

**University of Medicine and Pharmacy**  
**“Iuliu Hațieganu” Cluj-Napoca**  
**Faculty of Pharmacy**

**STUDY GUIDE**

**2019-2020**

**Cluj-Napoca**  
**2020**



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## 1. SHORT HISTORY OF FACULTY OF PHARMACY

Pharmacy university education began in Cluj-Napoca in 1872, when Hungarian University "Ferencz Jozsef" was founded, within which four universities were functioning, including Faculty of Medicine. At that time, pharmacists were educated at the Faculty of Medicine.

After its foundation, pharmacy education of Cluj developed in three stages.

The first stage occurred between 1872 and 1919. Until 1888, the educational system was organized after Austrian law, according to which the middle/secondary school graduation certificate and a proof of completing three years of practice in a pharmacy were necessary for the admission at the university. After 1888, the organization was taken over by Hungarian law, according to which the admission at the university required the candidates to complete six years of middle/secondary school, but only years of practice in a pharmacy and girls were also allowed to apply. During this period, between 1910 and 1914, the first location dedicated to pharmacy education was built on 41 Victor Babeş Street, where Pharmaceutical Technology, Pharmacology and University Clinics' Pharmacy carried on their activity, as well as a series of departments of the Faculty of Pharmacy do today. Didactic activity was completed by significant scientific activity of many valuable scientists (Gh. P. Pamfil, I. Orient, M. Wonesch (Voinescu), V. Ciocănelea, T. Goina and others).

The second stage took place between 1919 and 1934. The year 1919 represented an important turning point in the development of pharmaceutical education from Cluj. On May 12<sup>th</sup> 1919 University "King Ferdinand" was taken over by the Romanian state and on October 1<sup>st</sup> 1919, according to the decree number 4031, University of Superior Dacia from Cluj was founded and it started working in Romanian. Pharmacy students were being educated/trained for five years, two of which consisting of pharmacy practice, followed by three years of theoretical study. The lectures were taught by professors from Science Faculty for the first years and by professors from the Faculty of Medicine for the following years.

In 1920, as part of the Faculty of Medicine of University "King Ferdinand I", the Pharmaceutical Institute was founded, which formed along with Clinics' Pharmacy the pharmaceutical education system of Cluj, and carried on its activity on 41 Victor Babeş Street, under the leadership of Professor Gheorghe Pamfil. In 1923, the Faculty of Medicine, within which the Pharmaceutical Institute worked, officially changed its name to „ Faculty of Medicine and Pharmacy” through a decision of the Professors' Council, as recognition of the merits and rights of the members of the Pharmaceutical Institute.

Among personalities who marked the formation of pharmacists at those times and made a remarkable contribution to the research activity deserve to be mentioned: professor Gheorghe Pamfil who was in charge of organizing and administrating both pharmaceutical education system and Clinics' Pharmacy, professor Gheorghe Spacu who taught chemistry at the Department of Organic and Analytical Chemistry, professor Adriano Ostrogovich who taught General Chemistry, professor Alexandru Borza who was the first to teach Systematic Pharmaceutical Botany, professor Gheorghe Marinescu from the Department of Pharmacology and Pharmacognosy.

During this time, the Pharmaceutical Institute acquired a new location on 8 Victor Babeş Street, where the Department of Pharmacology and Pharmacognosy of the Faculty of

Medicine carried on its activity, which also consisted of educating/training the pharmacy students. The activity of the Department of Pharmaceutical Botany took place here from 1972 to 1998 when the old building was demolished, making room for the new, imposing one that hosts today the Library of the University of Medicine and Pharmacy “Iuliu Hațieganu” and a great part of the university’s administration.

Afterwards, for 12 years there was a discontinuity in the pharmaceutical education from Cluj, due to a law issued in 1934, which concentrated in Bucharest the pharmaceutical education from all over the country.

The third stage began in 1946 with the resuming of the activity in Cluj-Napoca, as a part of the University “King Ferdinand I” and lasted until 1948. As before 1934, pharmacy students attended the courses of the Science Faculty for the first two years and the ones of the Faculty of Medicine for the next two years.

In 1948, the „Education reform” was adopted, through which the educational system was organized according to the soviet model. One of the few positive consequences of this reform was the foundation of the “Medical-Pharmaceutical Institute”, within which the Faculty of Pharmacy of Cluj-Napoca was founded, with a five years study program, alongside the Faculty of General Medicine, Faculty of Hygiene, Faculty of Pediatrics and Faculty of Dental Medicine. Also in 1948, as a result of the efforts made by the first dean of the Pharmacy Faculty professor Erwin Popper, a new location for the Faculty of Pharmacy was acquired – the building at 4 Pasteur street. In this building departments like Analytical Chemistry, Physical Chemistry and later on General and Inorganic Chemistry carried on their activity. In 1957, due to the efforts made by Professor Popper, the approval was obtained to start building the first amphitheater of the Faculty of Pharmacy by construction of another floor on the already existent building at 4 Pasteur Street, initially named „Amphitheater A”. After 1989 it received the name of the person who made this achievement possible: Erwin Popper.

Among those who took part in the founding of the pharmaceutical school of Cluj, besides Erwin Popper, a series of remarkable personalities can be named: professor Stoian Ionescu-Petre from Galenical Pharmacy, professor Teodor Goina from Pharmacognosy, professor Cristian Maiorovici from Pharmaceutical Organic Chemistry, professor Victor Ciocănelea from Drug Industry, professor Constantin C. Velluda who was the head of the Pharmacology Department of the University of Medicine, but taught Pharmacodynamics, Anatomy and Physiology at the Faculty of Pharmacy, professor Alexandru Silberg who founded the pharmaceutical education of Organic Chemistry.

Around the year 1960, the name of the Institute became „Institute of Medicine and Pharmacy” which was maintained until 1989. During this period of time, a new generation of eminent professors promoted the development of the pharmaceutical school of Cluj: Professor Avram Radu from Pharmaceutical Botany, professor Ioan Grecu from Inorganic Chemistry, Professor Liviu Roman from Analytical Chemistry, Professor Valer Arieșan from Pharmaceutical Chemistry, and Professor Teodor Goina from Pharmacognosy. One of the most remarkable personalities who activated during this period of time is Professor Ioan Simiti from the Department of Organic Chemistry and dean of the Faculty of Pharmacy between 1968-1976, when he succeeded to raise another building in order to provide

educational space for some of the departments of the Faculty of Pharmacy on 12 Ion Creangă street (1971–1972), as well as an amphitheater that is today bearing his name.

Since 1990, the institution is named University of Medicine and Pharmacy and since 1993 is bearing the name of the first professor of Clinical Medicine and dean of the Faculty of Medicine, Iuliu Hațieganu.

## 2. MISSION, VISION AND TARGETS OF FACULTY OF PHARMACY

**The Mission of the Faculty of Pharmacy** is to create an educational and a research environment for students and teachers favorable to: communication, creativity and achieving didactic and scientific performance in the field of drugs, by creating a powerful academic community where the attraction, development and promotion of scientific and didactic values prevail in order to safeguard the health.

**The aim of the pharmacy degree syllabus** is the formation of specialists with high quality training, whose training and performance is recognized at both national and european level.

### **The general targets of the pharmacy degree syllabus are:**

- Providing educational environment for students in order to achieve the legal standard of the professional knowledge;
- Providing educational environment for students in order to achieve professional intellectual discipline;
- Providing educational environment for the ethical education of students in what concerns the approach of life and medical problems.

### **The specific targets of the pharmacy degree syllabus are:**

- Knowledge of drugs and substances used for obtaining them, precisely understanding the influence of the chemical structure of active pharmaceutical ingredients (of synthetic origin, of vegetal origin, obtained by biotechnology) on the chemical and metabolic stability, in order to explain the mechanisms of action and to properly select them in the drug fabrication process;
- Knowledge, selection and application of proper methods for the fabrication technology of drugs and for their physico-chemical, biological and microbiological control;
- Understanding of both therapeutic and toxic effects of drugs, in order to rationally use them;
- Developing skills for the proper recommendation of drugs, phytotherapeutic products, cosmetic products and medical devices;
- Developing the ability to evaluate and systematize scientific data concerning drugs, in order to deliver proper information;
- Knowledge and understanding of the legal conditions and other necessary requirements for practicing pharmaceutical activities.



### 3. EDUCATIONAL OFFER

The educational offer of the Faculty of Pharmacy consists of studies at a bachelor degree level – with two specializations: Pharmacy and Nutrition and Dietetics, and also at master and PhD level.

#### a. Bachelor Degree studies

- For the Pharmacy specialization, sectorial regulated, the studies last five years (300 credits granted according to European Credit Transfer and Accumulation System - ECTS) and consist of programs in Romanian language, French language and English language, all of them accredited by Romanian Agency for Quality Assurance in Higher Education (ARACIS).
- For the Nutrition and Dietetics specialization, generally regulated, the studies last three years (180 credits –ECTS), with a program in Romanian language, accredited by ARACIS.

**Admission to undergraduate studies**, to both specializations, for the study program in Romanian, is based on a competition which consists of a unique, written exam in Romanian. The registration and organization of admission competition for all specializations in the University are foreseen for July, and if after admission session in July still remain unoccupied positions, a second admission session is organized in September (the exact dates are established annually by a Decision of the University's Senate). For the French and English programs, the admission exam consists of evaluating the educational and personal performances of the candidates, presented by them in their personal file. The methodology and the period of the exam organization are provided on the web page of the University of Medicine and Pharmacy "Iuliu Hațieganu", *Education/Admission* section (<http://www.umfcluj.ro/en/educatie-uk/admitere-uk/licenta-uk/item/3242-adm-2015-en>).

#### b. Masters studies

The study offer of the Faculty of Pharmacy consists of 6 masters accredited by ARACIS:

- Cosmetology
- Pharmacovigilance: safety monitoring of drugs
- Pharmaceutical industry
- Applied pharmaceutical sciences
- Drug and environment toxicology
- Nutrition and life quality

The first five master programs last for 1 year (2 semesters, 60 credits) and they address to possessors of a bachelor's degree issued by an ARACIS accredited

university. Masters of Nutrition and life quality lasts for two years (4 semesters, 120 credits), being addressed especially to graduates of Nutrition and Dietetics major, allowing the completion of their studies, but also to graduates of other majors possessing a bachelor's degree of minimum 180 credits issued by an ARACIS accredited university.

Masters study programs are conducted in Romanian, except for the Cosmetology Masters, in which a part of the subjects are studied in French.

**Admission to the master studies** is accomplished by an annually organized contest, in September. The methodology of the exam and the timetable are provided on the web page of the University of Medicine and Pharmacy "Iuliu Hațieganu", *Education/Master's degree program* section (<http://www.umfcluj.ro/en/educatie-uk/masterate-uk>).

### **c. PhD studies**

PhD studies are organized by Ph.D. School of University of Medicine and Pharmacy "Iuliu Hațieganu" Cluj-Napoca and they last for four years. Admission to doctoral studies is accomplished through a contest. The methodology of the exam and the timetable are provided on the web page of the University of Medicine and Pharmacy "Iuliu Hațieganu", [www.umfcluj.ro](http://www.umfcluj.ro), *Education/Ph.D. School* section (<http://www.umfcluj.ro/en/educatie-uk/scoaladoctorala-uk>).

## 4. ACQUIRED COMPETENCIES

Professional and transversal **competencies** acquired by graduating five years of pharmacy degree study are rigorously defined and they correspond to the declared qualification. They provide the skills for achieving the necessary performance standards of the pharmacist.

- **Professional competencies of the pharmacy degree study graduate:**
  - Designing, formulating, preparing and packaging of drugs, food/dietary supplements, cosmetics and other health care products
  - Storage, preservation, distribution of drugs, food/dietary supplements, cosmetics and other health care products
  - Release of drugs, food/dietary supplements, cosmetics and other products for health care and pharmaceutical assistance
  - Analysis and control of substances, drugs, food/dietary supplements, cosmetics and other health care products, analysis in biochemistry, toxicology and food safety and environmental hygiene laboratories
  - Management, marketing and administration in the health care field
  - Consultancy and expertise in the field of drugs, food/dietary supplements, cosmetics and other health care products
- **Transversal competencies of the pharmacy degree study graduate:**
  - Identification of the targets, available resources, conditions of completion, work stages, work times, deadlines and related risks
  - Identification of roles and responsibilities in a multidisciplinary team and application of relating techniques and effective work as part of a team
  - Effective use of informational resources and communication and assisted professional formation resources (Internet portals, specialty software applications, data bases, on-line lectures etc.) both in Romanian and in an international language.

### **Graduates' qualification**

The Pharmacy study program trains specialists according to the Classification of occupations in Romania: pharmacist (code COR 226201). In agreement with/According to the National Qualification Framework, the Pharmacy study program trains specialists with a high level of training, 7 on a scale from 1 to 8, and the studies are completed with a bachelor's degree accompanied by a diploma supplement.

Results of the training level 7 imply:

- Highly specialized knowledge, some of it being in the forefront of knowledge in a work or research field as a result of original thinking and/or research; critical awareness of knowledge from a field and knowledge from the border of different fields.
- Specialized skills for managing problems in what concerns research and/or innovation in order to develop new information and procedures to integrate knowledge from different fields
- Management and transformational skills for complex, unforeseeable work and study situations that require new strategic tackling/approaches; taking the responsibility to

promote professional knowledge and practice and/or to review the strategic performance of the teams.

## 5. STRUCTURE OF FACULTY OF PHARMACY

Faculty of Pharmacy is structured in four departments comprising 21 chairs as presented below:

Department	Chairs
<b>I</b>	Analytical Chemistry and Instrumental Analysis
	Pharmaceutical Chemistry
	Organical Chemistry
	Pharmaceutical Physics - Biophysics
<b>II</b>	Physical Chemistry
	General and Inorganic Chemistry
	Therapeutical Chemistry
	Pharmacology, Physiology, Physiopathology
	Toxicology
	Research Center of Drug Report
<b>III</b>	Drug Analysis
	Biochemistry and Clinical Laboratory
	Pharmaceutical Botany
	Bromatology, Hygiene and nutrition
	Pharmacognosy
	Drug Industry and Pharmaceutical Biotechnologies
<b>IV</b>	Dermopharmacy and Cosmetics
	Clinical Pharmacy
	Mathematics - Informatics
	Pharmaceutical organization and legislation
	Medical Devices. Pharmaceutical practice.
	Pharmaceutical Technology and Biopharmacy

## **6. STRUCTURE OF THE UNIVERSITY YEAR 2019- 2020**

### **UNIVERSITY BACHELOR DEGREE STUDIES - LINEAR EDUCATIONAL SYSTEM**

**PHARMACY: 1<sup>st</sup> - 4<sup>th</sup> YEAR**

**NUTRITION AND DIETETICS: 1<sup>st</sup> - 3<sup>rd</sup> YEAR**

**(Linear educational system)**

#### **1<sup>st</sup> semester**

September 30<sup>th</sup> 2019 – December 20<sup>th</sup> 2019 = didactic activity (12 weeks)

December 23<sup>rd</sup> 2019 – January 3<sup>rd</sup> 2020 = Christmas vacation (2 weeks)

January 6<sup>th</sup> 2020 – January 17<sup>th</sup> 2020 = didactic activity (2 weeks)

January 20<sup>th</sup> 2020 – February 14<sup>th</sup> 2020 = exam session (4 weeks)

February 17<sup>th</sup> 2020 – February 21<sup>st</sup> 2020 = winter vacation (1 week)

#### **2<sup>nd</sup> semester**

February 24<sup>th</sup> 2020 – June 5<sup>th</sup> 2020 = didactic activity (14 weeks + 1 week Easter vacation:  
April 20<sup>th</sup> to April 24<sup>th</sup> 2020)

June 08<sup>th</sup> 2020 – July 3<sup>rd</sup> 2020 = exam session (4 weeks)

**July 13<sup>th</sup> 2020– July 17<sup>th</sup> 2020 = 1<sup>st</sup> re-examination session**

**July 24<sup>th</sup> 2020 – July 24<sup>th</sup> 2020 = 2<sup>nd</sup> re-examination session**

During summer vacation, students from 1<sup>st</sup> to 4<sup>th</sup> year will do the practical internship. The number of weeks of practical training and the period in which it is carried out are different, depending on the year of study and the specialization.

**PHARMACY: 5<sup>th</sup> YEAR**  
**(Linear educational system)**

**1<sup>st</sup> semester**

September 30<sup>th</sup> 2019 – December 20<sup>th</sup> 2019 = didactic activity (12 weeks)

December 23<sup>rd</sup> 2019 – January 3<sup>rd</sup> 2020 = Christmas vacation (2 weeks)

January 6<sup>th</sup> 2020 – January 17<sup>th</sup> 2020 = didactic activity (2 weeks)

January 20<sup>th</sup> 2020 – February 14<sup>th</sup> 2020 = exam session (4 weeks)

February 17<sup>th</sup> 2020 – February 21<sup>st</sup> 2020 = winter vacation (1 week)

**2<sup>nd</sup> semester**

February 24<sup>th</sup> 2020 - August 21<sup>st</sup> 2020 = pharmacy practice for 5<sup>th</sup> year (26 weeks, 1 week

Easter vacation: April 20<sup>th</sup> to April 24<sup>th</sup> 2020)

June 08<sup>th</sup> 2020 – July 3<sup>rd</sup> 2020 = exam session (4 weeks)

**July 13<sup>th</sup> 2020– July 17<sup>th</sup> 2020 = 1<sup>st</sup> re-examination session**

**July 24<sup>th</sup> 2020 – July 24<sup>th</sup> 2020 = 2<sup>nd</sup> re-examination session**

**September 2020 = attending the bachelor degree exam**

## **MASTER UNIVERSITY STUDIES**

### **1<sup>st</sup> semester (all masters)**

September 30<sup>th</sup> 2019 – December 20<sup>th</sup> 2019 = didactic activity (12 weeks)

December 23<sup>rd</sup> 2019 – January 3<sup>rd</sup> 2020 = Christmas vacation (2 weeks)

January 6<sup>th</sup> 2020 – January 17<sup>th</sup> 2020 = didactic activity (2 weeks)

January 20<sup>th</sup> 2020 – February 14<sup>th</sup> 2020 = exam session (4 weeks)

February 17<sup>th</sup> 2020 – February 21<sup>st</sup> 2020 = winter vacation (1 week)

### **2<sup>nd</sup> semester**

February 24<sup>th</sup> 2020 – June 5<sup>th</sup> 2020 = didactic activity (14 weeks + 1 week Easter vacation:  
April 20<sup>th</sup> to April 24<sup>th</sup> 2020)

June 08<sup>th</sup> 2020 – June 26<sup>th</sup> 2020 = exam session (3 weeks)

June 29<sup>th</sup> 2020 – July 03<sup>rd</sup> 2020 = re-examination session

**September 2020 = dissertation defense**

## **EXAMS AND CONTESTS**

February 3<sup>rd</sup> 2020 – February 07<sup>th</sup> 2020 -registration for attending the bachelor degree-exam,  
2<sup>nd</sup> session

February 3<sup>rd</sup> 2020 – February 07<sup>th</sup> 2020 -registration for dissertation defense

February 10<sup>th</sup> 2020 – February 14<sup>th</sup> 2020 - attending the bachelor degree-exam, 2<sup>nd</sup> session

February 3<sup>rd</sup> 2020 – February 07<sup>th</sup> 2020 - dissertation defers, 2<sup>nd</sup> session

September 24<sup>th</sup> – September 30<sup>th</sup> 2019 = registration and admission to the masters university  
studies

## **7. TRANSFERABLE CREDITS SYSTEM**

European Credit Transfer and Accumulation System (ECTS) is used nowadays by over 200 universities in order to facilitate the analysis and comparison of studies conducted by students as part of mobilities that take place in another university in the country or abroad. The major advantage of this system is the possibility of recognition by a higher educational institution of the studies that are conducted during a certain period of time or it can lie at the basis of the diploma recognition. All of the credits obtained from accredited institutions and programs are recognized and thus can be transferred to other institutions or study programs. Credits can only be transferred to the same cycle of university studies from an institution to another, as presented next: between disciplines, groups of disciplines or compact periods of study, according to inter-university agreements or by comparison of the study programs.

The credit represents a conventional unit used to calculate the work volume of a student during a certain period of time. According to the international university practice that follows ECTS Methodology, every academic year from the full-time educational system is assigned 60 ECTS credits, distributed between the two semesters, therefore during the studies 300 ECTS credits can be accumulated for the Faculty of Pharmacy and 180 ECTS credits for the Faculty of Nutrition and Dietetics.

Credit allocation within the University of Medicine and Pharmacy “Iuliu Hațieganu” is accomplished according to the ECTS methodology and it is defined in the specific regulation adopted by the University Senate.

In order to pass the exam of a discipline from the educational plan, a student obtains besides the grade a number of compulsory credits. The number of credits of every studied discipline (which is always a whole number) is established according to the usual work volume that must be invested to study and pass the exam of the discipline (including attendance at lectures and laboratories, individual study for elaborating projects, exam attendance etc), compared to the entire work volume that is necessary to pass an academic year. Students acquire the necessary credits of every discipline the moment they accomplish the required work volume and obtain the passing grade at every form of evaluation of a certain discipline.

At the University of Medicine and Pharmacy “Iuliu Hațieganu”, passing from a year of study to the next is conditioned by obtaining a minimum number of 45 credits out of 60 credits of a study year and for passing to the next year, the sum of the remaining credits from the past years must not be higher than 15 credit units. Students must obtain the remaining credits of a certain discipline during the next 2 years.



## **8. CURRICULA OF THE FACULTY OF PHARMACY 2019 - 2020**

The curricula of the Faculty of Pharmacy are harmonized to the European requirements referring to recognition of professional qualifications; curricula are updated and upgraded continuously.

University educational system from the Pharmacy specialization comprises required courses, within which subjects foreseen at the European level are taught, providing the necessary knowledge and skills in order for the future pharmacists to practice their profession, and also elective courses and facultative courses, which students can opt for according to their preferences and to the field they are willing to work in, after graduation. Afferent credits of the optional or facultative courses can be assigned to any of the proposed optional courses.

Registration at the elective courses of the Faculty of Pharmacy is accomplished through online platforms. From the second semester of the first year, every student has the obligation to follow one of the proposed optional courses, but after the choice is made, the course becomes compulsory, being accredited with 2 ECTS credits, included in the 30 compulsory credits of a semester. The methodology and the timetable for the registration are brought to students' attention by representative students of a certain year.

During an academic year, students may attend more optional or facultative courses, by paying a tax/fee. The obtained credits are supplementary credits granted over the limit established by the educational scheme/curriculum. Supplementary credits are not valid for calculation of the annual average, but they will be mentioned in the diploma supplement issued after passing the bachelor degree exam, according to current regulations.

Supplementary credits cannot substitute required courses credits.

**8.1. CURRICULA OF THE 1<sup>st</sup> YEAR OF PHARMACY 2019 - 2020**

<b>UNIVERSITY</b>	University of Medicine and Pharmacy " Iuliu Hațieganu" from Cluj-Napoca	<b>STUDY PROGRAM</b>	PHARMACY
<b>FACULTY</b>	PHARMACY	<b>GRADUATION TITLE</b>	PHARMACIST
<b>FIELD</b>	HEALTH	<b>PERIOD OF STUDIES</b>	5 YEARS
<b>REGLEMENTATION</b>	SECTORIAL	<b>STUDY UNITS</b>	300

No. crt.	Cod	Course	Category	Total no. of credits			Total hours/ universitary year		I st Semester		II nd Semester		Examination form		
				Total	S1	S2	Course	Practical lessons	Course/ week	P / week	Course/ week	P / week	S1	S2	
1	EN_FAR-1-S01-01	Anatomy-general physiology	Oblig DF	5	5		28	28	2	2			E1		
2	EN_FAR-1-S01-02	Biomathematics and biostatistics	Oblig DF	4	4		28	28	2	2			E1		
3	EN_FAR-1-S12-03	Pharmaceutical botany	Oblig DD	11	7	4	70	70	3	3	2	2	E1	E2	
4	EN_FAR-1-S02-04	Analytical chemistry	Oblig DD	5		5	28	42			2	3		E2	
5	EN_FAR-1-S02-05	Physical chemistry	Oblig DD	4		4	28	28			2	2		E2	
6	EN_FAR-1-S12-06	General and inorganic chemistry	Oblig DF	12	6	6	70	84	2	3	3	3	E1	E2	
7	EN_FAR-1-S02-07	Sport *	Oblig DC	2 suppl.		2 suppl.		28				2		C2	
8	EN_FAR-1-S12-08	Physics-Biophysics	Oblig DD	6	4	2	42	42	2	2	1	1	E1	E2	
9	EN_FAR-1-S02-09	Molecular genetics and genetic engineering	Oblig DF	2		2	14	14			1	1		E2	
10	EN_FAR-1-S01-10	Computer science	Oblig DC	2	2		14	14	1	1			E1		
11	EN_FAR-1-S02-11	Introduction in Pharmaceutical Technology and Legislation (IPhTL)	Oblig DS	2		2	14				1			E2	
12	EN_FAR-1-S02-12	Romanian language *	Oblig DC	1		1		56		2		2		E2	
13	EN_FAR-1-S02-13	Medical terminology *	Oblig DD	2		2		14				1		E2	
14	EN_FAR-1-S02-14	Pharmacy practice 2 weeks – 30 h / week **	Oblig DS	2		2		60						C2	
15	EN_FAR-1-S02-15	<b>Optional courses</b>		2	2		14		1				E1		
15.1	EN_FAR-1-S02-15.1	Ethics and academic integrity	Optionnel												
15.2	EN_FAR-1-S02-15.2	Risks associated with consumption of drug	Optionnel												
<b>Total heures / semaine</b>				<b>TOTAL</b>	<b>60</b>	<b>30</b>	<b>30</b>	<b>350</b>	<b>508</b>	<b>13</b>	<b>15</b>	<b>12</b>	<b>17</b>	<b>7E</b>	<b>9E</b> <b>2C</b>
<b>28.50</b>					<b>60+2S</b>		<b>30+2S</b>	<b>858</b>		<b>28</b>		<b>29</b>			

E = examen; C = colloquium; \* = seminar; \*\* = internship practice

**RECTOR,**  
*Prof.dr. Alexandru Irimie*

**DEAN,**  
*Prof.dr. Gianina Crișan*

## 8.1.1. COMPULSORY COURSES

### ANATOMY - GENERAL PHYSIOLOGY

#### 1. Information about the course

<b>1.1. Discipline</b>		<b>Pharmacology, physiology, physiopathology</b>					
<b>1.2. Course instructor</b>		<b>Professor Cristina Mogoşan, PhD</b>					
<b>1.3. Laboratory instructor</b>		<b>- Associate Professor Steliana Mihaela Ghibu Morgovan, PhD - Lecturer Cristina Pop, PhD</b>					
<b>1.4. Year</b>	1	<b>1.5. Semester</b>	1	<b>1.6. Evaluation type</b>	<b>Written exam + Practical exam</b>	<b>1.7. Course type</b>	<b>Fundamental discipline Compulsory discipline</b>

#### 2. Total estimated time (hours/semester for teaching activity)

<b>2.1. Total hours/week</b>	<b>2 (1<sup>st</sup> sem.) - (2<sup>nd</sup> sem.)</b>	<b>2.2. Course</b>	<b>2</b>	<b>2.3. Laboratories</b>	<b>2</b>
<b>2.4. Total hours in the curriculum</b>	<b>56 (1<sup>st</sup> sem.) - (2<sup>nd</sup> sem.)</b>	<b>2.5. Course</b>	<b>28</b>	<b>2.6. Laboratories</b>	<b>28</b>
<b>2.4. Distribution of time needed (1<sup>st</sup> sem. / 2<sup>nd</sup> sem.)</b>					<b>Hours</b>
a. Study using text books, lecture notes, bibliography					56/-
b. Individual study within libraries, on-line platforms, field research					14/-
c. Preparing seminars/laboratories, homework, projects, portfolios and essays					14/-
d. Tutoring					3/-
e. Evaluation/ semester					1/-
f. Other activities					-
<b>2.7. Total hours for individual study (a+b+c+d)</b>				<b>85 (1<sup>st</sup> sem.)</b>	
<b>2.8. Total hours per semester</b>				<b>141 (1<sup>st</sup> sem.)</b>	
<b>2.9. Number of credits</b>				<b>5 (1<sup>st</sup> sem.)</b>	

#### 3. Pre-requisites:

<b>3.1. Curriculum</b>	-
<b>3.2. Competences</b>	-

#### 4. Requisite:

<b>4.1. For lectures</b>	<ul style="list-style-type: none"> <li>Lecture classroom (amphitheater) with required facilities</li> </ul>
<b>4.2. For laboratories sessions</b>	<ul style="list-style-type: none"> <li>Classroom for practical courses with required facilities</li> </ul>

#### 5. Specific competences acquired

<b>Professional competences</b>	<ul style="list-style-type: none"> <li>The ability to use correctly and in the proper context the specific terminology.</li> <li>The ability to describe cell components, tissue types and the structure of different systems.</li> <li>The ability to evaluate the importance of each anatomical component for the proper functioning of the human body.</li> <li>The ability to make correlations between different anatomical components.</li> <li>The ability to interpret the functioning of the systems in the human body.</li> </ul>
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	<ul style="list-style-type: none"> <li>• The ability to make correlations between different functions of the human body.</li> <li>• The ability to perform tests in order to evaluate the health status of the human body or to investigate different functional or metabolic disorders (hematology tests, functional investigations: cardiac, vascular, renal, respiratory, etc.)</li> <li>• The ability to analyze/critically interpret the variations of biological parameters and to identify the causes for these variations: hematology tests (red blood cell count, hematocrit, hemoglobin, erythrocyte sedimentation rate – ESR, blood types, bleeding and coagulation time), EKG, blood pressure, digestive enzymes, pulmonary function parameters, hormones.</li> <li>• Work discipline based on motivation, honesty, rigor and efficiency.</li> <li>• The ability to explain and interpret the theoretical and practical information provided by the discipline, in an interdisciplinary approach with the other biomedical fundamental and specialty disciplines: pathophysiology, biochemistry, pharmacology, clinical pharmacy.</li> </ul>
<b>Transversal competences</b>	<ul style="list-style-type: none"> <li>• The acquisition of an integrative approach to the organization and functioning of the human body and the functional connections between different systems.</li> <li>• The use of the acquired knowledge in solving problems that can occur in an interdisciplinary or professional context.</li> <li>• The optimal use of the acquired knowledge in scientific activities.</li> <li>• Personal professional development.</li> </ul>

## 6. Course objectives

<b>6.1. General objectives</b>	<ul style="list-style-type: none"> <li>• The assimilation of basic anatomy and physiology needed to address specialized fields.</li> <li>• Experimental determination of physiological parameters, interpretation of normal values and analysis of normal main factors that may affect these values.</li> </ul>
<b>6.2. Specific objectives</b>	<ul style="list-style-type: none"> <li>• The acquisition of specific anatomy and physiology knowledge ensures the use of appropriate medical vocabulary necessary for inter-communication and understanding of medical concepts necessary for future pharmacists.</li> <li>• The ability to participate in medical conferences and consult specialized databases.</li> <li>• The acquisition of an ability to synthesize and to do bibliographic documentation.</li> <li>• Familiarization with possible research directions in the field of human physiology, a basic medical field for all medical disciplines.</li> </ul>

## 7. Content

**Teaching methods for course:** Lecture, interactive methods; exemplifications, connections with other studied disciplines or known facts, questions.

**Teaching methods for laboratory activity:** Systematic presentation, conversation, problem solving, practical demonstration

<b>7.1 Course (hours)</b>	<b>Remarks</b>
<b>1.</b> Human body organization. Levels of organization	<b>0.5 h</b>
<b>2.</b> The cell: structure, general properties, special properties	<b>3 h</b>
<b>3.</b> The tissues	<b>1 h</b>
<b>4.</b> Blood: Composition. Role. Hematopoiesis. Erythrocytes. Blood types. Leucocytes. Body immunity. Thrombocytes. Hemostasis. Coagulation. Fibrinolysis	<b>6 h</b>

5. Cardiovascular system	4 h
6. Renal system	1.5 h
7. Digestive system	3 h
8. Respiratory system	2 h
9. Autonomic nervous system: structure and functions	1 h
10. Central nervous system: structure and functions	2 h
11. Human sense organs	2 h
12. Endocrine system: structure and functions	2 h
<b>Bibliography</b>	
<ol style="list-style-type: none"> <li>1. Boron WF, Boulpaep EL. Medical Physiology. Third Edition Editura Elsevier 2017</li> <li>2. Mann DL, Ziper DP, Libby P, Bonow RO. Braunwald's Heart Disease A textbook of cardiovascular medicine. Tenth edition, vol 1 și 2, Editura Elsevier Saunders 2015</li> <li>3. Tortora GJ, Derrickson BH. Principles of Anatomy and Physiology, 14<sup>th</sup> Edition Ed Wiley 2014</li> <li>4. Rodney A. Rhoades, David R. Bell. Medical Physiology: Principles for Clinical Medicine, Fourth Edition. Ed. Wolters Kluwer Health /Lippincott Williams &amp; Wilkins 2013</li> <li>5. Netter FH, Atlas de Anatomie a Omului, ediția a 5-a, Ed. Callistro 2012</li> <li>6. Guyton AC, Hall JE. Tratat de Fiziologie a omului ediția a 11-a. Editura Callistro 2007</li> <li>7. Widmaier EP, Raff H, Strang K. Vander, Sherman, Luciano. Physiologie humaine. Les mécanismes du fonctionnement de l'organisme. 5<sup>ième</sup> édition, Ed. Maloine 2009.</li> <li>8. Silbernagl S, Despopoulos A. Color Atlas of Physiology, Ed. Thieme Stuttgart-New York 2009</li> <li>9. Niculescu C, Cârmaciu R, Voiculescu B, Sălăvăstru C, Niță C, Ciornei C. Anatomia și fiziologia omului, Ed. Corint, București, 2005.</li> <li>10. Tache S. Structura și funcțiile organismului uman, Ed. Medicală Universitară «Iuliu Hațieganu» Cluj-Napoca, 1999.</li> <li>11. Anatomy and General Physiology Course, Power Point Support</li> </ol>	
<b>7.2. Laboratory activities (hours)</b>	<b>Remarks</b>
1. Organization of the human body. General presentation of internal organs and main systems. Laboratory animals dissection	2 h
2. Blood. Functional explorations: erythrocyte, leucocyte, thrombocyte count, hematocrit determination, hemoglobin identification reaction, erythrocyte sedimentation rate (ESR), blood type determination in ABO and Rh systems, immunological processes involving leukocytes, physiologic hemostasis – bleeding time, coagulation time, activated partial thromboplastin time, Quick time.	12 h
3. Cardiovascular system. Functional explorations: blood pressure measurement, electrocardiograms (EKG) determination and interpretation	4 h
4. Digestive system. Tests used for exploration of the upper digestive tract, tests used for exploration of the inferior digestive tract, tests used to explore the liver.	2 h
5. Renal excretory system. Functional explorations of the kidney: basic urinary test, urine culture and antibiogram, tests used for the preliminary diagnosis of urinary infections, creatinine clearance.	2 h
6. Respiratory system. Breathing process functional explorations, bronchoscopy and other investigations.	2 h
7. The endocrine system. Pancreatic hormones. The effect of insulin on glycemia. The main factors affecting glycemia. The glucose tolerance test.	2 h
8. The endocrine system. Female sex hormones and contraception.	2 h
<b>Bibliography</b>	
<ol style="list-style-type: none"> <li>1. Ghibu Morgovan S, Pop C, Cazacu I, Mogoșan C. Noțiuni de bază în fiziologie. Determinarea și interpretarea unor parametri fiziologici cu utilitate practică. Editura Medicală Univesitară Iuliu Hațieganu Cluj-Napoca 2018</li> </ol>	

## 8. Evaluation

Activity type	8.1. Evaluation criteria	8.2. Evaluation methods	8.3. Percent of final grade
<b>8.4. Course</b>	General evaluation criteria (knowledge assimilation and correctness, coherence, ability to apply knowledge in a given context and to make correlations). Discipline specific criteria. Criteria concerning students' attitude and motivation. Students' ability to understand and apply fundamental problems.	Written exam - multiple answer questions	<b>80%</b>
<b>8.5. Laboratory</b>	Theoretical knowledge and practical skills evaluation	Practical skills exam.	<b>20%</b>
<b>8.6. Minimal performance standard</b>			
Learning the basic anatomy and physiology information: <ul style="list-style-type: none"> <li>• Cells' properties and structure description</li> <li>• Characterization of the main types of tissues</li> <li>• Structural and functional characterization of blood components</li> <li>• Structural and functional description of different systems in the organism (human body).</li> </ul>			

## BIOMATHEMATICS AND BIOSTATISTICS

### 1. Information about the course

<b>1.1. Discipline</b>		<b>Mathematics and Informatics</b>					
<b>1.2. Course instructor</b>		<b>Associate professor Revnic Cornelia, PhD</b>					
<b>1.3. Laboratory instructor</b>		<b>Associate professor Revnic Cornelia, PhD Lecturer Fărcaș Anca, PhD</b>					
<b>1.4. Year</b>	1	<b>1.5. Semester</b>	1	<b>1.6. Evaluation type</b>	<b>Examen</b>	<b>1.7. Course type</b>	<b>Fundamental discipline Compulsory discipline</b>

### 2. Total estimated time (hours/semester for teaching activity)

<b>2.1. Total hours/week</b>	<b>2 (1<sup>st</sup> sem.)</b>	<b>2.2. Course</b>	<b>2</b>	<b>2.3. Laboratories</b>	<b>2</b>
<b>2.4. Total hours in the curriculum</b>	<b>56 (1<sup>st</sup> sem.)</b>	<b>2.5. Course</b>	<b>28</b>	<b>2.6. Laboratories</b>	<b>28</b>
<b>2.4. Distribution of time needed (1<sup>st</sup> sem. / 2<sup>nd</sup> sem.)</b>					<b>Hours</b>
a. Study using text books, lecture notes, bibliography					30
b. Individual study within libraries, on-line platforms, field research					10
c. Preparing seminars/laboratories, homework, projects, portfolios and essays					10
d. Tutoring					4
e. Evaluation/ semester					4
f. Other activities					-
<b>2.7. Total hours for individual study (a+b+c+d)</b>				<b>54 (1<sup>st</sup> sem.)</b>	
<b>2.8. Total hours per semester</b>				<b>100 (1<sup>st</sup> sem)</b>	
<b>2.9. Number of credits</b>				<b>4 (1<sup>st</sup> sem.)</b>	

### 3. Pre-requisites:

<b>3.1. Curriculum</b>	-
<b>3.2. Competences</b>	-

### 4. Requisites:

<b>4.1. For lectures</b>	<ul style="list-style-type: none"> <li>• basic mathematics knowledge, high school level</li> </ul>
<b>4.2. For laboratories sessions</b>	<ul style="list-style-type: none"> <li>• basic mathematics knowledge, high school level</li> </ul>

### 5. Specific competences acquired

<b>Professional competences</b>	<ul style="list-style-type: none"> <li>• Knowledge and understanding of basic concepts in the field for use in pharmaceutical sciences</li> <li>• knowledge of the application of the notions learned in specialized software used in practice;</li> <li>• building the capacity to approach and synthesize learned knowledge,</li> <li>• developing the logical ability to think about practical problems in specialized software;</li> <li>• Capacity building to share specialist knowledge</li> </ul>
<b>Transversal competences</b>	<ul style="list-style-type: none"> <li>• Building the capacity to make a decision to make work more efficient by using data storage using the computer.</li> </ul>

	<ul style="list-style-type: none"> <li>• Capacity building to make a statistical analysis of pharmaceutical practice data</li> <li>• Forming the ability to make a decision to work more efficiently in pharmacies by addressing the practical problem in the statistical field.</li> </ul>
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## 6. Course objectifs

<b>6.1. General objectives</b>	<ul style="list-style-type: none"> <li>• Creating and developing skills in the use of computer tools (hardware and software) in the practice of pharmacist. Knowledge of software tools used in pharmaceutical practice</li> <li>• Familiarize the student with the deterministic problem specific to experimental sciences. Student training as a user of mathematical tools useful for pharmaceutical-specific approaches. Presentation of mathematical theoretical support in correlation with practical applications in pharmaceutical science and software implementations</li> </ul>
<b>6.2. Specific objectives</b>	<ul style="list-style-type: none"> <li>• Knowledge of software tools used in pharmaceutical practice. Getting the knowledge to research any desired information using webpages offered and available on the internet</li> <li>• Ability to implement and solve mathematical problems through software tools</li> <li>• Exercise of synthesis and bibliographic documentation</li> </ul>

## 7. Content

**Teaching methods for course:** Lecture, systematic exposure, conversation, problem-solving, oral exposures coupled with PowerPoint presentations, interactive communication.

**Teaching methods for laboratory activity:** Lecture, oral presentation, dubbed by electronic support, systematic exposure, conversation, problem-solving, oral exposures coupled with PowerPoint presentations, interactive communication.

7.1 Course (hours)	Remarks
<b>1. Elemental real functions:</b> Common elementary real functions. Limits, continuity, derivability. Taylor's formula. Study real functions of a real variable. Average rate and instantaneous rate of chemical reaction. Flow of fluid through the blood vessels (veins and arteries).	
<b>2. Series: Strings and series. Practical examples</b> - the concentration of impurity that remains after repeated washing of a precipitate; repeated dose pharmacokinetics. Numerical series. Series of functions. Fourier Series	
<b>3. Full calculation: Primitive. Defined integrations. Practical examples</b> - the plasma concentration of the active substance; the flow of a drug; Incorrect integrations. Approximate calculation of defined integers. Rectangle formula. Trapeze formula; Simpson's formula. Implementing formulas in Excel.	
<b>4. Differential equations:</b> Homogeneous and non-homogeneous differential equations. Practical examples - equations for the first and second order chemical reactions. Differential equations with restrictions. Total differential equations. Classic mathematical models used in pharmacokinetics. The monocomponent model. The two-part model.	
<b>5. Real Functions of Multiple Real Versions:</b> Multidimensional spaces. Define real functions of several real variables. Expanding limit notions, continuity, derivability for multiple variables. Differential. Practical examples - The pressure of a perfect gas. Surface description with multi-variable functions	
<b>6. Distribution laws of random variables:</b> Bernoulli distribution. Binomial distribution. Poisson distribution. Uniform distribution. Normal distribution	
<b>7. Sampling:</b> Statistical population and sample. Sampling methods. Sample size. Representativeness of a sample	



<b>8.Descriptive statistics:</b> Organization of statistical data. Indicators of centrality. Indicators of variation. Characterization of frequency distributions	
<b>9. Correlation and regression:</b> Parametric correlation. Nonparametric correlation. Regression analysis. Multiple regression. Prediction by regression functions	
<b>10. Testing statistical hypotheses:</b> Tests for comparing a group with reference values. Tests for comparing two groups of pairs. Tests to compare two independent groups. Tests for comparing more than two groups	
<b>Bibliography</b>	
<ol style="list-style-type: none"> <li>1. R. Trimbitas, Metode Statistice, Presa Universitara Clujeana, 2000</li> <li>2. S. Benazeth, Biomathematique et Biostatistique, Mason, Paris, 2002</li> <li>3. R Cimpean, A. Prodan, Biomatematica, aplicatii in Excel.</li> <li>4. Cornelia Revnic, Remus Câmpean, <i>Curs de biomatematică pentru studenții farmaciști</i>, Editura Medicala “Iuliu Hatieganu”, ISBN 978-973-693-376-9, (2011).</li> <li>5. www.farma.umfcluj.ro: Matematică si Informatică, suport PowerPoint</li> </ol>	
<b>7.2. Laboratory activities (hours)</b>	<b>Remarks</b>
1. Elementary real functions, limits, continuity, derivability. Practical application. Determination of the pH of an aqueous solution. Determination of the concentration of a radioactive material through the degradation process. Function charts.	
2. Series	
3. Integral calculation. Numerical applications of the defined integrals. Implement the approximate calculation formulas of the Excel-defined integers	
4. Differential equations Mathematical modeling and simulation	
5. Real functions of many real variables	
6. Distribution laws of random variables	
7. sampling	
8. Descriptive statistics	
9. Correlation and regression	
10. Testing statistical assumptions	
<b>Bibliography</b>	
<ol style="list-style-type: none"> <li>1. R. Trimbitas, Metode Statistice, Presa Universitara Clujeana, 2000</li> <li>2. S. Benazeth, Biomathematique et Biostatistique, Mason, Paris, 2002</li> <li>3. R Cimpean, A. Prodan, Biomatematica, aplicatii in Excel.</li> <li>4. Cornelia Revnic, Remus Câmpean, <i>Curs de biomatematică pentru studenții farmaciști</i>, Editura Medicala “Iuliu Hatieganu”, ISBN 978-973-693-376-9, (2011).</li> <li>5. www.farma.umfcluj.ro: Matematică si Informatică, suport PowerPoint</li> </ol>	

## 8. Evaluation

Activity type	8.1.Evaluation criteria	8.2. Evaluation methods	8.3.Percent of final grade
<b>8.4. Course</b>	General evaluation criteria: Verification of the degree of systematization and use of the acquired concepts (logical coherence, fluency of expression, argumentative force)	Exam.	<b>45%</b>
	Criteria specific to the discipline Criteria for Attitudinal and Motivational Aspects of Student Activities Ability to Understand Fundamental Issues And Customization	Active participation in courses	<b>5%</b>
<b>8.5. Laboratory</b>	The ability to work with the knowledge gained in practical activities	Practical examen Project	<b>45%</b> <b>5%</b>

**8.6. Minimal performance standard**

Acquiring the main notions of Biomathematics and Biostatistics: solving the integrals either by exact methods or numerical approximation methods, determining the limit of a series of real numbers, determining the solution of a mathematical model by solving the pharmacokinetics ecotics, the monocomponent model, random variables, statistical parameters centrality and dispersion, confidence intervals, parametric tests on mean and dispersion, boxplot.

5 Grade in the evaluation process

## PHARMACEUTICAL BOTANY

### 1. Information about the course

<b>1.1. Discipline</b>		<b>Pharmaceutical Botany</b>					
<b>1.2. Course instructor</b>		<b>Professor Gianina Cristina Crişan, PhD</b>					
<b>1.3. Laboratory instructor</b>		<b>Lecturer Andrei Mocan, PhD</b> <b>Lecturer Cristina Ştefănescu, PhD</b> <b>Lecturer Georgeta Balica, PhD</b> <b>Lecturer Irina Ielciu, PhD</b> <b>Assistant Ana Maria Gheldiu, PhD</b>					
<b>1.4. Year</b>	<b>1</b>	<b>1.5. Semester</b>	<b>1, 2</b>	<b>1.6. Evaluation type</b>	<b>Written exam + Practical exam</b>	<b>1.7. Course type</b>	<b>Fundamental discipline, Compulsory discipline</b>

### 2. Total estimated time (hours/semester for teaching activity)

<b>2.1. Total hours/week</b>	<b>6 (1<sup>st</sup> sem.)</b> <b>4 (2<sup>nd</sup> sem.)</b>	<b>2.2. Course</b>	<b>3</b> <b>2</b>	<b>2.3. Laboratories</b>	<b>3</b> <b>2</b>
<b>2.4. Total hours in the curriculum</b>	<b>84 (1<sup>st</sup> sem.)</b> <b>56 (2<sup>nd</sup> sem.)</b>	<b>2.5. Course</b>	<b>42</b> <b>28</b>	<b>2.6. Laboratories</b>	<b>42</b> <b>28</b>
<b>2.4. Distribution of time needed (1<sup>st</sup> sem. / 2<sup>nd</sup> sem.)</b>					<b>Hours</b>
a. Study using text books, lecture notes, bibliography					60/30
b. Individual study within libraries, on-line platforms, field research					20/10
c. Preparing seminars/laboratories, homework, projects, portfolios and essays					25/10
d. Tutoring					7/4
e. Evaluation/ semester					4/4
f. Other activities					-
<b>2.7. Total hours for individual study (a+b+c+d)</b>				<b>112 (1<sup>st</sup> sem.)</b> <b>54 (2<sup>nd</sup> sem.)</b>	
<b>2.8. Total hours per semester</b>				<b>200 (1<sup>st</sup> sem.)</b> <b>100 (2<sup>nd</sup> sem.)</b>	
<b>2.9. Number of credits</b>				<b>7 (1<sup>st</sup> sem.)</b> <b>4 (2<sup>nd</sup> sem.)</b>	

### 3. Pre-requisites

<b>3.1. Curriculum</b>	Fundamental notions of plant biology
<b>3.2. Competences</b>	-

### 4. Requisites

<b>4.1. For lectures</b>	<ul style="list-style-type: none"> <li>• Students need to turn off their mobile phones during this activity</li> <li>• Participating at this activity is conditioned by being in time at the hour indicated for course beginning</li> <li>• Student should comply with the Teaching activity regulation of the University</li> </ul>
<b>4.2. For laboratories sessions</b>	<ul style="list-style-type: none"> <li>• Students need to turn off their mobile phones during this activity</li> <li>• Participating at this activity is conditioned by being in time at the hour indicated for laboratory beginning</li> <li>• Student should comply with the Teaching activity regulation of the</li> </ul>

### 5. Specific competences acquired

<b>Professional competences</b>	<ul style="list-style-type: none"> <li>• Capacity of adequately using the profile terminology</li> <li>• Knowing the models for the cell study which allow emphasizing: the chemical composition of the cell, the particularities of prokaryote and eukaryote cells, the plant cell general morphology and organelles, the physiology of cell structures (plasma membrane, cytoplasm, nucleus, organelles)</li> <li>• Knowing the techniques mainly used in the laboratories for studying the plant histology and anatomy and the meaning/significance/morphology of plant tissues and anatomical structures</li> <li>• Recall the plant systematic, knowing the scientific nomenclature of medicinal plants and of vegetal medicinal products</li> <li>• Ability of correctly identifying plant species and recognizing the medicinal species from the spontaneous flora</li> <li>• Ability of interpreting and explaining the theoretical and practical content of the Pharmaceutical botany course through interdisciplinary approach with other biomedical courses, either fundamental or specific: Cell Biology, Pharmacognosy, Biochemistry, Genetics, Physiopathology, Pharmacology</li> <li>• Understanding the aspects concerning the particularities of the research in the field of Pharmaceutical Botany</li> <li>• Ability of using techniques and specific protocols for studying the plant material in the laboratory</li> <li>• Experience in handling laboratory equipment and in using laboratory protocols specific for life sciences: using an optical microscope and the tools and apparatus specific for the laboratory of Pharmaceutical Botany; recognizing the cell types, organelles, tissues, and anatomical structures studied in optical microscopy</li> </ul>
<b>Transversal competences</b>	<ul style="list-style-type: none"> <li>• Using notions in new contexts</li> <li>• Using theoretical knowledge in solving different problems</li> <li>• Best use of the individual creative potential in scientific research</li> <li>• Self professional development</li> </ul>

### 6. Course objectives

<b>6.1. General objectives</b>	<ul style="list-style-type: none"> <li>• Knowing and using correctly the notions specific to Pharmaceutical botany</li> </ul>
<b>6.2. Specific objectives</b>	<ul style="list-style-type: none"> <li>• Getting the students acquainted to the application of theoretical and practical principles of Pharmaceutical botany, mainly with the use of microscopy techniques in the study of plant cells, tissues and organs and with the methods of identification specific to plant systematics</li> <li>• Knowing the main characteristics and the systematic of plants species used in phytotherapy</li> <li>• Understanding how to choose a work protocol based on certain reasons and mechanisms</li> <li>• Getting acquainted with the main research directions in the field of Pharmaceutical Botany</li> <li>• Stimulating the ability of synthesis and bibliographic research</li> </ul>

## 7. Content

**Teaching methods for course:** Lecture, systematic approach, conversation, questioning, oral lecture with slide projection, interactive communication

**Teaching methods for laboratory activity:** Conversation, questioning, demonstration, oral presentation sustained by digital support, interactive communication

7.1. Course (hours)	Remarks
<b>1. Plant cytology:</b> General organization of plant cell, its chemical composition, the structure and the ultrastructure of cell organelles, their biological role (cytoplasm, plasma membrane, endoplasmic reticulum, ribosomes, Golgi apparatus, plastids, mitochondria, nucleus, lisosomes). Non-living contents. Cell physiology: permeability and absorption, cell division (15)	
<b>2. Plant histology:</b> Definition, differentiation and classification of plant tissues. Meristems, protection tissues, supporting tissues, ground tissues, vascular tissues, secretory tissues (8)	
<b>3. Morphology and anatomy of plant vegetative organs:</b> General characteristics of vegetative organs. The root, the stem, the leaf: origin, morphology, anatomy, modified homologues organs. The root, stem and leaf as sources of medicinal products. (19)	
<b>4. Plant reproduction:</b> Vegetative, sexual and asexual multiplication. Morphology and anatomy of the flower, fruit and seed. The flower, fruit and seed as medicinal sources (6)	
<b>5. Plant systematic:</b> Botanical nomenclature. Systematic units and classification. Subkingdoms Virobionta, Procariobionta, Phycobionta, Mycobionta, Bryobionta, Cormobionta. Principal orders, families, genera, species with pharmaceutical importance belonging to Cormobionta. (22)	
<p><b>Bibliography</b></p> <ol style="list-style-type: none"> <li><b>Bonnier, G., Douin R.</b> <i>La Grande Flore en couleurs de Gaston Bonnier</i>. Paris: Belin, 1990.</li> <li><b>Ciocârlan, V.</b> <i>Flora ilustrată a României</i>. București: Editura Ceres, 2009.</li> <li><b>Crișan G., Ștefănescu, C.</b> <i>Botanică farmaceutică. Lucrări practice</i>. Cluj-Napoca: Editura Medicală Universitară "Iuliu Hațieganu", 2005.</li> <li><b>Crișan G., Ștefănescu, C., Ielciu, I., Mocan, A.</b> <i>Botanică farmaceutică: identificarea micro- și macroscopică a speciilor vegetale</i>. Cluj-Napoca: Editura Medicală Universitară "Iuliu Hațieganu", 2013.</li> <li><b>Heinrich M., Jäger A. K.</b>, <i>Ethnopharmacology</i>. Oxford: John Wiley &amp; Sons, Ltd, 2015.</li> <li><b>Lim T.L.</b>, <i>Edible Medicinal and Non Medicinal Plants (Volume 8, Flowers)</i>: Dordrecht: Springer, 2014.</li> <li><b>Lim T.L.</b>, <i>Edible Medicinal and Non Medicinal Plants (Volume 9, Modified Stems, Roots, Bulbs)</i>: Dordrecht: Springer, 2015.</li> <li><b>Guignard, J.-L.</b> <i>Botanique</i>. Paris: Masson, 1998.</li> <li><b>Judd, W.S., Campbell, C.S., Kellogg, E.A., Stevens, P.</b> <i>Botanique systematique: une perspective phylogénétique</i>. Paris: DeBoeck Université, 2002.</li> <li><b>Laberche, J.-C.</b> <i>Biologie vegetale</i>. Paris: Dunod, 1999.</li> <li><b>Mauseth, J. D.</b> <i>Botany: an introduction to plant biology</i>. Boston Toronto London Singapore: Jones and Bartlett Publishers, 1998.</li> <li><b>Nabors, M.</b> <i>Biologie vegetale</i>. Paris : Pearson Education, 2008.</li> <li><b>Roland, J.-C., Roland, F.</b> <i>Biologie vegetale 8<sup>e</sup> edition</i>. Paris: Dunod, 2001.</li> <li><b>Spichiger, R.-E., Savolainen, V., Figeat, M., Jeanmonod, D.</b> <i>Botanique systématique des plantes à fleurs</i>. Lausanne: Presses polytechniques et universitaires romandes, 2002.</li> <li><b>Stern, K.R., Jansky, S., Bidlak, J.E.</b> <i>Introductory Plant Biology, 9<sup>th</sup> edition</i>. Boston: McGraw-Hill, 2003.</li> <li><b>Tămaș, M.</b> <i>Botanică farmaceutică, vol. I (Citologia)</i>. Cluj-Napoca: Ed. Med. Univ. UMF Cluj-</li> </ol>	

<p>Napoca, 2004.</p> <p>17. <b>Tămaș, M.</b> <i>Botanică farmaceutică, vol. II (Histologia)</i>. Cluj-Napoca: Ed. Med. Univ. UMF, 2002.</p> <p>18. <b>Tămaș, M.</b> <i>Botanică farmaceutică, vol. III (Sistematica - Cormobionta)</i>. Cluj-Napoca: Ed. Med. Univ. UMF, 2000.</p> <p>19. <b>Tămaș, M., Crișan, G., Ștefănescu, C., Balica, G.</b> <i>Botanique pharmaceutique</i>. Cluj-Napoca: Editura Medicală Universitară "Iuliu Hațieganu", 2005.</p> <p>20. ***<i>Flora Europaea</i>. Cambridge: Cambridge University Press, 1993.</p> <p>21. <a href="http://www.farma.umfcluj.ro">www.farma.umfcluj.ro</a>: <b>Pharmaceutical Botanique course</b></p>	
<b>7.2.Laboratory activities (hours)</b>	<b>Remarks</b>
1. The microscope, the microscopy kit. Microscope manipulation. Techniques for obtaining microscope slides (3)	
2. The structure of the plant cell. Chloroplasts, chromoplasts, starch grains, micro-crystals. Cell wall. Cell division (mitosis). Cellular plasmolysis (9)	
3. Protective tissues (epidermis with stomata, trichomes, cuticle), supporting tissues (collenchyma, sclerenchyma), fundamental tissues (parenchyma, aeriferous tissues, buliform cells), vascular tissue (xylem, phloem), secretory tissues (9)	
4. Primary structure of the root and its variations(3)	
5. Primary structure of the stem and its variations (6)	
6. Secondary structure of the root and stem (3)	
7. Leaf morphology. Leaf anatomy (9)	
8. Flower morphology. Inflorescences. Flower anatomy. Fruit morphology and classification (8)	
9. Divisions Pteridophyta and Spermatophyta – Subdivision Pinophytina (2)	
10. Plant determination. Medicinal plants from division Spermatophyta – Subdivision Magnoliophytina (18)	
<b>Bibliography</b>	
<p>1. <b>Bonnier, G., Douin R.</b> <i>La Grande Flore en couleurs de Gaston Bonnier</i>. Paris: Belin, 1990.</p> <p>2. <b>Ciocârlan, V.</b> <i>Flora ilustrată a României</i>. București: Editura Ceres, 2009.</p> <p>3. <b>Crișan G., Ștefănescu, C.</b> <i>Botanică farmaceutică. Lucrări practice</i>. Cluj-Napoca: Editura Medicală Universitară "Iuliu Hațieganu", 2005.</p> <p>4. <b>Crișan G., Ștefănescu, C., Ielciu, I., Mocan, A.</b> <i>Botanică farmaceutică: identificarea micro- și macroscopică a speciilor vegetale</i>. Cluj-Napoca: Editura Medicală Universitară "Iuliu Hațieganu", 2013.</p> <p>5. <b>Heinrich M., Jäger A. K.</b>, <i>Ethnopharmacology</i>. Oxford: John Wiley &amp; Sons, Ltd, 2015.</p> <p>6. <b>Lim T.L.</b>, <i>Edible Medicinal and Non Medicinal Plants (Volume 8, Flowers)</i>: Dordrecht: Springer, 2014.</p> <p>7. <b>Lim T.L.</b>, <i>Edible Medicinal and Non Medicinal Plants (Volume 9, Modified Stems, Roots, Bulbs)</i>: Dordrecht: Springer, 2015.</p> <p>8. <b>Guignard, J.-L.</b> <i>Botanique</i>. Paris: Masson, 1998.</p> <p>9. <b>Judd, W.S., Campbell, C.S., Kellogg, E.A., Stevens, P.</b> <i>Botanique systematique:une perspective phylogénétique</i>. Paris: DeBoeck Université, 2002.</p> <p>10. <b>Laberche, J.-C.</b> <i>Biologie vegetale</i>. Paris: Dunod, 1999.</p> <p>11. <b>Mauseth, J. D.</b> <i>Botany: an introduction to plant biology</i>. Boston Toronto London Singapore: Jones and Bartlett Publishers, 1998.</p> <p>12. <b>Nabors, M.</b> <i>Biologie vegetale</i>. Paris : Pearson Education, 2008.</p> <p>13. <b>Roland, J.-C., Roland, F.</b> <i>Biologie vegetale 8<sup>e</sup> edition</i>. Paris: Dunod, 2001.</p> <p>14. <b>Sârbu, I., Ștefan, N., Oprea, A.</b> <i>Plante vasculare din România. Determinator ilustrat de teren</i>. București: Ed. VictorBVictor, 2013</p> <p>15. <b>Spichiger, R.-E., Savolainen, V., Figeat, M., Jeanmonod, D.</b> <i>Botanique systématique des plantes à fleurs</i>.Lausanne: Presse polytechniques et universitaires romandes, 2002.</p> <p>16. <b>Stern, K.R., Jansky, S., Bidlak, J.E.</b> <i>Introductory Plant Biology, 9<sup>th</sup> edition</i>. Boston: McGraw-</p>	

Hill, 2003.

17. **Tămaș, M.** *Botanică farmaceutică, vol. I (Citologia)*. Cluj-Napoca: Ed. Med. Univ. UMF Cluj-Napoca, 2004.

18. **Tămaș, M.** *Botanică farmaceutică, vol. II (Histologia)*. Cluj-Napoca: Ed. Med. Univ. UMF, 2002.

19. **Tămaș, M.** *Botanică farmaceutică, vol. III (Sistematica - Cormobionta)*. Cluj-Napoca: Ed. Med. Univ. UMF, 2000.

20. **Tămaș, M., Crișan, G., Ștefănescu, C., Balica, G.** *Botanique pharmaceutique*. Cluj-Napoca: Editura Medicală Universitară "Iuliu Hațieganu", 2005.

21. \*\*\**Flora Europaea*. Cambridge: Cambridge University Press, 1993.

22. **www.farma.umfcluj.ro : Pharmaceutical botany laboratory**

## 8. Evaluation

Activity type	8.1.Evaluation criteria	8.2. Evaluation methods	8.3. Percent of final grade
<b>8.4. Course</b>	General evaluation criteria (full and correct knowledge, logical coherence, ability of analysis and synthesis) Criteria specific to the discipline Criteria judging the attitude and the motivation in the activity of the students Ability of understanding the fundamental problems and of seizing the particularities	Written exam (MCQ)	<b>80%</b>
<b>8.5. Laboratory</b>	Evaluation of theoretical knowledge and practical skills	Practical exam	<b>20%</b>
<b>8.6. Minimal performance standard</b>			
Knowing the principal notions of Pharmaceutical botany <ul style="list-style-type: none"> <li>• Definition and characterization of plant cell and cell constituents</li> <li>• Classification of plant tissues, types of plant tissues</li> <li>• Definition and structure of root, stem, leaf</li> <li>• The structure of the flower at the Angiosperms</li> <li>• The structure of the fruit and seed at the Angiosperms</li> <li>• Definition of systematic units</li> <li>• Classification of plant species in the main systematic units</li> <li>• General characteristics of the main systematic units</li> <li>• Plant species of medicinal interest</li> </ul>			

# ANALYTICAL CHEMISTRY

## 1. Information about the course

<b>1.1. Course</b>		<b>Analytical chemistry and instrumental analysis</b>					
<b>1.2. Course instructor</b>		<b>Prof. dr. Ede Bodoki</b>					
<b>1.3. Laboratory instructor</b>		<b>Prof. dr. Radu Nicolaie Oprean</b> <b>Prof. dr. Ede Bodoki</b> <b>Prof. dr. Cecilia Victoria Cristea</b> <b>Lecturer dr. Andreea Cernat</b> <b>Lecturer dr. Bogdan-Cezar Iacob</b> <b>Lecturer dr. Mihaela Tertis</b> <b>Teaching Assist dr. Bogdan George Feier</b> <b>Teaching Assist dr. Ioana-Daria Tiuca</b> <b>Teaching Assist dr. Oana Hosu</b>					
<b>1.4. Year</b>	1	<b>1.5. Semester</b>	2	<b>1.6. Evaluation type</b>	<b>Written exam + Continuous practical evaluation</b>	<b>1.7. Course type</b>	<b>Fundamental discipline Compulsory discipline</b>

## 2. Total estimated time (hours/semester for teaching activity)

<b>2.1. Total hours/week</b>	<b>5 (2<sup>nd</sup> sem.)</b>	<b>2.2. Course</b>	<b>2</b>	<b>2.3. Laboratories</b>	<b>3</b>
<b>2.4. Total hours in the curriculum</b>	<b>70 (2<sup>nd</sup> sem.)</b>	<b>2.5. Course</b>	<b>28</b>	<b>2.6. Laboratories</b>	<b>42</b>
<b>2.4. Distribution of time needed (1<sup>st</sup> sem. / 2<sup>nd</sup> sem.)</b>					<b>Hours</b>
a. Study using text books, lecture notes, bibliography					28
b. Individual study within libraries, on-line platforms, field research					14
c. Preparing seminars/laboratories, homework, projects, portfolios and essays					14
d. Tutoring					3
e. Evaluation/ semester					20
f. Other activities					1
<b>2.7. Total hours for individual study (a+b+c+d)</b>				<b>80 (2<sup>nd</sup> sem.)</b>	
<b>2.8. Total hours per semester</b>				<b>150 (2<sup>nd</sup> sem.)</b>	
<b>2.9. Number of credits</b>				<b>5 (2<sup>nd</sup> sem.)</b>	

## 3. Pre-requisites :

<b>3.1. Curriculum</b>	- General chemistry
<b>3.2. Competences</b>	-

## 4. Requisites :

<b>4.1. For lectures</b>	<ul style="list-style-type: none"> <li>• Mandatory attendance in at least 70% of the activities;</li> <li>• The students should arrive in time for the course, as any delay interrupts and disturbs the educational process;</li> <li>• Students will close their mobile phones during lectures. Phone calls will not be tolerated during lectures. Students leaving the classroom will not be tolerated either, except for special cases.</li> </ul>
<b>4.2. For laboratories sessions</b>	<ul style="list-style-type: none"> <li>• Mandatory attendance in 100% of the activities;</li> <li>• The students should arrive in time for the course, as any delay interrupts</li> </ul>



	<p>and disturbs the educational process;</p> <ul style="list-style-type: none"> <li>• Students will learn and respect the rules of safety and prevention of accidents and fires;</li> <li>• The deadline for laboratory tasks will be established by agreement with the teacher. No postponement will be taken into account, except for objective reasons.</li> </ul>
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### 5. *Specific competences acquired*

<b>Professional competences</b>	<ul style="list-style-type: none"> <li>• The ability to use properly the specialized terminology in a given context.</li> <li>• Gaining knowledge in analytical methods and techniques used for the separation and identification of chemical species, in order to study the chemical composition of samples with unknown constituents.</li> <li>• The study of chemical reactions for the identification of cations and anions.</li> <li>• Understanding the systematic inorganic analysis.</li> <li>• The capacity to explain and interpret the theoretical aspects and practical results of the qualitative analysis with an interdisciplinary approach with other biomedical fields such as inorganic and organic chemistry, biochemistry, pharmaceutical chemistry, pharmacognosy, toxicology, drug control, pharmaceutical technology, biopharmacy, pharmacokinetics.</li> <li>• Understanding aspects related to particularities of research in the fields of pharmaceutical, biomedical and environmental analysis.</li> <li>• Developing skills of using specific laboratory methodologies and technologies for the study of chemical composition of matter.</li> <li>• Gaining experience in handling laboratory equipment and techniques specific for qualitative analysis: reagents, analytical reactions, laboratory equipment (Bunsen burner, fume hood, Kipp's apparatus, assemblies for precipitation and filtration of precipitates, dissolution of substances in various solvents, identification of cations and anions with relevance to biology, medicine and pharmacy).</li> </ul>
<b>Transversal competences</b>	<ul style="list-style-type: none"> <li>• Using the concepts in new contexts</li> <li>• Using the gained theoretical knowledge in problem solving</li> <li>• Optimum use of the potential of each student in scientific activities</li> <li>• Personal professional development</li> </ul>

### 6. *Course objectives*

<b>6.1. General objectives</b>	<ul style="list-style-type: none"> <li>• Learning and using correctly the general principles underlying the qualitative chemical analysis</li> </ul>
<b>6.2. Specific objectives</b>	<ul style="list-style-type: none"> <li>• Familiarize students with the theoretical aspects and practical application of the principles of analytical chemistry with an emphasis on using the techniques of separation and identification of inorganic ionic species</li> <li>• Gaining knowledge of the main physical and chemical characteristics of cations and anions with relevance to biology, medicine and pharmacy</li> <li>• Gaining knowledge of basic principles of systematic analysis</li> <li>• Understanding the principles and mechanisms of reaction that enable the selection of given techniques for separating and identifying ions</li> <li>• Systematic analysis of mixtures (inorganic and organic ions) of pharmaceutical and biomedical interest</li> <li>• Separation of analytical groups and separation of ions from each analytical</li> </ul>

	<p>group</p> <ul style="list-style-type: none"> <li>• Performing qualitative analytical reactions of separated ions</li> <li>• Getting familiar with the main directions of research in the field of pharmaceutical, biomedical and environmental analysis</li> <li>• Exercise the capacity of data synthesis and of bibliographic documentation</li> </ul>
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## 7. Content

**Teaching methods for course: Oral presentations - PowerPoint presentation**

**Teaching methods for laboratory activity: Systematic oral presentation, conversation, demonstration, individual work**

7.1 Course (hours)	Remarks
<b>1. The objective of analytical chemistry</b> – Analytical classification of ions. Ions and their analytical properties. The influence of polarization on the analytical properties of ions. Analytical classifications of cations. Classification of anions in analytical groups.	3 lectures (2 h/lecture)
<b>2. Systematic analysis</b> Main operations in chemical analysis. The preliminary analysis. Dissolution of the samples. Separation of analytical groups of cations. Separation and identification of cations of group I (HCl), group II (hydrogen sulfide), group III (ammonium sulfide), group IV (ammonium carbonate), group V (general properties, conditions of precipitation, separation scheme, identification reactions). Anion analysis.	3 lectures (2 h/lecture)
<b>3. Chemical equilibrium in chemical analysis</b> The law of mass action. Shifting the equilibrium in analytical reactions. Applications of shifting the chemical equilibrium in qualitative analysis. Solutions and solvents in chemical analysis Dissociation constant. Electrolytes, activity, thermodynamic equilibrium constant, ionic strength. Water dissociation, the ionic product of water, pH pOH	2 lectures (2 h/lecture)
<b>4. Types of analytical reagents</b> Analytical reagent (pH indicators, redox indicators, adsorption, complexing, precipitating). Organic reagents. Analytical and functional active groups. The specificity and selectivity of analytical reactions. Factors that influence the selectivity. Masking and unmasking analytical reactions. The sensitivity of the analytical reactions	1 lecture (2 h/lecture)
<b>5. Chemical reactions used in qualitative analysis. Acid-base reactions.</b> General aspects and main theories of acids and bases. Ampholyte in the analysis. Hydrolysis of salts and analytical applications. Buffers, definition, examples, applications. <b>Analytical reactions of precipitation.</b> General notions. The formation of precipitates. The product of solubility and the solubility of precipitates. Factors affecting solubility of precipitates. Fractional precipitation applications. The dissolution of the precipitates, analytical applications. Adsorption, analytical applications. Colloidal state, analytical implications. <b>Analytical reactions of complexation.</b> Generalities (cations' ability to form complexes, coordination abilities of the ligands, the stability of complexes. Chelates and mixed complexes). Applications of complexes in chemical analysis. <b>Analytical redox reactions</b> Review of general notions (oxidation, reduction, redox potential, factors influencing the redox potential. The speed of redox reactions). Applications of redox reactions in systematic qualitative analysis. Dismutation reactions, reactions induced and catalytic reactions applied in chemical analysis.	5 lectures (2 h/lecture)
<b>Bibliography</b> <ol style="list-style-type: none"> <li>1. G. Svehla, Vogel's Qualitative Inorganic Analysis, 6th edition, Longman Scientific &amp; Technical, Essex, 1991</li> <li>2. G. Christian, Analytical Chemistry, 5th ed., John Wiley &amp; Sons, New York, 1994, ISBN: 0-471-59761-9</li> <li>3. www.farma.umfcluj.ro: Qualitative Analytical Chemistry, lectures, PowerPoint lecture notes</li> </ol>	

7.2. Laboratory activities (hours)	Remarks
1. Safety rules of working in the chemistry laboratory. Rules of fire prevention and firefighting. First aid measures in case of accidents in the laboratory.	1 session of laboratory practice
2. Preliminary reactions, ignition tube analysis, flame test, bead test, blowpipe test on charcoal, alkaline fusion, behavior against strong bases, behavior against dilute and concentrated sulfuric acid. Writing lab essays in the laboratory workbook.	1 session of laboratory practice
3. Performing identification reactions of the analytical groups of cations. Analytical Group I (Ag-I, Pb-II, Hg-I), group II (Hg-II, Pb-II, Bi-III, II, Cd-II, I-III and V, Sb, III and V, Sn II and IV), group III (Fe II and III, Co II, Ni II, Cr III, Mn II Zn-II, Al-III), Group IV (Ca-II, Sr-II, B-II), Group V (Li-I, Na I, KI, Mg II, NH <sub>4</sub> <sup>+</sup> ).	1 session of laboratory practice
4. Performing identification reactions of the analytical groups of anions, (gr. I-VI): Cl <sup>-</sup> , Br <sup>-</sup> , I <sup>-</sup> , CN <sup>-</sup> , SCN <sup>-</sup> , [Fe(CN) <sub>6</sub> ] <sup>3-</sup> , [Fe(CN) <sub>6</sub> ] <sup>4-</sup> , S <sup>2-</sup> , NO <sub>2</sub> <sup>-</sup> , CH <sub>3</sub> COO <sup>-</sup> , CO <sub>3</sub> <sup>2-</sup> , SO <sub>3</sub> <sup>2-</sup> , BO <sub>3</sub> <sup>3-</sup> , C <sub>2</sub> O <sub>4</sub> <sup>2-</sup> , tartrate (C <sub>4</sub> H <sub>4</sub> O <sub>6</sub> <sup>2-</sup> ), citrate (C <sub>6</sub> H <sub>5</sub> O <sub>7</sub> <sup>3-</sup> ), PO <sub>4</sub> <sup>3-</sup> , AsO <sub>3</sub> <sup>3-</sup> , AsO <sub>4</sub> <sup>3-</sup> , S <sub>2</sub> O <sub>3</sub> <sup>2-</sup> , CrO <sub>4</sub> <sup>2-</sup> , NO <sub>3</sub> <sup>-</sup> , MnO <sub>4</sub> <sup>-</sup> , SO <sub>4</sub> <sup>2-</sup> . Systematic analysis	2 sessions of laboratory practice
5. The analysis of unknown mixtures of cations and anions (7 comprehensive analysis of ions comprising between 2 and 6 inorganic or organic ions)	9 sessions of laboratory practice
<b>Bibliography</b>	
1. Bodoki E., Cecilia Cristea, R. Săndulescu, R. Oprean, <b>Qualitative Analytical Chemistry, laboratory guide</b> , Cluj-Napoca, multiplied manuscript, 2012.	
2. G. Svehla, <b>Vogel's Qualitative Inorganic Analysis</b> , 6th edition, Longman Scientific & Technical, Essex, 1991.	

## 8. Evaluation

Activity type	8.1. Evaluation criteria	8.2. Evaluation methods	8.3. Percent of final grade
<b>8.4. Course</b>	Specific criteria: assessing the assimilation and understanding of theoretical concepts, critical thinking, qualitative analytical problem solving and interpretation of results	Written and multiple choice exam. Theoretical solving of an inorganic qualitative analysis.	<b>70%</b>
<b>8.5. Laboratory</b>	Evaluation of theoretical knowledge and practical skills, of the attention and accuracy in laboratory experiments, of critical thinking and interpreting the results.	Practical exam	<b>30%</b>
<b>8.6. Minimal performance standard</b>			
<ul style="list-style-type: none"> <li>• Learning the main concepts of qualitative analytical chemistry</li> <li>• The theoretical principles of qualitative analysis</li> <li>• Methods and techniques of qualitative analysis</li> <li>• Identification reactions of cations (the most specific and sensitive)</li> <li>• Identification reactions of anions (the most specific and sensitive)</li> <li>• Analytical classification of cations and anions</li> <li>• Systematic analysis</li> <li>• Separation of ions in analytical groups and separation of ions of the same analytical group</li> </ul>			

# PHYSICAL CHEMISTRY

## 1. Information regarding the discipline

<b>1.1. Discipline</b>		<b>Physical Chemistry</b>					
<b>1.2. Course coordinator</b>		<b>Professor Dan Răzvan Rusu, PhD Lecturer Ioana Felecan, PhD</b>					
<b>1.3. Laboratory work coordinator</b>		<b>Professor Dan Răzvan Rusu, PhD Lecturer Ioana Felecan, PhD</b>					
<b>1.4. Year of study</b>	<b>1</b>	<b>1.5. Semester</b>	<b>2</b>	<b>1.6. Type of evaluation</b>	<b>Teoretic exam Practic exam</b>	<b>1.7. Type of discipline</b>	<b>Fundamental discipline, Mandatory discipline</b>

## 2. Total estimated time (hours/semester of didactic activities)

<b>2.1. Hours per week</b>	<b>4 (2<sup>nd</sup> sem.)</b>	<b>2.2. Course</b>	<b>2</b>	<b>2.3. Laboratory</b>	<b>2</b>
<b>2.4. Total hours in the curriculum</b>	<b>56 (2<sup>nd</sup> sem.)</b>	<b>2.5. Course</b>	<b>28</b>	<b>2.6. Laboratory</b>	<b>28</b>
<b>2.4. Time allotment:/ semester</b>					hours
a. Learning using manual, course support, bibliography, course notes					<b>28</b>
b. Additional documentation (in libraries, on electronic platforms, field documentation)					<b>21</b>
c. Preparation for seminars/labs, homework, papers, portfolios and essays					<b>21</b>
d. Tutorship					<b>14</b>
e. Evaluations/semester					<b>21</b>
f. Other activities					<b>-</b>
<b>2.7. Total individual study hours (a+b+c+d)</b>				<b>84 (2<sup>nd</sup> sem.)</b>	
<b>2.8. Total hours per semester</b>				<b>105 (2<sup>nd</sup> sem.)</b>	
<b>2.9. Number of credits</b>				<b>4 (2<sup>nd</sup> sem.)</b>	

## 3. Prerequisites

<b>3.1. Curriculum</b>	Notions of chemistry, physics, biology and matematics
<b>3.2. Competencies</b>	-

## 4. Conditions

<b>4.1. For the course</b>	-
<b>4.2. For the laboratory activities</b>	-

## 5. Specific competencies acquired

<b>Professional competencies</b>	<ul style="list-style-type: none"> <li>• The capacity to use the specific terminology in an appropriate way and in context</li> <li>• Use of basic knowledge in the field of chemistry and physics to understand the biological processes and the ability of some specific concepts with the purpose of proper usage of physico-chemical methods used in the analysis of drugs</li> <li>• The study of physico-chemical processes</li> <li>• The capacity to explain and discuss the theoretical and practical concepts of the Physical Chemistry discipline in an interdisciplinary way, combing the other biomedical fundamental and specialty disciplines: Biophysics, Biology, Cellular Biology, Organic Chemistry, Inorganic Chemistry, Analytical Chemistry,</li> </ul>
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	Biochemistry, Pharmaceutical Chemistry, Therapeutical Chemistry, Pharmacogenetics, Pharmacology <ul style="list-style-type: none"> <li>• Understanding the aspects regarding the particularities of research in physical-chemistry</li> <li>• The formation of the abilities to use some methodologies and specific laboratory techniques to study the physico-chemical processes</li> <li>• Having some practical experience in manipulating the laboratory equipments and the specific techniques of study in the chemistry laboratory: the use of the specific apparatus present in the physical chemistry laboratories.</li> </ul>
<b>Transversal competencies</b>	<ul style="list-style-type: none"> <li>• The use of notions in new contexts</li> <li>• The use of theoretic notions in problem solving</li> <li>• The acquiring of new notions in professional development</li> <li>• Promoting a logical way of thinking</li> <li>• An optic and creative use of the individual potential in scientific activities</li> <li>• Individual professional development</li> </ul>

### 6. Objectives of the discipline

<b>6.1. General objective</b>	<ul style="list-style-type: none"> <li>• The knowledge, approfondation and correct use of the notions in chemistry and physics</li> </ul>
<b>6.2. Specific objective</b>	<ul style="list-style-type: none"> <li>• The familiarization of students with the aspects regarding the application of theoretical and practical principles in physical chemistry, with the accent on having the necessary practical competencies in the laboratory: the use of specific apparatus, understanding the theoretical aspects and applying them during the experiments</li> <li>• The knowledge of the notions in the field of chemical thermodynamics, chemical kinetics, electronic and magnetic properties, refractometry, spectrometry, surface tension, emulsions.</li> <li>• Understanding the reasons and mechanisms which are situated at the bases in establishing a specific working protocol</li> <li>• The familiarization with the principal directions of research in the field of physical chemistry</li> <li>• Practicing the capacity of summarizing and bibliographic documentation</li> </ul>

### 7. Content

**Teaching methods course:** Lecture, systematic presentation, conversation, questioning; oral presentation combined with PowerPoint presentation.

**Teaching methods Laboratory practice:** Systemic presentation, Conversation, Questioning, Demonstration. Oral presentation combined with electronic support.

7.1. Course	Remarks
<b>1. Chemical thermodynamics</b> <i>First law.</i> States, functions of state, reversible and irreversible processes. Energy, heat and work. Processes at constant volume and pressure. Enthalpy. Heat capacity. Thermochemistry. Standard states. The relation between $\Delta U$ and $\Delta H$ . Their measurement. Reaction enthalpy temperature dependence. Formation enthalpy. Bond enthalpy. <i>Second law. Third law.</i> Reversible processes. Statistical and thermodynamic definition of entropy. Variation of entropy calculation. Third law. Helmholtz and Gibbs energies. Gibbs energies of formation. Gibbs-Helmholtz equation.	

<p><i>Chemical equilibrium.</i> Chemical equilibrium for gases ideal. Chemical equilibrium for solutions. Heterogeneous equilibrium. Variation of equilibrium. Effect of pressure and temperature on chemical equilibrium.</p> <p><i>Solutions and phases.</i> Phases identification. Vaporization and vapour pressure. Clapeyron and Clausius – Clapeyron equations. Vaporization enthalpy and entropy, Trouton’s rule. Ideal solutions: Raoult’s law and Henry’s law. Molar partial quantities. Chemical potential. Thermodynamics of solutions. Activity and activity coefficient. Coligative properties. Increasing of the boiling point. Freezing point depression. Solubility. Osmotic pressure.</p> <p><i>Phase equilibrium.</i> Components. Degrees of freedom. Phase rule. Monocomponent systems. Vapour binary systems. Distillation. Condensed binary systems. Thermal analysis. Ternary mixture</p>	
<p><b>2. Electrochemistry</b></p> <p><i>Molar conductivity.</i> Weak electrolyte. Arrhenius theory. Ostwald dilution law. Strong electrolyte. Debye – Hückel theory. Independent ion migration. Ion mobility. Transport numbers. Methods of determination. Conductivities and ion– ion interactions. Theories regarding ions in solution. Activity coefficients.</p> <p><i>Ionic equilibrium.</i> Electrochemical cells. Standard electrode potential. Nernst equation. Types of electrochemical cells. Applications of standard potentials. Electrode processes.</p>	
<p><b>3. Chemical kinetics</b></p> <p>Rate and order of reaction. Experimental techniques. Zero, first and second order reactions. Half life reaction. Reactions near the equilibrium. The effect of temperature on reaction rate. Arrhenius’ equation. Preexponential factor. The influence of polarity, ionic strength and dielectric constant of solvent on reaction rate. Elementary consecutive reactions. Reactions in solution. Chain reactions. Explosions. Photochemical and enzymatic reactions. Homogenous and heterogenous catalysis. Acid base specific catalysis. Collision theory. Theory of activated complex. The dynamic of molecular collisions. The alteration of drugs and pharmaceutical preparations. Hydrolysis. Oxidation. Other reactions: racemization, decarboxylation. The stability of pharmaceutical preparations.</p>	
<p><b>4. Interaction of substance with electric and magnetic field</b></p> <p>Permanent and induced electric moment. Polarization at high frequency. Relative permittivity. Refractive index. Intermolecular forces, hydrogen bonds. Lennard–Jones potential. Magnetic properties. Magnetic susceptibility. Permanent and induced magnetic moment.</p>	
<p><b>Bibliography</b></p> <ol style="list-style-type: none"> <li>1. Peter Atkins, Julio de Paula, <i>Physical Chemistry</i>, Oxford University Press, 2002</li> <li>2. Alexander T. Florence, David Attwood, <i>Physicochemical Principles of Pharmacy</i>, Pharmaceutical Press, London, 2004</li> <li>3. Richard M. Pashley, Marilyn E. Karaman, <i>Applied Colloid and Surface Chemistry</i>, John Wiley &amp; Sons, Ltd., 2004</li> <li>4. A. Martin, J. Swarbrick, A. Cammarata, <i>Physical Pharmacy-Physical Chemical Principles in the Pharmaceutical sciences</i>, Lea &amp; Febiger, Philadelphia, 1983</li> </ol>	
<b>7.2. Laboratory Practice</b>	<b>Remarks</b>
1. Quantitative calculations in pharmaceutical practice	
2. Determination of the neutralization enthalpy, mixing enthalpy and solvation enthalpy using calorimetric measurements	
3. Determination of partial molar volume	
4. Conductometric determination of the acidity constant for a weak acid	
5. Spectrophotometric determination of the acidity constant for a weak acid using	

metlioranj as indicator.	
6. Kinetic study of zaharosis hydrolysis in acidic medium	
7. Electrical properties of the molecules– applications of the permittivity measurements	
8. The kinetic study of tetracycline degradation	
9. Partition of a substance between two immiscible solvents	
10. Ccryoscopy and microcryoscopy	
<b>Bibliography</b>	
<ol style="list-style-type: none"> <li>1. Peter Atkins, Julio de Paula, <i>Physical Chemistry</i>, Oxford University Press, 2006</li> <li>2. Alexander T. Florence, David Attwood, <i>Physicochemical Principles of Pharmacy</i>, Pharmaceutical Press, London, 2004</li> <li>3. Richard M. Pashley, Marilyn E. Karaman, <i>Applied Colloid and Surface Chemistry</i>, John Wiley &amp; Sons, Ltd., 2004</li> <li>4. A. Martin, J. Swarbrick, A. Cammarata, <i>Physical Pharmacy-Physical Chemical Principles in the Pharmaceutical sciences</i>, Lea &amp; Febiger, Philadelphia, 1983</li> </ol>	

### 8. Evaluation

Type of activity	1.1.Evaluation criteria	8.2. Evaluation methods	8.3. Percent of final grade
<b>8.4. Course</b>	General criterias of evaluating (the knowledge to be complete and correct, logic, fluency in exprimation, argumentation capacity) Criterias specific to the discipline Criterias referring to atitudine and motivation of the activities of the students The capacity of understanding the fundamental and particular problems	Written exam, multiple choice	<b>75%</b>
<b>8.5. Laboratory Practice</b>	Evaluation of the theoretical knowledge and practical abilities	Practical exam	<b>25%</b>
<b>8.6. Minimum performance standards</b>			
<b>Having the most important notions in physical chemistry</b>			
<ul style="list-style-type: none"> <li>• Knowing the principles of chemical thermodynamics</li> <li>• Knowing the principles of chemical kinetics</li> <li>• Notions of electrochemistry (base principles)</li> <li>• Surface phenomena and transport</li> <li>• Notions of quantum mechanics and spectroscopy</li> <li>• Knowing the basic notions in colloid and macromolecular chemistry</li> <li>• Notions in physics (optics, mechanics, electricity and magnetism)</li> </ul>			

# GENERAL AND INORGANIC CHEMISTRY

## 1. Information about the course

<b>1.1. Discipline</b>		<b>General and Inorganic Chemistry</b>					
<b>1.2. Course instructor</b>		<b>Lecturer Andreea Bodoki, PhD</b>					
<b>1.3. Laboratory instructor</b>		<b>Lecturer Andreea Bodoki, PhD Lecturer Tamara Topală, PhD</b>					
<b>1.4. Year</b>	1	<b>1.5. Semester</b>	1, 2	<b>1.6. Evaluation type</b>	<b>Written exam + Practical exam</b>	<b>1.7. Course type</b>	<b>Fundamental discipline Compulsory discipline</b>

## 2. Total estimated time (hours/semester for teaching activity)

<b>2.1. Total hours/week</b>	<b>5 (1<sup>st</sup> sem.) 6 (2<sup>nd</sup> sem.)</b>	<b>2.2. Course</b>	<b>2 3</b>	<b>2.3. Laboratories</b>	<b>3 3</b>
<b>2.4. Total hours in the curriculum</b>	<b>70 (1<sup>st</sup> sem.) 84 (2<sup>nd</sup> sem.)</b>	<b>2.5. Course</b>	<b>28 42</b>	<b>2.6. Laboratories</b>	<b>42 42</b>
<b>2.4. Distribution of time needed (1<sup>st</sup> sem. / 2<sup>nd</sup> sem.)</b>					<b>Hours</b>
e. Study using text books, lecture notes, bibliography					42/42
f. Individual study within libraries, on-line platforms, field research					42/35
g. Preparing seminars/laboratories, homework, projects, portfolios and essays					35/35
h. Tutoring					7/7
e. Evaluation/ semester					7/7
f. Other activities					-
<b>2.7. Total hours for individual study (a+b+c+d)</b>				<b>133 (1<sup>st</sup> sem.) 126 (2<sup>nd</sup> sem.)</b>	
<b>2.8. Total hours per semester</b>				<b>203 (1<sup>st</sup> sem.) 210 (2<sup>nd</sup> sem.)</b>	
<b>2.9. Number of credits</b>				<b>6 (1<sup>st</sup> sem.) 6 (2<sup>nd</sup> sem.)</b>	

## 3. Pre-requisites:

<b>3.1. Curriculum</b>	Elementary concepts of general and inorganic chemistry at secondary school level
<b>3.2. Competences</b>	-

## 4. Requisites

<b>4.1. For lectures</b>	<ul style="list-style-type: none"> <li>• Mandatory and recommended bibliography is provided</li> <li>• Handouts and other useful information are available at <a href="http://www.farma.umfcluj.ro">http://www.farma.umfcluj.ro</a>, the General and Inorganic Chemistry section</li> <li>• Mandatory attendance in at least 70% of the activities</li> </ul>
<b>4.2. For laboratories sessions</b>	<ul style="list-style-type: none"> <li>• Students will thoroughly obey the safety rules and regulations and will wear the protection equipment as instructed</li> <li>• The necessary written material for all laboratory activities is available at <a href="http://www.farma.umfcluj.ro">http://www.farma.umfcluj.ro</a>, the General and Inorganic Chemistry section</li> <li>• Mandatory attendance in 100% of the activities</li> </ul>



## 5. *Specific competences acquired*

<b>Professional competences</b>	<ul style="list-style-type: none"><li>• The selected themes will familiarize the student with the fundamental concepts, theories and laws that apply in the field of general and inorganic chemistry</li><li>• The ability to properly use the terminology characteristic of general and inorganic chemistry within a given context</li><li>• Gaining insight into the structure, the preparation techniques, the physico-chemical properties and the transformation of chemical elements and their compounds; the ability to use the acquired knowledge in the biomedical field as well as in everyday life</li><li>• The ability to apply the course material to problem solving in the laboratory.</li><li>• The development of the students' interest for the study of chemical compounds and processes, the development of analytical and synthetic thinking, development of reasoning for solving specific problems and interpret the phenomena associated with chemical transformations</li><li>• The development of a sense of discipline and responsibility based on motivation, correctitude, efficiency and thoroughness</li></ul>
<b>Transversal competences</b>	<ul style="list-style-type: none"><li>• Gaining the skills necessary for team work as well as for efficient individual study and productive intellectual work</li><li>• Acknowledging the importance of continuous training, of sustained personal effort and of research in achieving one's goals</li><li>• Gaining the skills for an interdisciplinary approach</li></ul>

## 6. *Course objectifs*

<b>6.1. General objectives</b>	<ul style="list-style-type: none"><li>• Gaining insight into the basic and most important principles of general and inorganic chemistry and building the foundation necessary for the understanding of related fundamental disciplines and applied chemistry courses</li></ul>
<b>6.2. Specific objectives</b>	<ul style="list-style-type: none"><li>• Thorough understanding of following terms: structure, stability, reactivity, chemical reactions, chemical equilibrium, reaction rate, dispersed systems, physical properties and chemical properties with relation to atoms, molecules, ions, metals, non-metals, acids, bases, salts, binary compounds and coordination compounds in distinct states</li><li>• The relevance of knowing in detail the structure, properties and distinct uses of inorganic compounds for the fields of pharmacy, medicine and biology</li><li>• Gaining knowledge of both the beneficial and the potentially harmful properties of micro and macro elements, and of the essential functions of metal ions within the biological environment</li><li>• Using the gained theoretical knowledge in practice and in problem solving</li><li>• Gaining the practical skills specific for the chemistry laboratory; assessment of the laboratory safety regulations, of the preparation, separation and purification methods and techniques and of the correct manipulation of both chemical compounds and laboratory material and equipment</li><li>• Gaining the skills for the correct interpretation and for assessing the relevance of experimental results</li><li>• Development of scientific thinking, reason and creativity</li></ul>

## 7. Content

**Teaching methods for course:** Interactive lectures, PowerPoint presentation, systematic presentations, problem solving, questions and answers

**Teaching methods for laboratory activity:** Systematic presentations, problem solving, questions and answers, experiment, practical applications, individual work, demonstrations

7.1 Course (70 hours)	Remarks
<b>1<sup>st</sup> Semester (28 hours)</b>	
<b>1. The object of General and Inorganic Chemistry.</b> Short history. Branches of Chemistry. Fundamental and applied research.	<b>1 h</b>
<b>2. Atom structure.</b> Atomic theory – classical mechanics and quantum mechanics atom models. Atomic orbitals (wave functions). Polyelectronic Atoms: electronic configuration (principles).	<b>2 h</b>
<b>3. Periodic Table of Elements</b> Short history. Periodicity law. Different forms of the periodic table. Classification of elements: groups, periods and distinct blocks. Correlation between the physical and chemical properties of elements and their electronic configuration and position in the periodic table.	<b>3h</b>
<b>4. Types of inorganic compounds.</b> Elements and chemical compounds, chemical formulas	<b>1 h</b>
<b>5. IUPAC provisional recommendations for nomenclature of inorganic compounds</b>	<b>1 h</b>
<b>6. Chemical bonding.</b> Ionic Bond. Covalent Bond. Intermolecular forces (Hydrogen bonding, van der Waals forces). Classical mechanics and quantum mechanics bonding theories: the VSEPR Model, The Valence Bond Theory, Hybrid orbitals, Molecular Orbitals Theory. Polarization of molecules, Chemical Bond – Properties relationships: general properties of ionic and covalent compounds.	<b>6 h</b>
<b>7. States of matter.</b> Solid state. Crystal lattice. Crystal systems. Crystal lattice types: ionic lattice, atomic / covalent lattice, molecular lattice, metallic lattice. Polymorphism, isomorphism, allotropy. Liquid state. Gaseous state. Plasma.	<b>2 h</b>
<b>8. Electric and magnetic properties of inorganic compounds.</b> Polarization of ions reflected upon the properties of compounds. Diamagnetic, paramagnetic, ferromagnetic and antiferromagnetic compounds.	<b>1 h</b>
<b>9. Homogenous and Heterogeneous systems. Kinetics and chemical equilibrium.</b> Generalities. Reaction rates. Factors influencing reaction rates: nature of reactants and solvents, concentration, temperature, physical state. Catalysts in homogenous and heterogeneous systems – applications. Chemical equilibrium characteristics. Equilibrium constant. Equilibrium in homogenous and heterogeneous inorganic systems. Le Chatelier's Principle – applications.	<b>2 h</b>
<b>10. Chemical Reactions.</b> Chemical reactions and equations. Types of chemical reactions: combination, decomposition, displacement, double exchange, protolytic, redox, polymerization and condensation reactions.	<b>1 h</b>
<b>11. Acids, bases and salts.</b> The Bronsted-Lowry Theory. The Lewis Theory. Acids and Bases – classification. Parameters assessing the strength of acids and bases. General properties of acids and bases. Protolytic reactions. Properties of salts.	<b>5 h</b>
<b>12. Electron transfer reactions.</b> Oxidation process and reducing systems. Reduction process and oxidizing systems. Electrode potential. Spontaneous redox reactions. Types of redox reactions. Factors influencing redox reactions.	<b>3 h</b>
<b>Bibliography</b>	
1. G. Wulfsberg – <i>Inorganic Chemistry</i> , University Science Books, 2002. 2. D.F. Shriver, P.W. Atkins, C.H. Langford – <i>Inorganic Chemistry</i> , Oxford University Press, 1998.	

<p>3. Huheey, Keiter &amp; Keiter – <i>Inorganic Chemistry – Principles of structure and reactivity</i>, 4<sup>th</sup> edition, Prentice Hall, 1997.</p> <p>4. Bodie E. Douglas, Darl H. Daniel, John J. Alexander - <i>Concepts and models of inorganics chemistry</i>, 3d edition - John Wiley &amp; Sons, Inc.</p> <p>5. P. Atkins, L. Jones – <i>Chemical Principles</i>, 4th edition, W.H. Freeman, 2008</p> <p>6. C. Housecroft, A.G. Sharpe – <i>Inorganic Chemistry</i>, 2<sup>nd</sup> edition, Pearson Prentice Hall, 2004</p> <p>7. G.L. Miessler, D.A. Tarr – <i>Inorganic Chemistry</i>, 4<sup>th</sup> edition, Prentice Hall, 2011</p> <p>8. <a href="http://www.farma.umfcluj.ro">http://www.farma.umfcluj.ro</a>, General and Inorganic Chemistry section</p>	
<b>2<sup>nd</sup> Semester (42 hours)</b>	
<p><b>1. Coordination compounds.</b> General principles. Bonding and electronic structure – crystal field and ligand field theories. Structure, properties, kinetic and thermodynamic stability, isomerism. Types of coordination compounds: Werner-Mirolati complexes, chelates, organometallic compounds, molecular complexes. Analytical application, importance and biological role. (8h)</p>	
<p><b>2. Chemistry of main group elements: Groups 1, 2, 13 - 18 of the periodic table</b> (20h)</p> <p>- General Group characterization</p> <p>- Elements and compounds – preparation, structure, physical and chemical proprieties, uses, biological role, applications in pharmacy field.</p> <ul style="list-style-type: none"> <li>• Hydrogen and Group 18 elements: He, Ne, Ar, Kr, Xe, Rn</li> <li>• Group 17 elements: F, Cl, Br, I, At</li> <li>• Group 16 elements: O, S, Se, Te, Po</li> <li>• Group 15 elements: N, P, As, Sb, Bi</li> <li>• Group 14 elements: C, Si, Ge, Sn, Pb</li> <li>• Group 13 elements: B, Al, Ga, In, Tl</li> <li>• Group 2 elements: Be, Mg, Ca, Sr, Ba, Ra</li> <li>• Group 1 elements: Li, Na, K, Rb, Cs, Fr</li> </ul>	<p>2h</p> <p>3h</p> <p>4h</p> <p>3h</p> <p>2h</p> <p>2h</p> <p>2h</p> <p>2h</p>
<p><b>3. Chemistry of transition metals: Groups 3, 4, 5, 6, 7, 8, 9, 10, 11, 12 of the periodic table</b> (12h)</p> <p>- General characterization of transition metals; variation of properties within the 3d, 4d and 5d series</p> <p>- Elements and compounds – preparation, structure, physical and chemical proprieties, uses, biological role, applications in pharmacy.</p> <ul style="list-style-type: none"> <li>• Chromium and Manganese</li> <li>• Iron, Cobalt and Nickel</li> <li>• Copper, Silver and Gold</li> <li>• Zinc and Mercury</li> <li>• Palladium and Platinum</li> </ul>	<p>2h</p> <p>3h</p> <p>3h</p> <p>2h</p> <p>1h</p>
<p><b>4. Fundamentals of Bioinorganic Chemistry</b> (2h)</p> <p>- Essential elements: bulk elements and trace elements and their biochemical roles; essential ultratrace elements. Metal biomolecules. Implications and applications of bioinorganic compounds in biomedicine</p>	
<p><b>Bibliography</b></p> <p>1. G. Wulfsberg – <i>Inorganic Chemistry</i>, University Science Books, 2002.</p> <p>2. D.F. Shriver, P.W. Atkins, C.H. Langford – <i>Inorganic Chemistry</i>, Oxford University Press, 1998.</p> <p>3. Huheey, Keiter &amp; Keiter – <i>Inorganic Chemistry – Principles of structure and reactivity</i>, 4<sup>th</sup> edition, Prentice Hall, 1997.</p> <p>4. Bodie E. Douglas, Darl H. Daniel, John J. Alexander - <i>Concepts and models of inorganics chemistry</i>, 3d edition - John Wiley &amp; Sons, Inc.</p> <p>5. C. Housecroft, A.G. Sharpe – <i>Inorganic Chemistry</i>, 2<sup>nd</sup> edition, Pearson Prentice Hall, 2004</p>	

6. G.L. Miessler, D.A. Tarr – <i>Inorganic Chemistry</i> , 4 <sup>th</sup> edition, Prentice Hall, 2011	
7. R. M. Roat-Malone – <i>Bioinorganic Chemistry – A short course</i> , Wiley-Interscience, 2007	
8. H.B. Kraatz, N. Metzler-Nolte – <i>Concepts and models in bioinorganic chemistry</i> , Wiley-VCH, 2006	
9. J.A. Cowan - <i>Inorganic biochemistry – an introduction</i> , Wiley – VCH, 1997.	
10. <a href="http://www.farma.umfcluj.ro">http://www.farma.umfcluj.ro</a> , General and Inorganic Chemistry section	
<b>7.2. Laboratory activities (84 hours)</b>	<b>Remarks</b>
<b>1<sup>st</sup> Semester (42 hours)</b>	
1. Security and personal safety in the chemistry laboratory. Fire protection. First aid procedures in case of accidents.	<b>2 h</b>
2. Presentation of laboratory glassware and materials.	<b>1 h</b>
3. Laboratory practice specific techniques and methods. Basic separation and purification techniques: selective dissolution, sublimation, centrifugation, filtration, distillation, extraction, chromatographic techniques.	<b>9 h</b>
4. Purity criteria and evaluation – melting point, molecular masse, chemical equivalent, water molecules in crystal hydrates	<b>3 h</b>
5. Solubility. Solutions – concentrations units, preparation.	<b>4 h</b>
6. Kinetics, reaction rate. Factors influencing reaction rates. Homogeneous and heterogeneous catalysis.	<b>3 h</b>
7. Chemical equilibrium. Reversible and irreversible reactions. Law of mass action. Le Chatelier's principle – applications.	<b>3 h</b>
8. Acids and bases. Acid and base strength parameters. General proprieties of acids and bases. pH in aqueous solutions. Applications.	<b>5 h</b>
9. Properties of salts. Hydrolysis reactions. Applications.	<b>3 h</b>
10. Precipitation reactions. Ionic polarization.	<b>3 h</b>
11. Redox reactions. Factors influencing redox reaction (nature of substances and their oxidizing or reducing properties, temperature, concentration, pH, catalyzers).	<b>5 h</b>
<b>Bibliography</b>	
1. L.Oprean, A. Hangan, A. Bota, <i>Chimie anorganică. Noțiuni teoretice și aplicații practice</i> , Editura Medicală Universitară "Iuliu Hațieganu", Cluj-Napoca, 2007.	
2. H. R. Hunt, T. F. Block, G. M. McKelvy, <i>Laboratory Experiments for General Chemistry</i> , Saunders College Publisher, Orlando, 1998	
3. C. B. Bishop, M. B. Bishop, K. W. Whietten, <i>Standard and Microscale Experiments in General Chemistry</i> , fourth edition, Saunders College Publisher, Orlando, 2000	
4. <a href="http://www.farma.umfcluj.ro">http://www.farma.umfcluj.ro</a> , General and Inorganic Chemistry Section	
<b>2<sup>nd</sup> Semester</b>	
<b>1. Metal complexes – preparation, stability, characteristic reactions</b> Synthesis of metal complexes: $[\text{Cu}(\text{NH}_3)_4]\text{SO}_4$ , $[\text{Ni}(\text{NH}_3)_6]\text{SO}_4$ , $\text{K}_3[\text{Fe}(\text{C}_2\text{O}_4)_3]$ , $\text{K}[\text{PbI}_3]$ , $\text{Cu}(\text{glycolate})_2$ .	<b>6 h</b>
<b>2. Hydrogen – preparation and properties</b>	<b>1 h</b>
<b>3. Group 17 elements (halogens)</b> Chlorine, bromine, iodine: hydracids and salts, oxoacids and salts. Preparation and proprieties.	<b>5 h</b>
<b>4. Group 16 elements</b> Oxygen, hydrogen peroxide. Sulfur, acids: $\text{H}_2\text{S}$ , $\text{H}_2\text{SO}_3$ , $\text{H}_2\text{SO}_4$ , $\text{H}_2\text{S}_2\text{O}_3$ , $\text{H}_2\text{S}_2\text{O}_4$ , $\text{H}_2\text{S}_2\text{O}_8$ and salts. Preparation and proprieties.	<b>6 h</b>
<b>5. Group 15 elements</b> Nitrogen, phosphorus, arsenic and compounds: ammonia, acids: $\text{HNO}_2$ , $\text{HNO}_3$ , $\text{H}_3\text{PO}_2$ , $\text{H}_3\text{PO}_3$ , $\text{H}_3\text{PO}_4$ , $\text{H}_3\text{AsO}_3$ , $\text{H}_3\text{AsO}_4$ and salts. Antimony and bismuth: oxides, hydroxides, salts.	<b>6 h</b>

Preparation, properties.	
<b>6. Group 14 elements</b> Carbon, silicon: oxides, acids and salts Tin and lead: oxides, hydroxides and salts. Preparation and properties.	<b>3 h</b>
<b>7. Group 13 elements</b> Boron: boric acid, borax Aluminium: oxide, hydroxide, salts. Preparation and properties	<b>3 h</b>
<b>8. Groups 1 and 2 elements</b> Sodium, potassium, magnesium, calcium, barium: oxides, hydroxides and salts. Preparation and properties.	<b>2 h</b>
<b>9. Chromium and manganese</b> Oxides, hydroxides and salts Preparation and properties.	<b>3 h</b>
<b>10. Iron, cobalt, nickel</b> Oxides, hydroxides and salts Preparation and properties	<b>3 h</b>
<b>11. Copper and silver</b> Oxides, hydroxides and salts Preparation and properties.	<b>2 h</b>
<b>12. Zinc, cadmium and mercury</b> Oxides, hydroxides and salts Preparation and properties.	<b>2 h</b>
<b>Bibliography</b>	
1. L. Oprean, A. Hangan, A. Bota, <i>Chimie anorganică. Noțiuni teoretice și aplicații practice</i> , Editura Medicală Universitară "Iuliu Hațieganu", Cluj-Napoca, 2007.	
2. H. R. Hunt, T. F. Block, G. M. McKelvy, <i>Laboratory Experiments for General Chemistry</i> , Saunders College Publisher, Orlando, 1998	
3. C. B. Bishop, M. B. Bishop, K. W. Whietten, <i>Standard and Microscale Experiments in General Chemistry</i> , fourth edition, Saunders College Publisher, Orlando, 2000	
4. <a href="http://www.farma.umfcluj.ro">http://www.farma.umfcluj.ro</a> , General and Inorganic Chemistry Section	

## 8. Evaluation

Activity type	8.1. Evaluation criteria	8.2. Evaluation methods	8.3. Percent of final grade
<b>8.4. Course</b>	<ul style="list-style-type: none"> <li>The ability of understanding fundamental specific issues</li> <li>Concept assessment</li> <li>Problem-solving ability</li> <li>Analytical and synthetic thinking</li> </ul>	Multiple choice exam	<b>70%</b>
<b>8.5. Laboratory</b>	<ul style="list-style-type: none"> <li>Obeying the safety rules and regulations</li> <li>Thoroughness in performing experimental procedures</li> <li>Scientific thinking, correct interpretation and assessment of results</li> </ul>	Practical exam / performing experiments, chemical reactions and compound synthesis, assessment of the results, interview / oral exam	<b>20%</b>

### **8.6. Minimal performance standard**

Acquirement of the fundamental concepts of general and inorganic chemistry

- General knowledge on the atom structure, molecule structure, states of matter, dispersed systems
- Types of chemical elements and inorganic compounds – differentiating between a metal and a non-metal, between an ionic and a covalent compound, between an acid, a base and a salt, identifying a coordination compound
- Physico-chemical properties of elements. Names and physico-chemical properties of compounds within the main classes of inorganic substances
- Types of chemical reactions – writing and balancing chemical equations
- Security and personal safety in the chemistry laboratory, fire protection, first aid procedures in case of accidents
- Correct handling of chemical compounds, glassware and laboratory equipment
- Performing correctly various techniques and methods specific for the chemical laboratory: heating, cooling, weighing, volume measurement, temperature measurement, precipitation, filtration, distillation, extraction

## SPORT

### 1. Information about the course

<b>1.1. Discipline</b>		<b>SPORT</b>					
<b>1.2. Course instructor</b>		-					
<b>1.3. Laboratory instructor</b>		<b>Associate Professor Mihai Ludovic Kiss, PhD</b>					
<b>1.4. Year</b>	<b>1</b>	<b>1.5. Semester</b>	<b>2</b>	<b>1.6. Evaluation type</b>	<b>Practical exam</b>	<b>1.7. Course type</b>	<b>Compulsory, complementary discipline</b>

### 2. Total estimated time (hours/semester for teaching activity)

<b>2.1. Total hours/week</b>	<b>2 (2<sup>nd</sup> sem.)</b>	<b>2.2. Course</b>	<b>0</b>	<b>2.3. Laboratories</b>	<b>2</b>
<b>2.4. Total hours in the curriculum</b>	<b>28 (2<sup>nd</sup> sem.)</b>	<b>2.5. Course</b>	<b>0</b>	<b>2.6. Laboratories</b>	<b>28</b>
<b>2.4. Distribution of time needed (1<sup>st</sup> sem. / 2<sup>nd</sup> sem.)</b>					<b>Hours</b>
a. Study using text books, lecture notes, bibliography					-
b. Individual study within libraries, on-line platforms, field research					-
c. Preparing seminars/laboratories, homework, projects, portfolios and essays					-
d. Tutoring					-
e. Evaluation/ semester					2
f. Other activities					-
<b>2.7. Total hours for individual study (a+b+c+d)</b>				<b>2 (2<sup>nd</sup> sem.)</b>	
<b>2.8. Total hours per semester</b>				<b>30 (2<sup>nd</sup> sem.)</b>	
<b>2.9. Number of credits</b>				<b>2 suppl. (2<sup>nd</sup> sem.)</b>	

### 3. Prerequisites

<b>3.1. Curriculum</b>	-
<b>3.2. Competences</b>	- Motor abilities obtained upon completion of secondary education

### 4. Requisites

<b>4.1. For lectures</b>	-
<b>4.2. For laboratories sessions</b>	<ul style="list-style-type: none"> <li>-•Students will not practical work with mobile phones turned on. Also, telephone calls will not be tolerated during the practical work neither leaving the gym to make personal phone calls;</li> <li>• It is prohibited consumption of food and beverages during the practical work</li> <li>• No delay will be tolerated during the practical work students as it was proven to be disruptive to the educational process</li> <li>• Students have to wear the specific physical education equipment</li> <li>• Students will display an appropriate attitude towards the teaching process, teaching materials, teachers and colleagues.</li> </ul>

### 5. Specific competences acquired

<b>Professional competences</b>	<ul style="list-style-type: none"> <li>• Training future pharmacists by modern conceptions concerning the improvement of lifestyle of the population, based on systematic practice of physical activities and exercises</li> </ul>
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<b>Transversal competences</b>	<ul style="list-style-type: none"> <li>• To build a ability and a habit of systematic practice of physical exercises as a component of lifestyle conducive to health ( "Mens sana in corpore sano")</li> <li>• To know aspects of prevention and correction of deficiencies attitudes and recovery of traumatic sequelae and those caused by some diseases</li> <li>• To demonstrate concern for the professional development of critical thinking skills through training</li> <li>• To know the terminology physical education and sport</li> <li>• To strengthen technical and tactical skills specific individual and team sports</li> <li>• To have the ability to communicate effectively with teachers and peers</li> <li>• To develop skills to practice physical education and sports activities in their free time</li> <li>• To attend events / subject-specific events: contests, championships, cups in various sports, scientific and specialized seminars</li> <li>• The development and cultivation of aesthetic sense and developing a positive attitude towards artistic activities</li> </ul>
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### 6. Course objectives

<b>6.1.General objectives</b>	<ul style="list-style-type: none"> <li>• Maintaining optimal health by forming the habit of practicing systematic physical exercise</li> <li>• It is targeted the assimilation, consolidation and improvement of knowledge and skills of several sports previously acquired or newly learned</li> </ul>
<b>6.2. Specific objectives</b>	<p>At the end of the course students will be able to:</p> <ul style="list-style-type: none"> <li>• Understand and apply skills to practice health maintenance exercises as leisure</li> <li>• Know the regulations of dedicated sports</li> <li>• Demonstrate a technical element of a branch of sport practiced throughout the course</li> </ul>

### 7. Content

Teaching methods: oral presentation, explanation, demonstration. The activities of several branches of sports will be held in modular system.

<b>7.1.Lectures (hours)</b>
-
<b>7.2.Laboratory activities (hours)</b>
Physical education and sport: 1. General physical development 2. Physical activity for corrective and recovery purpose (activities that require low physical exertion)
Collective and individual sports branches (sections of ASUIH): - Basketball, volleyball, ballroom dancing, aerobics, fitness, bodybuilding, table tennis, martial arts, bodybuilding, fitness, skiing, chess, badminton
Elements of physiotherapy.
<b>Bibliography</b> - M. Kiss, Caiet de lucrări practice: Dans de societate, 2012 - M. Kiss, Caiet de lucrări practice: Baschet, 2012 - M. Kiss, Caiet de lucrări practice: Culturism - Fitness, 2013 - C. Suci, Îndreptar de lucrări practico-metodice, 2013 - Bocu T. Activitatea fizică în viața omului contemporan. Editura Casa Cărții de Știință 2007 - Regulations branches of sport that were practiced



## 8. Evaluation

Activity type	8.1.Evaluation criteria	8.2. Evaluation methods	8.3. Percent of final grade
<b>8.5. Laboratory</b>	According the educational goals	Colloquy Verification Summative evaluation	<b>80%</b> <b>20%</b>
<b>8.6. Minimal performance standard</b>			
<ul style="list-style-type: none"><li>- Knowledge of the training and systematic practice of physical exercise in order to maintain optimal health</li><li>- Knowledge of specific terminology and rules of sport practiced throughout the year</li><li>- Recognition of a structure of exercises specific to the chosen sport</li></ul>			

# PHARMACEUTICAL PHYSICS

## 1. Information about the course

<b>1.1. Discipline</b>		<b>Pharmaceutical physics. Biophysics</b>					
<b>1.2. Course instructor</b>		<b>Professor Constantin M. Lucaciu, PhD Professor Rareș Stiuftuc, PhD Associate professor, Nicoleta S. Vedeanu, PhD</b>					
<b>1.3. Laboratory instructor</b>		<b>Professor Rares Stiuftuc, PhD Associate professor, Nicoleta S. Vedeanu, PhD Lecturer Cristian Iacoviță, PhD</b>					
<b>1.4. Year</b>	<b>1</b>	<b>1.5. Semester</b>	<b>1</b>	<b>1.6. Evaluation type</b>	<b>Theoretical exam Lab exam Tests</b>	<b>1.7. Course type</b>	<b>Fundamental discipline Compulsory discipline</b>

## 2. Total estimated time (hours/semester for teaching activity)

<b>2.1. Total hours/week</b>	<b>4 (1<sup>st</sup> sem.) 0 (2<sup>nd</sup> sem.)</b>	<b>2.2. Course</b>	<b>2 0</b>	<b>2.3. Laboratories</b>	<b>2 0</b>
<b>2.4. Total hours in the curriculum</b>	<b>56 (1<sup>st</sup> sem.) 0 (2<sup>nd</sup> sem.)</b>	<b>2.5. Course</b>	<b>28 0</b>	<b>2.6. Laboratories</b>	<b>28 0</b>
<b>2.4. Distribution of time needed (1<sup>st</sup> sem. / 2<sup>nd</sup> sem.)</b>					<b>Hours</b>
a. Study using text books, lecture notes, bibliography					<b>2/0</b>
b. Individual study within libraries, on-line platforms, field research					<b>2/0</b>
c. Preparing seminars/laboratories, homework, projects, portfolios and essays					<b>2,5/0</b>
d. Tutoring					<b>0,5/0</b>
e. Evaluation/ semester					<b>16/0</b>
f. Other activities					<b>-</b>
<b>2.7. Total hours for individual study (a+b+c+d)</b>				<b>98 (1<sup>st</sup> sem.)</b>	
<b>2.8. Total hours per semester</b>				<b>170 (1<sup>st</sup> sem.)</b>	
<b>2.9. Number of credits</b>				<b>4 (1<sup>st</sup> sem.)</b>	

## 3. Pre-requisites :

<b>3.1. Curriculum</b>	-
<b>3.2. Competences</b>	-

## 4. Requisites :

<b>4.1. For lectures</b>	-
<b>4.2. For laboratories sessions</b>	-

## 5. Specific competences acquired

<b>Professional competences</b>	<ul style="list-style-type: none"> <li>• Ability to use properly and in the context the specialized terminology</li> <li>• Knowledge of physical models, the general principles of mechanics, thermodynamics, electromagnetism main laws, optics and structure of matter at atomic and subatomic level</li> <li>• Ability to explain and interpret the theoretical and practical contents of physics in an interdisciplinary approach with other fundamental biomedical as</li> </ul>
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	<p>chemistry, mathematics, cellular biology, biochemistry</p> <ul style="list-style-type: none"> <li>• Understanding of peculiar aspects of pharmaceutical physics research</li> <li>• Training skills of using specific methodologies and laboratory techniques</li> <li>• Gaining experience and ability in handling laboratory equipment and techniques specific for the study of physics applied in life sciences: determination of properties and specific physical constants of materials: density of liquids and solids, specific heat, melting point, boiling temperature, surface tension coefficient, viscosity coefficient, refractive index, specific rotation angle etc.</li> <li>• Students necessity to acquire skills needed to use laboratory equipment: electrical equipment, spectrosopes, spectrophotometers , radiation detectors, pH meters, conductometers, oscilloscopes, polarimeters</li> <li>• Students ability for the determination of some simple medical tests: hematocrit, hemoglobin, serum protein electrophoresis, the isoelectric point of proteins</li> <li>• Students necessity to acquire specific skills for experimental measurements: errors calculation, graphics, linear interpolation</li> </ul>
<b>Transversal competences</b>	<ul style="list-style-type: none"> <li>• Using the concepts in new contexts</li> <li>• Using theoretical knowledge in solving problems</li> <li>• Optimal and creative use of individual potential in and scientific activities</li> <li>• Individual professional development</li> </ul>

## 6. Course objectives

<b>6.1. General objectives</b>	<ul style="list-style-type: none"> <li>• Pharmaceutical physics course aims to contribute to the scientific training of Pharmacy students by integrating knowledge and skills acquired in the subject of Pharmaceutical physics with those of other basic subjects: Chemistry, Cell Biology, Physiology.</li> <li>• The course aims also to contribute to the development of students scientific thinking patterns based on the model description of physical, chemical and biological systems, to establish cause-effect relation between various phenomena and processes, to verify the theoretical models based on experimental data</li> </ul>
<b>6.2. Specific objectives</b>	<p>Students should be able to explain:</p> <ul style="list-style-type: none"> <li>• The physical principles underlying the physical methods and equipment used in the pharmaceutical practice and research, quantitative, qualitative and structural analysis of different molecules of biological interest</li> <li>• The physical - chemical and biological role of organic macromolecules based on structural data</li> <li>• Environmental effects on biological systems, mainly the effects of ionizing radiation;</li> </ul>

## 7. Content

**Teaching methods for course:** Lecture, systematic exposition, conversation, questioning, oral exposition combined with Power Point presentation, interactive communication

**Teaching methods for laboratory activity:** Conversation, questioning, demonstration, individual work, instrument manipulation

7.1 Course, 28 hours	Remarks
<p><b>1. Kinematics. Dynamics.</b>  Dynamics of the circular motion. Centrifugal force. Applications  The momentum of a force and the angular momentum. Conservation laws.  Mechanical work and energy. Harmonic oscillatory motion. Forced and amortized oscillations. Mechanical waves. Reflection and refraction. Interference of the waves. Diffraction. Doppler effect.  Mechanics of the deformable solid body. Hooke law. Elastic and plastic deformation. Hardness. Hardness of the pharmaceutical tablets.  Fluids. Static fluid mechanics. Pascal's law Archimede's law. Dynamics of fluids. Rheology. Notions of rheology. Bernoulli law. Newton law. Newtonian liquid flow. Viscometers. Non-Newtonian fluids. Rotational viscometer. Surface tension. Jurin's law.  Laplace's Law. The interfacial tension. Surfactant. Gibbs equation.</p>	
<p><b>2. Thermodynamics</b>  First principle of thermodynamics. Work. Heat. Internal energy. Applications. Calorimetry.  Second principle of thermodynamics. Carnot cycle. Efficiency.  Entropy. Entropy and probability. Entropy and disorder. Systems far from thermodynamic equilibrium.  Thermodynamic potentials. Enthalpy. Free energy. Gibbs potential. Kinetio-molecular theory of the gas. Pressure formula. State equation and caloric equations. Specific heat of solids. Colligative properties of the solutions. Osmosis. The osmotic work. Vaporization and boiling. Distillation. Clausius Clapeyron equation.. Melting and freezing. Eutectics. The triple point. The phases rule.  Transport Phenomena. Diffusion. Fick's equations. The transport of heat by conduction (Fourier), convection and radiation (radiation laws)</p>	
<p><b>3. Electricity and Magnetism</b>  Coulomb's law. Electric field. Electric potential. Gauss's law. Applications.  Stationary electric current. Electric circuit. Ohm's Law microscopic form. Electrolysis. Electrode potential. pH measurement. Magnetic field.  Magnetic induction. Ampere's law. Biot-Savart's law.  Electromagnetic induction. Faraday's Law.  Electron magnetic moments. Bohr magneton. Electronic spin. Magnetic properties of the substance. Dia, para and ferro magnetism. Resonance. Electron paramagnetic resonance. Nuclear Magnetic Resonance.</p>	
<p><b>4. Optics</b>  Geometrical optics. Diopters. Mirrors and lenses. The optical microscope.  Wave optics. Light-electromagnetic wave. Maxwell equations.  Interference and diffraction. Interferential devices.  Light polarization. Applications.  Fotonic optics. Photoelectric effect. Compton effect.</p>	
<p><b>5. Nuclear physics</b>  Atomic nucleus. Nuclear forces. Isobars. Isotopes Nuclear models.  Natural and artificial radioactivity. Decay law.  Irradiation doses. Biological dose. Protection against radiation.</p>	
<p><b>Bibliography</b>  1. Constantin Mihai Lucaciu, Fizica si Elemente de Biofizica, Editura Medicala Universitara "Iuliu Hatieganu" Cluj-Napoca, 2000  2. F. Gremy, Biophysique, Ed. Flammarion Paris, 1982</p>	

3. D., Halliday, R. Resnick, Fizica, Fizica, Ed. Didactica si pedagogica, Bucuresti, 1975 4. E. Shottan, K. Ridgway, Physical Pharmaceutics, Clarendon Press Oxford, 1974 5. G. Ronto, A Tarjan An introduction to Biophysics with medical orientation, Akademiai Kiado, Budapest 1994 6. Pharmaceutical physics lecture notes PDF	
<b>7.2. Laboratory activities 28 hours</b>	<b>Remarks</b>
1. Physical measures and units, errors calculation. Balance. Sensibility. Scaling methods	
2. Densimeters. Liquids and solids density measurements by pycnometer. Hydrometers. Mohr-Westphall balance	
3. Viscometers. Ostwald and Hoppler viscometer.	
4. Surface tension coefficient determination – Traube method	
5. Calorimetry. Specific heat determination solids and liquids. The melting latent heat coefficient determination. Enthalpy of vaporization.	
6. Electricity: electrolysis, conductometry, resistivity determination, variation of resistivity with the temperature, e.m.f. determination a galvanic element, galvanic cell, pH	
8. Optics (lenses study, microscope study, refractometry, polarimetry, spectrophotometry, SPEKOL spectro-colourimetre)	
9. Nuclear radiation detection	
<b>Bibliography</b>	
1. Lab reports (written and electronic materials) 2. C.M.Lucaciu, Physique et Biophysique experimentales Editura Medicala Universitara “Iuliu Hatieganu” Cluj-Napoca, 2000	

### 8. Evaluation

Activity type	8.1. Evaluation criteria	8.2. Evaluation methods	8.3. Percent of final grade
<b>8.4. Course</b>	General evaluation criteria (completeness and correctness of knowledge aquired, logical consistency, fluency of speech, the force of argument) Specific criteria: -criteria that emphasizes the attitude and the motivational aspects of student activities -the ability to understand the fundamental issues and to customise them	Written exam as multiple choice questions	<b>65 %</b>
<b>8.5. Laboratory</b>	Evaluation of theoretical knowledge and practical skills	Practical exam  Tests	<b>25%</b>  <b>10%</b>
<b>8.6. Minimal performance standard</b>			
<ul style="list-style-type: none"> <li>• Acquiring the fundamental concepts of Pharmaceutical physics               <ul style="list-style-type: none"> <li>- to know the principles of Newtonian mechanics</li> <li>- to define Newtonian and non-Newtonian bodies</li> <li>- defining methods for measuring the viscosity</li> <li>- to know the principles of thermodynamics. Applying the first principle in biological</li> </ul> </li> </ul>			

systems, living organisms. Energy balance.

- to know the fundamental laws of electricity and magnetism (Coulomb's law, Ohm's, Gauss's law)
- to know the role of electromagnetic force, Lorentz force, mass spectrometry and its pharmaceutical applications
- to characterise the electromagnetic spectrum of waves
- formation of images through lenses
- to characterization of the wave properties of light: diffraction, interference.
- to know the corpuscular aspect of light. Dualism wave-corporal
- to know the main types of nuclear radiation. Decay law. Medical Applications of radioisotopes.
- to acquire notions of irradiation dosimetry. Irradiation protection.

# BIOPHYSICS

## 1. Information about the course

<b>1.1. Discipline</b>		<b>Pharmaceutical physics. Biophysics</b>					
<b>1.2. Course instructor</b>		<b>Professor C. M. Lucaciu, PhD Professor Rareş Stiufiuc, PhD Associate professor N. S. Vedeanu, PhD</b>					
<b>1.3. Laboratory instructor</b>		<b>Professor Rareş Stiufiuc, PhD Associate professor Nicoleta S. Vedeanu, PhD Lecturer Cristian Iacoviță, PhD</b>					
<b>1.4. Year</b>	<b>1</b>	<b>1.5. Semester</b>	<b>1</b>	<b>1.6. Evaluation type</b>	<b>Theoretical exam Lab exam Tests</b>	<b>1.7. Course type</b>	<b>Fundamental discipline Compulsory discipline</b>

## 2. Total estimated time (hours/semester for teaching activity)

<b>2.1. Total hours/week</b>	<b>0 (1<sup>st</sup> sem.) 2 (2<sup>nd</sup> sem.)</b>	<b>2.2. Course</b>	<b>0 1</b>	<b>2.3. Laboratories</b>	<b>0 1</b>
<b>2.4. Total hours in the curriculum</b>	<b>0 (1<sup>st</sup> sem.) 28 (2<sup>nd</sup> sem.)</b>	<b>2.5. Course</b>	<b>0 14</b>	<b>2.6. Laboratories</b>	<b>0 14</b>
<b>2.4. Distribution of time needed (1<sup>st</sup> sem. / 2<sup>nd</sup> sem.)</b>					<b>Hours</b>
a. Study using text books, lecture notes, bibliography					<b>1</b>
b. Individual study within libraries, on-line platforms, field research					<b>1</b>
c. Preparing seminars/laboratories, homework, projects, portfolios and essays					<b>1,5</b>
d. Tutoring					<b>0,5</b>
e. Evaluation/ semester					<b>15,5</b>
f. Other activities					<b>-</b>
<b>2.7. Total hours for individual study (a+b+c+d)</b>				<b>56 (2<sup>nd</sup> sem.)</b>	
<b>2.8. Total hours per semester</b>				<b>99,5 (2<sup>nd</sup> sem.)</b>	
<b>2.9. Number of credits</b>				<b>2 (2<sup>nd</sup> sem.)</b>	

## 3. Pre-requisites:

<b>3.1. Curriculum</b>	-
<b>3.2. Competences</b>	-

## 4. Requisites:

<b>4.1. For lectures</b>	-
<b>4.2. For laboratories sessions</b>	-

## 5. Specific competences acquired

<b>Professional competences</b>	<ul style="list-style-type: none"> <li>• Ability to use properly and in the context the specialized terminology</li> <li>• Knowledge of physical knowledge in life science</li> <li>• Ability to explain and interpret the theoretical and practical contents of biophysics in an interdisciplinary approach with other fundamental biomedical as chemistry, mathematics, cellular biology, biochemistry</li> </ul>
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	<ul style="list-style-type: none"> <li>• Understanding of peculiar aspects of biophysics in research</li> <li>• Training skills of using specific methodologies and laboratory techniques</li> <li>• Gaining experience and ability in handling laboratory equipment and techniques specific for biophysics: determination of coefficients like concentration of hemoglobine, viscosity coefficients for non-newtonian fluids, hematocrit, solution concentration by polarimetry, osmotic pressure of solutions</li> <li>• Students necessity to acquire skills needed to use laboratory equipment: electrical equipment, spectrosopes, spectrophotometers , radiation detectors, pH meters, conductometers, oscilloscopes, polarimeters</li> <li>• Students ability for the determination of some simple medical tests: hematocrit, hemoglobin, serum protein electrophoresis, the isoelectric point of proteins</li> <li>• Students necessity to acquire specific skills for experimental measurements: errors calculation, graphics, linear interpolation</li> </ul>
<b>Transversal competences</b>	<ul style="list-style-type: none"> <li>• Using the concepts in new contexts</li> <li>• Using theoretical knowledge in solving problems</li> <li>• Optimal and creative use of individual potential in and scientific activities</li> <li>• Individual professional development</li> </ul>

## 6. Course objectives

<b>6.1. General objectives</b>	<ul style="list-style-type: none"> <li>• Students must be able to explain based on the physics laws the physiological and pathological processes occurring in biological systems; the relationships among physical and biological role of organic molecules, the effects of environmental factors on biological systems</li> </ul>
<b>6.2. Specific objectives</b>	<p>Students should be able to explain:</p> <ul style="list-style-type: none"> <li>• The physical principles underlying the physical methods and equipment used in the pharmaceutical practice and research, quantitative, qualitative and structural analysis of different molecules of biological interest</li> <li>• The physical - chemical and biological role of organic macromolecules based on structural data</li> <li>• Environmental effects on biological systems, mainly the effects of ionizing radiation;</li> </ul>

## 7. Content

**Teaching methods for course:** Lecture, systematic exposition, conversation, questioning, oral exposition combined with Power Point presentation, interactive communication

**Teaching methods for laboratory activity:** Conversation, questioning, demonstration, individual work, instrument manipulation

7.1 Course 14 hours	Remarks
<b>1. Biomechanics.</b> The structure of muscles. The mechanism of muscle contraction. The dynamics of muscle activity.	
<b>2. Structure of biological membranes</b> <b>Membrane models.</b> Physical properties of lipids. Protein membrane. Transport through biological membranes.	



Active transport through the lipidic bilayer. Transport through oligo-peptides and proteins. Active transport. Medical applications Biophysics methods in the study of transport systems.	
<b>3. Osmosis. Medical applications</b> <b>Biophysics of blood circulation</b>	
<b>4. Sounds. Infra- and ultra- sounds. Weber Fechner law.</b> <b>Sensory biophysics. Human eye.</b>	
<b>5. Bioelectricity</b> Transmembrane potential generation. Nernst-Planck equation. Resting potential. Action potential. Propagation of action potential.	
<b>Bibliography</b>	
<ol style="list-style-type: none"> <li>1. Constantin Mihai Lucaciu “Transportul ionilor prin membranele biologice” Editura medicala Universitara “Iuliu Hatieganu” Cluj-Napoca, 2005.</li> <li>2. F. Gremy, Biophysique, Ed. Flammarion, Paris, 1982.</li> <li>3. A. Bouyysy, M. Davier, B. Gantz, Physique pour les sciences de la vie, Ed. Belin, Paris, 1988</li> <li>4. D-G. Margineanu, Energetica lumii vii, Ed. Edimpex-Speranta, Bucuresti, 1992.</li> <li>5. D-G Margineanu, M.I.Isac, C.Tarba, Biofizica, Ed. Didactica si Pedagogica, Bucuresti, 1980</li> <li>6. Pharmaceutical physics lecture notes in PDF</li> </ol>	
<b>7.2. Laboratory activities 14 hours</b>	<b>Remarks</b>
1. Spectrophotometric determination of hemoglobin in blood	
2. Determination of viscosity coefficient by rotational viscometre for non-newtonian liquids	
3. Light polarisation. Determination of solution concentration with the polarimetre.	
4. Osmosis. Cryoscopy	
5. Characteristics of the optical microscope	
6. Gamma spectrometer	
<b>Bibliography</b>	
<ol style="list-style-type: none"> <li>1. Lab reports (written and electronic materials)</li> <li>2. C.M.Lucaciu, Physique et Biophysique experimentales Editura Medicală Universitară “Iuliu Hatieganu” Cluj-Napoca, 2000</li> </ol>	

## 8. Evaluation

Activity type	8.1. Evaluation criteria	8.2. Evaluation methods	8.3. Percent of final grade
<b>8.4. Course</b>	General evaluation criteria (completeness and correctness of knowledge aquired, logical consistency, fluency of speech, the force of argument) Specific criteria: -criteria that emphasizes the attitude and the motivational aspects of student activities -the ability to understand the fundamental issues and to customise them	Written exam as multiple choice questions	<b>65 %</b>
<b>8.5. Laboratory</b>	Evaluation of theoretical knowledge and practical skills	Practical exam Tests	<b>25%</b> <b>10%</b>

### **8.6. Minimal performance standard**

Learning the main concepts of biophysics

- Explanation of the osmotic flow mechanisms in biological cells. Explanation of physiological and pathological phenomena based on the laws of osmosis
- To explain mechanisms of muscle contraction
- Application of mechanics laws in the blood circulation
- To know the main types of transmembrane transport.
- To be able to calculate the equilibrium electric potentials for different transmembrane ion concentrations and how they can be modified due to transient changes of ionic permeability

# MOLECULAR GENETICS AND GENETIC ENGINEERING

## 1. Information about the course

<b>1.1. Discipline</b>		<b>Pharmaceutical botany</b>					
<b>1.2. Course instructor</b>		<b>Lecturer Georgeta Balica, PhD</b>					
<b>1.3. Laboratory instructor</b>		<b>Lecturer Georgeta Balica, PhD</b>					
<b>1.4. Year</b>	<b>1</b>	<b>1.5. Semester</b>	<b>2</b>	<b>1.6. Evaluation type</b>	<b>Written exam + Practical exam</b>	<b>1.7. Course type</b>	<b>Fundamental discipline, Compulsory discipline</b>

## 2. Total estimated time (hours/semester for teaching activity)

<b>2.1. Total hours/week</b>	<b>1 (2<sup>nd</sup> sem.)</b>	<b>2.2. Course</b>	<b>1</b>	<b>2.3. Laboratories</b>	<b>1</b>
<b>2.4. Total hours in the curriculum</b>	<b>28 (2<sup>nd</sup> sem.)</b>	<b>2.5. Course</b>	<b>14</b>	<b>2.6. Laboratories</b>	<b>14</b>
<b>2.4. Distribution of time needed (1<sup>st</sup> sem. / 2<sup>nd</sup> sem.)</b>					<b>Hours</b>
a. Study using text books, lecture notes, bibliography					20
b. Individual study within libraries, on-line platforms, field research					10
c. Preparing seminars/laboratories, homework, projects, portfolios and essays					12
d. Tutoring					2
e. Evaluation/ semester					3
f. Other activities					-
<b>2.7. Total hours for individual study (a+b+c+d)</b>				<b>44 (2<sup>nd</sup> sem.)</b>	
<b>2.8. Total hours per semester</b>				<b>75 (2<sup>nd</sup> sem.)</b>	
<b>2.9. Number of credits</b>				<b>2 (2<sup>nd</sup> sem.)</b>	

## 3. Pre-requisites:

<b>3.1. Curriculum</b>	Fundamental notions of Cell biology and Genetics
<b>3.2. Competences</b>	-

## 4. Requisites:

<b>4.1. For lectures</b>	<ul style="list-style-type: none"> <li>Students are accepted in the class only without different types of gadgets (mobile phone, smartphone) or having them turned off.</li> <li>Being late after the hour indicated for course beginning is not tolerated</li> <li>Student should respect the Teaching activity regulation of the University</li> </ul>
<b>4.2. For laboratories sessions</b>	<ul style="list-style-type: none"> <li>Students are accepted in the class only without different types of gadgets (mobile phone, smartphone) or having them turned off.</li> <li>Being late after the hour indicated for laboratory beginning is not tolerated</li> <li>Student should respect the Teaching activity regulation of the University and the Occupational safety and health regulation in the Molecular genetics laboratory</li> </ul>

## 5. Specific competences acquired

<b>Professional competences</b>	<ul style="list-style-type: none"> <li>Capacity of adequately using the profile terminology</li> <li>Understanding the aspects concerning the particularities of the research in the field of molecular genetics</li> </ul>
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	<ul style="list-style-type: none"> <li>• Knowing the classical and molecular cytogenetics methods, DNA recombinant technology and their applications on genetic disorders and in pharmaceutical industry</li> <li>• Ability of using techniques and specific protocols for studying the genetic material in the laboratory</li> <li>• Experience in handling laboratory equipment and in using specific laboratory protocols</li> </ul>
<b>Transversal competences</b>	<ul style="list-style-type: none"> <li>• Using notions in new contexts</li> <li>• Using theoretical knowledge in solving different problems</li> <li>• Best use of the own creative potential in scientific research</li> <li>• Self professional development</li> </ul>

## 6. Course objectives

<b>6.1.General objectives</b>	<ul style="list-style-type: none"> <li>• Getting the students acquainted to the aspects connected with the application of the theoretical and practical principles of genetics, the use of modern methods in therapy</li> </ul>
<b>6.2.Specific objectives</b>	<ul style="list-style-type: none"> <li>• Knowing and understanding the methods of study in molecular genetics</li> <li>• Knowing the structure and the functions of nucleic acids; knowing the laboratory techniques and protocols in the field of genomics</li> <li>• Understanding how to choose a work protocol based on certain reasons and mechanisms</li> <li>• Getting acquainted with the main research directions in the field of molecular genetics and the ethical issues implied</li> <li>• Stimulating the ability of synthesis and bibliographic research</li> </ul>

## 7. Content

**Teaching methods for course:** lecture, systematic approach, conversation, questioning, oral lecture with slide projection, interactive communication

**Teaching methods for laboratory activity:** conversation, questioning, demonstration, oral presentation sustained by digital support, interactive communication, virtual applications, modelling

<b>7.1 Course (hours)</b>	<b>Remarks</b>
1. The notion of gene (1)	
2. Nucleic acids: DNA, RNA – structure and functions. (1)	
3. DNA replication. The genetic code. Mutations and genetic disorders (2)	
4. Recombinant DNA technology. Molecular cloning (1)	
5. Restriction enzymes. Cloning vectors (2)	
6. Polymerase chain reaction (PCR) (1)	
7. Southern Blot analysis (1)	
8. DNA sequencing (1)	
9. The applications of molecular genetics in the pharmaceutical industry (1)	
10. Transgenic plants (1)	
11. Gene therapy (1)	
12. The genetic of cancer (1)	
<b>Bibliography</b>	
<ol style="list-style-type: none"> <li>1. <b>Alberts, B., Johnson, A., Lewis, J., Raff, M., Roberts, K., Walter, P.:</b> <i>Molecular Biology of the Cell</i>, 5<sup>th</sup> edition, New York: Garland Science, 2008.</li> <li>2. <b>Etienne, J.</b> <i>Biochimie genetique, Biologie moleculaire</i>. Paris: Masson, 1999.</li> <li>3. <b>Gavrilă, L.</b> <i>Genomică</i>. București: Editura Enciclopedică, 2003.</li> </ol>	

<p>4. <b>Lodish, H., Berk, A., Zipursky, L., Matsudaira, P., Baltimore, D., Darnell J.</b> <i>Molecular Cell Biology, 4th edition.</i> New York: W.H. Freeman, 2000.</p> <p>5. <b>Raicu, P.</b> <i>Genetica generală și umană.</i> București: Humanitas, 1997.</p> <p>6. <b>Rossignol, J.-L.</b> <i>Genetique, 4e edition.</i> Paris: Masson, 1996.</p> <p>7. <b>Taușer, R.G..</b> <i>Farmacogenetica. Designul de medicamente și terapia individualizată.</i> Iași : Junimea, 2005.</p> <p>8. <b>Zarnea G., O.V. Popescu,</b> <i>Dicționar de Microbiologie generală și Biologie moleculară,</i> București, Ed. Academiei Române, 2011.</p> <p>9. <b>www.farma.umfcluj.ro : Molecular genetics and genetic engineering course</b></p>	
<b>7.2. Laboratory activities (hours)</b>	<b>Remarks</b>
1. The structure of the nucleic acids: DNA and RNA (2)	
2. The genetic code. Transcription and translation (2)	
3. The extraction and the isolation of the DNA (2)	
4. The DNA electrophoresis (2)	
5. Size determination of DNA restriction fragments (2)	
6. DNA fingerprinting (2)	
7. The PCR technique (2)	
<b>Bibliography</b>	
<p>1. <b>Alberts, B., Johnson, A., Lewis, J., Raff, M., Roberts, K., Walter, P.:</b> <i>Molecular Biology of the Cell, 5<sup>th</sup> edition,</i> New York: Garland Science, 2008.</p> <p>2. <b>Dordea M., Crăciunaș C., Coman N., Andraș C.,</b> <i>Genetică generală și moleculară, abordare practică,</i> Cluj-Napoca: Presa. Universitară Clujeană, 2000.</p> <p>3. <b>Etienne, J.</b> <i>Biochimie genetique, Biologie moleculaire.</i> Paris: Masson, 1999.</p> <p>4. <b>Gavrilă, L.</b> <i>Genomică, Vol I,II,</i> București: Editura Enciclopedică, 2003.</p> <p>5. <b>Lodish, H., Berk, A., Zipursky, L., Matsudaira, P., Baltimore, D., Darnell J.</b> <i>Molecular Cell Biology, 4th edition.</i> New York: W.H. Freeman, 2000.</p> <p>6. <b>Raicu, P.</b> <i>Genetica generală și umană.</i> București: Humanitas, 1997.</p> <p>7. <b>Rossignol, J.-L.</b> <i>Genetique, 4e edition.</i> Paris: Masson, 1996.</p> <p>8. <b>Taușer, R.G..</b> <i>Farmacogenetica. Designul de medicamente și terapia individualizată.</i> Iași : Junimea, 2005.</p> <p>9. <b>Zarnea G., O.V. Popescu,</b> <i>Dicționar de Microbiologie generală și Biologie moleculară,</i> București : Ed. Academiei Române, 2011.</p> <p>10. <b>www.edvotek.com</b></p> <p>11. <b>www.farma.umfcluj.ro: molecular genetics and genetic engineering practical applications</b></p>	

## 8. Evaluation

Activity type	8.1.Evaluation criteria	8.2. Evaluation methods	8.3. Percent of final grade
<b>8.4. Course</b>	General evaluation criteria (full and correct knowledge, logical coherence, ability of analysis and synthesis) Criteria specific to the discipline Criteria judging the attitude and the motivation in the activity of the students Ability of understanding the fundamental problems and of seizing the particularities	Written exam (MCQ)	<b>80%</b>
<b>8.5. Laboratory</b>	Evaluation of theoretical knowledge and practical skills	Practical exam	<b>20%</b>
<b>8.6. Minimal performance standard</b>			
Knowing the principal notions of Molecular genetics and genetic engineering			

- The definition of the gene. The genetic code
- The nucleic acids (DNA, RNA, types, functions)
- Recombinant DNA technology.
- Methods of nucleic acids analysis.
- The applications of the molecular genetics in the pharmaceutical industry and medicine
- Recent development: transgenic plants, gene therapy, cancer genetics.

# COMPUTER SCIENCE

## 1. Information about the course

<b>1.1. Discipline</b>		<b>Mathematics and Informatics</b>					
<b>1.2. Course instructor</b>		<b>Lecturer Farcaș Anca, PhD</b>					
<b>1.3. Laboratory instructor</b>		<b>Lecturer Farcaș Anca, PhD Associate professor Revnic Cornelia, PhD</b>					
<b>1.4. Year</b>	1	<b>1.5. Semester</b>	1	<b>1.6. Evaluation type</b>	Exam	<b>1.7. Course type</b>	<b>Fundamental discipline</b>

## 2. Total estimated time (hours/semester for teaching activity)

<b>2.1. Total hours/week</b>	2 (1 <sup>st</sup> sem.)	<b>2.2. Course</b>	1	<b>2.3. Laboratories</b>	1
<b>2.4. Total hours in the curriculum</b>	28 (1 <sup>st</sup> sem.)	<b>2.5. Course</b>	14	<b>2.6. Laboratories</b>	14
<b>2.4. Distribution of time needed (1<sup>st</sup> sem. / 2<sup>nd</sup> sem.)</b>					Hours
a. Study using text books, lecture notes, bibliography					7
b. Individual study within libraries, on-line platforms, field research					14
c. Preparing seminars/laboratories, homework, projects, portfolios and essays					14
d. Tutoring					7
e. Evaluation/ semester					2
f. Other activities					-
<b>2.7. Total hours for individual study (a+b+c+d)</b>					<b>42 (1<sup>st</sup> sem.)</b>
<b>2.8. Total hours per semester</b>					<b>70 (1<sup>st</sup> sem.)</b>
<b>2.9. Number of credits</b>					<b>2 ( 1<sup>st</sup> sem.)</b>

## 3. Pre-requisites:

<b>3.1. Curriculum</b>	-
<b>3.2. Competences</b>	-

## 4. Requisites:

<b>4.1. For lectures</b>	• -
<b>4.2. For laboratories sessions</b>	• -

## 5. Specific competences acquired

<b>Professional competences</b>	<ul style="list-style-type: none"> <li>• the ability to use computer and software;</li> <li>• knowledge and appropriate use of terms commonly used in computer science;</li> <li>• computer operating capability;</li> <li>• electronic data management and analysis;</li> <li>• creating presentations with computer support;</li> <li>• information and documentation by electronic means</li> <li>• the ability to use specific terminology appropriately and in context</li> <li>• knowledge and understanding of basic concepts in the field for use in pharmaceutical sciences</li> <li>• knowledge of the application of the notions learned in specialized software used in practice;</li> </ul>
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	<ul style="list-style-type: none"> <li>the capacity to approach and synthesize learned knowledge,</li> <li>developing the logical ability to think about practical problems using specialized software;</li> <li>develop the capacity to share field specific knowledge;</li> </ul>
<b>Transversal competences</b>	<ul style="list-style-type: none"> <li>the ability to approach the informatics sciences;</li> <li>training capacity to operate with computer systems for medical and pharmaceutical sciences;</li> <li>training the ability to write complex electronic documents.</li> <li>capacity to make a statistical analysis of pharmaceutical practice data</li> <li>forming the ability to make a decision in order to ease the work in pharmacies.</li> </ul>

## 6. Course objectifs

<b>6.1. General objectives</b>	<ul style="list-style-type: none"> <li>creating and developing skills in the use of computer tools (hardware and software) for the practice of pharmacist.</li> <li>knowledge of software tools used in pharmaceutical practice</li> <li>familiarizing the student with the deterministic problem specific to the experimental sciences.</li> <li>forming the student as a user of computer tools useful for pharmaceutical-specific approaches.</li> <li>presentation of mathematical theoretical support in correlation with practical applications in pharmaceutical science and software implementations.</li> </ul>
<b>6.2. Specific objectives</b>	<ul style="list-style-type: none"> <li>knowledge of software tools used in pharmaceutical practice.</li> <li>acquiring the knowledge to research any desired information, using web pages provided and available on the internet</li> <li>enabling the ability to implement and solve mathematical problems through software tools</li> <li>exercise of synthesis and bibliographic documentation.</li> </ul>

## 7. Content

**Teaching methods for course:** Oral lecture combined with interactive sections, conversation. Oral exposures duplicated by PowerPoint presentations.

**Teaching methods for laboratory activity:** Demonstration, oral presentation doubled by electronic support, interactive communication.

<b>7.1 Course (hours)</b>	<b>Remarks</b>
<b>1. Introduction</b> <ul style="list-style-type: none"> <li>Computing resources for information and documentation. Local computers and networks. Internet.</li> <li>Know your computer. Hardware and Software. Basic software and application software. Graphic interface. Operating systems.</li> <li>Internet services (e-mail, FTP, World Wide Web, telnet).</li> <li>Ms Office applications: Word, Excel, PowerPoint, Access.</li> <li>Using the tools provided by Google, i.e. Google Docs, Sheets, Slides.</li> <li>Text editors. Pure Text Editor: Notepad. Editors for formatted text.</li> </ul>	<b>2h</b>
<b>2. Word editor</b> <ul style="list-style-type: none"> <li>Creating simple Word documents.</li> <li>Format of characters (shape, size, style, color, etc.)</li> <li>Text format (alignment, spacing, and indenting).</li> <li>Enumerations and numbering.</li> </ul>	<b>3h</b>



<ul style="list-style-type: none"> <li>• Arranging text on columns.</li> <li>• Fixed tab positions.</li> <li>• Creating and using tables.</li> </ul>	
<b>3. Excel</b> <ul style="list-style-type: none"> <li>• Excel documents. Workbooks and spreadsheets.</li> <li>• Excel formulas and functions.</li> <li>• Relative addresses and absolute addresses</li> <li>• Graphs in Excel.</li> <li>• Databases in Excel</li> <li>• Create subtotals.</li> <li>• Pivot tables.</li> <li>• Formulas with external references.</li> <li>• Statistical processing in Excel.</li> </ul>	<b>3h</b>
<b>4. PowerPoint and Prezi</b> <ul style="list-style-type: none"> <li>• Create a presentation.</li> <li>• Managing a slide show and slides.</li> <li>• Create a new slide.</li> <li>• Inserting images and other objects. Animation.</li> <li>• Print a presentation.</li> <li>• Viewing a presentation.</li> <li>• Reorganize slides in a presentation.</li> </ul>	<b>2h</b>
<b>5. Access databases</b> <ul style="list-style-type: none"> <li>• Creating a relational database.</li> <li>• Operations on the database (insertion, deletion, modification)</li> <li>• Retrieving information from the database (queries)</li> </ul>	<b>3h</b>
<b>6. Web pages</b> <ul style="list-style-type: none"> <li>• Create a simple web page</li> <li>• Add text on the page</li> <li>• Add images to the page</li> <li>• Add tables to the page</li> <li>• Page Formatting</li> </ul>	<b>1h</b>
<b>Bibliography</b> <ol style="list-style-type: none"> <li>1. Mihai Prodan, Augustin Prodan – <i>Microsoft Office XP pas cu pas</i>, Editura Albastra (Microinformatica Group), Cluj-Napoca, 2002, ISBN 973-650-080-2.</li> <li>2. A. Prodan, F. Gorunescu, M. Gorunescu – <i>Excel, Access si Pagini Web</i>, Editura Albastra (Microinformatica Group), Cluj-Napoca, 2006, ISBN 973-650-190-6.</li> <li>3. <a href="http://www.farma.umfcluj.ro">www.farma.umfcluj.ro</a> : Curs Matematică si Informatică, suport PowerPoint</li> </ol>	
<b>7.2. Laboratory activities (hours)</b>	<b>Remarks</b>
1. Computer resources for information and documentation. Local computers and networks. Internet. Internet services (email, FTP, World Wide Web, telnet).	<b>2h</b>
2. Word editor	<b>3h</b>
3. Excel	<b>3h</b>
4. Power Point and Prezi	<b>1h</b>
5. Access databases	<b>3h</b>
6. Web pages	<b>1h</b>
7. Summary	<b>1h</b>
<b>Bibliography</b> <ol style="list-style-type: none"> <li>1. Mihai Prodan, Augustin Prodan – <i>Microsoft Office XP pas cu pas</i>, Editura Albastra (Microinformatica Group), Cluj-Napoca, 2002, ISBN 973-650-080-2. A. Prodan, F. Gorunescu, M. Gorunescu – <i>Excel, Access si Pagini Web</i>, Editura Albastra (Microinformatica Group), Cluj-Napoca, 2006, ISBN 973-650-190-6.</li> <li>2. Mădălina Rusu, Augustin Prodan – <i>Informatică generală pentru studenții Facultății de</i></li> </ol>	

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3. [www.farma.umfcluj.ro](http://www.farma.umfcluj.ro): Matematică si Informatică, suport PowerPoint/Pdf

### 8. Evaluation

Activity type	8.1.Evaluation criteria	8.2. Evaluation methods	8.3. Percent of final grade
<b>8.4. Course</b>	General evaluation criteria: verification of the degree of systematization and use of the acquired concepts (logical coherence, fluency of expression, argumentation force) Criteria specific to the discipline Criteria for attitudinal and motivational aspects of student activities Ability to understand fundamental problems and customization.	Written exam	<b>20%</b>
		Group Project	<b>5%</b>
		Active participation	<b>5%</b>
<b>8.5. Laboratory</b>	The ability to work with the knowledge gained in practical activities	Practical exam	<b>65%</b>
		Individual projects	<b>5%</b>
<b>8.6. Minimal performance standard</b>			
<ul style="list-style-type: none"> <li>• Acquiring the main concepts of Medical informatics.</li> <li>• Grade 5 in the evaluation process.</li> </ul>			

# INTRODUCTION TO PHARMACEUTICAL TECHNOLOGY AND LEGISLATION

## 1. Information about the course

<b>1.1. Discipline</b>		<b>Pharmaceutical legislation</b>					
<b>1.2. Course instructor</b>				<b>Lecturer Anamaria Boboia, PhD</b>			
<b>1.3. Laboratory instructor</b>				<b>Not necessary.</b>			
<b>1.4. Year</b>	<b>I</b>	<b>1.5. Semester</b>	<b>II</b>	<b>1.6. Evaluation type</b>	<b>Individual homework + Written exam</b>	<b>1.7. Course type</b>	<b>Speciality discipline Compulsory discipline</b>

## 2. Total estimated time (hours / semester for teaching activity)

<b>2.1. Total hours / week</b>	<b>1</b>	<b>2.2. Course</b>	<b>1</b>	<b>2.3. Laboratories</b>	<b>0</b>
<b>2.4. Total hours in the curriculum</b>	<b>14</b>	<b>2.5. Course</b>	<b>14</b>	<b>2.6. Laboratories</b>	<b>0</b>
<b>Distribution of time needed</b>					<b>Hours</b>
a. Study using text books, lecture notes, bibliography					28
b. Individual study within libraries, on-line platforms, field research					2
c. Preparing seminars/laboratories, homework, projects, portfolios and essays					1
d. Tutoring					2
e. Evaluation/semester					2
f. Other activities: visiting community pharmacies					1
<b>2.7. Total hours for individual study</b>				<b>36 (2<sup>nd</sup> sem.)</b>	
<b>2.8. Total hours per semester</b>				<b>50 (2<sup>nd</sup> sem.)</b>	
<b>2.9. Number of credits</b>				<b>2 (2<sup>nd</sup> sem.)</b>	

## 3. Prerequisites

<b>3.1. Curriculum</b>	Not needed.
<b>3.2. Competences</b>	Not needed.

## 4. Requisites

<b>4.1. For lectures</b>	Compliance with the Charter and University regulations.
<b>4.2. For laboratories sessions</b>	Not needed.

## 5. Specific competences acquired

<b>Professional competences</b>	<p>The students are able to:</p> <ul style="list-style-type: none"> <li>- understand the importance of respecting the professional legislation and ethics;</li> <li>- understand the role of the pharmacist and of the pharmaceutical establishments, especially of the pharmacy, in society;</li> <li>- understand the activities to which a pharmacist has access: conception, formulation, preparation/manufacture, testing, storage, preservation, distribution, supply of medicinal products, food supplements, cosmetics and other health</li> </ul>
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	<p>products; testing in laboratory (medical, toxicology, food and environment hygiene); management, marketing, administration in health field; provision of information and advice on medicinal products, food supplements, cosmetics and other health products;</p> <ul style="list-style-type: none"> <li>- understand the functions and the composition of medicinal products and pharmaceutical forms;</li> <li>- develop a conscientious and responsible rapport toward the profession;</li> <li>- develop an active attitude on the pharmacist's role in the health care;</li> <li>- develop their ability to relate with professional staff and with patients in the pharmacy;</li> <li>- develop their ability of right use of digital information sources on the medicinal products, available at national and European level, including in at least an international language;</li> </ul>
<b>Transversal competences</b>	<ul style="list-style-type: none"> <li>- prove their preoccupation for active participation, as European citizens, to the community, society and humanity issues;</li> <li>- develop their ability to relate and to communicate at interpersonal, intercultural, social and civic level;</li> <li>- develop their personal autonomy, the responsibility and the capacity of lifelong learning;</li> <li>- identify their roles and responsibilities in a multidisciplinary team and apply some efficient relating techniques;</li> <li>- prove their preoccupation for quality assurance in professional activities.</li> </ul>

## 6. Course objectives

<b>6.1. General objective</b>	<ul style="list-style-type: none"> <li>- To familiarize the students with the basic concepts and principles of pharmaceutical technology, legislation and ethics.</li> </ul>
<b>6.2. Specific objectives</b>	<ul style="list-style-type: none"> <li>- To understand the legal and ethical context for pursuing activities regarding medicinal products, food supplements, cosmetics and other health products, especially in pharmacy.</li> <li>- To understand the basic rules of the technology of preparation and of the use of medical products.</li> <li>- To develop the abilities of professional communication.</li> </ul>

## 7. Content

**Teaching methods for course:** academic lecture with ppt support, analyses, discussions.

**Teaching methods for laboratory activity:** not needed.

<b>7.1. Course (hours)</b>	<b>Remarks</b>
1. Presentation of the course. Importance for the 1 <sup>st</sup> year students. (1)	1 lecture
2. Introduction to legislation (1)	1 lecture
3. Pharmacy as an institution (1)	1 lecture
4. Pharmacy as a profession (1)	1 lecture
5. Exercise as pharmacist: the law, the code of deontology (ethics). (1)	1 lecture
6. Health system and pharmaceutical establishments (1)	1 lecture
7. Fields of pharmaceutical activity (1)	1 lecture
8. Medicinal product: definition, classification, composition. (1)	1 lecture
9. Medicinal product: pharmaceutical forms. (4)	4 lectures
10. Medical prescription: definition, parts, categories. (1)	1 lecture
11. Pharmacist – patient relationship: communication, advice. (1)	1 lecture

**Bibliography:**

1. Aiache J.-M., Beyssac E., Cardot J.-M., Hoffart V., Renoux R., Initiation à la connaissance du médicament, Elsevier Masson, 2008;
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19. Leucuța S., Tehnologie farmaceutică industrială, Editura Dacia, Cluj-Napoca, 2001;
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**7.2. Laboratory activities (hours)****Observation**

Not needed.

**Bibliography:** Not needed.



## ROMANIAN LANGUAGE

### 1. Information about the course

<b>1.1. Discipline</b>		<b>Romanian language</b>					
<b>1.2. Course entitled</b>		-					
<b>1.3. Laboratory entitled</b>		<b>Assistant professor Maria Grosu, PhD</b>					
<b>1.4. Year</b>	<b>1</b>	<b>1.5. Semester</b>	<b>1, 2</b>	<b>1.6. Evaluation type</b>	<b>Written exam + Practical exam</b>	<b>1.7. Course type</b>	<b>Complementary discipline Compulsory discipline</b>

### 2. Total estimated time (hours/semester for teaching activity)

<b>2.1. Total hours/week</b>	<b>2</b>	<b>2.2. Course</b>	<b>-</b>	<b>2.3. Laboratories</b>	<b>2</b>
<b>2.4. Total hours in the curriculum</b>	<b>28</b>	<b>2.5. Course</b>	<b>-</b>	<b>2.6. Laboratories</b>	<b>28</b>
<b>2.4. Distribution of time needed (1<sup>st</sup> sem. / 2<sup>nd</sup> sem.)</b>					<b>Hours</b>
a. Study using text books, lecture notes, bibliography					4/4
b. Individual study within libraries, on-line platforms, field research					2/2
c. Preparing seminars/laboratories, homework, projects, portfolios and essays					4/4
d. Tutoring					-
e. Evaluation/ semester					2/2
f. Other activities					1/1
<b>2.7. Total hours for individual study (a+b+c+d)</b>					<b>13 (2<sup>nd</sup> sem.)</b>
<b>2.8. Total hours per semester</b>					<b>41 (2<sup>nd</sup> sem.)</b>
<b>2.9. Number of credits</b>					<b>1 (2<sup>nd</sup> sem.)</b>

### 3. Pre-requisites

<b>3.1. Curriculum</b>	-
<b>3.2. Competences</b>	-

### 4. Requisites

<b>4.1. For course ongoing</b>	-
<b>4.2. For laboratories ongoing</b>	Student should respect the Teaching activity regulation of the University

### 5. Specific competences acquired

<b>Professional competences</b>	<ul style="list-style-type: none"> <li>Capacity of properly use of Romanian language (listen, reading, speaking, writing) to communicate in general, academic and medical contexts</li> <li>Capacity to use the medical terms specific to the pharmaceutical field</li> </ul>
<b>Transversal competences</b>	<ul style="list-style-type: none"> <li>The ability to use the acquired knowledge in the academic and medical activity in order to an adequately communication in the Romanian language</li> <li>Making interdisciplinary connections in the studied areas.</li> </ul>

### 6. Course objectives

<b>6.1. General objectives</b>	<ul style="list-style-type: none"> <li>Developing general communication skills in Romanian language and language skills in medical and academic area</li> </ul>
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<b>6.2. Specific objectives</b>	At the end of the seminar, students will be able to: <ul style="list-style-type: none"> <li>• Introduce and talk about himself</li> <li>• Ask and provide information in familiar context</li> <li>• Describing people and objects using adjectives</li> <li>• Express preference, agreement and disagreement</li> <li>• Talk about everyday activities</li> <li>• Name the body parts</li> <li>• Expressing pain</li> <li>• Talking about family</li> </ul>
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## 7. Content

**Teaching methods course:** Interactive education and media, support.

<b>7.1. Course (hours) -</b>	
<b>7.2. Laboratory (hours)</b>	<b>Remarks</b>
<p><b>Seminar 1.</b> I'm student at the University of Medicine and Pharmacy from Cluj-Napoca! Romania - overview (neighboring countries, representative cities, relief etc).</p> <p><b>Seminar 2.</b> The alphabet. The sounds/group of sounds specific to Romanian language.</p> <p><b>Seminar 3.</b> Nationalities, greetings and presentation modality. Verbs to have, to be (affirmative and negative form).</p> <p><b>Seminar 4.</b> Time. Expressing the date and the time. The days of the week, the month of the year, the seasons. The weather. The cardinal numeral.</p> <p><b>Seminar 5.</b> What are you doing today? Daily activities. Verb conjugation (first and fourth group).</p> <p><b>Seminar 6.</b> What are you doing today? Daily activities. Verb conjugation (second and third group).</p> <p><b>Seminar 7.</b> What are you doing this week? Weekly activities.</p> <p><b>Seminar 8.</b> Means of transport. Frequency adverbs.</p> <p><b>Seminar 9.</b> Useful information. At the bank. Filling forms. Read/understand a bill (gas, electricity, internet etc).</p> <p><b>Seminar 10.</b> What profession do you choose? Professions. Activities. Specific objectives. The names (gender, number).</p> <p><b>Seminar 11.</b> Let's go shopping! Food (fruit, vegetables dairy products etc). The definite article.</p> <p><b>Seminar 12.</b> Let's go to the restaurant! The menu. The indefinite article.</p> <p><b>Seminar 13.</b> Navigating outside. In the taxi.</p> <p><b>Seminar 14.</b> Where do you live? The house. The furniture. Move inside - prepositions.</p> <p><b>Seminar 15.</b> My room. Adjectives.</p> <p><b>Seminar 16.</b> What do you wear? Clothes. The colors.</p> <p><b>Seminar 17.</b> What are you doing during holidays? Past tense. Expressions with past tense.</p> <p><b>Seminar 18.</b> The verb like (present, past tense). Writing post cards.</p> <p><b>Seminar 19.</b> What am I doing today? What I did yesterday? The daily program. Reflexive verbs in accusative voice. Writing: the letter.</p> <p><b>Seminar 20.</b> The parts of the body (external organs).</p> <p><b>Seminar 21.</b> Description/characterization of a person (physically, morally).</p>	<p>Exercise and specific activities (individual, in pairs or in groups) in order to develop speaking, listening, reading and writing skills in Romanian language</p>
<p><b>Bibliography</b></p> <p>1. Bejan, D. <i>Gramatica limbii române</i>. IIIème Edition, Cluj, Ed. Echinox, 2001.</p>	



2. Brâncuș, G. Ionescu A., Saramandu M., *Limba Romana. Manual pentru studenții străini*. IVème Edition, Ed. Universitatii din Bucuresti, 1996.
3. Dorobăț, A., Fotea, M. *Limba română de bază*. Iasi, Ed. Institutul European, 1999.
4. Kohn, D., *Puls. Limba română pentru străini*. Iași, Ed. Polirom, 2009.
5. Platon, E., Sonea, I., Vilcu, D. *Manual de limba română ca limbă străină (RLS). A1-A2*. Cluj-Napoca, Casa Cărții de Știință, 2012.
6. Pop, L. *Româna cu sau fără profesor*. Vème Edition, Cluj-Napoca, Ed. Echinox, 2003.

### 8. Evaluation

Activity type	8.1.Evaluation criteria	8.2. Evaluation methods	8.3. Percent of final grade
<b>8.4. Course</b>	-	-	-
<b>8.5. Laboratory</b>	Evaluation of written communication skills	Written exam	<b>33%</b>
	Evaluation of oral communication skills	Oral evaluation	<b>33%</b>
	Activity at the seminar, the seminar portfolio	Evaluation of seminar activities and of the individual portfolio	<b>33%</b>
<b>8.6. Minimal performance standard</b>			
Romanian language skills and general and medical communication skills which enable the general, academic and medical communication at A1 level (Common European Framework of Reference for Languages)			

## MEDICAL TERMINOLOGY

### 1. Information about the course

<b>1.1. Discipline</b>		<b>Toxicology</b>					
<b>1.2. Course instructor</b>		<b>Lecturer Anca Cherfan, PhD</b>					
<b>1.3. Laboratory instructor</b>		<b>Lecturer Anca Cherfan, PhD</b>					
<b>1.4. Year</b>	1	<b>1.5. Semester</b>	1	<b>1.6. Evaluation type</b>	<b>Written exam</b>	<b>1.7. Course type</b>	<b>Domain discipline Compulsory discipline</b>

### 2. Total estimated time (hours/semester for teaching activity)

<b>2.1. Total hours/week</b>	1 (2 <sup>nd</sup> sem.)	<b>2.2. Course</b>	-	<b>2.3. Laboratories</b>	1
<b>2.4. Total hours in the curriculum</b>	14 (2 <sup>nd</sup> sem.)	<b>2.5. Course</b>	-	<b>2.6. Laboratories</b>	14
<b>2.4. Distribution of time needed (1<sup>st</sup> sem.)</b>					Hours
a. Study using text books, lecture notes, bibliography					14
b. Individual study within libraries, on-line platforms, field research					7
c. Preparing seminars/laboratories, homework, projects, portfolios and essays					14
d. Tutoring					7
e. Evaluation/ semester					2
f. Other activities					-
<b>2.7. Total hours for individual study (a+b+c+d)</b>					<b>42 (2<sup>nd</sup> sem.)</b>
<b>2.8. Total hours per semester</b>					<b>56 (2<sup>nd</sup> sem.)</b>
<b>2.9. Number of credits</b>					<b>2 (2<sup>nd</sup> sem.)</b>

### 3. Pre-requisites:

<b>3.1. Curriculum</b>	-
<b>3.2. Competences</b>	Knowlegde of anatomy and physiology, high school level

### 4. Requisites:

<b>4.1. For lectures</b>	-
<b>4.2. For laboratories sessions</b>	• To respect the internal regulations of University

### 5. Specific competences acquired

<b>Professional competences</b>	• Ability to understand and to use in a proper way and in a certain context the specific terminology used in the medical field.
<b>Transversal competences</b>	• Competences to use medical terms learned in English and Romanian in new multidisciplinary contexts.

### 6. Course objectifs

<b>6.1. General objectives</b>	• Learning and knowledge of basic medical terminology, bilingual, English-Romanian, developing and improving the specific medical vocabulary, in order to facilitate the study of the speciality disciplines in the next years (IV <sup>th</sup> and V <sup>th</sup> years of study) and to develop a dialogue and the cooperation with the pharmacy professionals.
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<b>6.2. Specific objectives</b>	<ul style="list-style-type: none"> <li>• Knowledge of the rules applied in the forming of frequently used medical terms by pharmacists and other professionals working in the medical field.</li> <li>• Learn prefixes and suffixes often used in medical terms and their combinations.</li> <li>• Analyze and correctly identify the component parts of medical terms and properly understand their meanings.</li> </ul>
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## 7. Content

**Teaching methods for course:**

**Teaching methods for laboratory activity: Systematic exposition, exercises, conversation**

<b>7.1 Course (hours)</b>	<b>Remarks</b>
<b>7.2. Laboratory activities (hours)</b>	<b>Remarks</b>
1. Introduction to medical terminology. The units that compose the words. Rules applied in the forming of medical terms.	1 week
2. The general organization of the human body. The roots of terms describing the human body.	3 weeks
3. Applying the rules for the formation of medical terms. The use of prefixes, suffixes and basic radicals to form medical terms.	4 weeks
<b>Bibliography</b> Iuliana Popovici, Lăcrămioara Ochiuz, D. Lupuleasa – Terminologie medicală și farmaceutică, Editura Polirom, București, 2007.	

## 8. Evaluation

<b>Activity type</b>	<b>8.1. Evaluation criteria</b>	<b>8.2. Evaluation methods</b>	<b>8.3. Percent of final grade</b>
<b>8.4. Course</b>	-	-	-
<b>8.5. Laboratory</b>	General evaluation criteria (quality of acquired knowledge, the correct use of terms in the context of professional speech in Romanian)	Written exam (exercises: explain the medical terms, form words from their definitions, writing in Romanian)	<b>100%</b>
<b>8.6. Minimal performance standard</b>			
Identify, understand and explain the terms used in the medical context of a Romanian specialty text and the correct understanding of information.			

## PHARMACY PRACTICE 1<sup>st</sup> YEAR

### 1. Information about the course

<b>1.1. Discipline</b>		<b>Medical devices. Pharmaceutical practice</b>					
<b>1.2. Course instructor</b>		-					
<b>1.3. Laboratory instructor</b>		<b>Senior lecturer, PhD Simona Mirel</b>					
<b>1.4. Year</b>	<b>1</b>	<b>1.5. Semester</b>	<b>2</b>	<b>1.6. Evaluation type</b>	<b>Practical exam</b>	<b>1.7. Course type</b>	<b>Speciality discipline, Compulsory discipline</b>

### 2. Total estimated time (hours/semester for teaching activity)

<b>2.1. Total hours/week</b>	<b>30 (2 weeks, 2<sup>nd</sup> sem.)</b>	<b>2.2. Course</b>	-	<b>2.3. Laboratories</b>	<b>30</b>
<b>2.4. Total hours in the curriculum</b>	<b>60</b>	<b>2.5. Course</b>	-	<b>2.6. Laboratories</b>	<b>60</b>
<b>2.4. Distribution of time needed (1<sup>st</sup> sem. / 2<sup>nd</sup> sem.)</b>					<b>Hours</b>
a. Study using text books, lecture notes, bibliography					5
b. Individual study within libraries, on-line platforms, field research					5
c. Preparing seminars/laboratories, homework, projects, portfolios and essays					10
d. Tutoring					0.5
e. Evaluation/ semester					0.5
f. Other activities					5
<b>2.7. Total hours for individual study (a+b+c+d)</b>					<b>20.5 (2<sup>nd</sup> sem.)</b>
<b>2.8. Total hours per semester</b>					<b>86 (2<sup>nd</sup> sem.)</b>
<b>2.9. Number of credits</b>					<b>2 (2<sup>nd</sup> sem.)</b>

### 3. Pre-requisites:

<b>3.1. Curriculum</b>	Knowledge regarding the Romanian pharmaceutical legislation, botanics, chemistry, physics
<b>3.2. Competences</b>	-

### 4. Requisites:

<b>4.1. For lectures</b>	-
<b>4.2. For laboratories sessions</b>	Authorized pharmacies.

### 5. Specific competences acquired

<b>Professional competences</b>	<ul style="list-style-type: none"> <li>• The understanding of the role, responsibilities and obligations related to the profession of pharmacist</li> <li>• The capacity to understand aspects related to the founding, organisation and functioning of a pharmacy</li> <li>• The capacity to identify and know the basic activities performed in a pharmacy</li> <li>• The capacity to identify and know the main categories of health products available in pharmacies</li> <li>• The familiarization with the medical and pharmaceutical terminology</li> </ul>
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	<ul style="list-style-type: none"> <li>• The capacity to identify and know the medicinal teas and their use</li> <li>• The capacity to identify pharmaceutical formulations containing anorganic substances and their use</li> </ul>
<b>Transversal competences</b>	<ul style="list-style-type: none"> <li>• The acquirement of an active attitude towards the role of the speciality practice in the professional development of the future pharmacist</li> <li>• The identification of the objectives that must be fulfilled during the initial practical internship in pharmacies</li> <li>• The identification of the pharmacist's role and responsibilities in society</li> <li>• The application of certain communication techniques</li> <li>• Individual professional development</li> </ul>

## 6. Course objectives

<b>6.1. General objectives</b>	<ul style="list-style-type: none"> <li>• Initiation in the activities performed in a pharmacy (community or hospital pharmacy)</li> <li>• The application of the acquired theoretical knowledge into the practical activities performed in pharmacies, under the coordination, surveillance and evaluation of a pharmacist-practical internship coordinator</li> </ul>
<b>6.2. Specific objectives</b>	<ul style="list-style-type: none"> <li>• To understand the role, responsibilities and obligations related to the profession of pharmacist</li> <li>• To understand aspects related to the founding, organisation and functioning of a pharmacy</li> <li>• To identify and know the basic activities performed in a pharmacy</li> <li>• To identify and know the main categories of health products available in pharmacies</li> <li>• To get familiar to the medical and pharmaceutical terminology</li> <li>• To identify and know the medicinal teas and their use</li> <li>• To identify pharmaceutical formulations containing anorganic substances and their use</li> <li>• To exersize the capacity to document and to synthesize information, in order to solve the practical applications contained in the Guide for practice</li> </ul>

## 7. Content

**Teaching methods for course:** -

**Teaching methods for laboratory activity:** explanation, conversation, questioning, analysis.

<b>7.1 Course (hours)</b>	<b>Remarks</b>
-	-
<b>7.2. Laboratory activities (hours)</b>	<b>Remarks</b>
<b>1. The role of the pharmacist and of the pharmacy in the student's speciality practice</b>	The analysis of the way to solve problems
<b>2. The founding, organisation and functioning of a pharmacy</b>	Conversation, questioning
<b>3. Basic pharmaceutic activities</b>	The analysis of the way to solve problems
<b>4. Medical and pharmaceutical terminology</b>	Explanation, individual documentation

<b>5. Medicinal teas</b>	Theory into practice
<b>6. Pharmaceutical formulations containing anorganic substances</b>	Theory into practice
<b>Bibliography</b>	
<ol style="list-style-type: none"> <li>1. Mirel S. (coordonator), Stagiul de inițiere și orientare în practica farmaceutică- Ghid pentru studenții anilor I-IV, Editura Medicală Universitară "Iuliu Hațieganu" Cluj-Napoca, 2013</li> <li>2. Crișan O. (coordonator), Introducere în tehnologie și în legislație farmaceutică, Editura Medicală Universitară «Iuliu Hațieganu», Cluj-Napoca, 2012;</li> <li>3. Legea nr. 266/2008 a farmaciei, republicată, Monitorul Oficial al României, partea I, nr. 448/2009, cu modificările și completările ulterioare;</li> <li>4. Ordinul ministrului sănătății nr. 962/2009 pentru aprobarea Normelor privind înființarea, organizarea și funcționarea farmaciilor și drogheriilor, Monitorul Oficial al României, partea I, nr. 538/2009, cu modificările și completările ulterioare;</li> <li>5. Ordinul ministrului sănătății nr. 75/2010 pentru aprobarea Regulilor de bună practică farmaceutică, Monitorul Oficial al României, partea I, nr. 91/2010;</li> <li>6. Codul deontologic al farmacistului, Monitorul Oficial al României, partea I, nr. 490/2009;</li> <li>7. Farmacopeea română, Ed. X, Editura Medicală, București, 1993</li> <li>8. Popovici I, Ochiuz L, Lupuleasa D. Terminologie medicală și farmaceutică, Editura Polirom, București, 2007.</li> <li>9. Rusu V, Dicționar medical, Editura Medicală, București, 2007.</li> <li>10. Popa DS, Terminologie medicale et pharmaceutique appliquée. Ier volume. Edition bilingue roumain-français. Editura Medicală Universitară „Iuliu Hațieganu” Cluj-Napoca, 2012.</li> <li>11. Bojor O., Popescu O. Fitoterapie tradițională și modernă. București: Ed. Fiat Lux, 1998</li> <li>12. Tămaș M, Botanică farmaceutică, vol. II. Cluj-Napoca: Ed. Med. Univ. „Iuliu Hațieganu”, 2004</li> <li>13. Agenția Națională a Medicamentului și a Dispozitivelor Medicale, Nomenclatorul medicamentelor de uz uman, disponibil la <a href="http://www.anm.ro/app/nom1/anm_list.asp">http://www.anm.ro/app/nom1/anm_list.asp</a></li> <li>14. Agenda medicală, Editura Medicală, București, 2013</li> <li>15. Memomed, Editura Universitară, București, 2013.</li> </ol>	

## 8. Evaluation

Activity type	8.1. Evaluation criteria	8.2. Evaluation methods	8.3. Percent of final grade
<b>8.4. Course</b>	-	-	-
<b>8.5. Laboratory</b>	Criteria regarding the attitude and motivation of the students	The evaluation of the coordinator pharmacist	<b>30%</b>
	The way in which the applications proposed are solved (Practical stage guide)	The way in which the applications are solved	<b>30%</b>
	The capacity to understand and respond to problems	Oral exam	<b>40%</b>
<b>8.6. Minimal performance standard</b>			
The acquirement of basic knowledge regarding: <ul style="list-style-type: none"> <li>• The role of the pharmacy and of the pharmacist</li> <li>• The founding, organisation and functioning of a pharmacy</li> <li>• Basic activities performed in a pharmacy</li> <li>• Medicinal teas</li> </ul>			

## 8.1.2. OPTIONAL COURSES

### ACADEMIC ETHICS AND INTEGRITY

#### 1. Information about the course

<b>1.1. Discipline</b>			<b>Pharmaceutical legislation</b>				
<b>1.2. Course instructor</b>				<b>Professor Ofelia Crișan, PhD</b>			
<b>1.3. Laboratory instructor</b>				<b>Not necessary.</b>			
<b>1.4. Year</b>	<b>I</b>	<b>1.5. Semester</b>	<b>II</b>	<b>1.6. Evaluation type</b>	<b>Written exam</b>	<b>1.7. Course type</b>	<b>Complementary discipline Optional discipline</b>

#### 2. Total estimated time (hours / semester for teaching activity)

<b>2.1. Total hours / week</b>	<b>1</b>	<b>2.2. Course</b>	<b>1</b>	<b>2.3. Laboratories</b>	<b>0</b>
<b>2.4. Total hours in the curriculum</b>	<b>14</b>	<b>2.5. Course</b>	<b>14</b>	<b>2.6. Laboratories</b>	<b>0</b>
<b>Distribution of time needed</b>					<b>Hours</b>
a. Study using text books, lecture notes, bibliography					26
b. Individual study within libraries, on-line platforms, field research					2
c. Preparing seminars/laboratories, homework, projects, portfolios and essays					2
d. Tutoring					2
e. Evaluation/semester					2
f. Other activities: following of cases of violation of academic ethics and integrity in mass media					2
<b>2.7. Total hours for individual study</b>				<b>36 (1<sup>st</sup> sem.)</b>	
<b>2.8. Total hours per semester</b>				<b>50 (1<sup>st</sup> sem.)</b>	
<b>2.9. Number of credits</b>				<b>2 (1<sup>st</sup> sem.)</b>	

#### 3. Prerequisites

<b>3.1. Curriculum</b>	Not needed.
<b>3.2. Competences</b>	Not needed.

#### 4. Requisites

<b>4.1. For lectures</b>	Compliance with the Charter and University regulations.
<b>4.2. For laboratories sessions</b>	Not needed.

#### 5. Specific competences acquired

<b>Professional competences</b>	<p>The students are able to:</p> <ul style="list-style-type: none"> <li>- understand the importance of respecting the academic ethics and of integrity in the activities of education and research;</li> <li>- develop a conscientious and responsible rapport toward the academic activities;</li> <li>- develop their ability to apply the principles of ethics, for integrity in their activity;</li> </ul>
	<ul style="list-style-type: none"> <li>- develop their ability of right use of digital information sources on ethics and integrity, including in at least an international language;</li> </ul>

<b>Transversal competences</b>	<ul style="list-style-type: none"> <li>- prove their preoccupation for active participation, as European citizens, to the community, society or humanity ethical issues;</li> <li>- develop their ability to relate and to communicate at interpersonal, intercultural, social and civic level;</li> <li>- develop their personal autonomy, the responsibility and the capacity of lifelong learning, including in the field of ethics and integrity;</li> <li>- prove their preoccupation for quality and integrity assurance in professional activities.</li> </ul>
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## 6. Course objectives

<b>6.1. General objective</b>	- To familiarize the students with the basic concepts and principles of academic ethics and integrity.
<b>6.2. Specific objectives</b>	<ul style="list-style-type: none"> <li>- To understand the legal and ethical context for pursuing academic activities (education, research).</li> <li>- To understand the basic ethical rules of the integrity in academic activities.</li> <li>- To develop the students' abilities of ethical reflexion and integrity in activity.</li> </ul>

## 7. Content

**Teaching methods for course:** academic lecture with ppt support, analyses, discussions.

**Teaching methods for laboratory activity:** not needed.

<b>7.1. Course (hours)</b>	<b>Remarks</b>
1. Presentation of the course. Introduction. Definitions. Bibliography. (1)	1 lecture
2. Legislation, national and international guidelines and codes. (1)	1 lecture
3. University Charter. Code of ethics and academic deontology. (1)	1 lecture
4. Principles of academic ethics and integrity. (2)	2 lectures
5. Responsibility for non-compliance with academic ethics and integrity (1)	1 lecture
6. Case studies (7)	7 lectures
7. Conclusion on the importance of the course for students. Examples of questions for the exam. (1)	1 lecture
<b>Bibliography:</b>	
<ol style="list-style-type: none"> <li>1. ALLEA – All European Academies, The European Code of Conduct for Research Integrity, Revised Edition, Berlin 2017, <a href="http://www.allea.org/wp-content/uploads/2017/05/ALLEA-European-Code-of-Conduct-for-Research-Integrity-2017.pdf">http://www.allea.org/wp-content/uploads/2017/05/ALLEA-European-Code-of-Conduct-for-Research-Integrity-2017.pdf</a>.</li> <li>2. Corvol P., Bilan et propositions de mise en oeuvre de la charte nationale d'intégrité scientifique, <a href="http://www.academie-sciences.fr/pdf/communique/rapport_corvol_290616.pdf">http://www.academie-sciences.fr/pdf/communique/rapport_corvol_290616.pdf</a>.</li> <li>3. Ethics &amp; Integrity Portal, <a href="http://ethics-and-integrity.org">http://ethics-and-integrity.org</a>.</li> <li>4. European Commission, The European Charter for Researchers, The Code of Conduct for the Recruitment of Researchers, Luxembourg, 2005, <a href="https://euraxess.ec.europa.eu/sites/default/files/am509774cee_en_e4.pdf">https://euraxess.ec.europa.eu/sites/default/files/am509774cee_en_e4.pdf</a>.</li> <li>5. Integru – Upholding Academic Integrity and Ethical Values, <a href="http://integru.org/">http://integru.org/</a>.</li> <li>6. Ministerul Cercetării și Inovării, Consiliul Național de Etică a Cercetării Științifice, Dezvoltării Tehnologice și Inovării, Hotărâri, <a href="http://cnecsdti.research.gov.ro/hotarari/">http://cnecsdti.research.gov.ro/hotarari/</a>.</li> <li>7. Ministerul Educației Naționale, Ordinul nr. 3131/2018 privind includerea în planurile de învățământ, pentru toate programele de studii universitare organizate în instituțiile de învățământ superior din sistemul național de învățământ, a cursurilor de etică și integritate academică, Monitorul Oficial al României, partea I, nr. 140/2018.</li> <li>8. Parlamentul României, Legea nr. 8/1996 privind dreptul de autor și drepturile conexe,</li> </ol>	



<p>republicată, Monitorul Oficial al României, partea I, nr. 489/2018.</p> <p>9. Parlamentul României, Legea nr. 206/2004 privind buna conduită în cercetarea științifică, dezvoltarea tehnologică și inovare, Monitorul Oficial al României, partea I, nr. 505/2004, cu modificările și completările ulterioare.</p> <p>10. Parlamentul României, Legea nr. 1/2011 a educației naționale, Monitorul Oficial al României, partea I, nr. 18/2011, cu modificările și completările ulterioare.</p> <p>11. UMF „Iuliu Hațieganu” Cluj-Napoca, Codul de etică și deontologie universitară, Carta UMF „Iuliu Hațieganu” Cluj-Napoca, <a href="http://www.umfcluj.ro">www.umfcluj.ro</a> [intranet].</p> <p>12. UMF „Iuliu Hațieganu” Cluj-Napoca, Regulamentul comisiei de etică universitară, Carta UMF „Iuliu Hațieganu” Cluj-Napoca, <a href="http://www.umfcluj.ro">www.umfcluj.ro</a> [intranet].</p> <p>13. UMF „Iuliu Hațieganu” Cluj-Napoca, Regulamentul comisiei de etica cercetării, Carta UMF „Iuliu Hațieganu” Cluj-Napoca, <a href="http://www.umfcluj.ro">www.umfcluj.ro</a> [intranet].</p> <p>14. UMF „Iuliu Hațieganu” Cluj-Napoca, Regulamentul de organizare și desfășurare a activității didactice în ciclul de studii universitare de licență, Carta UMF „Iuliu Hațieganu” Cluj-Napoca, <a href="http://www.umfcluj.ro">www.umfcluj.ro</a> [intranet].</p> <p>15. UMF „Iuliu Hațieganu” Cluj-Napoca, Regulamentul de organizare și desfășurare a activității didactice în ciclul de studii universitare de masterat, Carta UMF „Iuliu Hațieganu” Cluj-Napoca, <a href="http://www.umfcluj.ro">www.umfcluj.ro</a> [intranet].</p> <p>16. Université de Genève, Plagiat et fraude scientifique: la perspective académique, <a href="http://responsable.unige.ch">http://responsable.unige.ch</a>.</p> <p>17. Université Sorbonne Nouvelle Paris 3, Ethique, déontologie et intégrité scientifique, <a href="http://www.univ-paris3.fr/ethique-deontologie-et-integrite-scientifique-459625.kjsp?RH=1506526933387">http://www.univ-paris3.fr/ethique-deontologie-et-integrite-scientifique-459625.kjsp?RH=1506526933387</a>.</p> <p>18. University of Cambridge, Research Integrity, <a href="https://www.research-integrity.admin.cam.ac.uk/">https://www.research-integrity.admin.cam.ac.uk/</a>.</p> <p>19. University of Oxford, Research Integrity, <a href="https://researchsupport.admin.ox.ac.uk/governance/integrity">https://researchsupport.admin.ox.ac.uk/governance/integrity</a>.</p> <p>20. World Conferences on Research Integrity Foundation, Singapore Statement, <a href="https://wcrif.org/statement">https://wcrif.org/statement</a>.</p>	
<b>7.2. Laboratory activities (hours)</b>	<b>Observation</b>
Not needed.	
<b>Bibliography:</b> Not needed.	

## 8. Evaluation

Activity type	8.1. Evaluation criteria	8.2. Evaluation methods	8.3. Percent of final grade
<b>8.4. Course</b>	<ul style="list-style-type: none"> <li>- Knowledge of the terminology used in the course.</li> <li>- Knowledge of the legal and ethical context for pursuing academic activities</li> <li>- Understanding of the importance of respecting the principles of ethics and integrity in academic activities.</li> <li>- Capacity of using correctly the notions of ethics and integrity in practice.</li> </ul>	<p>Written exam with multiple choice questions (MCQ):</p> <ul style="list-style-type: none"> <li>- single answer;</li> <li>multiple answer.</li> </ul>	<b>100%</b>

	- Capacity of recognising the most important violations of academic ethics and integrity.	-	
<b>8.5. Laboratory</b>	Not needed.		
<b>8.6. Minimal performance standards</b>			
<ul style="list-style-type: none"> <li>- Knowledge of the terminology used in the course.</li> <li>- Knowledge of the legal and ethical context for pursuing academic activities.</li> <li>- Understanding of the importance of respecting the principles of ethics and integrity in academic activities.</li> </ul>			

## RISKS ASSOCIATED WITH CONSUMPTION OF DRUGS

### 1. Information about the course

<b>1.1. Discipline</b>		<b>Toxicology</b>					
<b>1.2. Course instructor</b>		<b>Professor Béla Kiss, PhD</b>					
<b>1.3. Laboratory instructor</b>		<b>-</b>					
<b>1.4. Year</b>	<b>I</b>	<b>1.5. Semester</b>	<b>II</b>	<b>1.6. Evaluation type</b>	<b>Project, oral presentation</b>	<b>1.7. Course type</b>	<b>Complementary discipline Optional discipline</b>

### 2. Total estimated time (hours/semester for teaching activity)

<b>2.1. Total hours/week</b>	<b>1 (2<sup>nd</sup> sem.)</b>	<b>2.2. Course</b>	<b>1</b>	<b>2.3. Laboratories</b>	<b>-</b>
<b>2.4. Total hours in the curriculum</b>	<b>14 (2<sup>nd</sup> sem.)</b>	<b>2.5. Course</b>	<b>14</b>	<b>2.6. Laboratories</b>	<b>-</b>
<b>2.4. Distribution of time needed (1<sup>st</sup> sem. / 2<sup>nd</sup> sem.)</b>					<b>Hours</b>
a. Study using text books, lecture notes, bibliography					6
b. Individual study within libraries, on-line platforms, field research					4
c. Preparing seminars/laboratories, homework, projects, portfolios and essays					-
d. Tutoring					2
e. Evaluation/ semester					2
f. Other activities					-
<b>2.7. Total hours for individual study (a+b+c+d)</b>				<b>12 (2<sup>nd</sup> sem.)</b>	
<b>2.8. Total hours per semester</b>				<b>28 (2<sup>nd</sup> sem.)</b>	
<b>2.9. Number of credits</b>				<b>2 (2<sup>nd</sup> sem.)</b>	

### 3. Pre-requisites :

<b>3.1. Curriculum</b>	Physiology
<b>3.2. Competences</b>	-

### 4. Requisites :

<b>4.1. For lectures</b>	<ul style="list-style-type: none"> <li>• Students are expected to attend all scheduled lectures on time at the amphitheatre</li> <li>• They will have their mobile phone switched off</li> <li>• Students must respect the internal rules and regulations of the university</li> </ul>
<b>4.2. For laboratories sessions</b>	-

### 5. Specific competences acquired

<b>Professional competences</b>	<p>At the end of the lectures, students must be aware of:</p> <ul style="list-style-type: none"> <li>• The extent of drug addiction in Romania and worldwide</li> <li>• The main health risks associated with drug abuse</li> <li>• The economic and social consequences of illicit drug abuse and trafficking</li> </ul>
<b>Transversal competences</b>	<ul style="list-style-type: none"> <li>• At the end of the lectures, students must be able to participate in campaigns aiming to educate and inform the general population (e.g. in high-schools, universities, pharmacies) about the risks of drug abuse</li> </ul>

## 6. Course objectives

<b>6.1. General objectives</b>	<ul style="list-style-type: none"> <li>To acquire theoretical knowledge about the risks associated to drug abuse</li> </ul>
<b>6.2. Specific objectives</b>	<p>To acquire theoretical knowledge about:</p> <ul style="list-style-type: none"> <li>The main classes of drugs of abuse, including the “classic” ones and also the new psychoactive compounds: their forms of presentation, ways of consumption</li> <li>Main causes of morbidity and mortality in drug users</li> <li>Issues related to the reduction or prevention of drug abuse and the therapeutic approaches available for drug overdose cases and drug addiction</li> </ul>

## 7. Content

**Teaching methods for course:** Lecture (systematic presentation with PowerPoint support), exemplification, discussion.

**Teaching methods for laboratory activity:** -

<b>7.1 Course (hours)</b>	<b>Remarks</b>
1. The situation of drug abuse in Romania and worldwide. The prevalence of consumption. The motivation of starting the drug abuse. Triggering factors	<b>2h</b>
2. Drug abuse, dependence, addiction - related terminology	<b>1h</b>
3. Classification of drugs of abuse. Presentation of the main representatives of each class: opiates/opioids, stimulants, hallucinogens, „designer drugs”, new psychoactive drugs (forms of presentation, quality of drugs of abuse from the illicit market)	<b>6h</b>
4. Morbidity and mortality associated to drugs of abuse consumption. Drugs and crime rate increase	<b>2h</b>
5. Therapeutic approaches in acute intoxication with drugs of abuse and in drug addictions	<b>1h</b>
6. Fighting drug trafficking and consumption	<b>2h</b>
<p><b>Bibliography</b></p> <ol style="list-style-type: none"> <li>Flomenbaum NE, Howland MA, Goldfrank LR, Lewis NA, Hoffman RS, Nelson LS. Goldfrank’s Toxicologie Emergencies. NY The McGraw Hill, 2006</li> <li>G. Cicu, D. Georgescu, A. M. Moldovan Concepte de bază privind tulburările datorate consumului de substanțe, București, Agenția Națională Antidrog, 2007</li> <li>Michel, R., Laurent, K., Henri-Jean, A. &amp; Amine, B. Traité d’addictologie. (Lavoisier, Paris, 2016).</li> <li>Nelson, M. E., Bryant, S. M. &amp; Aks, S. E. Emerging drugs of abuse. Emerg. Med. Clin. North Am. 32, 1–28 (2014).</li> <li>UKDPC. A Fresh Approach to Drugs: the final report of the UK Drug Policy Commission. (2012). Available at: <a href="http://www.ukdpc.org.uk/wp-content/uploads/a-fresh-approach-to-drugs-the-final-report-of-the-uk-drug-policy-commission.pdf">http://www.ukdpc.org.uk/wp-content/uploads/a-fresh-approach-to-drugs-the-final-report-of-the-uk-drug-policy-commission.pdf</a>. (Accessed: 26th June 2017)</li> <li>Fogaça, M. V., Campos, A. C. &amp; Guimarães, F. S. Neuropathology of Drug Addictions and Substance Misuse. Neuropathology of Drug Addictions and Substance Misuse (2016). doi:10.1016/B978-0-12-800213-1.00070-5</li> <li>EMCDDA (European Monitoring Centre for Drugs and Drug Addiction). New developments in Europe’s cannabis market. 2008–2013 (2014).</li> <li>Drugs, P. O. N. Controlling new psychoactive substances. (2012).</li> <li>European Monitoring Centre for Drugs and Drug Addiction. European Drug Reports 2014-2017</li> <li>European Monitoring Centre for Drugs and Drug Addiction. Understanding the Spice Phenomenon. Themat. Pap. 25 (2009). doi:10.2810/27063</li> </ol>	

11. Unodc. World drug reports 2014-2017. United Nations publication	
12. Raport național privind situația drogurilor 2014-2017.	
13. Hofer, K. E. et al. Ketamine-like effects after recreational use of methoxetamine. Ann. Emerg. Med. 60, 97–99 (2012).	
<b>7.2. Laboratory activities (hours)</b>	<b>Remarks</b>
-	-
<b>Bibliography</b>	-
-	-

### 8. Evaluation

Activity type	8.1. Evaluation criteria	8.2. Evaluation methods	8.3. Percent of final grade
<b>8.4. Course</b>	<ul style="list-style-type: none"> <li>• Proper understanding and assimilating the basics about drugs of abuse</li> <li>• Ability to highlight the major risks associated to different classes of drugs of abuse</li> </ul>	<b>Project, oral presentation</b>	<b>100%</b>
<b>8.5. Laboratory</b>	-	-	-
<b>8.6. Minimal performance standard</b>			
<ul style="list-style-type: none"> <li>• Knowledge of the main types of drugs of abuse</li> <li>• Knowledge of the main health effects, treatment options, social-economical implications of drug abuse and trafficking</li> <li>• Ability to inform correctly a third party about drugs of abuse</li> </ul>			

### 8.2. CURRICULA OF THE 2<sup>nd</sup> YEAR OF PHARMACY 2019 - 2020

<b>UNIVERSITY</b>	University of Medicine and Pharmacy " Iuliu Hatieganu" Cluj-Napoca	<b>STUDY PROGRAM</b>	PHARMACY
<b>FACULTY</b>	PHARMACY	<b>GRADUATION TITLE</b>	PHARMACIST
<b>FIELD</b>	HEALTH	<b>PERIOD OF STUDIES</b>	5 YEARS
<b>REGLEMENTATION</b>	SECTORIAL	<b>STUDY UNITS</b>	300

No. crt.	Cod	Course	Category	Total no. of credits			Total hours/ universitary year		I st Semester		II nd Semester		Examination form	
				Total	S1	S2	Course	Practical lessons	Course/ week	P/ week	Course/ week	P/ week	S1	S2
1	EN_FAR-2-S02-01	Pharmaceutical biochemistry and clinical laboratory	Oblig DF	6		6	28	42			2	3		E2
2	EN_FAR-2-S01-02	Cellular and Molecular Biology	Oblig DF	4	4		28	14	2	1				E1
3	EN_FAR-2-S12-03	Analytical chemistry and instrumental analysis	Oblig DF	12	6	6	56	84	2	3	2	3		E1 E2
4	EN_FAR-2-S01-04	Physical chemistry	Oblig DF	4	4		28	28	2	2				E1
5	EN_FAR-2-S12-05	Organic chemistry	Oblig DF	13	6	7	84	84	3	3	3	3		E1 E2
6	EN_FAR-2-S12-06	Sport *	Oblig DC	2 suppl.		2 suppl.		14				1		C2
7	EN_FAR-2-S02-07	Molecular genetics and genetic engineering	Oblig DF	3		3	14	14	0	0	1	1		E2
8	EN_FAR-2-S02-08	Romanian language	Oblig DC	1		1	0	56	0	2	0	2		E2
9	EN_FAR-2-S02-09	Microbiology, virology, parasitology	Oblig DF	3		3	28	28			2	2		E2
10	EN_FAR-2-S01-10	Medical devices	Oblig DS	3	3		28	14	2	1	0	0		E1
11	EN_FAR-2-S01-11	Medical semiology	Oblig DD	3	3		28	28	2	2				E1
12	EN_FAR-2-S01-12	Medical terminology	Oblig DS	2		2	28	28			2	2		E2
13	EN_FAR-2-S01-13	Pharmaceutical terminology	Oblig DD	2	2		14	14	1	1				E1
14	EN_FAR-2-S01-14	Pharmacy practice 2 weeks – 30 h / week	Oblig DS	2		2		60						C2
15	FR_FAR-2-S02-15	<b>Optional courses</b>		2	2		14		1					E1
15.1	FR_FAR-2-S02-15.1	Micology	Optional											
	<b>Total heures/semaine</b>	<b>TOTAL</b>		<b>60+2S</b>	<b>30</b>	<b>30+2S</b>	<b>378</b>	<b>508</b>	<b>15</b>	<b>15</b>	<b>12</b>	<b>17</b>	<b>8E</b>	<b>7E+2C</b>
	<b>30.00</b>						<b>886</b>		<b>30</b>		<b>29</b>			

E = examen; C = colloque; \* = seminar

**RECTOR,**  
*Prof.dr. Alexandru Irimie*

**DEAN,**  
*Prof.dr. Gianina Crişan*

## 8.2.1. COMPULSORY COURSES

### PHARMACEUTICAL BIOCHEMISTRY AND CLINICAL LABORATORY

#### 1. Information about the course

<b>1.1. Discipline</b>		<b>Pharmaceutical biochemistry and Clinical laboratory</b>					
<b>1.2. Course instructor</b>		<b>Professor Corina Ionescu, PhD</b>					
<b>1.3. Laboratory instructor</b>		<b>Professor Corina Ionescu, PhD</b> <b>Associate professor Roxana Stan, PhD</b>					
<b>1.4. Year</b>	<b>2</b>	<b>1.5. Semester</b>	<b>2</b>	<b>1.6. Evaluation type</b>	<b>Written exam + Practical exam</b>	<b>1.7. Course type</b>	<b>Compulsory discipline, Specialty discipline</b>

#### 2. Total estimated time (hours/semester for teaching activity)

<b>2.1. Total hours/week</b>	<b>5 (2<sup>nd</sup> sem.)</b>	<b>2.2. Course</b>	<b>2</b>	<b>2.3. Laboratories</b>	<b>3</b>
<b>2.4. Total hours in the curriculum</b>	<b>70 (2<sup>nd</sup> sem.)</b>	<b>2.5. Course</b>	<b>28</b>	<b>2.6. Laboratories</b>	<b>42</b>
<b>2.4. Distribution of time needed / semester</b>					<b>Hours</b>
a. Study using text books, lecture notes, bibliography					24
b. Individual study within libraries, on-line platforms, field research					12
c. Preparing seminars/laboratories, homework, projects, portfolios and essays					12
d. Tutoring					6
Evaluation/ semester					3
Other activities					-
<b>2.7. Total hours for individual study (a+b+c+d)</b>				<b>54 (2<sup>nd</sup> sem.)</b>	
<b>2.8. Total hours per semester</b>				<b>124 (2<sup>nd</sup> sem.)</b>	
<b>2.9. Number of credits</b>				<b>6 (2<sup>nd</sup> sem.)</b>	

#### 3. Prerequisites:

<b>3.1. Curriculum</b>	<ul style="list-style-type: none"> <li>inorganic, organic and analytical chemistry, anatomy-physiology, cellular biology, genetics acquaintances</li> </ul>
<b>3.2. Competences</b>	<ul style="list-style-type: none"> <li>understanding and appropriate using of the specialized terminology; ability of analysis and synthesis of the informations; capacity to use common laboratory methodologies and techniques; computer usage skills; knowledge of at least one foreign language (of international use)</li> </ul>

#### 4. Requisites:

<b>4.1. For lectures</b>	<ul style="list-style-type: none"> <li>ensuring necessary infrastructure for PP presentations (laptop, video projector, internet connection); ensuring of a course support; obligation of participation to the courses according to the university requirements; it is not tolerated the delay of the students (as interrupting the educational process); the courses have to be inter-active, so the students have the opportunity to address questions upon the informations presented; during the courses it is forbidden the use of mobile phones, as well as leaving the lecture hall in order to download personal phone calls</li> </ul>
<b>4.2. For laboratories</b>	<ul style="list-style-type: none"> <li>ensuring necessary infrastructure for the qualitative and quantitative</li> </ul>

<b>sessions</b>	determinations included in the curricula (proper laboratory tables, gas lamps, apparatus, laboratory glassware, adjustable pipettes, sets of reagents, video projection system, computer, printer, internet connection; ensuring specific working conditions; ensuring of a working support (laboratory guide); presence is compulsory at all the practical works; it is forbidden the use of mobile phones all along the duration of the practical works
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### 5. *Specific competences acquired*

<b>Professional competences</b>	<ul style="list-style-type: none"> <li>• ability to use adequately and in context the specialized terminology</li> <li>• ability to explain and interpret the theoretical and practical knowledge of the discipline of pharmaceutical biochemistry and clinical laboratory in correlation with other bio-medical fundamental and specialty disciplines</li> <li>• ability of understanding the molecular bases for drug study (action, prospecting, drug-design)</li> </ul>
<b>Transversal competences</b>	<ul style="list-style-type: none"> <li>• harnessing the own optimal and creative potential in scientific activity</li> <li>• responsible execution of professional duties in terms of autonomy</li> <li>• awareness of the need of continuous learning</li> <li>• efficient use of learning resources and techniques for the benefit of personal and professional development</li> <li>• ability to design research projects</li> <li>• ability to elaborate and sustain a specialty work (in Roumanian and an international foreign language) on an actual issue in the domain, using different sources of information</li> </ul>

### 6. *Course objectives*

<b>6.1.General objectives</b>	<ul style="list-style-type: none"> <li>• the accumulation of theoretical and practical knowledge that is indispensable for the formation of the pharmacist in bio-medical profile; deciphering the molecular basis for drug study (action, prospectation, drug-design)</li> </ul>
<b>6.2.Specific objectives</b>	<ul style="list-style-type: none"> <li>• familiarizing the students with aspects connected with the application of the theoretical and practical principles in the domain of biochemistry</li> <li>• understanding the reasons that represent the basis of choosing a specific work protocol</li> <li>• familiarizing with the main research directions in the domain of biochemistry</li> <li>• training and developing of the synthesis ability and references research</li> </ul>

### 7. *Content:*

**Teaching methods for the courses:** lectures, questioning, power point presentations, dialog in real-time with the audience. Each chapter includes bio-medical aspects and therapeutical implications.

**Teaching methods for the practical labs:** presentation of the experiment, questioning, discussion of the results



<b>7.1.Lectures (hours)</b>	<b>Remarks</b>
<b>1. Nucleotides</b> – Structure, biochemical roles. Modified nucleotides used in therapy.	<b>2 h</b>
<b>2. Vitamins</b> - General considerations on the group. Fat- and water-soluble vitamins: structures, sources, absorption, circulation, distribution, biotransformations, biochemical roles, vitamins deficiencies, antagonists, toxicity. Vitamins in therapy.	<b>9 h</b>
<b>3. Proteins</b> – Structure and roles. Aminoacids. Peptides. Physicochemical properties. Isolation, fractionation and purification. The primary structure, biological significance. Peptide synthesis: chemical methods and biotechnology. Three-dimensional structure: models of secondary, tertiary and quaternary structure. Fibrillar proteins: collagen and elastin, structures and biosynthesis. Globular proteins: hemoglobin: genetics, structure, cooperativity, types in humans, role in disease, diagnostic uses; myoglobin: structure, function, role in disease. The phenomenon of distortion. The determinism of the three-dimensional structure, functional consequences.	<b>8 h</b>
<b>4. Enzymes</b> – Definition, classification, roles, structural properties: catalytic and allosteric centres. Organic enzymatic cofactors. Role of metals in enzymatic catalysis. Molecular mechanism of action. Specificity of enzymatic catalysis. Kinetics. Inhibition: types of inhibition, functions of inhibitors. Regulation of turnover and activity. Allosteric modulation. Involvement in disease.	<b>6 h</b>
<b>5. Simple and complex carbohydrates</b> – structures, biochemical roles.	<b>1.5 h</b>
<b>6. Simple and complex lipids</b> – structures, biochemical roles. (Total hours: 28)	<b>1.5 h</b>
<b>Bibliography</b>	
<ol style="list-style-type: none"> <li><b>Corina Ionescu, Roxana Stan</b>, Structural Biochemistry. Course support (CD).</li> <li>Marcy Osgood, Karen Ocorr, Principles of Biochemistry. The absolute, ultimate Guide to Lehninger. Study Guide and Solutions Manual, Sixth Edition, WH Freeman and Company, NY, 2013.</li> <li>Robert K. Murray, Daryl K. Granner, Peter A. Mayes, Victor W. Rodwell, Harper's Illustrated Biochemistry, 26<sup>th</sup> Edition, Lange Medical Books/ McGraw Hill, 2003.</li> <li>David L. Nelson, Michael M. Cox, Lehninger. Principles of Biochemistry, Fifth Ed, Ed W.H. Freeman and Company, NY, 2000.</li> <li>Burton E. Tropp, Biochemistry. Concepts and Applications, Brooks/Cole Publishing Company, 1997.</li> </ol>	
<b>7.2.Laboratory activities (hours)</b>	<b>Remarks</b>
<b>1.</b> Protection and safety rules in the clinical laboratory. Presentation of laboratory vessels, materials and equipment.	<b>1 h</b>
<b>2. Biochemical analysis of aminoacids and proteins:</b> identification, separation and quantitative determination methods and techniques.	<b>14 h</b>
<b>3. Biochemical analysis of vitamins:</b> identification, differentiation and quantitative determination methods.	<b>6h</b>
<b>4. Biochemical analysis of enzymes:</b> factors that influence enzyme activity; quantitative determination methods; determination of inhibition type and kinetic parameters.	<b>9 h</b>
<b>5. Biochemical analysis of carbohydrates:</b> identification, differentiation and quantitative determination methods.	
<b>6. Biochemical analysis of simple and complex lipids:</b> specific reactions for identification of structural components, identification and differentiation of different types of lipids.  (Total hours: 42)	<b>6 h</b>

**Bibliography**

1. **Roxana Stan, Corina Ionescu**, Biochemistry. Practical Labs in Pharmacy, Editura Medicală Universitară "Iuliu Hațieganu" Cluj-Napoca, 2014.
2. William J. Marshall, Clinical Chemistry, Third Edition, Ed. Mosby, UK, 1995.

**8. Evaluation**

<b>Activity type</b>	<b>8.1.Evaluation criteria</b>	<b>8.2. Evaluation methods</b>	<b>8.3.Percent of final grade</b>
<b>8.4. Lectures</b>	General criteria for the assessment (completeness and correctness of logical consistency, force of argument) Specific criteria regarding the attitudinal and motivational aspects of the students activity Ability of understanding the fundamental issues and customization	Written exam (tests with multiple-choise answers)	<b>75%</b>
<b>8.5. Laboratory</b>	Evaluation of the theoretical acquaintances and practical skills	Practical exam	<b>25%</b>

**8.6. Minimal performance standard**

The provision of some basic notions in the field of biochemistry, creating the prerequisites for the formation of the pharmacist in the bio-medical profile; future pharmacist will acquire the ability to understand and interpret at the molecular level the pathophysiological aspects of metabolic processes, as well as the relationship of anatomy, physiology and biochemistry of all the body.

## CELLULAR AND MOLECULAR BIOLOGY

### 1. Information about the course

<b>1.1. Discipline</b>		<b>Pharmaceutical botany</b>					
<b>1.2. Course instructor</b>		<b>Lecturer Cristina Ștefănescu, PhD</b>					
<b>1.3. Laboratory instructor</b>		<b>Lecturer Cristina Ștefănescu, PhD</b> <b>Lecturer Georgeta Balica, PhD</b> <b>Associate professor Andrei Mocan, PhD</b> <b>Lecturer Irina Ielciu, PhD</b> <b>Assistant Professor Ana Maria Gheldiu, PhD</b>					
<b>1.4. Year</b>	<b>2</b>	<b>1.5. Semester</b>	<b>1</b>	<b>1.6. Evaluation type</b>	<b>Written exam + Practical exam</b>	<b>1.7. Course type</b>	<b>Fundamental discipline Compulsory discipline</b>

### 2. Total estimated time (hours/semester for teaching activity)

<b>2.1. Total hours/week</b>	<b>3 (1<sup>st</sup> sem.)</b>	<b>2.2. Course</b>	<b>2</b>	<b>2.3. Laboratories</b>	<b>1</b>
<b>2.4. Total hours in the curriculum</b>	<b>42 (1<sup>st</sup> sem.)</b>	<b>2.5. Course</b>	<b>28</b>	<b>2.6. Laboratories</b>	<b>14</b>
<b>2.4. Distribution of time needed (1<sup>st</sup> sem. / 2<sup>nd</sup> sem.)</b>					<b>Hours</b>
a. Study using text books, lecture notes, bibliography					30
b. Individual study within libraries, on-line platforms, field research					10
c. Preparing seminars/laboratories, homework, projects, portfolios and essays					10
d. Tutoring					4
e. Evaluation/ semester					4
f. Other activities					-
<b>2.7. Total hours for individual study (a+b+c+d)</b>					<b>54 (1<sup>st</sup> sem.)</b>
<b>2.8. Total hours per semester</b>					<b>100 (1<sup>st</sup> sem.)</b>
<b>2.9. Number of credits</b>					<b>4 (1<sup>st</sup> sem.)</b>

### 3. Pre-requisites:

<b>3.1. Curriculum</b>	Fundamental notions of cytology
<b>3.2. Competences</b>	Knowledge of the optical microscopy techniques

### 4. Requisites:

<b>4.1. For lectures</b>	<ul style="list-style-type: none"> <li>• Students are accepted in the class only without different types of gadgets (mobile phone, smartphone) or having them turned off.</li> <li>• Being late after the hour indicated for course beginning is not tolerated</li> <li>• Student should comply with the Teaching activity regulation of the University</li> </ul>
<b>4.2. For laboratories sessions</b>	<ul style="list-style-type: none"> <li>• Students are accepted in the class only without different types of gadgets (mobile phone, smartphone) or having them turned off.</li> <li>• Being late after the hour indicated for laboratory beginning is not tolerated</li> <li>• Student should comply with the Teaching activity regulation of the University and the Occupational safety and health regulation in the Cell biology laboratory</li> </ul>

### 5. Specific competences acquired

<b>Professional competences</b>	<ul style="list-style-type: none"> <li>• Capacity of adequately using the profile terminology</li> <li>• Knowing the models for the cell study which allow emphasizing: the chemical composition of the cell, the particularities of prokaryote and eukaryote cells, the internal compartments and the morphological characteristics of eukaryote cells, the physiology of plant and animal cell structures (plasma membrane, cytoplasm, nucleus, organelles) – their functions and implications in human physiology and pathology</li> <li>• Ability of interpreting and explaining the theoretical and practical content of the Cell and molecular biology course through interdisciplinary approach with other biomedical courses, either fundamental or specific: Pharmaceutical botany, Pharmacognosy, Biochemistry, Biotechnologies, Pharmacogenetics, Physiopathology, Pharmacology, Biological drugs</li> <li>• Understanding the aspects concerning the particularities of the research in the field of Cell biology</li> <li>• Ability of using techniques and specific protocols for studying the biological material in the laboratory</li> <li>• Experience in handling laboratory equipment and in using laboratory protocols specific for life sciences: using an optical microscope and the tools and apparatus specific for the laboratory of Cell biology, recognizing the cell types, organelles, studied in optical microscopy, manipulating cell cultures and knowing <i>in vitro</i> culture techniques</li> </ul>
<b>Transversal competences</b>	<ul style="list-style-type: none"> <li>• Using notions in new contexts</li> <li>• Using theoretical knowledge in solving different problems</li> <li>• Best use of the own creative potential in scientific research</li> <li>• Self professional development</li> </ul>

### 6. Course objectifs

<b>6.1.General objectives</b>	<ul style="list-style-type: none"> <li>• Knowing the general notions about the molecular basis of cell structure and cell mechanisms, both physiological and pathological</li> </ul>
<b>6.2. Specific objectives</b>	<ul style="list-style-type: none"> <li>• Getting the students acquainted to the application of theoretical and practical principles of Cell biology, mainly with the use of Cell biology techniques: microscopy, cell cultures, isolation and analysis of cell organelles</li> <li>• Knowing the cell structure and functions, the laboratory techniques in the field of Cell biology</li> <li>• Understanding how to choose a work protocol based on certain reasons and mechanisms</li> <li>• Getting acquainted with the main research directions in the field of Cell biology with direct applications to the medical field</li> <li>• Stimulating the ability of synthesis and bibliographic research</li> </ul>

### 7. Content

**Teaching methods for course:** Lecture, systematic approach, conversation, questioning, oral lecture with slide projection, interactive communication

**Teaching methods for laboratory activity:** Conversation, questioning, demonstration, oral presentation sustained by digital support, interactive communication

<b>7.1. Course (hours)</b>	<b>Remarks</b>
1. The importance of cell and molecular biology for the pharmaceutical training. Recent development in cell and molecular biology (1)	
2. Cell study techniques: histological techniques, cytochemical, cytophysical methods, electron microscopy, ultracentrifugation (2)	
3. Cell membranes: classification, biological and pharmaceutical role. Molecular organization of biological membranes. Membrane of the erythrocyte. Lectins and liposomes. Membrane receptors (4)	
4. Transport through membranes. Carrier and channel proteins. Active and passive transport. Simple diffusion. Uniport, symport, antiport systems. Exocytosis, endocytosis, transcytosis. Medical implications (4)	
5. Cytoskeleton. Cell junctions (4)	
6. Biological role of the nucleus. Molecular organization of DNA, RNA synthesis (transcription), synthesis of proteins (translation), antibiotics inhibition. DNA synthesis (replication) (8)	
7. Cancer cell biology (2)	
8. Stem cells; prions (1)	
9. Cell cycle. Apoptosis (2)	
<b>Bibliography</b>	
<ol style="list-style-type: none"> <li>1. <b>Alberts, B., Johnson, A., Lewis, J., Raff, M., Roberts, K., Walter, P.:</b> <i>Molecular Biology of the Cell, 5<sup>th</sup> edition</i>, New York: Garland Science, 2008.</li> <li>2. <b>Cachița-Cosma, D., Deliu C., Rakosy-Tican L., Ardelean A.</b> <i>Tratat de biotehnologie vegetală, vol. I.</i> Cluj-Napoca: Dacia, 2004.</li> <li>3. <b>Callen J-C.:</b> <i>Biologie cellulaire – Des molécules aux organismes</i>, 2<sup>e</sup> édition, Paris: Dunod, 2005</li> <li>4. <b>Crăciun, C., Florea, A., Dragoș, N., Ardelean, A.</b> <i>Introduction to Cell and Molecular Biology.</i> Cluj-Napoca: Cluj University Press, 1999.</li> <li>5. <b>Israil, A.-M.</b> <i>Biologie moleculară, Prezent și Perspective.</i> București: Humanitas, 2000.</li> <li>6. <b>Lodish, H., Berk, A., Zipursky, L., Matsudaira, P., Baltimore, D., Darnell, J.</b> <i>Molecular Cell Biology, 4th edition.</i> New York: W.H. Freeman, 2000.</li> <li>7. <b>Étienne J.-</b><i>Biochimie génétique Biologie moléculaire</i>, 6<sup>e</sup> édition, Paris:Masson, 2000.</li> <li>8. <b>Maillet, M.</b> <i>Biologie cellulaire, 8<sup>e</sup> edition.</i> Paris: Masson, 2000.</li> <li>9. <b>www.farma.umfcluj.ro : Curs Biologie celulară</b></li> </ol>	
<b>Laboratory activities</b>	
<b>Remarks</b>	
1. Preparation of permanent microscope slides: Histological technique (2)	
2. Cytochemical localization of nucleic acids (Feulgen reaction and Brachet test). Electron microscopy techniques and interpretation of EM micrographs (2)	
3. The analysis of mammalian cell types (2)	
4. Morphology of cancer cells (2)	
5. Cell cycle. The effect of colchicine upon mitosis. Chromosome spread – karyotype of cancer cells. (2)	
6. Plant biotechnology. <i>In vitro</i> cell and tissue culture techniques (2)	
7. Isolation of plant chloroplasts (2)	
<b>Bibliography</b>	
<ol style="list-style-type: none"> <li>1. <b>Alberts, B., Johnson, A., Lewis, J., Raff, M., Roberts, K., Walter, P.:</b> <i>Molecular Biology of the Cell, 5<sup>th</sup> edition</i>, New York: Garland Science, 2008.</li> <li>2. <b>Cachița-Cosma, D., Deliu C., Rakosy-Tican L., Ardelean A.</b> <i>Tratat de biotehnologie vegetală, vol. I.</i> Cluj-Napoca: Dacia, 2004.</li> <li>3. <b>Crăciun C.,</b> <i>Citologie generală</i>, Cluj-Napoca, Ed. Risoprint, 2012.</li> <li>4. <b>Crăciun, C., Florea, A., Dragoș, N., Ardelean, A.</b> <i>Introduction to Cell and Molecular Biology.</i> Cluj-Napoca: Cluj University Press, 1999.</li> <li>5. <b>Dordea M., Crăciunaș C., Coman N., Andraș C.,</b> <i>Genetică generală și moleculară, abordare practică</i>, Cluj-Napoca, Presa. Universitară Clujeană, 2000.</li> </ol>	

6. **Israil, A.-M.** *Biologie moleculară, Prezent și Perspective*. București: Humanitas, 2000.
7. **Lodish, H., Berk, A., Zipursky, L., Matsudaira, P., Baltimore, D., Darnell, J.** *Molecular Cell Biology, 4th edition*. New York: W.H. Freeman, 2000.
8. **Maillet, M.** *Biologie cellulaire, 8<sup>e</sup> edition*. Paris: Masson, 2000.
9. **Tămaș, M.** *Lucrări practice de Biologie celulară*. Cluj-Napoca: Litografia I.M.F., 1976.
10. **Zarnea G., O.V. Popescu,** *Dicționar de Microbiologie generală și Biologie moleculară*, București, Ed. Academiei Române, 2011.
11. [www.edvotek.com](http://www.edvotek.com)
12. [www.farma.umfcluj.ro](http://www.farma.umfcluj.ro) : Cellular and molecular biology laboratory

## 8. Evaluation

Activity type	8.1.Evaluation criteria	8.2. Evaluation methods	8.3. Percent of final grade
<b>8.4. Course</b>	General evaluation criteria (full and correct knowledge, logical coherence, ability of analysis and synthesis) Criteria specific to the discipline Criteria judging the attitude and the motivation in the activity of the students Ability of understanding the fundamental problems and of seizing the particularities	Written exam (MCQ)	<b>80%</b>
<b>8.5. Laboratory</b>	Evaluation of theoretical knowledge and practical skills	Practical exam	<b>20%</b>
<b>8.6. Minimal performance standard</b>			
Knowing the principal notions of Cell biology: <ul style="list-style-type: none"> <li>• Definition and characterization of the cell and of the cell constituents</li> <li>• Techniques for the study of the cell</li> <li>• Biomembranes</li> <li>• Membrane transport</li> <li>• Centrosome. Cilia and flagella</li> <li>• Cytoskeleton. Cell junctions</li> <li>• Nucleus. Replication, transcription, translation</li> <li>• Cell cycle. Apoptosis</li> </ul>			

# ANALYTICAL CHEMISTRY AND INSTRUMENTAL ANALYSIS

## 1. Information about the course

<b>1.1. Course</b>		<b>Quantitative analytical chemistry</b>					
<b>1.2. Course instructor</b>		<b>Prof. dr. Ede Bodoki</b>					
<b>1.3. Laboratory instructor</b>		<b>Prof. dr. Radu Nicolaie Oprean</b> <b>Prof. dr. Ede Bodoki</b> <b>Prof. dr. Cecilia Victoria Cristea</b> <b>Lecturer dr. Andreea Cernat</b> <b>Lecturer dr. Bogdan-Cezar Iacob</b> <b>Lecturer dr. Mihaela Tertis</b> <b>Lecturer dr. Bogdan George Feier</b> <b>Teaching Assist dr. Ioana-Daria Tiuca</b> <b>Teaching Assist dr. Oana Hosu</b>					
<b>1.4. Year</b>	<b>2</b>	<b>1.5. Semester</b>	<b>1, 2</b>	<b>1.6. Evaluation type</b>	<b>Written exam + Continuous practical evaluation</b>	<b>1.7. Course type</b>	<b>Fundamental discipline Compulsory discipline</b>

## 2. Total estimated time (hours/semester for teaching activity)

<b>2.1. Total hours/week</b>	<b>5 (1<sup>st</sup> sem.) 5 (2<sup>nd</sup> sem.)</b>	<b>2.2. Course</b>	<b>2</b>	<b>2.3. Laboratories</b>	<b>3</b>
<b>2.4. Total hours in the curriculum</b>	<b>70 (1<sup>st</sup> sem.) 70 (2<sup>nd</sup> sem.)</b>	<b>2.5. Course</b>	<b>28</b>	<b>2.6. Laboratories</b>	<b>42</b>
<b>2.4. Distribution of time needed (1<sup>st</sup> sem. / 2<sup>nd</sup> sem.)</b>					<b>Hours</b>
a. Study using text books, lecture notes, bibliography					50/28
b. Individual study within libraries, on-line platforms, field research					20/14
c. Preparing seminars/laboratories, homework, projects, portfolios and essays					30/14
d. Tutoring					7/3
e. Evaluation/ semester					3/20
f. Other activities					-/1
<b>2.7. Total hours for individual study (a+b+c+d)</b>				<b>110 (1<sup>st</sup> sem.) 80 (2<sup>nd</sup> sem.)</b>	
<b>2.8. Total hours per semester</b>				<b>180 (1<sup>st</sup> sem.) 150 (2<sup>nd</sup> sem.)</b>	
<b>2.9. Number of credits</b>				<b>6 (1<sup>st</sup> sem.) 6 (2<sup>nd</sup> sem.)</b>	

## 3. Pre-requisites :

<b>3.1. Curriculum</b>	General and Inorganic Chemistry, Qualitative and Quantitative Analytical Chemistry
<b>3.2. Competences</b>	Preparation of solutions, concentration of solutions, calculation of concentration Basic knowledge of general and inorganic chemistry, organic chemistry, physical chemistry, qualitative and quantitative analytical chemistry, physics, (bio)statistics

#### 4. Requisites :

<b>4.1. For lectures</b>	<ul style="list-style-type: none"><li>• Mandatory attendance in at least 70% of the activities;</li><li>• Students should arrive in time for the course, as any delay interrupts and disturbs the educational process;</li><li>• Students will close their mobile phones during lectures. Phone calls will not be tolerated during lectures. Students leaving the classroom will not be tolerated either, except for special cases.</li></ul>
<b>4.2. For laboratories sessions</b>	<ul style="list-style-type: none"><li>• Mandatory attendance in 100% of the activities;</li><li>• The students should arrive in time for the course, as any delay interrupts and disturbs the educational process;</li><li>• Students will acknowledge and fully comply with the regulations regarding work safety and prevention of accidents and fires;</li><li>• The deadline for laboratory tasks will be established by agreement with the teacher. No postponement will be taken into account, except for objective reasons.</li></ul>

#### 5. Specific competences acquired

<b>Professional competences</b>	<ul style="list-style-type: none"><li>• Principles of quantitative analysis</li><li>• Evaluation and minimization of errors in quantitative analysis</li><li>• Preparation and standardizing solutions</li><li>• The use of analytical procedures for quantitative analysis based on the main chemical reaction types</li><li>• Calculation of analysis results and their statistical evaluation</li><li>• Acquiring theoretical and practical skills needed for the analysis and control of substances, medicines, food supplements, cosmetics and other health products, analysis in laboratories of biochemistry, toxicology and environmental and food chemistry</li><li>• Efficient use of information sources, as well as, communication and training resources</li><li>• The ability to use properly the specialized terminology in a given context</li><li>• Learning the basic notions regarding separation methods used in chemical analysis, instrumental methods of analysis and validation of the results of analysis methods</li><li>• Development of practical skills through exemplification, manipulation and obtaining and evaluating results for the most important methods of separation and instrumental analysis</li><li>• Ability to explain and interpret the theoretical and practical aspects of instrumental analysis and separation techniques in an interdisciplinary approach with other fundamental and specialized biomedical subjects</li><li>• Understanding aspects regarding the particularities of research in the field of analytical chemistry</li><li>• The development of skills in using certain methodologies and laboratory techniques specific to separation methods and instrumental analysis</li><li>• Gaining experience and manual skills in handling laboratory equipment and techniques of study specific to analytical chemistry</li></ul>
<b>Transversal competences</b>	<ul style="list-style-type: none"><li>• Use of specialized notions in new contexts</li><li>• Use of theoretical notions in problem solving</li></ul>



	<ul style="list-style-type: none"> <li>• Optimal and creative development of own potential in scientific activities</li> <li>• Personal professional development Autonomy and responsibility</li> <li>• Development of critical thinking skills</li> <li>• Development of moral guidelines, of professional and civic attitudes, allowing students to be fair, honest, non-conflictual, cooperative, willing to help people, interested in the development of the community;</li> <li>• To know and to apply the ethical principles related to medical and pharmaceutical practice;</li> <li>• To recognize when a problem arises and to provide responsible solutions for solving it. Social Interaction</li> <li>• To have respect for diversity and multiculturalism;</li> <li>• To develop teamwork skills;</li> <li>• To communicate orally and in writing the requirements, the operative fashion, the results obtained;</li> <li>• To engage in volunteering actions, to know the key issues of the community. Personal and Professional Development</li> <li>• To be open to learning throughout life;</li> <li>• To acknowledge the need for individual study as the basis of personal autonomy and of professional development;</li> <li>• To optimally and creatively exploit ones potential in collective activities;</li> <li>• To properly use the information and communication technology.</li> <li>• Optimal and creative exploitation of ones potential in the scientific activities</li> </ul>
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## 6. Course objectives

<b>6.1. General objectives</b>	<ul style="list-style-type: none"> <li>• Knowledge, profound study and correct use of the principles that stand at the base of quantitative chemical analysis, the errors that can appear in quantitative analysis, and the main volumetric and gravimetric quantitative methods of determination</li> <li>• Offering the informational support for understanding, deepening and correct use of the concepts of instrumental analysis and separation methods</li> </ul>
<b>6.2. Specific objectives</b>	<ul style="list-style-type: none"> <li>• Familiarization of students with aspects related to the application of theoretical and practical principles of analytical chemistry, emphasizing the use of chemical quantitative analysis</li> <li>• Gaining knowledge related to errors appearing in chemical analysis; their evaluation and minimization</li> <li>• Learning the calculation method of solution concentration and acquiring the ability to prepare them</li> <li>• Understanding of principles of volumetric analysis</li> <li>• Familiarization with the main directions of research in pharmaceutical analysis, biomedical and environmental domains</li> <li>• Practice of synthesis skills and bibliographical documentation capability</li> <li>• Familiarization of the students with aspects regarding the applications of theoretical and practical principles of separation methods and of instrumental analysis</li> <li>• Knowing the main characteristics of the separation methods employed</li> <li>• Understanding the reasons and mechanisms underlying the choice of a particular work protocol</li> </ul>

	<ul style="list-style-type: none"> <li>• Familiarization with the main research directions in the field of analytical chemistry</li> <li>• Practicing the capacity of synthesis and of bibliographic documentation</li> </ul>
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## 7. Content

**Teaching methods for course:** Oral presentations - PowerPoint presentation

**Teaching methods for laboratory activity:** Systematic oral presentation, conversation, problem solving, demonstration, individual work

7.1 Course (hours)	Remarks
<b>1<sup>st</sup> Semester</b>	
1. Introduction in quantitative analysis. Steps of quantitative analysis. Classification of analytical methods. Sampling and sample dissolution. Units of measurement	1 lecture (2 h /lecture)
2. Errors in chemical analysis. Expression of analytical results and the evaluation of errors	1 lecture (2 h/lecture)
3. Volumetric analysis. Introduction. Concentration of solutions	1 lecture (2 h/lecture)
4. Volumetric methods based on acid-base reactions. Volumetric analysis by acid-base reactions in aqueous media (Alkalimetry. Acidimetry). Volumetric analysis by acid-base reactions in non-aqueous media	4 lecture (2 h/lecture)
5. Volumetric methods based on redox reactions. General remarks. Permanganometry. Iodimetry and iodometry. Other volumetric methods based on redox reactions (Iodatometry, Dichromatometry, Cerimetry)	3 lecture (2 h/lecture)
6. Volumetric methods based on diazotization reactions (nitritometry)	0,25 lecture (2 h/lecture)
7. Volumetric methods based on precipitation (Argentometry)	1,75 lecture (2 h/lecture)
8. Volumetric methods based on complexation reactions Complexometry.	1 lecture (2 h/lecture)
9. Gravimetric methods.	1 lecture (2 h/lecture)
10. Validation of analytical procedures	1 lecture (2 h/lecture)
<b>2<sup>nd</sup> Semester</b>	
1. Classification of the methods of separation and instrumental analysis. Fundamental concepts of analytical procedures. Analytical strategy	1 lecture (2 h/lecture)
2. Optical methods of analysis. Spectroscopy (Classification of spectroscopic methods; Molecular Spectroscopy - UV-VIS and IR Atomic spectroscopy - absorption, emission, fluorescence)	2 lectures (2 h/lecture)
3. Analytical techniques of separation. The classification of the separation techniques. Extraction (liquid-liquid, solid-phase, with supercritical fluid). Countercurrent extraction.	1,5 lectures (2 h/lecture)
4. Chromatographic methods. Principle and classification of the chromatographic methods. General theory of column chromatographic separations. High performance liquid chromatography. Gas chromatography. Planar chromatography (paper, thin layer).	4 lectures (2 hours / lecture)
5. Electrophoretic methods of analysis. Theory. Instrumentation. Types of separation by capillary electrophoresis. Analytical applications.	1 lecture (2 h/lecture)
6. Electroanalytical methods. Classification of electroanalytical methods. Conductimetry (direct and indirect). Potentiometry (direct and indirect). Types of	1,5 lectures (2 h/lecture)

electrodes. Ion selective electrodes. Biosensors. Voltamperometric methods. Polarography. Amperometry. Coulometry.	
7. Mass spectrometry. Ion sources and types of ionization. Mass analyzers. Analytical applications.	1,5 lectures (2 h/lecture)
8. Coupled analytical techniques. Gas chromatography coupled with mass spectrometry. Liquid chromatography coupled with mass spectrometry. Analytical applications.	1 lecture (2 h/lecture)
9. Validation of analytical methods	1 lecture (2 h/lecture)
<b>Bibliography</b>	
1. G. Christian, ANALYTICAL CHEMISTRY, 5th ed., John Wiley & Sons, New York, 1994, ISBN: 0-471-59761-9	
2. Analytical Chemistry 2.1 - A Collection of Free Digital Resources for Teaching Analytical Chemistry, <a href="http://dpquadweb.depauw.edu/harvey_web/eTextProject/version_2.1.html">http://dpquadweb.depauw.edu/harvey_web/eTextProject/version_2.1.html</a>	
3. D.A. Skoog, D.M. West, F.J. Holler, CHIMIE ANALYTIQUE, DeBoeck Universite, Paris, Bruxelles, 1997	
4. www.farma.umfcluj.ro: Quantitative Analytical Chemistry lectures, PowerPoint lecture notes	
5. www.farma.umfcluj.ro: Instrumental Analytical Chemistry lectures, PowerPoint lecture notes.	
<b>7.2. Laboratory activities (hours)</b>	<b>Remarks</b>
<b>1<sup>st</sup> Semester</b>	
1. Briefing on general safety regulations and good laboratory practice. Fire safety instructions and firefighting. First aid in case of laboratory accidents.	1 session
2. Concentrations of solutions. Calculation examples. Volumetric methods. Measuring the volume of standard solutions. Errors in the measurement of volumes. Titration exercises. Weighing exercises.	1 session
3. Volumetric methods based on acid-base reactions. Weighing exercises. Preparation of 0.1 N NaOH solution. Standardization of the 0.1 N NaOH against oxalic acid. Determination of strong acids, determination of aspirin, determination of boric acid. Preparation and standardization of 0.1 N HCl solution. Determination of strong bases, determination of ammonia, determination of sodium hydrogen carbonate.	2 sessions
4. Volumetric methods based on redox reactions. Preparation of 0.1 N KMnO <sub>4</sub> solution. Standardization of 0.1 N KMnO <sub>4</sub> solution. Determination of alkaline oxalates, determination of hydrogen peroxide, determination of reduced Fe. Preparation of 0.1 N Na <sub>2</sub> S <sub>2</sub> O <sub>3</sub> solution. Standardization of 0.1 N Na <sub>2</sub> S <sub>2</sub> O <sub>3</sub> solution. Determination of alkaline bromates, determination of Cu(II). Preparation and standardization of 0,1 N iodine solution. Determination of vitamin C.	2 sessions
5. Fundamental notions of statistics. Statistical interpretation of the analytical results.	1 session
6. Volumetric methods based on precipitation reactions. Preparation and standardization of 0.05 N AgNO <sub>3</sub> solution. Determination of Cl <sup>-</sup> (Mohr), I <sup>-</sup> (Fajans). Preparation and titration of 0.05 N NH <sub>4</sub> SCN solution. Determination of bromides (Volhard).	2 sessions
7. Volumetric methods based on complexation reactions. Preparation of 0.01 M Complexon III solution. Determination of Bi(III), Zn(II). Determination of the total hardness of water. Simultaneous determination of Ca(II), Mg(II) and Bi(II) from a mixture.	2 session
8. Gravimetric methods. Principles, errors, calculation of results.	2 sessions
9. Final analysis	1 session
<b>2<sup>nd</sup> Semester</b>	
1. Work safety training, prevention of fires and firefighting. Introduction to instrumental analysis	1 session

2. Paper chromatography - the separation of inorganic and organic compounds	1 session
3. Thin layer chromatography - separation and determination of dyes	1 session
4. Paper electrophoresis – separation of cations	1 session
5. High performance liquid chromatography - separation and determination of caffeine	1 session
6. Separation techniques – Recapitulation, exercises	1 session
7. Automatic potentiometric titration - determination of phosphoric acid	1 session
8. Manual potentiometric titration - determination of acids and bases	1 session
9. Direct potentiometry- Determination of fluoride	1 session
10. Conductimetric titration - determination of strong and weak acids and salts	1 session
11. UV absorption spectrophotometry - determination of ephedrine	1 session
12. Visible absorption spectrophotometry - simultaneously determination of a binary mixture ( $K_2Cr_2O_7$ and $KMnO_4$ )	1 session
13. Instrumental analysis – Recapitulation, exercises, Evaluation of optional activities	1 session
14. Final evaluation of theoretical and practical concepts	1 session
<b>Bibliography</b>	
1. G. Christian, ANALYTICAL CHEMISTRY, 5th ed., John Wiley & Sons, New York, 1994.	
2. E. Bodoki, C. Cristea, R. Săndulescu, R. Oprean, Quantitative Analytical Chemistry, laboratory guidebook, Cluj-Napoca, 2013.	
3. E. Bodoki, C. Cristea, R. Oprean, R. Sandulescu, Separation Methods And Instrumental Analysis, laboratory guidebook, Cluj-Napoca, 2014	

### 8. Evaluation

Activity type	8.1. Evaluation criteria	8.2. Evaluation methods	8.3. Percent of final grade
<b>8.4. Course</b>	Specific criteria: assessing knowledge and understanding of theoretical notions, way of thinking in quantitative analytical problem solving and interpretation of obtained results (1 <sup>st</sup> sem.). Specific criteria: assessing the assimilation and understanding of theoretical concepts, skills in solving analytical problems and interpretation of results (2 <sup>nd</sup> sem.).	Multiple choice written examination, calculation problems	<b>70%</b>
<b>8.5. Laboratory</b>	Evaluation of theoretical knowledge and practical abilities, focus and accuracy in laboratory experiments, way of thinking and interpretation of results.	Evaluation of practical activities during the semester based on gathered points, test papers and final analysis (1 <sup>st</sup> sem.) Continuous evaluation in the form of written tests, essays presentations, colloquia (2 <sup>nd</sup> sem.)	<b>30%</b>

### **8.6. Minimal performance standard**

- Learning of main Quantitative analytical chemistry notions
- Theoretical principles of quantitative analysis
- Quantitative analysis methods and techniques
- Application in the pharmaceutical domain
- Learning the main concepts of separation and instrumental analysis methods:
  - The theoretical principles of instrumental analysis
  - The theoretical principles of the main methods of separation
- Confirmation of lab practical skills
- Ability to solve analytical problems in the pharmaceutical field
- Understanding the officialized methods of analysis

# PHYSICAL CHEMISTRY

## 1. Information regarding the discipline

<b>1.1. Discipline</b>		<b>Physical Chemistry</b>					
<b>1.2. Course coordinator</b>		<b>Professor Dan Răzvan Rusu, PhD Lecturer Ioana Felecan, PhD</b>					
<b>1.3. Laboratory work coordinator</b>		<b>Professor Dan Răzvan Rusu, PhD Lecturer Ioana Felecan, PhD</b>					
<b>1.4. Year of study</b>	<b>1</b>	<b>1.5. Semester</b>	<b>2</b>	<b>1.6. Type of evaluation</b>	<b>Teoretic exam Practic exam</b>	<b>1.7. Type of discipline</b>	<b>Fundamental discipline, Mandatory discipline</b>

## 2. Total estimated time (hours/semester of didactic activities)

<b>2.1. Hours per week</b>	<b>4 (1<sup>st</sup> sem.)</b>	<b>2.2. Course</b>	<b>2</b>	<b>2.3. Laboratory</b>	<b>2</b>
<b>2.4. Total hours in the curriculum</b>	<b>56 (1<sup>st</sup> sem.)</b>	<b>2.5. Course</b>	<b>28</b>	<b>2.6. Laboratory</b>	<b>28</b>
<b>2.4. Time allotment:/ semester</b>					<b>hours</b>
a. Learning using manual, course support, bibliography, course notes					<b>42</b>
b. Additional documentation (in libraries, on electronic platforms, field documentation)					<b>21</b>
c. Preparation for seminars/labs, homework, papers, portfolios and essays					<b>21</b>
d. Tutorship					<b>21</b>
e. Evaluations/semester					<b>21</b>
f. Other activities					<b>-</b>
<b>3.7. Total individual study hours (a+b+c+d)</b>				<b>105 (1<sup>st</sup> sem.)</b>	
<b>3.8. Total hours per semester</b>				<b>126 (1<sup>st</sup> sem.)</b>	
<b>3.9. Number of credits</b>				<b>4 (1<sup>st</sup> sem.)</b>	

## 1. Prerequisites

<b>3.1. Curriculum</b>	Notions of chemistry, physics, biology and matematics
<b>3.2. Competencies</b>	-

## 2. Conditions

<b>4.1. For the course</b>	-
<b>4.2. For the lab</b>	-

## 5. Specific competencies acquired

<b>Professional competencies</b>	<ul style="list-style-type: none"> <li>• The capacity to use the specific terminology in an appropriate way and in context</li> <li>• Use of basic knowledge in the field of chemistry and physics to understand the biological processes and the ability of some specific concepts with the purpose of proper usage of physico-chemical methods used in the analysis of drugs</li> <li>• The study of physico-chemical processes</li> <li>• The capacity to explain and discuss the theoretical and practical concepts of the Physical Chemistry discipline in an interdisciplinary way, combing the other</li> </ul>
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	<p>biomedical fundamental and specialty disciplines: Biophysics, Biology, Cellular Biology, Organic Chemistry, Inorganic Chemistry, Analytical Chemistry, Biochemistry, Pharmaceutical Chemistry, Therapeutical Chemistry, Pharmacogenetics, Pharmacology</p> <ul style="list-style-type: none"> <li>• Understanding the aspects regarding the particularities of research in physical-chemistry</li> <li>• The formation of the abilities to use some methodologies and specific laboratory techniques to study the physico-chemical processes</li> <li>• Having some practical experience in manipulating the laboratory equipments and the specific techniques of study in the chemistry laboratory: the use of the specific apparatus present in the physical chemistry laboratories.</li> </ul>
<b>Transversal competencies</b>	<ul style="list-style-type: none"> <li>• The use of notions in new contexts</li> <li>• The use of theoretic notions in problem solving</li> <li>• The acquiring of new notions in professional development</li> <li>• Promoting a logical way of thinking</li> <li>• An optic and creative use of the individual potential in scientific activities</li> <li>• Individual professional development</li> </ul>

### 6. Objectives of the discipline

<b>6.1.General objective</b>	<ul style="list-style-type: none"> <li>• The knowledge, approfondation and correct use of the notions in chemistry and physics</li> </ul>
<b>6.2. Specific objective</b>	<ul style="list-style-type: none"> <li>• The familiarization of students with the aspects regarding the application of theoretical and practical principles in physical chemistry, with the accent on having the necessary practical competencies in the laboratory: the use of specific apparatus, understanding the theoretical aspects and applying them during the experiments</li> <li>• The knowledge of the notions in the field of chemical thermodynamics, chemical kinetics, electronic and magnetic properties, refractometry, spectrometry, surface tension, emulsions.</li> <li>• Understanding the reasons and mechanisms which are situated at the bases in establishing a specific working protocol</li> <li>• The familiarization with the principal directions of research in the field of physical chemistry</li> <li>• Practicing the capacity of summarizing and bibliographic documentation</li> </ul>

### 7. Content

**Teaching methods course:** Lecture, Systemic presentation, Conversation, Questioning. Oral presentation combined with PowerPoint presentation

**Teaching methods Laboratory Practice:** Systemic presentation, Conversation, Questioning, Demonstration. Oral presentation combined with electronic support, conversation, questioning.

7.1.Course	Remarks
<p><b>1. Notions of quantum mechanics and structure</b>  The limitations of classical physics. Wave-particle duality. Schrödinger equation. Postulates of quantum mechanics. Quantum mechanics applied to a free particle, particle in potential pit, vibration and rotation movements. The structure of hydrogenoid atoms. The physical semnification of orbital quantum numbers. Angular and magnetic moments. Spin quantum numbers. The structure of atoms with more electrons. Methods of approximation used in quantum mechanics.</p>	

<p><b>2. Spectroscopy</b> Emission and absorption spectra. Atomic spectra. Pure rotation spectra. The vibrations of diatomic molecules. The vibrations of polyatomic molecules. Vibration-rotation spectra. Raman spectra. Electronic spectra. Fluorescence and phosphorescence. Laser spectroscopy. Photoelectron spectroscopy. Photoacoustic spectroscopy. Magnetic nuclear resonance. Electron spin resonance. Optical rotatory dispersion and dichroism circular. Solid state. Crystalline network. X ray crystallography . Experimental methods. Theories regarding the solid structure.</p>	
<p><b>3. Transport properties</b> Viscosity. Viscosity measurement. Viscosity in liquids, gases and solutions. Rheology. Diffusion. Fick Laws. Einstein equations, Nernst-Einstein equations and Stokes–Einstein equations. The measurement of diffusion coefficient. Sedimentation - speed, coefficient, sedimentation equilibrium. Electrokinetic effects. Electroosmosis. Electrophoresis. Applications.</p>	
<p><b>4. Colloid and surface chemistry</b> Generalities regarding the disperse systems. The classification of disperse systems. The classification of colloidal solutions. The preparation of colloidal solutions. Reversible and irreversible sols. Dispersions procedures. Condensation and purification procedures. Electrodialysis and dialysis. Ultrafiltration. Optical properties of colloidal solutions: Tyndall effect, microscopic exam, colour, turbidimetry, nephelometry. Kinetic properties of colloidal solutions: brownian movement, diffusion, osmotic pressure, sedimentation, viscosity. Electric properties of colloidal solutions : electric charge of micelles, electric double layer. DLVO theory. Stability of colloidal solutions. Coacervation. Protective action. Micromeritic. Rheology. Suspensions. Emulsions. Adsorption. Generalities. Adsorption at liquid-gas interface. Gibbs isotherm. Critical micellar concentration. Superficial films. Adsorption at solid gas interface. Freundlich isotherm, Langmuir isotherm, BET isotherm. Thermodynamics of adsorption. Polymers. Pharmaceutical applications of polymers. Definitions. Determination of the dimension and shape of molecules. Microstructure and shape of the chains. Solutions. Preparation and thermodynamics of the solutions of polymers.</p>	
<p><b>Bibliography</b></p> <ol style="list-style-type: none"> <li>1. Peter Atkins, Julio de Paula, <i>Physical Chemistry</i>, Oxford University Press, 2006</li> <li>2. Alexander T. Florence, David Attwood, <i>Physicochemical Principles of Pharmacy</i>, Pharmaceutical Press, London, 2004</li> <li>3. Richard M. Pashley, Marilyn E. Karaman, <i>Applied Colloid and Surface Chemistry</i>, John Wiley &amp; Sons, Ltd., 2004</li> <li>4. A. Martin, J. Swarbrick, A. Cammarata, <i>Physical Pharmacy-Physical Chemical Principles in the Pharmaceutical sciences</i>, Lea &amp; Febiger, Philadelphia, 1983</li> </ol>	
<p><b>7.2.Laboratory Practice</b></p>	<p><b>Remarks</b></p>
<p>1. The kinetic study of the hydrolysis of acetylsalicylic acid. The stability profile against pH</p>	
<p>2. Refractometric measurements applied at qualitative and quantitative determinations. Abbe refractometer, immersion refractometer and interferometer</p>	
<p>3. The determination of the intrinsic viscosity of dextran</p>	
<p>4. The identification of the type of a emulsion and its inversion. The determination of the isoelectric point of the proteins</p>	
<p>5. Surface tension–structural determination based on parachor and the determination of the critical micellar concentration</p>	
<p>6. Adsorption isotherms – the adsorption of acetic acid on active charcoal</p>	
<p>7. Deviations from Lambert-Beer Law. The solvent effect on n-π* transition in the group C=O</p>	
<p>8. Lambert-Beer Law- the composition determination for some solution mixture</p>	



9. Spectrofotometric titrations – the titration of iodine with sodium thiosulfate	
10. Qualitative applications of infrared spectroscopy	
<b>Bibliography</b> <ol style="list-style-type: none"> <li>1. Peter Atkins, Julio de Paula, <i>Physical Chemistry</i>, Oxford University Press, 2006</li> <li>2. Alexander T. Florence, David Attwood, <i>Physicochemical Principles of Pharmacy</i>, Pharmaceutical Press, London, 2004</li> <li>3. Richard M. Pashley, Marilyn E. Karaman, <i>Applied Colloid and Surface Chemistry</i>, John Wiley &amp; Sons, Ltd., 2004</li> <li>4. A. Martin, J. Swarbrick, A. Cammarata, <i>Physical Pharmacy-Physical Chemical Principles in the Pharmaceutical sciences</i>, Lea &amp; Febiger, Philadelphia, 1983</li> </ol>	

### 1. Evaluation

Type of activity	1.1.Evaluation criteria	8.2. Evaluation methods	8.3. Percent of final grade
8.4. Course	General criterias of evaluating (the knowledge to be complete and correct, logic, fluency in exprimation, argumentation capacity) Criterias specific to the discipline Criterias referring to atitudine and motivation of the activities of the students The capacity of understanding the fundamental and particular problems	Written exam, multiple choice	75%
8.5. Laboratory	Evaluation of the theoretical knowledge and practical abilities	Practical exam	25%
<b>8.6. Minimum performance standards</b>			
<b>Having the most important notions in physical chemistry</b> <ul style="list-style-type: none"> <li>• Knowing the principles of chemical thermodynamics</li> <li>• Knowing the principles of chemical kinetics</li> <li>• Notions of electrochemistry (base principles)</li> <li>• Surface phenomena and transport</li> <li>• Notions of quantum mechanics and spectroscopy</li> <li>• Knowing the basic notions in colloid and macromolecular chemistry</li> <li>• Notions in physics (optics, mechanics, electricity and magnetism)</li> </ul>			

# ORGANICAL CHEMISTRY

## 1. Information about the course

<b>1.1. Discipline</b>			<b>Organic Chemistry</b>				
<b>1.2. Course instructor</b>			<b>Professor Valentin Zaharia, PhD</b> <b>Associate Professor Ovidiu Crisan, PhD</b>				
<b>1.3. Laboratory instructor</b>			<b>Lecturer Denisa Leonte, PhD</b> <b>Assistant professor Fana-Maria Coman, PhD</b>				
<b>1.4. Year</b>	<b>2</b>	<b>1.5. Semester</b>	<b>1,2</b>	<b>1.6. Evaluation type</b>	<b>Written exam + Practical exam</b>	<b>1.7. Course type</b>	<b>Fundamental discipline, Compulsory discipline</b>

## 2. Total estimated time (hours/semester for teaching activity)

<b>2.1. Total hours/week</b>	<b>6 (1<sup>st</sup> sem.)</b> <b>6 (2<sup>nd</sup> sem.)</b>	<b>2.2. Course</b>	<b>3</b> <b>3</b>	<b>2.3. Laboratories</b>	<b>3</b> <b>3</b>
<b>2.4. Total hours in the curriculum</b>	<b>84 (1<sup>st</sup> sem.)</b> <b>84 (2<sup>nd</sup> sem.)</b>	<b>2.5. Course</b>	<b>42</b> <b>42</b>	<b>2.6. Laboratories</b>	<b>42</b> <b>42</b>
<b>2.4. Distribution of time needed (1<sup>st</sup> sem. / 2<sup>nd</sup> sem.)</b>					<b>Hours</b>
a. Study using text books, lecture notes, bibliography					70/42
b. Individual study within libraries, on-line platforms, field research					14/7
c. Preparing seminars/laboratories, homework, projects, portfolios and essays					42/20
d. Tutoring					7/4
e. Evaluation/ semester					20/14
f. Other activities					-
<b>2.7. Total hours for individual study (a+b+c+d)</b>				<b>153 (1<sup>st</sup> sem.)</b> <b>87 (2<sup>nd</sup> sem.)</b>	
<b>2.8. Total hours per semester</b>				<b>237 (1<sup>st</sup> sem.)</b> <b>171 (2<sup>nd</sup> sem.)</b>	
<b>2.9. Number of credits</b>				<b>6 (1<sup>st</sup> sem.)</b> <b>7 (2<sup>nd</sup> sem.)</b>	

## 3. Pre-requisites :

<b>3.1. Curriculum</b>	<ul style="list-style-type: none"> <li>• General and inorganic chemistry</li> <li>• Analytical chemistry and instrumental analysis</li> <li>• Physical chemistry</li> <li>• Physics – Biophysics</li> </ul>
<b>3.2. Competences</b>	<ul style="list-style-type: none"> <li>• Students should be able to understand, learn, and apply practically the theoretical notions.</li> <li>• Students should have the ability to make correlations between taught notions, both interdisciplinary and between course and practical work.</li> </ul>

## 4. Requisites :

<b>4.1. For lectures</b>	• Students must know and respect the University rules.
<b>4.2. For laboratories sessions</b>	• Students must know and respect the University rules.

### 5. Specific competences acquired

<b>Professional competences</b>	<ul style="list-style-type: none"> <li>• Students will become familiar with the scientific language suitable to organic chemistry.</li> <li>• Students will have the capacity to analyze, to correlate and to use correctly the theoretical and practical concepts of organic chemistry.</li> <li>• Students will understand the importance of the chemical structure for the organic properties.</li> <li>• Students will know how to properly use methods and techniques specific to an organic chemistry laboratory: synthesis methods, separation methods, purification methods, chemical and physical analysis methods.</li> <li>• Students will gain experience in handling laboratory glassware and in working with the equipment for the organic synthesis.</li> <li>• Students will be able to document, resume and interpret the obtained results.</li> </ul>
<b>Transversal competences</b>	<ul style="list-style-type: none"> <li>• Students will develop the ability to use the acquired knowledge in new contexts.</li> <li>• Students will be able to use the theoretical concepts in order to solve problems.</li> <li>• Students will develop the ability to work in teams, as well as by themselves.</li> <li>• Students will develop the capacity of make a decision.</li> <li>• Students will train their logical thinking.</li> <li>• Students will get involved in scientific activities.</li> <li>• Students will learn to take responsibility.</li> </ul>

### 6. Course objectifs

<b>6.1. General objectives</b>	<ul style="list-style-type: none"> <li>• Students will know to use correctly the theoretical and practical notions of organic chemistry, aspect that will help them in understanding further subjects related to organic chemistry.</li> </ul>
<b>6.2. Specific objectives</b>	<ul style="list-style-type: none"> <li>• Students will develop the ability to use the gained information in order to explain the physical, biological and chemical properties of the organic substances.</li> <li>• Students will know the main methods of synthesis, separation and purification of organic compounds.</li> <li>• Students will know how to use the devices found in an organic synthesis laboratory.</li> <li>• Students will acquire the knowledge and skills needed to study specialty disciplines.</li> </ul>

### 7. Content

<b>7.1 Course (hours)</b>	<b>Remarks</b>
1. General Organic Chemistry 1.1. The purpose and specificity of organic chemistry and its importance to the pharmacy. 1.2. The structure of organic compounds, constitutional isomers and stereoisomerism. 1.3. The mutual influence of atoms in the molecule. Electronic effects. 1.4. The acids and bases in organic chemistry. 1.5. The organic reactions, reaction intermediates and catalysts. 1.6. The relationship between the structure and physical properties of substances. 1.7. The nomenclature of organic compounds and compounds of pharmaceutical interest.	3 lectures
2. Hydrocarbons: alkanes, cycloalkanes, alkenes, alkynes, dienes and polyenes arenas.	3 lectures
3. Compounds with simple functions	15 lectures

3.1 Halogenated compounds 3.2 Organometallic compounds 3.3 Hydroxyl compounds: alcohols, phenols, enols 3.4 Functional derivatives of hydroxyl compounds: inorganic esters, ethers 3.5 Organic compounds of sulfur 3.6 Aldehydes and ketenes 3.7 Carboxylic acids and functional derivatives of carboxylic acids 3.8 Organic nitrogen compounds	
4. Compounds with mixed functions 4.1 Carbohydrates 4.2 Amino acids, peptides, proteins	3 lectures
5. Isoprenoid: terpenoids, carotenoids, steroids	1 lectures
6. Heterocyclic Compounds 6.1 General considerations, classification 6.2 Pentatomic heterocyclic compounds 6.3 Hexatomic heterocyclic compounds 6.4 Heptaatomic heterocyclic compounds 6.5 Condensed heterocyclic compounds 6.6 Natural heterocyclic compounds: morphine, nucleotides, nucleosides, nucleic acids, vitamins, antibiotics, alkaloids	3 lectures
<b>Bibliography</b>	
<ol style="list-style-type: none"> <li>1. I. Simiti: Chimie organică I (1979), III (1981), IV (1990), Litografia U.M.F. Cluj-Napoca.</li> <li>2. I. Simiti: Compuși heterociclici 1984, Litografia U.M.F. Cluj-Napoca.</li> <li>3. C. D. Nenițescu: Chimie organică I și II Editura Didactică și Pedagogică București, 1980.</li> <li>4. J. Hendrickson, D. Gran, G. Hamond: Chimie organică Editura Stiințifică și Enciclopedică, București, 1976.</li> <li>5. P. Arnaud: Cours de chimie organique, Editura Dunod, 1990.</li> <li>6. F.A. Carey, R.J. Sundberg: Advanced Organic Chemistry, 3<sup>th</sup> edition, Plenum Press, 1993.</li> <li>7. T.W.G. Solomons: Organic Chemistry, 6<sup>th</sup> edition, John Willey and sons, 1996.</li> <li>8. H. Hart, D.J. Hart, Leslie E. Craine: Organic Chemistry, 9<sup>th</sup> edition, 1995.</li> <li>9. Margareta Avram: Chimie organică, vol. I și II Editura Academiei R.S.R., București, 1983.</li> <li>10. M. Iovu: Chimie organică, Editura Didactică și Pedagogică București, 1993.</li> <li>11. S. Mager: Analiza structurală organică, Editura Stiințifică și Enciclopedică, București, 1979.</li> <li>12. S. Hauptmann: Organische Chemie, VEB Deutscher Verlag fur Grundstoff industrie Leipzig, 1985.</li> <li>13. M. Miocque, C. Combet Farnoux, H. Moskowitz: Chimie organique, Tom 1, Masson, Paris, Milan, Barcelona, 5<sup>e</sup> édition, 1999.</li> <li>14. M. Miocque, C. Combet Farnoux, H. Moskowitz: Chimie organique, Tom 2, Masson, Paris, Milan, Barcelona, 3<sup>e</sup> édition, 1990.</li> <li>15. V. Loppinet, G. Germain, R. Mari, D. Burnel: Chimie organique, Masson, Paris, Milan, Barcelona, 4<sup>e</sup> édition, 1996.</li> <li>16. O. Lafont, J. Mayrarque, M. Vayssiére: Exercices de Chimie organique, Paris, 1989.</li> <li>17. J. March: Advanced Organic Chemistry; reactions, mechanism and structure, Wiley Interscience, Forth edition, 1992.</li> <li>18. I. Simiti, V. Zaharia: Produși naturali, Editura Dacia, Cluj-Napoca, 1996.</li> <li>19. K.P.C. Vollhardt, N. E. Schore: Organic Chemistry, W.H. Freeman and Company, New York, 1999.</li> <li>20. K.P.C. Vollhardt, N. E. Schore: Traité de Chimique Organique, DeBoeck – Wesmael S.A Bruxelles, 1995.</li> <li>21. H. Galons: Chimie Organique, Masson, Paris, 2000.</li> <li>22. I. Cristea: Reacții și mecanisme de reacție în chimia organică, Editura Risoprint, Cluj-Napoca, 2000.</li> </ol>	

<p>23. I. Simiti, V.Zaharia, Ana Mureșan, O. Crișan: <i>Prođuși naturali heterociclici</i>, Editura Dacia, Cluj-Napoca, 1998.</p> <p>24. Ioana Șaramet, Valeria Rădulescu: <i>Bazele teoretice ale Chimiei Organice</i>, vol. I și II, Editura Tehnoplast Company, București, 2006.</p> <p>25. <i>Chimie organica</i>, suport de curs, <a href="http://www.farma.umfcluj.ro/">http://www.farma.umfcluj.ro/</a>.</p> <p>26. Valentin Zaharia, <i>Chimie organică</i>, Volumul I, Editura Medicală Universitară „Iuliu Hațieganu” Cluj-Napoca, 2018.</p> <p>27. Valentin Zaharia, <i>Chimie organică</i>, Volumul II, Editura Medicală Universitară „Iuliu Hațieganu” Cluj-Napoca, 2019.</p> <p>Valentin Zaharia, <i>Prođuși naturali și compuși heterociclici</i>, Editura Medicală Universitară „Iuliu Hațieganu” Cluj-Napoca, 2019.</p>	
<b>7.2. Laboratory activities (hours)</b>	<b>Remarks</b>
1. Methods of separation and purification of solid and liquid organic substances.	Presentation, Conversation, Practical application, Problem solving, Demonstration 3 laboratories
2. The qualitative and quantitative elemental organic analysis.	Presentation, Conversation, Practical application, Problem solving, Demonstration 2 laboratories
3. Organic synthesis and the chemical and spectral analysis for the following classes of organic compounds. 3.1. Monohydroxilic and polihydroxilic alcohols 3.2. Enols 3.3. Phenols 3.4. Thiols and their derivatives 3.5. Aldehydes and ketones 3.6. Carboxylic acids and their derivatives 3.7. Amines 3.8. Mixed-function compounds: carbohydrates, amino acids 3.9. Heterocyclic compounds	Presentation, Conversation, Practical application, Problem solving, Demonstration 16 laboratories
4. The basic and functional analysis of unknown substances.	Presentation, Conversation, Practical application, Problem solving, Demonstration 7 laboratories
<b>Bibliography</b>	
<p>1. V. Zaharia, <i>Chimie organică experimentală</i>, vol. 1, Editura Medicală Universitară „Iuliu Hațieganu”, Cluj-Napoca, 2003.</p> <p>2. V. Zaharia, <i>Chimie organique expérimentale</i>, vol. 1, Editura Medicală Universitară „Iuliu Hațieganu”, Cluj-Napoca, 2007.</p> <p>3. O. Crișan, Adriana Ignat, <i>Synthèse organique de laboratoire</i>, Editura Medicală Universitară “Iuliu Hațieganu” Cluj-Napoca, 2007.</p> <p>4. S. Mager, Adriana Donea, I. Hopârtean, A. Benko: <i>Lucrări practice de Chimie organică</i>, vol. I, Universitatea Babeș-Bolyai, Facultatea de Chimie și Chimie Industrială, 1990.</p> <p>5. S. Mager, Adriana Donea, I. Hopârtean, A. Benko: <i>Lucrări practice de Chimie organică</i>, vol. II, Universitatea Babeș-Bolyai, Facultatea de Chimie și Chimie industrială, 1991.</p> <p>6. S. Mager: <i>Analiza structurală organică</i>, Ed. Stiințifică și Enciclopedică, București, 1979.</p> <p>7. Margareta Avram, Gh. Mateescu: <i>Spectroscopia în infraroșu. Aplicații în Chimia Organică</i>, București, 1966.</p>	

8. I. Pogany, M. Banciu: Metode fizice în Chimia organică, Ed. Stiințifică, București, 1972.
9. Heinz Becker and colab.: Organicum, Berlin, 1978 (Traducere București 1982).
10. Dana W. Mayo, Ronald M. Pike, Peter K. Trumper: Microscale Organic Laboratory, Third Edition, John Witley and Sons, 1994.
11. Chimie organică experimentală, <http://www.farma.umfcluj.ro/>.

## 8. Evaluation

Activity type	8.1.Evaluation criteria	8.2. Evaluation methods	8.3. Percent of final grade
8.4. Course	<ul style="list-style-type: none"> <li>• Students will have to know and understand the general concepts of organic chemistry needed to study the classes of organic compounds.</li> <li>• Students will have to acquire, understand and use the concepts related to the classification, structure, name, synthesis and physical-chemical behavior of the main classes of organic compounds.</li> <li>• Students will have the ability to use theoretical concepts in structural analysis, in explaining the chemical behavior, in explaining reaction mechanisms taking into consideration the chemical behavior of substances.</li> <li>• Students will understand the importance of organic chemistry in acquiring specialty notions, in explaining the physical, chemical and biological properties of drugs and other components of a drug.</li> <li>• Students will understand the importance of knowing the physical and chemical properties, aspects related to the stability of pharmaceutical substances.</li> </ul>	Written exam	80%
8.5. Laboratory	<ul style="list-style-type: none"> <li>• Students will have to know the theory and the practical aspects related to the synthesis, separation, purification and analysis of compounds from the main classes of organic compounds.</li> <li>• Students will have the ability to manage the synthesis and analysis of organic substances.</li> <li>• Students will have the necessary knowledge needed for the synthesis and characterization of organic substances from the specialty disciplines.</li> </ul>	Practical exam	20%
<b>8.6. Minimal performance standard</b>			
<ul style="list-style-type: none"> <li>• Students will have to know the main concepts of organic chemistry.</li> <li>• Students will have to know the main methods related to the synthesis of organic compounds.</li> <li>• Students will have to know the structures of organic compounds and understand and explain the physical and chemical properties of these organic compounds based on their structure.</li> <li>• Students will have to understand and interpret reaction mechanisms.</li> </ul>			

## SPORT

### 1. Information about the course

<b>1.1. Discipline</b>		<b>SPORT</b>					
<b>1.2. Course instructor</b>		-					
<b>1.3. Laboratory instructor</b>		<b>Associate Professor Mihai Ludovic Kiss, PhD</b>					
<b>1.4. Year</b>	<b>2</b>	<b>1.5. Semester</b>	<b>2</b>	<b>1.6. Evaluation type</b>	<b>Practical exam</b>	<b>1.7. Course type</b>	<b>Compulsory complementary discipline</b>

### 2. Total estimated time (hours/semester for teaching activity)

<b>2.1. Total hours/week</b>	<b>1 (2<sup>nd</sup> sem.)</b>	<b>2.2. Course</b>	<b>0</b>	<b>2.3. Laboratories</b>	<b>1</b>
<b>2.4. Total hours in the curriculum</b>	<b>14 (2<sup>nd</sup> sem.)</b>	<b>2.5. Course</b>	<b>0</b>	<b>2.6. Laboratories</b>	<b>14</b>
<b>2.4. Distribution of time needed (1<sup>st</sup> sem. / 2<sup>nd</sup> sem.)</b>					<b>Hours</b>
a. Study using text books, lecture notes, bibliography					-
b. Individual study within libraries, on-line platforms, field research					-
c. Preparing seminars/laboratories, homework, projects, portfolios and essays					-
d. Tutoring					-
e. Evaluation/ semester					2
f. Other activities					-
<b>2.7. Total hours for individual study (a+b+c+d)</b>				<b>2 (2<sup>nd</sup> sem.)</b>	
<b>2.8. Total hours per semester</b>				<b>16 (2<sup>nd</sup> sem.)</b>	
<b>2.9. Number of credits</b>				<b>2 suppl. (2<sup>nd</sup> sem.)</b>	

### 3. Prerequisites

<b>3.1. Curriculum</b>	-
<b>3.2. Competences</b>	- Motor abilities obtained upon completion of secondary education

### 4. Requisites

<b>4.1. For lectures</b>	-
<b>4.2. For laboratories sessions</b>	<ul style="list-style-type: none"> <li>-•Students will not practical work with mobile phones turned on. Also, telephone calls will not be tolerated during the practical work neither leaving the gym to make personal phone calls;</li> <li>• It is prohibited consumption of food and beverages during the practical work</li> <li>• No delay will be tolerated during the practical work students as it was proven to be disruptive to the educational process</li> <li>• Students have to wear the specific physical education equipment</li> <li>• Students will display an appropriate attitude towards the teaching process, teaching materials, teachers and colleagues.</li> </ul>

### 5. Specific competences acquired

<b>Professional competences</b>	<ul style="list-style-type: none"> <li>• Training future pharmacists by modern conceptions concerning the improvement of lifestyle of the population, based on systematic practice of physical activities and exercises</li> </ul>
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<b>Transversal competences</b>	<ul style="list-style-type: none"> <li>• To build a ability and a habit of systematic practice of physical exercises as a component of lifestyle conducive to health ( "Mens sana in corpore sano")</li> <li>• To know aspects of prevention and correction of deficiencies attitudes and recovery of traumatic sequelae and those caused by some diseases</li> <li>• To demonstrate concern for the professional development of critical thinking skills through training</li> <li>• To know the terminology physical education and sport</li> <li>• To strengthen technical and tactical skills specific individual and team sports</li> <li>• To have the ability to communicate effectively with teachers and peers</li> <li>• To develop skills to practice physical education and sports activities in their free time</li> <li>• To attend events / subject-specific events: contests, championships, cups in various sports, scientific and specialized seminars</li> <li>• The development and cultivation of aesthetic sense and developing a positive attitude towards artistic activities</li> </ul>
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### 6. Course objectives

<b>6.1.General objectives</b>	<ul style="list-style-type: none"> <li>• Maintaining optimal health by forming the habit of practicing systematic physical exercise</li> <li>• It is targeted the assimilation, consolidation and improvement of knowledge and skills of several sports previously acquired or newly learned</li> </ul>
<b>6.2. Specific objectives</b>	<p>At the end of the course students will be able to:</p> <ul style="list-style-type: none"> <li>• Understand and apply skills to practice health maintenance exercises as leisure</li> <li>• Know the regulations of dedicated sports</li> <li>• Demonstrate a technical element of a branch of sport practiced throughout the course</li> </ul>

### 7. Content

Teaching methods: oral presentation, explanation, demonstration. The activities of several branches of sports will be held in modular system.

<b>7.1.Lectures (hours)</b>
-
<b>7.2.Laboratory activities (hours)</b>
Physical education and sport: 1. General physical development 2. Physical activity for corrective and recovery purpose (activities that require low physical exertion)
Collective and individual sports branches (sections of ASUIH): - Basketball, volleyball, ballroom dancing, aerobics, fitness, bodybuilding, table tennis, martial arts, bodybuilding, fitness, skiing, chess, badminton
Elements of physiotherapy.
<b>Bibliography</b> - M. Kiss, Caiet de lucrări practice: Dans de societate, 2012 - M. Kiss, Caiet de lucrări practice: Baschet, 2012 - M. Kiss, Caiet de lucrări practice: Culturism - Fitness, 2013 - C. Suci, Îndreptar de lucrări practico-metodice, 2013 - Bocu T. Activitatea fizică în viața omului contemporan. Editura Casa Cărții de Știință 2007 - Regulations branches of sport that were practiced



## 8. Evaluation

<b>Activity type</b>	<b>8.1.Evaluation criteria</b>	<b>8.2. Evaluation methods</b>	<b>8.3. Percent of final grade</b>
<b>8.5. Laboratory</b>	According the educational goals	Colloquy Verification Summative evaluation	<b>80%</b> <b>20%</b>
<b>8.6. Minimal performance standard</b>			
<ul style="list-style-type: none"><li>- Knowledge of the training and systematic practice of physical exercise in order to maintain optimal health</li><li>- Knowledge of specific terminology and rules of sport practiced throughout the year</li><li>- Recognition of a structure of exercises specific to the chosen sport</li></ul>			

# MOLECULAR GENETICS AND GENETIC ENGINEERING

## 1. Information about the course

<b>1.1. Discipline</b>		<b>Pharmaceutical botany</b>					
<b>1.2. Course instructor</b>		<b>Lecturer Georgeta Balica, PhD</b>					
<b>1.3. Laboratory instructor</b>		<b>Lecturer Georgeta Balica, PhD</b>					
<b>1.4. Year</b>	<b>2</b>	<b>1.5. Semester</b>	<b>2</b>	<b>1.6. Evaluation type</b>	<b>Written exam + Practical exam</b>	<b>1.7. Course type</b>	<b>Fundamental discipline, Compulsory discipline</b>

## 2. Total estimated time (hours/semester for teaching activity)

<b>2.1. Total hours/week</b>	<b>1 (2<sup>nd</sup> sem.)</b>	<b>2.2. Course</b>	<b>1</b>	<b>2.3. Laboratories</b>	<b>1</b>
<b>2.4. Total hours in the curriculum</b>	<b>28 (2<sup>nd</sup> sem.)</b>	<b>2.5. Course</b>	<b>14</b>	<b>2.6. Laboratories</b>	<b>14</b>
<b>2.4. Distribution of time needed (1<sup>st</sup> sem. / 2<sup>nd</sup> sem.)</b>					<b>Hours</b>
a. Study using text books, lecture notes, bibliography					20
b. Individual study within libraries, on-line platforms, field research					10
c. Preparing seminars/laboratories, homework, projects, portfolios and essays					12
d. Tutoring					2
e. Evaluation/ semester					3
f. Other activities					-
<b>2.7. Total hours for individual study (a+b+c+d)</b>				<b>44 (2<sup>nd</sup> sem.)</b>	
<b>2.8. Total hours per semester</b>				<b>75 (2<sup>nd</sup> sem.)</b>	
<b>2.9. Number of credits</b>				<b>3 (2<sup>nd</sup> sem.)</b>	

## 3. Pre-requisites:

<b>3.1. Curriculum</b>	Fundamental notions of Cell biology and Genetics
<b>3.2. Competences</b>	-

## 4. Requisites:

<b>4.1. For lectures</b>	<ul style="list-style-type: none"> <li>Students are accepted in the class only without different types of gadgets (mobile phone, smartphone) or having them turned off.</li> <li>Being late after the hour indicated for course beginning is not tolerated</li> <li>Student should respect the Teaching activity regulation of the University</li> </ul>
<b>4.2. For laboratories sessions</b>	<ul style="list-style-type: none"> <li>Students are accepted in the class only without different types of gadgets (mobile phone, smartphone) or having them turned off.</li> <li>Being late after the hour indicated for laboratory beginning is not tolerated</li> <li>Student should respect the Teaching activity regulation of the University and the Occupational safety and health regulation in the Molecular genetics laboratory</li> </ul>

## 5. Specific competences acquired

<b>Professional competences</b>	<ul style="list-style-type: none"> <li>Capacity of adequately using the profile terminology</li> <li>Understanding the aspects concerning the particularities of the research in the</li> </ul>
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	field of molecular genetics <ul style="list-style-type: none"> <li>• Knowing the classical and molecular cytogenetics methods, DNA recombinant technology and their applications on genetic disorders and in pharmaceutical industry</li> <li>• Ability of using techniques and specific protocols for studying the genetic material in the laboratory</li> <li>• Experience in handling laboratory equipment and in using specific laboratory protocols</li> </ul>
<b>Transversal competences</b>	<ul style="list-style-type: none"> <li>• Using notions in new contexts</li> <li>• Using theoretical knowledge in solving different problems</li> <li>• Best use of the own creative potential in scientific research</li> <li>• Self professional development</li> </ul>

### 6. Course objectives

<b>6.1.General objectives</b>	<ul style="list-style-type: none"> <li>• Getting the students acquainted to the aspects connected with the application of the theoretical and practical principles of genetics, the use of modern methods in therapy</li> </ul>
<b>6.2.Specific objectives</b>	<ul style="list-style-type: none"> <li>• Knowing and understanding the methods of study in molecular genetics</li> <li>• Knowing the structure and the functions of nucleic acids; knowing the laboratory techniques and protocols in the field of genomics</li> <li>• Understanding how to choose a work protocol based on certain reasons and mechanisms</li> <li>• Getting acquainted with the main research directions in the field of molecular genetics and the ethical issues implied</li> <li>• Stimulating the ability of synthesis and bibliographic research</li> </ul>

### 7. Content

**Teaching methods for course:** lecture, systematic approach, conversation, questioning, oral lecture with slide projection, interactive communication

**Teaching methods for laboratory activity:** conversation, questioning, demonstration, oral presentation sustained by digital support, interactive communication, virtual applications, modelling

7.1 Course (hours)	Remarks
1. The notion of gene (1)	
2. Nucleic acids: DNA, RNA – structure and functions. (1)	
3. DNA replication. The genetic code. Mutations and genetic disorders (2)	
4. Recombinant DNA technology. Molecular cloning (1)	
5. Restriction enzymes. Cloning vectors (2)	
6. Polymerase chain reaction (PCR) (1)	
7. Southern Blot analysis (1)	
8. DNA sequencing (1)	
9. The applications of molecular genetics in the pharmaceutical industry (1)	
10. Transgenic plants (1)	
11. Gene therapy (1)	
12. The genetic of cancer (1)	
<b>Bibliography</b>	
1. <b>Alberts, B., Johnson, A., Lewis, J., Raff, M., Roberts, K., Walter, P.:</b> <i>Molecular Biology of the Cell, 5<sup>th</sup> edition</i> , New York: Garland Science, 2008. 2. <b>Etienne, J.</b> <i>Biochimie genetique, Biologie moleculaire</i> . Paris: Masson, 1999. 3. <b>Gavrilă, L.</b> <i>Genomică</i> . București: Editura Enciclopedică, 2003.	

<p>4. <b>Lodish, H., Berk, A., Zipursky, L., Matsudaira, P., Baltimore, D., Darnell J.</b> <i>Molecular Cell Biology, 4th edition.</i> New York: W.H. Freeman, 2000.</p> <p>5. <b>Raicu, P.</b> <i>Genetica generală și umană.</i> București: Humanitas, 1997.</p> <p>6. <b>Rossignol, J.-L.</b> <i>Genetique, 4e edition.</i> Paris: Masson, 1996.</p> <p>7. <b>Taușer, R.G..</b> <i>Farmacogenetica. Designul de medicamente și terapia individualizată.</i> Iași : Junimea, 2005.</p> <p>8. <b>Zarnea G., O.V. Popescu,</b> <i>Dicționar de Microbiologie generală și Biologie moleculară,</i> București, Ed. Academiei Române, 2011.</p> <p>9. <b>www.farma.umfcluj.ro : Molecular genetics and genetic engineering course</b></p>	
<b>7.2. Laboratory activities (hours)</b>	<b>Remarks</b>
1. The structure of the nucleic acids: DNA and RNA (2)	
2. The genetic code. Transcription and translation (2)	
3. The extraction and the isolation of the DNA (2)	
4. The DNA electrophoresis (2)	
5. Size determination of DNA restriction fragments (2)	
6. DNA fingerprinting (2)	
7. The PCR technique (2)	
<b>Bibliography</b>	
<p>1. <b>Alberts, B., Johnson, A., Lewis, J., Raff, M., Roberts, K., Walter, P.:</b> <i>Molecular Biology of the Cell, 5<sup>th</sup> edition,</i> New York: Garland Science, 2008.</p> <p>2. <b>Dordea M., Crăciunaș C., Coman N., Andraș C.,</b> <i>Genetică generală și moleculară, abordare practică,</i> Cluj-Napoca: Presa. Universitară Clujeană, 2000.</p> <p>3. <b>Etienne, J.</b> <i>Biochimie genetique, Biologie moleculaire.</i> Paris: Masson, 1999.</p> <p>4. <b>Gavrilă, L.</b> <i>Genomică, Vol I,II,</i> București: Editura Enciclopedică, 2003.</p> <p>5. <b>Lodish, H., Berk, A., Zipursky, L., Matsudaira, P., Baltimore, D., Darnell J.</b> <i>Molecular Cell Biology, 4th edition.</i> New York: W.H. Freeman, 2000.</p> <p>6. <b>Raicu, P.</b> <i>Genetica generală și umană.</i> București: Humanitas, 1997.</p> <p>7. <b>Rossignol, J.-L.</b> <i>Genetique, 4e edition.</i> Paris: Masson, 1996.</p> <p>8. <b>Taușer, R.G..</b> <i>Farmacogenetica. Designul de medicamente și terapia individualizată.</i> Iași : Junimea, 2005.</p> <p>9. <b>Zarnea G., O.V. Popescu,</b> <i>Dicționar de Microbiologie generală și Biologie moleculară,</i> București : Ed. Academiei Române, 2011.</p> <p>10. <b>www.edvotek.com</b></p> <p>11. <b>www.farma.umfcluj.ro: molecular genetics and genetic engineering practical applications</b></p>	

## 8. Evaluation

Activity type	8.1.Evaluation criteria	8.2. Evaluation methods	8.3. Percent of final grade
<b>8.4. Course</b>	General evaluation criteria (full and correct knowledge, logical coherence, ability of analysis and synthesis) Criteria specific to the discipline Criteria judging the attitude and the motivation in the activity of the students Ability of understanding the fundamental problems and of seizing the particularities	Written exam (MCQ)	<b>80%</b>
<b>8.5. Laboratory</b>	Evaluation of theoretical knowledge and practical skills	Practical exam	<b>20%</b>
<b>8.6. Minimal performance standard</b>			

Knowing the principal notions of Molecular genetics and genetic engineering

- The definition of the gene. The genetic code
- The nucleic acids (DNA, RNA, types, functions)
- Recombinant DNA technology.
- Methods of nucleic acids analysis.
- The applications of the molecular genetics in the pharmaceutical industry and medicine
- Recent development: transgenic plants, gene therapy, cancer genetics.

## ROMANIAN LANGUAGE

### 1. Information about the course

<b>1.1. Discipline</b>		<b>Romanian language</b>					
<b>1.2. Course entitled</b>		-					
<b>1.3. Laboratory entitled</b>		<b>Assistant Maria Grosu</b>					
<b>1.4. Year</b>	<b>2</b>	<b>1.5. Semester</b>	<b>1, 2</b>	<b>1.6. Evaluation type</b>	<b>Written exam + Practical exam</b>	<b>1.7. Course type</b>	<b>Complementary discipline Compulsory discipline</b>

### 2. Total estimated time (hours/semester for teaching activity)

<b>2.1. Total hours/week</b>	<b>2</b>	<b>2.2. Course</b>	<b>-</b>	<b>2.3. Laboratories</b>	<b>2</b>
<b>2.4. Total hours in the curriculum</b>	<b>28</b>	<b>2.5. Course</b>	<b>-</b>	<b>2.6. Laboratories</b>	<b>28</b>
<b>2.4. Distribution of time needed (1<sup>st</sup> sem. / 2<sup>nd</sup> sem.)</b>					<b>Hours</b>
a. Study using text books, lecture notes, bibliography					4/4
b. Individual study within libraries, on-line platforms, field research					1/1
c. Preparing seminars/laboratories, homework, projects, portfolios and essays					2/2
d. Tutoring					-
e. Evaluation/ semester					2/2
f. Other activities					1/1
<b>2.7. Total hours for individual study (a+b+c+d)</b>					<b>10 (2<sup>nd</sup> sem.)</b>
<b>2.8. Total hours per semester</b>					<b>38 (2<sup>nd</sup> sem.)</b>
<b>2.9. Number of credits</b>					<b>1 (2<sup>nd</sup> sem.)</b>

### 3. Pre-requisites

<b>3.1. Curriculum</b>	-
<b>3.2. Competences</b>	-

### 4. Requisites

<b>4.1. For course ongoing</b>	-
<b>4.2. For laboratories ongoing</b>	Student should respect the Teaching activity regulation of the University

### 5. Specific competences acquired

<b>Professional competences</b>	<ul style="list-style-type: none"> <li>Capacity of properly use of Romanian language (listen, reading, speaking, writing) to communicate in general, academic and medical contexts</li> <li>Capacity to use the medical terms specific to the pharmaceutical field</li> </ul>
<b>Transversal competences</b>	<ul style="list-style-type: none"> <li>The ability to use the acquired knowledge in the academic and medical activity in order to an adequately communication in the Romanian language</li> <li>Making interdisciplinary connections in the studied areas.</li> </ul>

### 6. Course objectives

<b>6.1. General objectives</b>	<ul style="list-style-type: none"> <li>Developing general communication skills in Romanian language and language skills in medical and academic area</li> </ul>
<b>6.2. Specific objectives</b>	At the end of the seminar, students will be able to: <ul style="list-style-type: none"> <li>Make an inventory of the most used pharmaceutical products</li> </ul>

	<ul style="list-style-type: none"> <li>• Use all the forms of the verb "a dura" and conjugate it at all verbal times</li> <li>• To give advices and to formulate recommendations for a patient</li> <li>• Make the case history for a patient</li> <li>• Filling in the medical questionnaire based on case history</li> <li>• Speaking about diseases</li> </ul>
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## 7. Content

Teaching methods: Interactive education and media support

7.1.Course (hours)	Remarks
<b>Bibliography -</b>	
7.2.Laboratory (hours)	Remarks
<p><b>Seminar 1.</b> The medical professions and specific activities.  <b>Seminar 2.</b> The verb at present tense (revision). Cover letter.  <b>Seminar 3.</b> The pharmacy profession. Professional qualities.  <b>Seminar 4.</b> Agreement of adjective and noun. The degrees of comparison. Physical traits and character (revision).  <b>Seminar 5.</b> The moods. Pronominal verbs (revision). The verb - future tense.  <b>Seminar 6.</b> Body care. Pharmaceutical products. Expressing body sensations. Verbs and verbal structures with reflexive pronouns (to be hunger, thirsty, sleepy... wanting to...)  <b>Seminar 7.</b> The depression. Antidepressant drugs. Past perfect (revision).  <b>Seminar 8.</b> The substance dependency. Drogues and drugs.  <b>Seminar 9.</b> The passive voice, prepositions and adverbs of time.  <b>Seminar 10.</b> The parts of the body. Organs. Systems. Symptoms.  <b>Seminar 11.</b> Taking notes during anamnesis. Role play: pharmacist - patient.  <b>Seminar 12.</b> Symptoms of cold and flu. The informative notice.  <b>Seminar 13.</b> Making recommendations. The subjunctive. Pronouns in dative.  <b>Seminar 14.</b> Drugs. Pharmaceutical forms. Routes of administrations.  <b>Seminar 15.</b> The distributive numeral and the adverbial numeral. Making recommendations for drug administration.  <b>Seminar 16.</b> Drug effects on digestive system. The organs of digestive system.  <b>Seminar 17.</b> The imperative. Making recommendations for drug administration.  <b>Seminar 18.</b> Skin diseases et pharmaceutical products. Verbs with COD pronouns, symptomatology of skin diseases (itching, scratching, burning).  <b>Seminar 19.</b> Verbs accompanied by personal pronouns in accusative case.  <b>Seminar 20.</b> Pediatrics. Baby care. The pharmaceutical products.  <b>Seminar 21.</b> The genitive. Expressing the possession. Prepositions with genitive and dative case.  <b>Seminar 22.</b> Orthopedic products. Verbs of the specific symptomatology (fracture, break)  <b>Seminar 23.</b> The personnel pronoun in dative. COI. Expressing the interdiction.  <b>Seminar 24.</b> Pregnancy, birth and breastfeeding. Pharmaceutical products.  <b>Seminar 25.</b> The indefinite pronouns: <i>oricine, orice, fieceare, unul, altul, toți, toate</i>. Argumentation.  <b>Seminar 26.</b> Dietary supplements. Advices for a healthy lifestyle.  <b>Seminar 27.</b> The demonstrative pronoun and adjective. Adversative conjunctions. Explain the advantages and disadvantages.  <b>Seminar 28.</b> Review.</p>	<p>Exercise and specific activities (individual, in pairs or in groups) in order to develop speaking, listening, reading and writing skills in Romanian language</p>
<b>Bibliography</b>	
1. Coiug, A. <i>Limba română. Elemente de comunicare în mediul spitalicesc</i> . Cluj-Napoca, Editura	

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2. Dorobăț, A., Fotea, M. *Limba română de bază*. Iași, Ed. Institutul European, 1999.
3. Kohn, D., *Puls. Limba română pentru străini*. Iași, Ed. Polirom, 2009.
4. *Larousse Dicționar de Medicină*. București, ed. Univers Enciclopedic, 1998.
5. Mandelbrojt-Sweeney, M., *Limba română pentru medici și asistente*. Iași, Ed. Polirom, 2006.
6. Platon, E., Sonea, I., Vîlcu, D. *Manual de limba română ca limbă străină (RLS). A1-A2*. Cluj-Napoca, Casa Cărții de Știință, 2012.
7. Pop, L. *Româna cu sau fără profesor*. Vème Edition, Cluj-Napoca, Ed. Echinox, 2003.

### 8. Evaluation

Activity type	8.1.Evaluation criteria	8.2. Evaluation methods	8.3. Percent of final grade
<b>8.4. Course</b>	-	-	-
<b>8.5. Laboratory</b>	Evaluation of written communication skills	Written exam	<b>33%</b>
	Evaluation of oral communication skills	Oral evaluation	<b>33%</b>
	Activity at the seminar, the seminar portfolio	Evaluation of seminar activities and of the individual portfolio	<b>33%</b>
<b>8.6. Minimal performance standard</b>			
Romanian language skills and general and medical communication skills which enable the general, academic and medical communication at B1 level (Common European Framework of Reference for Languages).			



# MICROBIOLOGY, VIROLOGY, PARASITOLOGY

## 1. Information about the course

<b>1.1. Discipline</b>		<b>Microbiology, virology, parasitology</b>					
<b>1.2. Course instructor</b>		<b>Lecturer Ioana Alina Colosi, PhD</b>					
<b>1.3. Laboratory instructor</b>		<b>Assistant professor Lavinia Berinde, PhD Lecturer Mihaela Ionescu, PhD</b>					
<b>1.4. Year</b>	<b>2</b>	<b>1.5. Semester</b>	<b>2</b>	<b>1.6. Evaluation type</b>	<b>Written exam+ Practical exam</b>	<b>1.7. Course type</b>	<b>Speciality discipline, Compulsory discipline</b>

## 2. Total estimated time (hours/semester for teaching activity)

<b>2.1. Total hours/week</b>	<b>4 (2<sup>nd</sup> sem.)</b>	<b>2.2. Lecture</b>	<b>2</b>	<b>2.3. Laboratory activity</b>	<b>2</b>
<b>2.4. Total hours in the curriculum</b>	<b>56 (2<sup>nd</sup> sem.)</b>	<b>2.5. Lecture</b>	<b>28</b>	<b>2.6. Laboratory Activity</b>	<b>28</b>
<b>2.4. Distribution of time needed (1<sup>st</sup> sem. / 2<sup>nd</sup> sem.)</b>					<b>Hours</b>
a. Study using text books, lecture notes, bibliography					20
b. Individual library study, on-line platforms, field research					20
c. Preparing seminars/. Laboratory activities, homework, projects, portfolios and essays					10
d. Tutoring					-
e. Examination/ semester					4
f. Other activities					-
<b>2.7. Total hours of individual study (a+b+c+d)</b>				<b>54 (2<sup>nd</sup> sem.)</b>	
<b>2.8. Total hours/semester</b>				<b>110 (2<sup>nd</sup> sem.)</b>	
<b>2.9. Number of credits</b>				<b>3 (2<sup>nd</sup> sem.)</b>	

## 3. Prerequisites

<b>3.1. Curriculum</b>	
<b>3.2. Competences</b>	Knowledge of analytical methods with applications in the microbiology laboratory (e.g. handling a microscope)

## 4. Requisites

<b>4.1. For lectures</b>	Knowing and observing the University rules; amphitheatre with projection system
<b>4.2. For laboratory sessions</b>	Knowing and observing the University rules (e.g. always wear lab coat); laboratories with an infrastructure specific for practical activities.

## 5. Acquired specific competences

<b>Professional competences</b>	<ul style="list-style-type: none"> <li>• Pharmacist involvement in educating the population on the impact of microorganisms (including human normal flora) on health</li> <li>• knowledge of the microorganisms (bacteria, viruses, parasites, fungi) and the diseases produced; knowledge of medical terminology</li> <li>• Understand the relationship between microorganisms and the human body, ways of transmission and production of infectious diseases in order to participate, along with doctors, in treatment, prevention and control of this pathology</li> </ul>
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	<ul style="list-style-type: none"> <li>• Skills training for the use of specific techniques in microbiology laboratories; acquiring the skills for use of laboratory equipment.</li> <li>• Analysis and interpretation of microbiological information to participate, along with other health professionals, to form a correct attitude of patients towards microorganisms</li> <li>• The ability to properly use specialized terminology in context</li> </ul>
<b>Transversal competences</b>	<ul style="list-style-type: none"> <li>• Identify roles and responsibilities in a multidisciplinary team</li> <li>• Apply techniques for feedback and longitudinal effective work within the team</li> <li>• Effective use of information sources, communication resources and training (Internet, on-line courses, professional websites)</li> <li>• The application of theoretical concepts in practical activity</li> <li>• Own professional and personal development.</li> </ul>

## 6. Course objectives

<b>6.1. General objectives</b>	<ul style="list-style-type: none"> <li>• Knowledge, deepening and correct use of microbiology concepts related to contamination with infectious agents and their transmission to humans by initiating an infectious process</li> <li>• Acquiring the basics of general microbiology, properties of the different groups of microorganisms, relationship with humans and their environment</li> <li>• Bacteria, viruses, parasites and fungi involved in the etiology of human infections</li> </ul>
<b>6.2. Specific objectives</b>	<ul style="list-style-type: none"> <li>• Knowledge of the main characteristics of bacteria, viruses, fungi and parasites potentially dangerous to human health.</li> <li>• To know the aetiology, pathogenesis and laboratory diagnosis of bacterial, viral, parasitic and fungal diseases</li> <li>• Acquisition of theoretical and practical knowledge on infectious agents, human contamination possibilities</li> <li>• Knowledge of the characteristics of an infectious process and the diagnostic possibilities</li> <li>• Interpretation of microbiological analysis results</li> <li>• Understand the reasons and mechanisms underlying the choice of a particular protocol work</li> <li>• Acquaintance with the main areas of research in microbiology</li> <li>• Exercise synthesis capacity and bibliographic documentation.</li> </ul>

## 7. Content

Teaching methods for courses: lectures, systematic exposure, conversation, problem based learning. Oral presentations, power point presentations.

Teaching methods for practical sessions: Systematic presentation, practical demonstrations, conversation. Power point presentation followed by learning basic techniques used in microbiology laboratories (strictly supervised). Discussions.

<b>7.1. Lecture</b>	<b>Remarks</b>
<b>1. General microbiology</b> <ul style="list-style-type: none"> <li>• Microorganism world: Eukaryotes vs. Prokaryote, bacterial morphology: shape, necessary (compulsory)/unnecessary (facultative) bacterial structures</li> <li>• Bacterial metabolism (general ideas, bacterial nutrition, bacterial growth curve), bacterial genetics (general ideas, cromozomial and extracromozomial information,</li> </ul>	6 h

<p>variability mechanisms).</p> <ul style="list-style-type: none"> <li>• Microorganisms and pathogenesis; microorganism - human body interactions</li> <li>• Host defense against microorganisms (nonspecific, immunity, specific bacterial, viral, parasitic and fungal antigens, specific antimicrobial antibodies)</li> </ul> <p>Antibiotics (definitions, classifications, targets and mechanisms of action, spectrum of action, bacterial resistance mechanisms)</p>	
<p><b>2. Medical bacteriology</b></p> <ul style="list-style-type: none"> <li>• Gram positive cocci (staphylococci, streptococci, pneumococci, enterococci): properties, infections, laboratory diagnosis, treatment and prophylaxis</li> <li>• Gram negative cocci (meningococci, gonococci): properties, infections, laboratory diagnosis, treatment and prophylaxis</li> <li>• Gram positive bacilli (<i>Bacillus</i>, <i>Clostridium</i>, <i>Corynebacterium</i>): properties, infections, laboratory diagnosis, treatment and prophylaxis</li> <li>• Gram negative bacilli (<i>Enterobacteriaceae</i>, <i>Pseudomonas</i>, <i>Helicobacter pylori</i>, <i>Vibrio cholerae</i>): properties, infections, laboratory diagnosis, treatment and prophylaxis</li> <li>• Infections produced by <i>Mycobacterium</i>: tuberculosis</li> <li>• Spirochetes (<i>Treponema</i>, <i>Borrelia</i>): properties, infections, laboratory diagnosis, treatment and prophylaxis</li> </ul> <p><i>Chlamydia</i>, <i>Mycoplasma</i>: properties, infections, laboratory diagnosis, treatment and prophylaxis</p>	8h
<p><b>3. Medical virology</b></p> <ul style="list-style-type: none"> <li>• General properties, structure, classification</li> <li>• Hepatitis A-E viruses, HIV: properties, infections, laboratory diagnosis, treatment and prophylaxis</li> <li>• Influenza viruses, Herpes viruses: properties, infections, laboratory diagnosis, treatment and prophylaxis</li> </ul> <p>Viruses that produce respiratory and digestive infections: properties, infections, laboratory diagnosis, treatment and prophylaxis</p>	6 h
<p><b>4. Medical parasitology</b></p> <ul style="list-style-type: none"> <li>• General properties, classification</li> <li>• Protozoa (<i>Giardia</i>, <i>Toxoplasma gondii</i>, <i>Trichomonas vaginalis</i>): properties, infections, laboratory diagnosis, treatment and prophylaxis</li> <li>• Nematodes (<i>Ascaris</i>, <i>Trichocephalus</i>, <i>Enterobius</i>, <i>Trichinella</i>): properties, infections, laboratory diagnosis, treatment and prophylaxis</li> </ul> <p>Flat worms (<i>Taenia solium</i> - cisticercosis / <i>Taenia saginata</i>): properties, infections, laboratory diagnosis, treatment and prophylaxis</p>	4 h
<p><b>5. Medical mycology</b></p> <ul style="list-style-type: none"> <li>• General properties, definitions, classification</li> <li>• Yeasts (<i>Candida</i>): properties, infections, laboratory diagnosis, treatment and prophylaxis</li> </ul> <p>Filamentous fungi (<i>Aspergillus</i>): properties, infections, laboratory diagnosis, treatment and prophylaxis</p>	2 h
<b>Pharmaceutical microbiology</b>	2 h
<p><b>Bibliography</b></p> <ol style="list-style-type: none"> <li>1. Carmen Costache, Lia Monica Junie - Medical bacteriology and medical virology, Editura Medicală Universitară "Iuliu Hațieganu", Cluj Napoca, 2011.</li> <li>2. Lia Monica Junie, Carmen Costache (trad): Basic bacteriology and virology, Editura Medicală Universitară "Iuliu Hațieganu", ISBN 978-973-693-422-3, 2011.</li> <li>3. George F. Brooks, Janet S. Butel, Stephen A. Morse, Joseph L. Melnick, Ernest Jawetz, Edward A. Adelberg- Jawetz, Melnick Adelberg's Medical Microbiology – 25-th edition,</li> </ol>	

McGraw-Hill Professional Ed., 2007.	
<b>7.2.Laboratory activity 28 hours; 2 hours/week, 14 weeks, second semester</b>	<b>Remarks</b>
1. Microbiology laboratory: presentation, safety rules. Sterilization and disinfection.	2 h
2. Sample collection for laboratory diagnosis in infectious diseases.	2 h
3. Microscopic preparation: wet smear, stained smear - principles, techniques, information. Stainings: Gram, Ziehl-Nielsen – principle, technique, interpretation; special staining. Examination at the optical microscope of wet mount – motile bacteria ( <i>Proteus</i> ) and eukaryotic cells ( <i>Candida</i> ). Examination at the optical microscopes of stained smears with Gram positive bacteria ( <i>Staphylococci</i> , <i>Streptococci</i> ), Gram negative bacteria ( <i>E. coli</i> , <i>Pseudomonas</i> , <i>Neisseria</i> ).	2 h Realisation and observation of microscopic preparations (wet mount and stained smears).
4. Microscopic preparation: stained smear - principles, techniques, information. Stainings: Ziehl-Nielsen – principle, technique, interpretation; special staining. Examination at the optical microscopes of stained smears with acid-fast bacteria ( <i>Mycobacterium</i> ), capsulated bacteria ( <i>Klebsiella</i> in Burri staining for the capsule), sporulated bacteria ( <i>Clostridium</i> ).	2 h Realisation and observation of microscopic preparations (stained smears).
5. Culture media (definition, classification, examples). Bacterial colonies. Inoculation techniques. Cultural characteristics used in bacterial identification. Identification by cultural properties of <i>staphylococci</i> , <i>streptococci</i> , <i>Bacillus cereus</i> , <i>Candida</i> .	2 h Culture media inoculation, observation and identification of bacterial culture.
6. Culture media (definition, classification, examples). Bacterial colonies. Inoculation techniques. Cultural characteristics used in bacterial identification. Identification by cultural properties of <i>Enterobacteriaceae</i> ( <i>E. coli</i> , <i>Klebsiella</i> , <i>Proteus</i> ), <i>Pseudomonas</i> .	2 h Culture media inoculation, observation and identification of bacterial culture.
7. Antibiotic susceptibility testing for bacteria: principles, techniques, interpretation, clinical application. Antifungal susceptibility testing for fungi. Test.	2 h
8. Laboratory diagnostic scheme for the diagnosis of infectious diseases. Principle of serological diagnosis. Test results interpretation, case studies.	2 h
9. Virology: laboratory diagnosis in viral hepatitis. Laboratory diagnosis in HIV infection. Test results interpretation, case studies.	2 h
10. Virology: laboratory diagnosis in flu. Laboratory diagnosis in other viral infections. (2 hours). Test results interpretation, case studies.	
11. Laboratory diagnosis in Parasitology: principles, methods. Laboratory diagnosis in infections produced by nemathelminths ( <i>Ascaris lumbricoides</i> , <i>Enterobius vermicularis</i> , <i>Trichinella spiralis</i> ). Microscopical examination of ova and parasites (O&P) exams, test results interpretation.	2 h
12. Parasitology: laboratory diagnosis in infections produced by plathelminths	2 h

( <i>Taenia saginata/solium</i> ). Laboratory diagnosis in protozoa infections: <i>Giardia</i> , <i>Trichomonas vaginalis</i> , <i>Plasmodium</i> . Microscopical examination of O&P exams, test results interpretation.	
13. Recapitulation (review).	2 h
<b>14. Practical examination.</b>	2 h
<b>Bibliography</b>	
<ol style="list-style-type: none"> <li>1. Carmen Costache, Lia Monica Junie - Medical bacteriology and medical virology, Editura Medicală Universitară "Iuliu Hațieganu", Cluj Napoca, 2011.</li> <li>2. Lia Monica Junie, Carmen Costache (trad): Basic bacteriology and virology, Editura Medicală Universitară "Iuliu Hațieganu", ISBN 978-973-693-422-3, 2011.</li> <li>3. George F. Brooks, Janet S. Butel, Stephen A. Morse, Joseph L. Melnick, Ernest Jawetz, Edward A. Adelberg- Jawetz, Melnick Adelberg's Medical Microbiology – 25-th edition, McGraw-Hill Professional Ed., 2007, ISBN 0071412077.</li> </ol>	

### 8. Evaluation

Activity type	8.1. Evaluation criteria	8.2. Evaluation methods	8.3. Percent of final grade
<b>8.4. Lectures</b>	<ul style="list-style-type: none"> <li>• General criteria for evaluation (correctness knowledge, logical consistency, fluency of speech, the force of argument)</li> <li>• Discipline specific criteria</li> <li>• Criteria that envisage attitudinal and motivational aspects of student activities</li> <li>• The ability to understand the fundamental issues and the ability to customize.</li> </ul>	Written examination: multiple choice questions and editorial questions	<b>70%</b>
<b>8.5. Laboratory</b>	<ul style="list-style-type: none"> <li>• Evaluation of theoretical knowledge obtained during practical activities and evaluation of practical abilities</li> <li>• Evaluation during the entire semester of practical activities, seminars.</li> </ul>	Practical examination	<b>30%</b>
<b>8.6. Minimum performance standard</b>			
Learning the main Microbiology's items: <ul style="list-style-type: none"> <li>• What are microorganisms (bacteria, viruses, parasites, fungi)</li> <li>• The main features of microorganisms (morphological characters, culture, metabolism, genetics, pathogenicity) essential for the laboratory diagnosis of infectious diseases</li> <li>• Ways of human contamination with bacteria, viruses, parasites, fungi</li> <li>• The basics of sterilization and disinfection</li> <li>• Bacterial, viral, parasitic and fungal infections: laboratory diagnosis, treatment, prevention</li> <li>• Microorganisms and pharmaceuticals</li> <li>• Formation of an active attitude in educating people for knowing microorganisms in order to prevent contamination with infectious agents.</li> </ul>			

## MEDICAL DEVICES

### 1. Information about the course

<b>1.1. Discipline</b>		<b>Medical devices. Pharmaceutical practice</b>					
<b>1.2. Course instructor</b>		<b>Associate professor PhD Simona Mirel</b>					
<b>1.3. Laboratory instructor</b>		<b>Associate professor Simona Mirel, PhD Lecturer Liora Colobățiu, PhD Assistant professor Alexandru Gâvan, PhD</b>					
<b>1.4. Year</b>	<b>2</b>	<b>1.5. Semester</b>	<b>1</b>	<b>1.6. Evaluation type</b>	<b>Written exam + Practical exam</b>	<b>1.7. Course type</b>	<b>Speciality discipline, Compulsory discipline</b>

### 2. Total estimated time (hours/semester for teaching activity)

<b>2.1. Total hours/week</b>	<b>3 (1<sup>st</sup> sem.)</b>	<b>2.2. Course</b>	<b>2</b>	<b>2.3. Laboratories</b>	<b>1</b>
<b>2.4. Total hours in the curriculum</b>	<b>42 (1<sup>st</sup> sem.)</b>	<b>2.5. Course</b>	<b>28</b>	<b>2.6. Laboratories</b>	<b>14</b>
<b>2.4. Distribution of time needed (1<sup>st</sup> sem. / 2<sup>nd</sup> sem.)</b>					<b>Hours</b>
a. Study using text books, lecture notes, bibliography					14
b. Individual study within libraries, on-line platforms, field research					14
c. Preparing seminars/laboratories, homework, projects, portfolios and essays					14
d. Tutoring					7
e. Evaluation/ semester					7
f. Other activities					-
<b>2.7. Total hours for individual study (a+b+c+d)</b>				<b>49 (1<sup>st</sup> sem.)</b>	
<b>2.8. Total hours per semester</b>				<b>98 (1<sup>st</sup> sem.)</b>	
<b>2.9. Number of credits</b>				<b>3 (1<sup>st</sup> sem.)</b>	

### 3. Pre-requisites:

<b>3.1. Curriculum</b>	- basic knowledge of anatomy, physiology, chemistry, physics
<b>3.2. Competences</b>	-

### 4. Requisites:

<b>4.1. For lectures</b>	-
<b>4.2. For laboratories sessions</b>	-

### 5. Specific competences acquired

<b>Professional competences</b>	<ul style="list-style-type: none"> <li>• Getting acquainted with the specific terminology in order to use it adequately;</li> <li>• The capacity to identify and know the main types of medical devices frequently released in pharmacies (in correlation with their proper medical indications);</li> <li>• The capacity to know and understand the characteristics of certain medical devices (description, advantages, disadvantages);</li> <li>• Gaining experience in handling properly certain medical devices</li> <li>• The capacity to know, to understand and to explain the correct way of use of the medical devices</li> </ul>
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	<ul style="list-style-type: none"> <li>• Developing the necessary abilities to analyze requests regarding the procurement of medical devices, in order to avoid choosing errors;</li> <li>• Acquiring certain communication skills necessary in the act of releasing medical devices;</li> <li>• The capacity to explain and analyze the theoretical and practical content of the course, in a multidisciplinary approach ;</li> <li>• Understanding aspects related to the complexity of the research carried out in order to obtain performant medical devices, highlighting the importance of biomaterials and biocompatibility</li> </ul>
<b>Transversal competences</b>	<ul style="list-style-type: none"> <li>• The development of a responsible attitude towards the profession</li> <li>• The development of an active attitude regarding the counseling of patients</li> <li>• The ability to use theoretical knowledge in order to solve practical cases</li> <li>• The ability to use new information in new contexts</li> </ul> <p>Individual professional development</p>

## 6. Course objectifs

<b>6.1. General objectives</b>	<ul style="list-style-type: none"> <li>• To know and understand the importance and the role of medical devices in medicine and to properly use the acquired information in order to adequately counsel patients regarding the selection and use of these specific health products.</li> </ul>
<b>6.2. Specific objectives</b>	<ul style="list-style-type: none"> <li>• Familiarization with the regulations regarding medical devices</li> <li>• The identification of the main types of medical devices available in pharmacies</li> <li>• To understand and know the proper way of use and to exercise the way of use of the main types of medical devices</li> <li>• To know the role of medical devices and to get acquainted with their indications and medical applications</li> <li>• To develop the necessary abilities in order to identify and solve problems related to the selection and release of medical devices in pharmacies</li> <li>• Familiarization with the main research directions in the field of medical technology</li> </ul>

## 7. Content

**Teaching methods for course:** discourse, systematic display, questioning, conversation. Oral discourse doubled by Power Point presentations.

**Teaching methods for laboratory activity:** systematic display, conversation, questioning, conversation. Oral presentations, completed by electronic support, practical demonstrations and exercise.

<b>7.1 Course (hours)</b>	<b>Remarks</b>
<b>1. The role of medical devices in medical practice:</b> the role and applications of the medical devices; Introduction; Definitions; The difference between a medical device and a medicine; Frontier products; Classification; Regulations; Romanian legislation regarding medical devices; Labelling. Materiovigilance.	
<b>2. Materials used to obtain medical devices:</b> Cellulose and cotton. Metals and metal alloys. Natural and synthetic rubber. Ceramics. Biomedical polymers. Biomaterials and biocompatibility.	
<b>3. Medical devices used to administer medicines parenterally :</b> syringes; needles ; catheters ; infusion/transfusion sets. Medical devices used to administer insulin : standard insulin syringes ; insulin pens ; insulin	

pumps ; new technologies in development for the administration of insulin.	
<b>4. Surgical medical devices:</b> Medical devices for surgical incision ; medical devices for surgical suture ; Suture materials. Materials and equipment for protection: surgical masks, surgical gloves, surgical fields	
<b>5. Dressings :</b> Skin lesions and wound healing phases. Characteristics of dressings. Classification. Wet wound healing-types of dressings used : alginate, hydrocolloid, hydrogel, foam, poliurethane.	
<b>6. Medical devices for in vitro diagnosis:</b> thermometers, blood pressure monitoring devices, glucose meters. Pregnancy tests.	
<b>7. Medical devices used in the treatment of respiratory diseases:</b> Medical aerosols – general aspects. Nebulisers. Spacers. Inhalers.	
<b>8. Medical devices used for sexual protection and birth control:</b> Barrier methods used in contraception and their role in preventing sexually transmitted diseases (STDs) ; The male condom ; The female condom ; Vaginal diaphragm ; contraceptive sponge ; Spermicides. Intrauterine devices.	
<b>9. Infant care medical devices:</b> nursing bottles, pacifiers, diapers, breast pumps, breast protectors and tampons, nasal aspirators.	
<b>Bibliography</b>	
<ol style="list-style-type: none"> <li>1. <b>Simona Mirel, Flavius Neag</b>, <i>Produse tehnico-medicale</i>, Editura Medicală Universitară “Iuliu Hațieganu” Cluj-Napoca, (ISBN 978-973-693-278-6), 2008</li> <li>2. <b>Roșca M.</b> <i>Produse Tehnico-Medicale</i>. Tipografia UMF Cluj, 1996.</li> <li>3. <b>Roșca M.</b> <i>Produse Tehnico-Medicale</i>. Tipografia UMF Cluj, 2001.</li> <li>4. <b>Robin J. Harman</b>, <i>Patient care in community practice: a handbook of non-medicinal healthcare</i>, Editura Pharmaceutical Press, 2002</li> <li>5. <b>Jacques Callanquin</b> , <i>Le Matériel De Maintien À Domicile - Avec Cas Pratiques Et Exercices</i>, Ed. Masson, Collection Abrégés, 2008</li> <li>6. <b>Jacques Callanquin, Pierre Labrude</b>, <i>Les dispositifs médicaux et les accessoires. Guide à l'usage des praticiens</i>, Ed. Pharmathèmes, 2010</li> <li>7. <b>Antoine Audry , Jean-Claude Ghislain</b>, <i>Le dispositif médical</i>, Editure PUF, Paris, 2009</li> <li>8. <b>Bleas Jean-Jacques, Boulet François-Xavier</b>, <i>Le préparateur en pharmacie Dossier 8: Dispositifs médicaux - Communication professionnelle</i>, Editeur : Tec Et Doc, 2004</li> <li>9. <b>Ana-Maria Iounut</b>, Managementul plăgii, <i>Tratamentul plăgilor în mediu umed</i>. Editura Medicală Universitară „Iuliu Hațieganu”, 2008</li> <li>10. <a href="http://www.farma.umfcluj.ro">www.farma.umfcluj.ro</a> : Curs <b>Produse tehnico-medicale</b>, suport PowerPoint</li> </ol>	
<b>7.2. Laboratory activities (hours)</b>	<b>Remarks</b>
<b>1. The identification of the main types of medical devices. Frontier devices:</b> medical device-medicine.	
<b>2. Medical devices used to administer treatment parenterally</b> (knowing the characteristics and the proper way of use of such devices) : medical devices used to administer treatment (syringes, catheters, infusion/transfusion sets) and protection equipment (masks, gloves, surgical fields).	
<b>3. Dressing materials. Modern dressings used in wet wound healing.</b>	
<b>4. Medical devices used in the management of the chronic patient at home :</b> blood pressure monitoring devices, thermometers, specific devices.	
<b>5. Medical devices used in the management of the diabetic patient:</b> Medical devices used to administer and monitor treatment.	
<b>6. Medical devices used in the management of the patient with respiratory</b>	



<b>diseases:</b> Monitoring medical devices (peakflowmeter) and MD used in therapy (nebulizers, spacers, inhalers).	
<b>7. Medical devices used for sexual protection and birth control. Infant care devices.</b>	
<b>Bibliography</b>	
<ol style="list-style-type: none"> <li>1. <b>Simona Mirel, Flavius Neag</b>, <i>Produse tehnico-medicale</i>, Editura Medicală Universitară “Iuliu Hațieganu” Cluj-Napoca, (ISBN 978-973-693-278-6), 2008</li> <li>2. <b>Roșca M.</b> <i>Produse Tehnico-Medicale</i>. Tipografia UMF Cluj, 1996.</li> <li>3. <b>Roșca M.</b> <i>Produse Tehnico-Medicale</i>. Tipografia UMF Cluj, 2001.</li> <li>4. <b>Robin J. Harman</b>, <i>Patient care in community practice: a handbook of non-medicinal healthcare</i>, Editura Pharmaceutical Press, 2002</li> <li>5. <b>Jacques Callanquin</b> , <i>Le Matériel De Maintien À Domicile - Avec Cas Pratiques Et Exercices</i>, Ed. Masson, Collection Abrégés, 2008</li> <li>6. <b>Jacques Callanquin, Pierre Labrude</b>, <i>Les dispositifs médicaux et les accessoires. Guide à l'usage des praticiens</i>, Ed. Pharmathèmes, 2010</li> <li>7. Bleas Jean-Jacques, Boulet François-Xavier, <i>Le préparateur en pharmacie Dossier 8: Dispositifs médicaux - Communication professionnelle</i>, Editeur : Tec Et Doc, 2004</li> <li>8. Ana-Maria Iounut., Managementul plăgii, <i>Tratamentul plăgilor în mediu umed</i>. Editura Medicală Universitară „Iuliu Hațieganu”, 2008</li> <li>9. www.farma.umfcluj.ro: LP-uri <i>Produse tehnico-medicale</i>, suport PowerPoint</li> </ol>	

## 8. Evaluation

Activity type	8.1.Evaluation criteria	8.2. Evaluation methods	8.3. Percent of final grade
<b>8.4. Course</b>	<p><b>General evaluation criteria:</b> the correct assimilation of the information presented, the argumentation and logical coherence, the adequate vocabulary</p> <p><b>Specific criteria:</b> The capacity to understand the general aspects included in the lectures and to apply these aspects in practical cases Criteria concerning the attitude and motivation of students</p>	Written, grid exam	<b>70%</b>
<b>8.5. Laboratory</b>	The evaluation of students' capacity to apply theoretical knowledge into practice; the acquirement of practical abilities.	Practical exam	<b>30%</b>
<b>8.6. Minimal performance standard</b>			
<p>The acquirement of the most important notions regarding medical devices and the use of medical devices in the prevention, diagnostic, monitorization, treatment and care of the patient.</p> <ul style="list-style-type: none"> <li>• The definition of medical devices and their proper identification</li> <li>• To know the main medical applications of the medical devices</li> <li>• The identification of the main categories of medical devices</li> <li>• The classification of medical devices:criteria</li> <li>• The safe use of medical devices. Materiovigilance</li> <li>• Biocompatibility. Biomaterials</li> </ul> <p>Medical devices used in the management of the patient suffering from chronic diseases regularly released in pharmacies: devices used for the administration of treatment, autotest devices, dressings used in the treatment of chronic wounds</p>			

## MEDICAL SEMIOLOGY

### 1. Information about the course

<b>1.1. Discipline</b>				<b>Medical Semiology</b>			
<b>1.2. Responsible for lecture</b>				<b>Lecturer Vlad Vasile Calin, PhD</b>			
<b>1.3. Responsible for practical activity</b>				<b>Lecturer Vlad Vasile Calin, PhD</b>			
<b>1.4. Year of study</b>	<b>2</b>	<b>1.5. Semester</b>	<b>1</b>	<b>1.6. Evaluation form</b>	<b>Written examination + Oral Examination (practical + portfolio)</b>	<b>1.7. Course type</b>	<b>Mandatory</b>

### 2. Total estimated time (hours/semester for teaching activity)

<b>2.1. Total hours/week</b>	<b>4</b>	<b>2.2. Course</b>	<b>2</b>	<b>2.3. Practical Activity</b>	<b>2</b>
<b>2.4. Total hours in the curriculum</b>	<b>56</b>	<b>2.5. Course</b>	<b>28</b>	<b>2.6. Practical activity</b>	<b>28</b>
<b>2.4. Distribution of time needed/week</b>					<b>Hours</b>
a. Study using text books, lecture notes, references					5
b. Individual study using on-line platforms, field research					5
c. Preparing seminars/Laboratory activities, homework, projects, portfolios, essays					4
d. Tutoring					
e. Examination/ semester					4
f. Other activities					1
<b>2.7. Total hours of individual study (a+b+c+d)</b>				<b>19 (1<sup>st</sup> sem.)</b>	
<b>2.8. Total hours/semester</b>				<b>75 (1<sup>st</sup> sem.)</b>	
<b>2.9. Number of credits</b>				<b>3 (1<sup>st</sup> sem.)</b>	

### 3. Prerequisites

<b>3.1. Curriculum</b>	Notions of anatomy, physiology, physiopathology and biochemistry
<b>3.2. Competences</b>	

### 4. Requisites

<b>4.1. For lectures</b>	Amphitheatre with projection system
<b>4.2. For practical activities</b>	Patient rooms with beds

### 5. Acquired specific competences

<b>Professional competences</b>	<ul style="list-style-type: none"> <li>• Capacity of using the semiologic terminology in specific situations and diagnostic algorithm</li> <li>• Capacity of communication with the medical community</li> <li>• Critic evaluation, synthesis of disease manifestations</li> <li>• Learning the techniques of examining the patient</li> <li>• Gathering experience in using the medical instruments (eg. Stethoscope)</li> <li>• Correct interpretation of paraclinic examinations</li> <li>• The capacity to integrate the anamnestic findings, the objective data and the paraclinic data in the syndrome diagnosis</li> <li>• Development of the medical rationale</li> <li>• Learning notions needed to apply prevention in the stomatology field</li> <li>• Making the correct diagnosis of an emergency in the stomatology cabinet</li> </ul>
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<b>Transversal competences</b>	<ul style="list-style-type: none"> <li>• Being able to apply the new findings into their future job routine</li> <li>• Applying the new theoretical knowledge in practical activity</li> <li>• Making new correlations in various fields</li> </ul>
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## 6. Course objectives

<b>6.1. General Objectives</b>	<ul style="list-style-type: none"> <li>• Presenting the semiology data regarding the symptoms, signs, explorations, in order to create the correct clinical picture and to formulate the correct syndrome diagnosis</li> <li>• Creation of a precise, consistent and useful medical language</li> </ul>
<b>6.2. Specific objectives</b>	<ul style="list-style-type: none"> <li>• Learning the correct technique of anamnesis and clinical examination, conducting the future investigations and formulating the syndrome diagnosis</li> <li>• Development of the medical rationale for each case</li> </ul>

## 7. Content

**Teaching methods course:** Systematic, interactive lecture. Oral lecture, Power Point presentations

**Teaching Methods Practical Activities:** Practical teaching near the patient`s bed.

<b>7.1. Courses</b>	<b>Remarks</b>
1. <b>Introductory course.</b> General notions of semiotics, symptom, sign, syndrome, diagnosis. Patient records, disease history. Particularities of the anamnesis in dental pathology	2 h
2. <b>Clinical examination.</b> Methods of examining the patient. Face, attitudes, constitution	2 h
3. <b>Clinical examination.</b> Skin, mucous and membrane colour changes and lesions; oedema. The importance of clinical examination in dentistry.	2 h
4. <b>Respiratory tract semiotics.</b> Main symptoms: chest pain, dyspnea, cough, expectoration and haemoptysis. Physical examination of the respiratory system. Lab explorations in respiratory diseases.	2 h
5. <b>Respiratory tract semiotics.</b> Pulmonary condensation syndrome. Pleural fluid syndrome. Bronchitis syndrome. Mediastinal syndrome.	2 h
6. <b>Cardio-vascular semiotics.</b> Symptoms: chest pain and vascular pain, cardiac dyspnea, palpitations. Physical examination of heart and vessels. Additional examinations in cardiovascular diseases.	2 h
7. <b>Cardio-vascular semiotics.</b> Coronary syndrome. Valvular syndromes. Heart failure syndromes. Thrombotic syndromes. Rhythm and conduction disorders. Hypertension and hypotension semiology. Shock and syncope.	2 h
8. <b>Reno-urinary semiotics.</b> Main symptoms: pain, reno-urethral colic, diuresis and micturition disorders. Examination of the urinary system. Additional examinations in urinary system diseases.	2 h
9. <b>Reno-urinary semiotics.</b> Nephritic syndrome, nephritic syndrome, renal failure syndrome.	2 h
10. <b>Digestive semiotics.</b> Particularities of the anamnesis in the mouth and throat diseases. Symptoms and signs of special importance for dentists: the oral cavity pain, gum bleeding, halitosis, salivary secretion disturbances, changes of taste. Examination of the mouth.	2 h
11. <b>Digestive semiotics.</b> Esophageal semiotics: symptoms, signs, lab exploration and the esophageal syndrome. Stomach and duodenum semiotics: main symptoms – pain, appetite change, nausea, vomiting. Examination of the stomach and duodenum. Additional explorations. Ulcer dyspepsia. Upper digestive bleeding.	2 h

12. <b>Digestive semiotics.</b> Intestinal semiotics: symptoms and signs – intestinal pain, intestinal obstruction, and disorders of transit. Abdominal examination in intestinal diseases. Additional explorations in bowel diseases. Diarrhea syndrome. Constipation syndrome. Acute peritonitis syndrome. Ano-recto-sigmoidian syndrome.	2 h
13. <b>Digestive semiotics.</b> Liver and gallbladder semiotics: symptoms and signs. Physical examination and additional explorations. Jaundice syndrome. Ascites syndrome. Liver failure syndrome. Pancreas and spleen semiotics: pancreatic pain, general examination and additional explorations in pancreas and spleen pathology.	2 h
14. <b>Hematopoietic system semiotics.</b> Symptoms and signs in blood diseases. Syndromes, anemia, bleeding syndrome, myeloproliferative syndrome and importance in dentistry	2 h
<b>Bibliography</b>	
<ol style="list-style-type: none"> <li>The lecture</li> <li>“Semiologie clinica medicala” – Dorel Sampelean, Simina Tarmure, Florin Casoinic, Olga Orasan, Ed. Casa Cartii de Stiinta, Cluj-Napoca, 2008</li> <li>“Semiologia bolilor endocrine si metabolice” – Monica Lencu, Vasile Negrean, Ed. Sedan, Cluj-Napoca</li> <li>“Semiologie Medicala” – Ion I Bruckner, Ed. Medicala, Bucuresti, 2002</li> <li>“Semiologie Medicala” – Marius Motocu, Vasile Chira, Aurel Babes, Vasile Negrean, Theodor Tr. Maghiar, Librariile Crican, 1996</li> </ol>	
<b>7.2. Practical Activities</b>	<b>Activity to be done by students</b>
1. Patient records. Classical examination method, diagnosis of acute or chronic disease and their importance in dental medicine. Anamnesis techniques.	Anamnesis, Clinical examination, Building a diagnosis
2. Physical examination techniques: inspection, palpations, percussion and auscultation	Anamnesis, Clinical examination, Building a diagnosis
3. Attitude. Face. Constitutional type. Nutritional status.	Anamnesis, Clinical examination, Building a diagnosis
4. Pallor, cyanosis, particularly in the oral mucosa	Anamnesis, Clinical examination, Building a diagnosis
5. Jaundice, dyschromatic features in the oral mucosa. Edema, trophicity disorders, lymph node pathology, febrile curve	Anamnesis, Clinical examination, Building a diagnosis
6. Main breathing symptoms. Physical examination of the chest	Anamnesis, Clinical examination, Building a diagnosis
7. Assessment of acute and chronic respiratory diseases. Evaluation of a respiratory emergency – significance for the dentist	Anamnesis, Clinical examination, Building a diagnosis
8. Major cardiac symptoms. Physical examination of heart and vessels.	Anamnesis, Clinical examination, Building a diagnosis
9. Diagnosis of cardiovascular emergencies in dental surgery. Complementary methods of investigation: blood pressure measurement, electrocardiography.	Anamnesis, Clinical examination, Building a diagnosis
10. Evaluation of a valvular patient – significance for the dental practice. Differential diagnosis significance in the coronary chest pain.	Anamnesis, Clinical examination, Building a diagnosis
11. Esophagus, stomach and bowel symptoms. Physical examination. Dyspeptic syndromes.	Anamnesis, Clinical examination, Building a diagnosis
12. Liver disease, bile duct and pancreatic symptoms and signs; physical exam. Jaundice syndrome, ascites and the liver failure.	Anamnesis, Clinical examination, Building a diagnosis
<b>Bibliography:</b>	
1. The lecture	

2. "Semiologie clinica medicala" – Dorel Sampelean, Simina Tarmure, Florin Casoinic, Olga Orasan, Ed. Casa Cartii de Stiinta, Cluj-Napoca, 2008
3. "Semiologia bolilor endocrine si metabolice" – Monica Lencu, Vasile Negrean, Ed. Sedan, Cluj-Napoca
4. "Semiologie Medicala" – Ion I Bruckner, Ed. Medicala, Bucuresti, 2002
5. "Semiologie Medicala" – Marius Motocu, Vasile Chira, Aurel Babes, Vasile Negrean, Theodor Tr. Maghiar, Librariile Crican, 1996

### 8. Evaluation

Activity type	8.1.Evaluation criteria	8.2. Evaluation	8.3 Percent from the final grade
<b>8.4. Lecture</b>	General evaluation criteria Capacity of understanding the semiotics in specific syndromes	Written exam	<b>90%</b>
<b>8.5. Practical Activity</b>	Evaluation of the theoretical knowledge applied in practical field	Continuous evaluation	<b>10%</b>
<b>8.6. Minimum performance standard</b>			
<ul style="list-style-type: none"> <li>- Correct technique of anamnesis and clinical evaluation</li> <li>- Discussion of a case, presenting the case and argumentation of the clinical diagnosis</li> <li>- Correct medical rationale and appropriate using of semiology notions</li> </ul>			

## MEDICAL TERMINOLOGY

### 1. Information about the course

<b>1.1. Discipline</b>		<b>Toxicology</b>					
<b>1.2. Course instructor</b>		<b>Lecturer Anca Cherfan, PhD</b>					
<b>1.3. Laboratory instructor</b>		<b>Lecturer Anca Cherfan, PhD</b>					
<b>1.4. Year</b>	<b>2</b>	<b>1.5. Semester</b>	<b>2</b>	<b>1.6. Evaluation type</b>	<b>Oral and written exam</b>	<b>1.7. Course type</b>	<b>Domain discipline Compulsory discipline</b>

### 2. Total estimated time (hours/semester for teaching activity)

<b>2.1. Total hours/week</b>	<b>4 (2<sup>nd</sup> sem.)</b>	<b>2.2. Course</b>	<b>2</b>	<b>2.3. Laboratories</b>	<b>2</b>
<b>2.4. Total hours in the curriculum</b>	<b>56 (2<sup>nd</sup> sem.)</b>	<b>2.5. Course</b>	<b>28</b>	<b>2.6. Laboratories</b>	<b>28</b>
<b>2.4. Distribution of time needed (2<sup>nd</sup> sem.)</b>					<b>Hours</b>
a. Study using text books, lecture notes, bibliography					28
b. Individual study within libraries, on-line platforms, field research					14
c. Preparing seminars/laboratories, homework, projects, portfolios and essays					14
d. Tutoring					14
e. Evaluation/ semester					2
f. Other activities					-
<b>2.7. Total hours for individual study (a+b+c+d)</b>					<b>70 (2<sup>nd</sup> sem.)</b>
<b>2.8. Total hours per semester</b>					<b>126 (2<sup>nd</sup> sem.)</b>
<b>2.9. Number of credits</b>					<b>2 (2<sup>nd</sup> sem.)</b>

### 3. Pre-requisites:

<b>3.1. Curriculum</b>	-
<b>3.2. Competences</b>	Knowlegde of anatomy and physiology, high school level

### 4. Requisites:

<b>4.1. For lectures</b>	<ul style="list-style-type: none"> <li>To respect the internal regulations of University</li> </ul>
<b>4.2. For laboratories sessions</b>	<ul style="list-style-type: none"> <li>To respect the internal regulations of University</li> </ul>

### 5. Specific competences acquired

<b>Professional competences</b>	<ul style="list-style-type: none"> <li>The ability to understand and properly use, in context, the specific terminology used in the medical field.</li> <li>To understand the medical terms taught in English and Romanian in professional and scientific contexts.</li> <li>Ability to use the terms taught in Romanian in the current medical language.</li> </ul>
<b>Transversal competences</b>	<ul style="list-style-type: none"> <li>Skills to use the medical terms learned in English and Romanian in new multidisciplinary contexts.</li> <li>Develop dialogues with Romanian professionals in the medical field.</li> <li>Use correctly and in a creative way the medical language acquired in various scientific activities.</li> </ul>

	<ul style="list-style-type: none"> <li>• The ability to understand and effectively use informational sources, communication resources and computer assisted training that includes the specific medical lexicon.</li> </ul>
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## 6. Course objectives

<b>6.1. General objectives</b>	<ul style="list-style-type: none"> <li>• Learning and knowledge of basic medical terminology, bilingual, English-Romanian, developing and improving the specific medical vocabulary, in order to facilitate the study of the speciality disciplines in the next years (IV<sup>th</sup> and V<sup>th</sup> years of study) and to develop a dialogue and the cooperation with the professionals working in the medical field.</li> </ul>
<b>6.2. Specific objectives</b>	<ul style="list-style-type: none"> <li>• Constructing medical terms using their definitions.</li> <li>• Proper use of the medical terms in professional communication, both in Romanian and in English.</li> <li>• Use in a proper manner the medical terms in different scientific contexts (understanding, explanation and interpretation of situations, processes, results for different medical specialisations) in Romanian and in English.</li> </ul>

## 7. Content

**Teaching methods for course: Systematic exposition, exercises, conversation**

**Teaching methods for laboratory activity: Exercises, conversation**

<b>7.1 Course (hours)</b>	<b>Remarks</b>
1. Medical and pharmaceutical specialities. The human body levels of organization. Specific medical terms for cells and tissues.	<b>1 lecture</b>
2. Specific medical terms for musculoskeletal, respiratory, gastrointestinal, cardiovascular, urinary, reproductive and nervous system.	<b>7 lectures</b>
3. Specific medical terms used in ophthalmology, dermatology, otolaryngology, dentistry, endocrinology, immunology, oncology, in medical laboratories and preclinical studies in professional and scientific contexts.	<b>6 lectures</b>
<b>7.2. Laboratory activities (hours)</b>	<b>Remarks</b>
1. Review of the studied terms.	1 week
2. The study of specific medical terms used for musculoskeletal, respiratory, gastrointestinal, cardiovascular, urinary, reproductive and nervous system in professional and scientific contexts given.	7 weeks
3. The study of specific medical terms used in ophthalmology, dermatology, otolaryngology, dentistry, endocrinology, immunology, oncology, in medical laboratories and preclinical studies in professional and scientific contexts.	5 weeks
4. Review of the studied terms. Applications on medical related texts.	1 week
<b>Bibliography</b>	
Iuliana Popovici, Lăcrămioara Ochiuz, D. Lupuleasa – Terminologie medicală și farmaceutică, Editura Polirom, București, 2007.	

## 8. Evaluation

<b>Activity type</b>	<b>8.1. Evaluation criteria</b>	<b>8.2. Evaluation methods</b>	<b>8.3. Percent of final grade</b>
<b>8.4. Course</b>	General evaluation criteria (quality of acquired knowledge, the correct use of terms in the context of professional speech in Romanian)	Written exam (exercises: explain the medical terms,	<b>70%</b>

		form words from their definitions, writing in Romanian)	
<b>8.5. Laboratory</b>	General evaluation criteria (the quality of reading a medical text, understanding and expressing ideas)	Oral exam	<b>30%</b>
<b>8.6. Minimal performance standard</b>			
Identify, understand and explain the terms used in the medical context of a Romanian specialty text and the correct understanding of information. To correctly use of medical terms in Romanian in the context of a discussion in Romanian.			



## PHARMACEUTICAL TERMINOLOGY

### 1. Information about the course

<b>1.1. Discipline</b>		<b>Drug industry and pharmaceutical biotechnology</b>					
<b>1.2. Course instructor</b>		-					
<b>1.3. Laboratory instructor</b>		<b>Lecturer Cristina Bota, PhD</b>					
<b>1.4. Year</b>	2	<b>1.5. Semester</b>	1	<b>1.6. Evaluation type</b>	Written examination	<b>1.7. Course type</b>	<b>Discipline in specialty, Compulsory seminar</b>

### 2. Total estimated time (hours/semester for teaching activity)

<b>2.1. Total hours/week</b>	1 (1 <sup>st</sup> sem.)	<b>2.2. Course</b>	-	<b>2.3. Seminar</b>	1
<b>2.4. Total hours in the curriculum</b>	14 (1 <sup>st</sup> sem.)	<b>2.5. Course</b>	-	<b>2.6. Seminar</b>	14
<b>2.4. Distribution of time needed (1<sup>st</sup> sem. / 2<sup>nd</sup> sem.)</b>					Hours
a. Study using text books, lecture notes, bibliography					7
b. Individual study within libraries, on-line platforms, field research					4
c. Preparing seminars/laboratories, homework, projects, portfolios and essays					7
d. Tutoring					2
e. Evaluation/ semester					2
f. Other activities					-
<b>2.7. Total hours for individual study (a+b+c+d)</b>					<b>20 (1<sup>st</sup> sem.)</b>
<b>2.8. Total hours per semester</b>					<b>36 (1<sup>st</sup> sem.)</b>
<b>2.9. Number of credits</b>					<b>2 (1<sup>st</sup> sem.)</b>

### 3. Pre-requisites:

<b>3.1. Curriculum</b>	
<b>3.2. Competences</b>	High school knowledge of inorganic chemistry, analytical chemistry, organic chemistry, physical chemistry

### 4. Requisites:

<b>4.1. For lectures</b>	
<b>4.2. For laboratories sessions</b>	Students must comply with the University's teaching activities regulations

### 5. Specific competences acquired

<b>Professional competences</b>	<ul style="list-style-type: none"> <li>• The ability to understand and properly use, in context, the specific terminology used in the pharmaceutical field</li> <li>• To understand the medical and pharmaceutical terms taught in English and Romanian in professional and scientific contexts</li> <li>• Facility to use the Romanian professional language terms in the current pharmaceutical context</li> </ul>
<b>Transversal competences</b>	<ul style="list-style-type: none"> <li>• Skills to use the pharmaceutical terms learned in English and Romanian in new multidisciplinary contexts</li> </ul>

	<ul style="list-style-type: none"> <li>• Develop dialogues with Romanian professionals in the medical and pharmaceutical field</li> <li>• Use correctly and in a creative way the medical and pharmaceutical language acquired in various scientific activities</li> <li>• The ability to understand and effectively use informational sources, communication resources and computer assisted training that includes the specific pharmaceutical lexicon.</li> </ul>
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## 6. Seminar objectifs

<b>6.1. General objectives</b>	<ul style="list-style-type: none"> <li>• Knowledge and learning the bilingual English-Romanian elementary pharmaceutical terminology and development of the medical and pharmaceutical vocabulary in order to facilitate the study of disciplines in the following academic years (fourth and fifth years of studies) and developing dialogue and collaborations with pharmaceutical professionals.</li> </ul>
<b>6.2. Specific objectives</b>	<ul style="list-style-type: none"> <li>• Knowledge of the rules applied in the forming of frequently used pharmaceutical terms by pharmacists and other professionals working in the pharmaceutical field</li> <li>• Learn prefixes and suffixes often used in pharmaceutical terms and their combinations with basic radicals</li> <li>• Analyze and correctly identify the component parts of pharmaceutical terms and properly understand their meanings</li> <li>• Form pharmaceutical terms from their definitions.</li> <li>• Correctly use pharmaceutical terms learned in professional communication in Romanian and English</li> <li>• Use in an adequate manner pharmaceutical terms in various scientific contexts (understand, explain and interpret situations, processes, outcomes associated with various pharmaceutical specializations) in Romanian and English.</li> </ul>

## 7. Content

**Teaching methods for seminar activity: reading, exercises, explanations, conversations**

<b>7.1 Seminar (hours)</b>	<b>Remarks</b>
<b>1. Composing specific terms for pharmaceutical field using certain radicals</b>	<b>2 h</b>
<b>2. Learning of specific pharmaceutical terms for different pharmaceutical specialties using exercises: composing words, identifying specific terms inside scientific texts and explaining their meaning, cross-words, correspondence exercises between terms and their meaning (12 hours)</b>	<b>Reading, exercises, conversations, explanations 12 h</b>
<b>Bibliography.</b> Iuliana Popovici, Lăcrămioara Ochiuz, D. Lupuleasa – Terminologie medicală și farmaceutică, Editura Polirom, București, 2007	

## 8. Evaluation

<b>Activity type</b>	<b>8.1. Evaluation criteria</b>	<b>8.2. Evaluation methods</b>	<b>8.3. Percent of final grade</b>
<b>8.4. Course</b>	-		
<b>8.5. Seminar</b>	General evaluation criteria (quality of acquired knowledge, the correct use of terms in the context of professional speech in Romanian)	Written exam (exercises: explain the pharmaceutical terms, form words from their definitions, writing in Romanian)	<b>100%</b>

**8.6. Minimal performance standard**

Identify, understand and explain the terms used in the pharmaceutical context of a Romanian specialty text and the correct understanding of information.

## SPECIALTY PRACTICE 2<sup>nd</sup> YEAR

### 1. Information about the course

<b>1.1. Discipline</b>		<b>Medical devices. Pharmaceutical practice</b>					
<b>1.2. Course instructor</b>		-					
<b>1.3. Laboratory instructor</b>		Associate professor Simona Mirel, PhD					
<b>1.4. Year</b>	2	<b>1.5. Semester</b>	2	<b>1.6. Evaluation type</b>	<b>Practical exam</b>	<b>1.7. Course type</b>	<b>Speciality discipline, Compulsory discipline</b>

### 2. Total estimated time (hours/semester for teaching activity)

<b>2.1. Total hours/week</b>	<b>30 (2 weeks, 2<sup>nd</sup> sem.)</b>	<b>2.2. Course</b>	-	<b>2.3. Laboratories</b>	<b>30</b>
<b>2.4. Total hours in the curriculum</b>	<b>60</b>	<b>2.5. Course</b>	-	<b>2.6. Laboratories</b>	<b>60</b>
<b>2.4. Distribution of time needed (1<sup>st</sup> sem. / 2<sup>nd</sup> sem.)</b>					<b>Hours</b>
a. Study using text books, lecture notes, bibliography					5
b. Individual study within libraries, on-line platforms, field research					5
c. Preparing seminars/laboratories, homework, projects, portfolios and essays					10
d. Tutoring					0.5
e. Evaluation/ semester					0.5
f. Other activities					5
<b>2.7. Total hours for individual study (a+b+c+d)</b>				<b>20,5 (2<sup>nd</sup> sem.)</b>	
<b>2.8. Total hours per semester</b>				<b>86 (2<sup>nd</sup> sem.)</b>	
<b>2.9. Number of credits</b>				<b>2 (2<sup>nd</sup> sem.)</b>	

### 3. Pre-requisites:

<b>3.1. Curriculum</b>	Knowledge regarding the Romanian pharmaceutical legislation, botanics, chemistry, physics
<b>3.2. Competences</b>	Acquired during the first practical internship (initiation internship) performed the previous year in pharmacies

### 4. Requisites:

<b>4.1. For lectures</b>	-
<b>4.2. For laboratories sessions</b>	Authorized pharmacies.

### 5. Specific competences acquired

<b>Professional competences</b>	<ul style="list-style-type: none"> <li>• The understanding of the role, responsibilities and obligations related to the profession of pharmacist</li> <li>• The capacity to understand aspects related to the founding, organisation and functioning of a pharmacy</li> <li>• The capacity to consult speciality literature</li> <li>• The capacity to analyse and explain the physical and chemical properties of certain medicinal substances</li> <li>• The familiarization with the specific procedures performed in a pharmacy</li> </ul>
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	(qualitative and quantitative reception of medicines and other health products, storage of medicines and other health products) <ul style="list-style-type: none"> <li>• The capacity to identify medical devices released from pharmacies</li> </ul>
<b>Transversal competences</b>	<ul style="list-style-type: none"> <li>• The acquirement of an active attitude towards the role of the speciality practice in the professional development of the future pharmacist</li> <li>• The identification of the objectives that must be fulfilled during the initial practical stage in pharmacies</li> <li>• The identification of the pharmacist's role and responsibilities in society</li> <li>• The application of certain communication techniques</li> <li>• Individual professional development</li> </ul>

## 6. Course objectives

<b>6.1. General objectives</b>	<ul style="list-style-type: none"> <li>• Initiation in the activities performed in a pharmacy (community or hospital pharmacy)</li> <li>• The application of the acquired theoretical knowledge into the practical activities performed in pharmacies, under the coordination, surveillance and evaluation of a pharmacist-practical internship coordinator</li> </ul>
<b>6.2. Specific objectives</b>	<ul style="list-style-type: none"> <li>• To identify and know the basic activities performed in a pharmacy</li> <li>• To get involved in the basic activities performed in a pharmacy</li> <li>• To consult the speciality literature available in the pharmacy (reception and storage of medicines and other health products)</li> <li>• To know the role and content of the Pharmacopeia (Romanian and European)</li> <li>• To know the physical and chemical properties of different medicinal substances</li> <li>• To identify and know different medical devices available in pharmacies</li> <li>• To exercise the capacity to document and to synthesize information, in order to solve the practical applications contained in the Guide for practice</li> </ul>

## 7. Content

**Teaching methods for course:** -

**Teaching methods for laboratory activity:** explanation, conversation, questioning, analyse.

<b>7.1 Course (hours)</b>	<b>Remarks</b>
-	-
<b>7.2. Laboratory activities (hours)</b>	<b>Remarks</b>
<b>1. The role and content of the Pharmacopeia</b>	Explanation, individual documentation
<b>2. Physical and chemical properties of medicinal substances</b>	Theory into practice
<b>3. The reception of medicines and other health products</b>	Analysis of the way to solve existent problems
<b>4. The storage of medicines and other health products</b>	Analysis of the way to solve existent problems
<b>5. Medical devices in pharmacies</b>	Explanation, individual documentation
<b>Bibliography</b>	
<ol style="list-style-type: none"> <li>1. Mirel S.(coordonator), Stagiul de inițiere și orientare în practica farmaceutică - Ghid pentru studenții anilor I-IV, Editura Medicală Universitară "Iuliu Hațieganu" Cluj-Napoca, 2013</li> <li>2. Crișan O. (coordonator), Introducere în tehnologie și în legislație farmaceutică, Editura Medicală Universitară «Iuliu Hațieganu», Cluj-Napoca, 2012;</li> </ol>	

3. Farmacopeea română, Ed. X, Editura Medicală, București, 1993
4. Legea nr. 266/2008 a farmaciei, republicată, Monitorul Oficial al României, partea I, nr. 448/2009;
5. Ordinul M.S. nr. 75 din 3 februarie 2010 pentru aprobarea Regulilor de buna practica farmaceutica, M.O. nr. 91 din 10 februarie 2010
6. Iacob S. (coordonator), Legislație și modele de proceduri pentru aplicarea în farmacie a Regulilor de buna practică farmaceutică, Ed . Risoprint, Cluj, 2011
7. Lege nr. 176 / 2000 \*\*\* privind dispozitivele medicale - Republicată MO 79/ 2005
8. Mirel S., Neag F., Produse tehnico-mediceale, Editura Medicală Universitară "Iuliu Hațieganu" Cluj-Napoca, 2008
9. Agenția Națională a Medicamentului și a Dispozitivelor Medicale, Nomenclatorul medicamentelor de uz uman, disponibil la [http://www.anm.ro/app/nom1/anm\\_list.asp](http://www.anm.ro/app/nom1/anm_list.asp)
10. Agenda medicală, Editura Medicală, București, 2013
11. Memomed, Editura Universitara, București, 2013

### 8. Evaluation

Activity type	8.1.Evaluation criteria	8.2. Evaluation methods	8.3.Percent of final grade
<b>8.4. Course</b>	-	-	-
<b>8.5. Laboratory</b>	Criteria regarding the attitude and motivation of the students	The evaluation of the coordinator pharmacist	<b>30%</b>
	The way in which the applications proposed are solved (Practical stage guide)	The way in which the applications are solved	<b>30%</b>
	The capacity to understand and respond to problems	Oral exam	<b>40%</b>
<b>8.6. Minimal performance standard</b>			
The acquirement of basic knowledge regarding: <ul style="list-style-type: none"> <li>• The basic activities performed in a pharmacy: the reception and storage of medicines and other health products</li> <li>• The identification of the main types of medical devices available in pharmacies</li> </ul>			

## 8.2.2. OPTIONAL COURSES

### MYCOLOGY

#### 1. Information about the course

<b>1.1. Discipline</b>		<b>Pharmaceutical botany</b>					
<b>1.2. Course instructor</b>		<b>Lecturer Cristina Ștefănescu, PhD</b>					
<b>1.3. Laboratory instructor</b>		-					
<b>1.4. Year</b>	<b>3</b>	<b>1.5. Semester</b>	<b>1</b>	<b>1.6. Evaluation type</b>	<b>Written exam</b>	<b>1.7. Course type</b>	<b>Fundamental discipline, Optional discipline</b>

#### 2. Total estimated time (hours/semester for teaching activity)

<b>2.1. Total hours/week</b>	<b>1</b>	<b>2.2. Course</b>	<b>1</b>	<b>2.3. Laboratories</b>	-
<b>2.4. Total hours in the curriculum</b>	<b>14</b>	<b>2.5. Course</b>	<b>14</b>	<b>2.6. Laboratories</b>	-
<b>2.4. Distribution of time needed</b>					<b>Hours</b>
a. Study using text books, lecture notes, bibliography					20
b. Individual study within libraries, on-line platforms, field research					10
c. Preparing seminars/laboratories, homework, projects, portfolios and essays					3
d. Tutoring					1
e. Evaluation/ semester					2
f. Other activities					-
<b>2.7. Total hours for individual study (a+b+c+d)</b>				<b>34 (1<sup>st</sup> sem.)</b>	
<b>2.8. Total hours per semester</b>				<b>50 (1<sup>st</sup> sem.)</b>	
<b>2.9. Number of credits</b>				<b>2 (1<sup>st</sup> sem.)</b>	

#### 3. Pre-requisites

<b>3.1. Curriculum</b>	Fundamental notions of plant biology
<b>3.2. Competences</b>	-

#### 4. Requisites

<b>4.1. For lectures</b>	<ul style="list-style-type: none"> <li>• Students need to turn off their mobile phones during this activity</li> <li>• Participating at this activity is conditioned by being in time at the hour indicated for course beginning</li> <li>• Student should respect the Teaching activity regulation of the University</li> </ul>
<b>4.2. For laboratories sessions</b>	-

#### 5. Specific competences acquired

<b>Professional competences</b>	<ul style="list-style-type: none"> <li>• Capacity of adequately using the profile terminology</li> <li>• Knowing the aspects connected with the diversity of fungal organisms and the implications of their living</li> <li>• Knowing important aspects concerning the edible, toxic, and pathogenic</li> </ul>
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	species, their implications in human, animal, and plant pathology <ul style="list-style-type: none"> <li>• Knowing important aspects concerning the potential of fungi in therapy (mycotherapy, fungal metabolites of pharmacological interest)</li> </ul>
<b>Transversal competences</b>	<ul style="list-style-type: none"> <li>• Using notions in new contexts</li> <li>• Using theoretical knowledge in solving different problems</li> <li>• Best use of individual creative potential in scientific research</li> <li>• Self professional development</li> </ul>

## 6. Course objectives

<b>6.1.General objectives</b>	<ul style="list-style-type: none"> <li>• Getting the students acquainted to the application of theoretical and practical principles of Mycology, mainly with the knowledge about fungal species involved in human, animal, and plant pathology, and about the techniques used in order to obtain fungal metabolites through biotechnologies</li> </ul>
<b>6.2.Specific objectives</b>	<ul style="list-style-type: none"> <li>• Knowing the main characteristics of fungi, their systematic classification and representative species</li> <li>• Knowing edible species of mushrooms, toxic ones, pathogenic and phytopathogenic ones; knowing the principal fungal metabolites important in the pharmaceutical and food fields</li> <li>• Getting acquainted with the main research directions in the field of Mycology</li> <li>• Stimulating the ability of synthesis and bibliographic research</li> </ul>

## 7. Content

**Teaching methods for course:** Lecture, systematic approach, conversation, questioning, oral lecture with slide projection, interactive communication

<b>7.1.Course (hours)</b>	<b>Remarks</b>
1. The implications of mycology in the pharmaceutical field (1)	
2. Fungi: general characterization, classification, representatives (2)	
3. Edible mushrooms. Recognition criteria and nutritive value (2)	
4. Toxic mushrooms. Recognition criteria and toxic potential. Types of syndromes. Prophylaxis and therapy (2)	
5. Pathogen fungi for humans. Main types of mycosis in human pathology Antimycotic treatment. Mycotoxicoses (3)	
6. Phytopathogenic fungi. Their implications on human society. Main phytopathogenic species. Antimycotic treatment in prophylaxis and therapy (2)	
7. Fungal metabolites of medicinal interest. Their obtention through biotechnologies (1)	
8. Mycotherapy (1)	
<b>Bibliography</b>	
<ol style="list-style-type: none"> <li>1. <b>Barceloux, D.G.</b> <i>Medical Toxicology of Natural Substances: Foods, Fungi, Medicinal Herbs, Plants and Venomous Animals</i>. New Jersey: Wiley &amp; Sons, 2008.</li> <li>2. <b>Bouchet, PH., Guignard, J.-L., Villard, J.</b> <i>Les champignons. Mycologie fondamentale et appliquée</i>. Paris, Milan, Barcelone: Masson, 1999.</li> <li>3. <b>Chabasse, D., Guiguen, C., Contet-Audonneau, N.</b> <i>Mycologie médicale</i>. Paris: Masson, 1999.</li> <li>4. <b>Locsmándi, C., Vasas, G.</b> <i>Ghidul culegătorului de ciuperci</i>. Oradea: Ed. Casa, 2013.</li> <li>5. <b>Parvu, M.</b> <i>Ghid practic de micologie</i>. Cluj-Napoca: Ed. Casa Cărții de Știință, 2007.</li> <li>6. <b>Petre, M.</b> editor. <i>Advances in Applied Biotechnology</i>. InTechOpen, 2012.</li> <li>7. <b>Puia, C.E.</b> <i>Patologie vegetală</i>. Cluj-Napoca: Ed. Digital Data, 2003.</li> </ol>	



8. <b>Shipton, WA.</b> <i>The Biology of Fungi Impacting Human Health: A Tropical Asia – Pacific Perspective.</i> Singapore: Partridge Publishing, 2014.	
9. <b>Singh, MP., Srivastava, AK., Vishwakarma, SK., Singh, VK., Pandey, VK.</b> <i>Mushroom Biotechnology. In: Recent Trends in Biotechnology, Volume 1,</i> Nova Science Publishers, Inc., 2009.	
10. <b>Sterry, P., Hughes, B.</b> <i>Complete Guide to British Mushrooms &amp; Toadstools.</i> London: HarperCollinsPublishers Ltd., 2009.	
11. <b>Tudor, I.</b> <i>Ciuperci comestibile si medicinale.</i> București: Ed. Lucman, 2007.	
12. <b>Tudor, I.</b> <i>Manualul cultivatorului de ciuperci comestibile. Ed. a III-a.</i> București: Ed. BLASSCO, 2014.	
13. <b>www.farma.umfcluj.ro : Curs Micologie</b>	
<b>7.2.Laboratory activities (hours)</b>	<b>Observation</b>
-	

### 8. Evaluation

Activity type	8.1.Evaluation criteria	8.2. Evaluation methods	8.3.Percent of final grade
<b>8.4. Course</b>	General evaluation criteria (full and correct knowledge, logical coherence, ability of analysis and synthesis) Criteria specific to the discipline Criteria judging the attitude and the motivation in the activity of the students Ability of understanding the fundamental problems and of seizing the particularities	Written exam	<b>100%</b>
<b>8.5. Laboratory</b>	-	-	-
<b>8.6. Minimal performance standard</b>			
Knowing the principal notions of Mycology: <ul style="list-style-type: none"> <li>• Structure and characterization of fungal cell; the main characteristics of mycetes; the main fungal species and their systematics</li> <li>• Main species of edible mushrooms</li> <li>• Main species of toxic mushrooms. Mycetism – toxic syndromes. Mycotoxicoses</li> <li>• Pathogenic fungi. Main mycoses in medical practice and fungal species involved. The bases of antimycotic therapy</li> <li>• Main species of phytopathogenic fungi. The mechanism of mycosis development in plants</li> <li>• Recent development: fungal metabolites and biotechnologies; mycotherapy</li> </ul>			

8.3. CURRICULA OF THE 3<sup>rd</sup> YEAR OF PHARMACY 2019 - 2020

<b>UNIVERSITY</b>	University of Medicine and Pharmacy " Iuliu Hatieganu" Cluj-Napoca	<b>STUDY PROGRAM</b>	PHARMACY
<b>FACULTY</b>	PHARMACY	<b>GRADUATION TITLE</b>	PHARMACIST
<b>FIELD</b>	HEALTH	<b>PERIOD OF STUDIES</b>	5 YEARS
<b>REGLEMENTATION</b>	SECTORIAL	<b>STUDY UNITS</b>	300

No. crt.	Cod	Course	Category	Total no. of credits			Total hours/ university year		I st Semester		II nd Semester		Examination form	
				Total	S1	S2	Course	Practical lessons	Course/ week	P/ week	Course/ week	P/ week	S1	S2
1	EN_FAR-3-S01-01	Pharmaceutical biochemistry and clinical laboratory	Oblig DS	5	5	0	42	42	3	3	0	0	E1	
3	EN_FAR-3-S01-02	Bromatology, hygiene, nutrition	Oblig DS	5	5	0	28	42	2	3	0	0	E1	
2	EN_FAR-3-S12-03	Pharmaceutical chemistry	Oblig DS	12	6	6	70	84	2	3	3	3	E1	E2
4	EN_FAR-3-S12-04	Pharmacognosy	Oblig DS	12	6	6	84	84	3	3	3	3	E1	E2
5	EN_FAR-3-S02-05	Pharmacology	Oblig DS	3	0	3	28	14			2	1		E2
6	EN_FAR-3-S02-06	Immunology	Oblig DC	2	0	2	28	0			2			E2
7	EN_FAR-3-S02-07	Drug industry and pharmaceutical biotechnologies	Oblig DS	4	0	4	28	42			2	3		E2
8	EN_FAR-3-S12-08	Pharmaceutical technology	Oblig DS	10	5	5	56	84	2	3	2	3	E1	E2
9	EN_FAR-3-S12-09	Applied pharmaceutical terminology	Oblig DD	2	0	2	14	28	1			2		E2
	EN_FAR-3-S12-10	Medical terminology	Oblig DD	1	1			14		1			E1	
10	EN_FAR-3-S12-11	Pharmacy practice 2 weeks – 30 h / week	Oblig DS	2	0	2	0	60						C2
11		<b>Optional courses</b>		2	2	0	14	0	1	0	0	0	E1	
11.1	EN_FAR-3-S12-12	Medical devices	Optional											
	<b>Total heures/semaine</b>	<b>TOTAL</b>		<b>60</b>	<b>30</b>	<b>30</b>	<b>392</b>	<b>494</b>	<b>14</b>	<b>16</b>	<b>14</b>	<b>15</b>	<b>6E</b>	<b>7E +1C</b>
	<b>29.50</b>						<b>886</b>		<b>30</b>		<b>29</b>			

E = examen; C = colloque; \* = seminar

**RECTOR,**  
*Prof.dr. Alexandru Irimie*

**DEAN,**  
*Prof.dr. Gianina Crişan*

### 8.3.1. COMPULSORY COURSES

#### BIOCHEMISTRY AND CLINICAL LABORATORY

##### 1. Information about the course

<b>1.1. Discipline</b>		<b>Pharmaceutical biochemistry and Clinical laboratory</b>					
<b>1.2. Course instructor</b>		<b>Professor Corina Ionescu, PhD</b>					
<b>1.3. Laboratory instructor</b>		<b>Professor Corina Ionescu, PhD Associate professor Roxana Stan, PhD</b>					
<b>1.4. Year</b>	<b>3</b>	<b>1.5. Semester</b>	<b>1</b>	<b>1.6. Evaluation type</b>	<b>Written exam + Practical exam</b>	<b>1.7. Course type</b>	<b>Compulsory discipline, Specialty discipline</b>

##### 2. Total estimated time (hours/semester for teaching activity)

<b>2.1. Total hours/week</b>	<b>6 (1<sup>st</sup> sem.)</b>	<b>2.2. Course</b>	<b>3</b>	<b>2.3. Laboratories</b>	<b>3</b>
<b>2.4. Total hours in the curriculum</b>	<b>84 (1<sup>st</sup> sem.)</b>	<b>2.5. Course</b>	<b>42</b>	<b>2.6. Laboratories</b>	<b>42</b>
<b>2.4. Distribution of time needed (1<sup>st</sup> sem. / 2<sup>nd</sup> sem.)</b>					<b>Hours</b>
a. Study using text books, lecture notes, bibliography					30
b. Individual study within libraries, on-line platforms, field research					18
c. Preparing seminars/laboratories, homework, projects, portfolios and essays					12
d. Tutoring					6
e. Evaluation/ semester					3
f. Other activities					-
<b>2.7. Total hours for individual study (a+b+c+d)</b>				<b>66 (1<sup>st</sup> sem.)</b>	
<b>2.8. Total hours per semester</b>				<b>150 (1<sup>st</sup> sem.)</b>	
<b>2.9. Number of credits</b>				<b>5 (1<sup>st</sup> sem.)</b>	

##### 3. Prerequisites:

<b>3.1. Curriculum</b>	<ul style="list-style-type: none"> <li>inorganic, organic and analytical chemistry, anatomy-physiology, cellular biology, genetics acquaintances</li> </ul>
<b>3.2. Competences</b>	<ul style="list-style-type: none"> <li>understanding and appropriate using of the specialized terminology; ability of analysis and synthesis of the informations; capacity to use common laboratory methodologies and techniques; computer usage skills; knowledge of at least one foreign language (of international use)</li> </ul>

##### 4. Requisites:

<b>4.1. For lectures</b>	<ul style="list-style-type: none"> <li>ensuring necessary infrastructure for PP presentations (laptop, video projector, internet connection); ensuring of a course support; obligation of participation to the courses according to the university requirements; it is not tolerated the delay of the students (as interrupting the educational process); the courses have to be inter-active, so the students have the opportunity to address questions upon the informations presented; during the courses it is forbidden the use of mobile phones, as well as leaving the lecture hall in order to download personal phone calls</li> </ul>
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<b>4.2. For laboratories sessions</b>	<ul style="list-style-type: none"> <li>ensuring necessary infrastructure for the qualitative and quantitative determinations included in the curricula (proper laboratory tables, gas lamps, apparatus, laboratory glassware, adjustable pipettes, sets of reagents, video projection system, computer, printer, internet connection, protection equipment for analyses on biological samples); ensuring of a working support (laboratory guide); presence is compulsory at all the practical works; it is forbidden the use of mobile phones all along the duration of the practical works</li> </ul>
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### 5. Specific competences acquired

<b>Professional competences</b>	<ul style="list-style-type: none"> <li>ability to use adequately and in context the specialized terminology</li> <li>ability to explain and interpret the theoretical and practical knowledge of the discipline of pharmaceutical biochemistry and clinical laboratory in correlation with other bio-medical fundamental and specialty disciplines</li> <li>ability of understanding the molecular bases for drug study (action, prospecting, drug-design)</li> <li>ability of understanding the relations between anatomy, physiology and biochemistry of the body</li> <li>ability of interpretation at molecular level the physiological and pathophysiological processes</li> <li>ability and some experience in interpretation of laboratory analysis results</li> <li>ability to design plans for patients monitoring and response to therapy</li> </ul>
<b>Transversal competences</b>	<ul style="list-style-type: none"> <li>harnessing the own optimal and creative potential in scientific activity</li> <li>responsible execution of professional duties in terms of autonomy</li> <li>awareness of the need of continuous learning</li> <li>efficient use of learning resources and techniques for the benefit of personal and professional development</li> <li>ability to design research projects</li> <li>ability to elaborate and sustain a specialty work (in Roumanian and an international foreign language) on an actual issue in the domain, using different sources of information</li> </ul>

### 6. Course objectives

<b>6.1.General objectives</b>	<ul style="list-style-type: none"> <li>the accumulation of theoretical and practical knowledge that is indispensable for the formation of the pharmacist in bio-medical profile; deciphering the molecular basis for drug study (action, prospection, drug-design)</li> </ul>
<b>6.2.Specific objectives</b>	<ul style="list-style-type: none"> <li>familiarizing the students with aspects connected with the application of the theoretical and practical principles in the domain of biochemistry and clinical laboratory</li> <li>understanding the reasons that represent the basis of choosing a specific work protocol</li> <li>accumulation of basic knowledge for the laboratory practice and the interpretation of laboratory analysis results</li> <li>familiarizing with the main research directions in the domain of biochemistry and clinical laboratory</li> <li>training and developing of the synthesis ability and references research</li> </ul>

## 7. Content:

**Teaching methods for the courses:** lectures, questioning, power point presentations, dialog in real-time with the audience. Each metabolic pathway includes pathological aspects.

**Teaching methods for the practical labs:** presentation of the experiment, questioning, discussion of the results. For each biochemical parameter there are presented: the method principle, the required reagents, the procedure, the calculation formula(s), the reference range and the results interpretation.

<b>7.1.Lectures (hours)</b>	<b>Remarks</b>
<b>1. Intermediate metabolism</b> – General pathways of biotransformations of the fundamental cellular components. Bioenergetics. Cellular oxidation: Krebs cycle, the respiratory chain, the oxidative phosphorylation, microzomial systems (importance related to drugs metabolization). Oxygen cytotoxicity, antioxidant mechanisms.	<b>6 h</b>
<b>2. Carbohydrates metabolism</b> - Digestion and absorbtion. The glycolitic pathway. Metabolic position of the pyruvate. Gluconeogenesys. The pentosophosphate and uronic pathways. Metabolism of fructose and galactose. Glycogen metabolism. Enzymatic deficiencies in carbohydrates metabolism. Hormonal control and regulation of carbohydrates metabolism.	<b>12 h</b>
<b>3. Lipid metabolism</b> - Digestion and absorbtion. The metabolism of saturated and not-saturated fatty acids. Eicosanoids. The metabolism of ketone bodies. The metabolism of acylglycerols and complex lipids. Cholesterol biosynthesis and biotransformations. Biliary acids. Steroid hormones. Blood transport of lipids and metabolism of lipoproteins. Hormonal control and regulation of lipid metabolism.	<b>10 h</b>
<b>4. Aminoacids and proteins metabolism</b> – Digestion, absorbtion, distribution, directions of biotransformations. Transamination, decarboxylation, oxidative deamination, ureogenesis. Conversion of the aminoacids carbon skeleton in substrates and intermediates for the Krebs cycle, glucose and ketone bodies byosynthesis. Conversion of aminoacids in specialized products, roles and mechanisms of action of these products. Hemoglobin: biosynthesis, porphyrins, degradation, metabolism of biliary pigments. Hormonal control and regulation of proteins metabolism.	<b>12 h</b>
<b>5. Biochemistry of the hormonal system.</b> Intercellular comunication. Molecular mechanisms of action of hormones: transduction systems, secondary messengers. Types of hormones: classification, examples, mechanisms of action.	<b>2 h</b>
<b>(Total hours: 42)</b>	
<b>Bibliography</b>	
<ol style="list-style-type: none"> <li>Allan Gaw, Michael J. Murphy, Rajeev Srivastava, Robert A. Cowan, Denis St J O'Reilly, Clinical Biochemistry, Fifth Edition, Ed Churchill, Livingstone, Elsevier, 2013.</li> <li>Marcy Osgood, Karen Ocorr, Principles of Biochemistry. The absolute, ultimate Guide to Lehninger. Study Guide and Solutions Manual, Sixth Edition, WH Freeman and Company, NY, 2013</li> <li>Michael Lieberman, Allan Marks, Mark' Basic Medical Biochemistry – A clinical approach, Third Ed, Wolters Kluwer&amp;Lippincott Wiliams&amp;Wilkins, 2009.</li> <li>Robert K. Murray, Daryl K. Granner, Peter A. Mayes, Victor W. Rodwell, Harper's Illustrated</li> </ol>	

<p>Biochemistry, 26<sup>th</sup> Edition, Lange Medical Books/ McGraw Hill, 2003.</p> <p>5. David L. Nelson, Michael M. Cox, Lehninger. Principles of Biochemistry, Fifth Ed, Ed W.H. Freeman and Company, NY, 2000.</p> <p>6. Geoffrey L. Zubay, Biochemistry, 4<sup>th</sup> Edition, Wm.C. Brown Publishers, USA, 1998.</p> <p>7. Burton E. Tropp, Biochemistry. Concepts and Applications, Brooks/Cole Publishing Company, 1997.</p>	
<b>7.2.Laboratory activities (hours)</b>	<b>Remarks</b>
<b>1.</b> The importance and place of clinical laboratory in the healthcare practice. Results analysis, validation and interpretation. Factors affecting laboratory tests interpretation. Fast tests and the dry technology with slides.	<b>3 h</b>
<b>2. The biochemical analysis of blood:</b> mineral components – biochemical roles and dosage methods; proteins - quantitative determination, disproteinemia tests, electrophoresis, albumins separation by affinity chromatography; enzymes – quantitative determination of diagnostic usefulness enzymes; glicemia and glycosylated hemoglobin determination ; serum lipids – quantitative determination of triglycerides, cholesterol, phospholipids and total lipids, bilirubin, hemoglobin, uric acid and fibrinogen determinations.	<b>21 h</b>
<b>3. The biochemical analysis of urine:</b> determination of urine density and acidity, identification of pathological urinary components, separation of aminoacids from urine by thin layer chromatography, quantitative analysis of various compounds present in urine (proteins, chlorides, phosphate, calcium and glucose), the urinary sediment, the Van Slyke urea clearance test and the creatinine clearance test.	<b>15 h</b>
<b>4. The biochemical analysis of cerebrospinal fluid and gastric juice.</b> <b>(Total hours: 42)</b>	<b>3 h</b>
<b>Bibliography</b>	
<p>1. <b>Roxana Stan, Corina Ionescu</b>, Qualitative and quantitative determinations of biochemical parameters of diagnostic value. Practical labs., Editura Medicală Universitară “Iuliu Hațieganu” Cluj-Napoca, 2014.</p> <p>2. William J. Marshall, Stephen K. Baugert, Clinical Biochemistry, Metabolic and Clinical Aspects, Ed Churchill Livingstone, USA, 1995.</p> <p>3. William J. Marshall, Clinical Chemistry, Third Edition, Ed. Mosby, UK, 1995.</p>	

## 8. Evaluation

Activity type	8.1.Evaluation criteria	8.2. Evaluation methods	8.3. Percent of final grade
<b>8.4. Lectures</b>	General criteria for the assessment (completeness and correctness of logical consistency, force of argument) Specific criteria regarding the attitudinal and motivational aspects of the students activity Ability of understanding the fundamental issues and customization	Written exam (tests with multiple-choise answers)	<b>75%</b>
<b>8.5. Laboratory</b>	Evaluation of the theoretical acquaintances and practical skills	Practical exam	<b>25%</b>
<b>8.6. Minimal performance standard</b>			
The provision of some basic notions in the field of biochemistry and biochemical laboratory analyses,			

creating the prerequisites for the formation of the pharmacist in the bio-medical profile; future pharmacist will acquire the ability to understand and interpret at the molecular level the pathophysiological aspects of metabolic processes, as well as the relationship of anatomy, physiology and biochemistry of an the body. Equally, the future pharmacist will acquire the ability to define and describe the biochemical parameters with diagnostic value, to use modern analysis methods for the diagnosis, monitoring and prognosis of pathological conditions and to interpret medical checkup. Through all the knowledge thus acquired, the future pharmacist shall ensure an active attitude regarding the role of a counselor.

## BROMATOLOGY, HYGIENE, NUTRITION

### 1. Information about the course

<b>1.1. Discipline</b>		<b>Bromatology, Hygiene, Nutrition</b>					
<b>1.2. Course instructor</b>		<b>Şef Lucr. Dr. Anamaria Cozma</b>					
<b>1.3. Laboratory instructor</b>		<b>Şef Lucr. Dr. Oana Maria stanciu</b>					
<b>1.4. Year</b>	3	<b>1.5. Semester</b>	1	<b>1.6. Evaluation type</b>	<b>Written exam + Practical exam + Projects</b>	<b>1.7. Course type</b>	<b>Specialty discipline, Compulsory discipline</b>

### 2. Total estimated time (hours/semester for teaching activity)

<b>2.1. Total hours/week</b>	<b>5 (1<sup>st</sup> sem.)</b>	<b>2.2. Course</b>	<b>2</b>	<b>2.3. Laboratories</b>	<b>3</b>
<b>2.4. Total hours in the curriculum</b>	<b>70 (1<sup>st</sup> sem.)</b>	<b>2.5. Course</b>	<b>28</b>	<b>2.6. Laboratories</b>	<b>42</b>
<b>2.4. Distribution of time needed (1<sup>st</sup> sem. / 2<sup>nd</sup> sem.)</b>					<b>Hours</b>
a. Study using text books, lecture notes, bibliography					21
b. Individual study within libraries, on-line platforms, field research					21
c. Preparing seminars/laboratories, homework, projects, portfolios and essays					21
d. Tutoring					4
e. Evaluation/ semester					7
f. Other activities					-
<b>2.7. Total hours for individual study (a+b+c+d)</b>				<b>67 (1<sup>st</sup> sem.)</b>	
<b>2.8. Total hours per semester</b>				<b>137 (1<sup>st</sup> sem.)</b>	
<b>2.9. Number of credits</b>				<b>5 (1<sup>st</sup> sem.)</b>	

### 3. Pre-requisites:

<b>3.1. Curriculum</b>	Organic chemistry, general and inorganic chemistry, analytical chemistry, biology, microbiology, biochemistry
<b>3.2. Competences</b>	Knowledge of analytical methods applicable to the study of environmental factors.

### 4. Requisites:

<b>4.1. For lectures</b>	<ul style="list-style-type: none"> <li>Compliance with the regulation for conducting the teaching activity.</li> </ul>
<b>4.2. For laboratories sessions</b>	<ul style="list-style-type: none"> <li>Compliance with the regulation for conducting the teaching activity, own laboratory equipment (laboratory coat).</li> </ul>

### 5. Specific competences acquired

<b>Professional competences</b>	<ul style="list-style-type: none"> <li>Defining and describing the sanogenous and non-sanogenous composition of environmental factors: food, air, water, soil.</li> <li>Understanding the environmental hygiene as a determinant factor of health status.</li> <li>Participating, as a pharmacist, in the education of population regarding the impact of environmental factors on health.</li> <li>Using analytical methods to monitor environmental factors and interpret analysis results.</li> <li>Building skills for the use of laboratory methodologies and techniques, specific for the study of environmental factors; drawing up plans to prevent environmental factors contamination and health monitor them properly.</li> <li>Knowing and describing nutrients, bioactive compounds in food, and the principles of</li> </ul>
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	<p>a healthy diet, for their appropriate use within the pharmaceutical care process.</p> <ul style="list-style-type: none"> <li>• Analyzing and interpreting specialized knowledge in order to participate, along with the other health professionals, in the formation of a conscious attitude of patients towards adopting a healthy lifestyle.</li> <li>• Ability to explain and interpret the contents of the theoretical and practical activities of bromatology, hygiene, nutrition discipline, in an interdisciplinary approach with the other fundamental and specialty biomedical disciplines.</li> <li>• Knowing, understanding and describing the concepts concerning the physico-chemical characteristics, the quality and quantity control, and the methods of analysis of food supplements and other health products.</li> <li>• Performing the quality/quantity control of food supplements and other health products.</li> <li>• Explaining and interpreting the causality of the physico-chemical structure aspects and identification of analytical methods to be applied to food supplements and other health products.</li> <li>• Understanding the aspects related to the particularities of the research in the bromatology, hygiene, and nutrition domain.</li> <li>• Ability to use the specialized terminology adequately and in the right context.</li> </ul>
<b>Transversal competences</b>	<ul style="list-style-type: none"> <li>• Performing complex professional tasks.</li> <li>• Identifying the objectives to be achieved, the resources available, the conditions for their completion, the working steps, the working time, the related deadlines and risks, to responsibly perform the professional tasks.</li> <li>• Identifying the roles and responsibilities in a multidisciplinary team and applying the techniques for efficient work, efficient networking and longitudinal feedback within the team.</li> <li>• Using effectively the informational sources and the resources of communication and assisted professional training (Internet portals, specialized software applications, databases, online courses etc.), to ensure continuous personal and professional development.</li> </ul>

## 6. Course objectifs

<b>6.1. General objectives</b>	<ul style="list-style-type: none"> <li>• Knowing, deepening and correctly using the concepts of bromatology, hygiene, and nutrition.</li> </ul>
<b>6.2. Specific objectives</b>	<ul style="list-style-type: none"> <li>• Acquiring the theoretical and practical knowledge concerning environmental factors, needed by future pharmacists to engage in the process of promotion and maintenance of the population health status.</li> <li>• Knowing the physico-chemical, nutritional, hygienic and sanitary characteristics of main types and groups of food, in order to promote healthy eating, as a key element of a healthy lifestyle.</li> <li>• Familiarizing students with analytical methods applied in the physico-chemical analysis of the normal composition of environmental factors (water, air, soil, food), as well as in the identification of contamination, pollution, alteration or denaturation processes, that can characterize environmental factors.</li> <li>• Acquiring the theoretical and practical knowledge for the assessment of nutritional status at individual and collective level (collection, compilation, interpretation and presentation of data on dietary habits and lifestyle), as well as developing the ability for nutritional intervention.</li> <li>• Understanding the reasons and mechanisms underlying the choosing of a particular work protocol.</li> <li>• Familiarizing with the main directions of research targeting the bromatology, hygiene, and nutrition domain.</li> <li>• Practicing the ability of synthesis and bibliographic documentation.</li> </ul>

## 7. Content

**Teaching methods for course:** Lecture, systematic exposure, conversation, problematization. Oral presentation coupled with PowerPoint presentation.

**Teaching methods for laboratory activity:** Systematic exposure, conversation, problematization, demonstration. Oral presentation coupled with PowerPoint presentation, conversation.

7.1 Course (hours)	Remarks
<p><b>1. Nutrition. Healthy human nutrition.</b></p> <ul style="list-style-type: none"> <li>• The energy requirements of the human body.</li> <li>• Proteins. Types of food proteins. Biological value. Food sources. Requirements of the human body. Effects of an inadequate intake.</li> <li>• Carbohydrates. Types of food carbohydrates. Biological role. Food sources. Requirements of the human body. Effects of an inadequate intake.</li> <li>• Lipids. Types of food lipids. Fatty acids. Biological role. Food sources. Requirements of the human body. Effects of an inadequate intake.</li> <li>• Mineral elements. Classification. Biological role. Food sources. Requirements of the human body. Effects of an inadequate intake.</li> <li>• Vitamins. Classification. Biological role. Food sources. Requirements of the human body. Effects of an inadequate intake.</li> <li>• Dietary fibers. Biological and nutritional role. Food sources. Requirements of the human body. Effects of an inadequate intake.</li> </ul>	<p><b>6 h</b></p>
<p><b>2. Bromatology.</b></p> <p>Definition. Types and groups of food. Food pyramid. Healthy eating as a component of a healthy lifestyle. Food hygiene. Sanitary and toxicological aspects.</p> <p>The study of food groups in the context of food balance:</p> <ul style="list-style-type: none"> <li>•Cereals and cereal derivatives. Definition, classification. Chemical composition and nutritional value. Sanitary aspects. Hygiene and toxicology aspects. Alteration and prevention measures.</li> <li>•Legumes. Definition. Chemical composition. Nutritional value. Sanitary and toxicological aspects. Aspects regarding the contamination, alteration and preserving of legumes. Soy: soy protein preparations.</li> <li>•Fruits and vegetables. Classification, chemical composition, nutritional value. Sanitary and toxicological aspects. Alteration, contamination, preservation.</li> <li>•Milk and dairy products. Milk – definition, properties, structure. Chemical composition. Nutritional value. Sanitary aspects. Particularities of breast milk compared to cow's milk. Dairy products: acidic dairy products, cheese, cream, butter. Nutritional value of dairy products. Milk contamination and alteration. Falsification of milk.</li> <li>•Egg. Classifications, chemical composition, nutritional value, functional properties. Egg digestibility. Egg alteration and contamination. Preservation of eggs and egg derivatives.</li> <li>•Meat. Classification, chemical composition, nutritional value. Liver. Meat products. Sanitary aspects. Changes in the chemical composition of meat after slaughter. Meat contamination and alteration.</li> <li>•Fish. Classification, chemical composition, sensory properties of fish: flavor, texture. Nutritional value of fish. Alteration and preservation of fish. Sanitary and toxicological aspects.</li> <li>•Dietary fats. Classification. Fats of plant origin. Fats of animal origin. Fats with modified chemical composition. Chemical composition, nutritional value, examples of dietary fats. Culinary use of fats. Sanitary aspects, aspects of hygiene and toxicology: contamination, alteration, prevention measures.</li> </ul>	<p><b>16 h</b></p>

<ul style="list-style-type: none"> <li>•Herbs and spices. Chemical composition, nutritional value properties. Culinary use. Sanitary aspects.</li> <li>•Alcoholic and non-alcoholic beverages. Alcoholic beverages. Classification. Chemical composition and nutritional value. The effects of inadequate alcohol consumption. Fraud and falsifications. Non-alcoholic beverages: tea, coffee, soft drinks, energy drinks, fruit and vegetable juices, nectars. Chemical composition and nutritional value of non-alcoholic beverages.</li> <li>•Sugar and sugar products. Sugar products made predominantly of small molecule carbohydrates in refined form. Sugar products made from sugar and fruits. Sugar products made from sugar and oilseeds. Complex mixtures. Honey. Chemical composition, nutritional and energy value of sugar products. Ration and effects of an inadequate consumption. Contamination and alteration of sugar products.</li> <li>•New types of food. Novel foods. Functional foods. Genetically modified foods. Organic (bio) foods. Food supplements. Probiotics. Prebiotics. Synbiotics.</li> <li>•Food additives. Classification, legislative aspects, the main groups of food additives.</li> <li>•Food safety. Food hygiene. The HACCP system. Traceability. Food-borne diseases.</li> </ul>	
<p><b>3. Water hygiene.</b> Water as environmental factor. The importance of water for the human body. Drinking water and wastewater. Sanitary norms of potability for water. Health risks due to water pollution. Water-borne diseases.</p>	<b>2 h</b>
<p><b>4. Air hygiene.</b> Air as environmental factor. Air and health status. Health risks due to air pollution.</p>	<b>2 h</b>
<p><b>5. Soil hygiene.</b> Soil and health status. The soil-human impact.</p>	<b>1 h</b>
<p><b>6. The hygiene of rooms, communities. The hygiene of pharmaceutical units.</b></p>	<b>1 h</b>
<p><b>Bibliography</b></p> <ol style="list-style-type: none"> <li>1. Miere D. Chimia și Igiena alimentelor. Vol 1. Cluj-Napoca: Ed. Med. Univ. „Iuliu Hațieganu”, 2002.</li> <li>2. Miere D. Chimia și Igiena alimentelor. Vol 2. Cluj-Napoca: Ed. Med. Univ. „Iuliu Hațieganu”, 2007.</li> <li>3. Mahan LK, Raymond JL, Escott-Stump S. Krause’s Food and the Nutrition Care Process. 13th Edition. USA: Elsevier Saunders, 2012.</li> <li>4. Soriano del Castillo JM. Nutricion basica humana, Educacio. Materials 91. Universidad de Valencia, 2006.</li> <li>5. Mann J, Truswell AS. Essentials of human nutrition. Oxford: University Press, 2002.</li> <li>6. Russell NJ, Gould GW. Food Preservatives. New York: Kluwer Academic, 2003.</li> <li>7. Giorgi Usturoi M. Tehnologia laptelui și a produselor derivate. Iași: Ed. Alfa, 2007.</li> <li>8. Frățilă R, Mihaiu R. Produsele alimentare - sortiment, calitate, trend. Cluj-Napoca: Ed. Alma Mater, 2006.</li> <li>9. Savu C, Georgescu N. Siguranța alimentelor - riscuri și beneficii. București: Ed. Semne, 2004.</li> <li>10. Mănescu S, Tănăsescu Gh, Dumitrache S, Cucu M. Igienă. București: Ed. Medicală, 1996.</li> <li>11. Belitz HD, Grosch W. Food Chemistry. Berlin: Springer, 1999.</li> <li>12. Vollmer G, Josst G, Schenker D, Sturm W, Vreden N. Elementos de Bromatologia Descriptiva. Zaragoza: Ed. Acribia, 1999.</li> <li>13. Gutierrez JG. Ciencia Bromatologica. Principios generales de los alimentos. Madrid: Ed. Diaz de Santos, 2000.</li> <li>14. Mataix Verdu J. Nutricion y alimentacion humana. Vol. I. Nutrientes y alimentos. 2 ed. Madrid: Ed. Ergon, 2009.</li> <li>15. Salas – Salvado J, Bonada i Sanjuame A, Trallero Casanas R, Salo i Sola ME, Burgos Pelaez R. Nutricion y Dietetica clinica. 2 ed. Barcelona: Elsevier, 2008.</li> <li>16. Camean AM, Repetto M. Toxicologia alimentaria. Madrid-Buenos Aires: Ed Doaz de Santos, 2006.</li> </ol>	

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18. Vasilachi G, Vasilachi A. Alimentația omului sănătos și bolnav. Chișinău: Ed. ARC, 2008.	
19. Web GP. Complementos nutricionales y alimentos funcionales. Zaragoza: Ed. Acribia, 2007.	
20. Banu C. Alimentație pentru sănătate. București: Ed. ASAB, 2009.	
21. Banu C. Suveranitate, securitate și siguranță alimentară. București: Ed. ASAB, 2007	
22. Alvarez Cruz NS, Bague Serrano AI. Los alimentos funcionales. Una oportunidad para un mejor salud. Madrid: AMV Edicion, 2011.	
23. www.farma.umfcluj.ro: Bromatology, Hygiene, Nutrition course, PowerPoint presentations	
<b>7.2. Laboratory activities (hours)</b>	<b>Remarks</b>
1. Assessment of dietary intake using food frequency questionnaires, evaluation of diet over 24 hours, food diaries, diet history. Assessment of physical development based on anthropometric measurements.	<b>3 h</b>
2. Nutritional analysis. Presentation of a software used for the record of patients under nutritional intervention.	<b>3 h</b>
3. Presentation of principles underlying the preparation of various types of menus: menus for the main meals of the day (breakfast, lunch, dinner); menus for various categories of consumers (children, adolescents, adults, athletes); dietetic menus; menus for special meals; menus specific for certain units (school canteens, hospital canteens, etc.). The use of food composition tables. The use of national and international recommendations to promote healthy eating.	<b>3 h</b>
4. Physico-chemical analysis of food. General aspects. Methods for food analysis. Determination of normal chemical composition of food: <ul style="list-style-type: none"> <li>• Determination of proteins in food: general methods (Kjeldahl method) and specific methods: determination of casein in milk, determination of gluten in flour.</li> <li>• Determination of lipids in food: general (Soxhlet method) and specific (Gerber method) methods.</li> <li>• Determination of water content in food: gravimetric method, azeotropic distillation method, Karl-Fischer method.</li> <li>• Determination of carbohydrates in food: Bertrand method, Schoorl method, iodometric method, determination of lactose in milk by Ionescu-Matiu method.</li> <li>• Determination of ash.</li> <li>• Determination of mineral elements.</li> <li>• Determination of vitamins.</li> </ul>	<b>3 h</b>
5. Analysis of food by food groups (milk and dairy products, meat and meat products, fats, eggs, cereal derivatives, alcoholic and non-alcoholic beverages, honey, salt, vinegar). Determination of normal components in the chemical composition of food. Determination of biological constants. Assessment of the freshness of food. Assessment of the falsification of food. Determination of contaminants: pesticides, heavy metals.	<b>15 h</b>
6. Physico-chemical analysis of water. Analysis of normal components in water. Analysis of potentially toxic or undesirable components in water. The processes of disinfection and treatment used to obtain drinking water.	<b>6 h</b>
7. Physico-chemical analysis of air. The chemical composition of air and its importance to life. Air pollution and its influence on the health status of the population. Measures to prevent and combat air pollution. Microclimate hygiene.	<b>3 h</b>
8. Physico-chemical analysis of soil. Physical analysis of soil. Normal chemical composition of soil. Assessment of soil pollution. Measures to prevent and combat soil pollution.	<b>3 h</b>
9. The hygiene of healthcare professionals: basic principles in the application of universal precautions, use of safety equipment, hand hygiene (transmission of microbes through hands, classification of cutaneous flora, hand decontamination procedures).	<b>3 h</b>

## Bibliography

1. Miere D, Filip L, Banc R, Cozma A, Stanciu O. Bromatologie, Igienă, Nutriție - Lucrări practice (Facultatea de Farmacie). Cluj-Napoca: Ed. Med. Univ. „Iuliu Hațieganu”, 2014.
2. Miere D, Filip L, Banc R, Cozma A. Chimia și Igiena Mediului - Lucrări practice (Facultatea de Farmacie). Cluj-Napoca: Ed. Med. Univ. „Iuliu Hațieganu”, 2012.
3. Filip L, Miere D, Cozma A, Banc R. La chimie et l'hygiène de l'environnement - Applications pratiques (Faculté de Pharmacie). Cluj-Napoca: Ed. Med. Univ. „Iuliu Hațieganu”, 2012.
4. Miere D. Chimia și Igiena alimentelor. Vol 1. Cluj-Napoca: Ed. Med. Univ. „Iuliu Hațieganu”, 2002.
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6. Șendrea D, Miere D. Ghid de analiză chimico-sanitară a mediului. Cluj-Napoca: Litografia UMF, 1996.
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21. Gutierrez JG. Ciencia Bromatologica. Principios generales de los alimentos. Madrid: Ed. Diaz de Santos, 2000.

## 8. Evaluation

Activity type	8.1. Evaluation criteria	8.2. Evaluation methods	8.3. Percent of final grade
8.4. Course	General criteria for evaluation (completeness and correctness of knowledge, logical coherence, fluency of expression, force of argumentation). Criteria specific for the discipline. Criteria focusing on aspects of attitude and motivation of students' activities. Ability to understand fundamental issues and to customize.	Written exam: multiple choice exam	70%

<b>8.5. Laboratory</b>	Evaluation of theoretical knowledge (acquired during laboratory work) and practical skills. Evaluation of the quality of practical work during the semester, tests during the semester.	Practical exam	<b>20%</b>
	Preparation of projects based on literature review. Preparation of a nutritional plan.	Project	<b>10%</b>

### **8.6. Minimal performance standard**

Assimilation of the main concepts of Bromatology, Hygiene, Nutrition:

- Healthy human nutrition.
- The energy requirements of the human body.
- Nutrients - carbohydrates, lipids, proteins, vitamins, minerals, dietary fibers.
- The principles of healthy eating as a key element of a healthy lifestyle.
- Food – source of energy and nutrients. Study of food groups in the context of food balance.
- Novel foods. Functional foods.
- Food hygiene. Food safety.
- Evaluation of food consumption.
- Water, air, soil hygiene.
- The hygiene of rooms, communities, and pharmaceutical units.
- Formation of an active attitude in educating the population to adopt a healthy lifestyle.

# PHARMACEUTICAL CHEMISTRY

## 1. Information about the course

<b>1.1. Discipline</b>			<b>Pharmaceutical chemistry</b>				
<b>1.2. Course instructor</b>			<b>Professor Ovidiu Oniga, PhD</b> <b>Professor Brîndușa Tiperciuc, PhD</b> <b>Associate professor Cristina Nastasă, PhD</b> <b>Lecturer Ioana Ionuț, PhD</b>				
<b>1.3. Laboratory instructor</b>			<b>Professor Ovidiu Oniga, PhD</b> <b>Professor Brîndușa Tiperciuc, PhD</b> <b>Associate professor Cristina Nastasă, PhD</b> <b>Lecturer Ioana Ionuț, PhD</b> <b>Assistant professor Anca Stana, PhD</b>				
<b>1.4. Year</b>	<b>3</b>	<b>1.5. Semester</b>	<b>1, 2</b>	<b>1.6. Evaluation type</b>	<b>Written exam + Practical exam</b>	<b>1.7. Course type</b>	<b>Speciality discipline, Compulsory discipline</b>

## 2. Total estimated time (hours/semester for teaching activity)

<b>2.1. Total hours/week</b>	<b>5 (1<sup>st</sup> sem.)</b> <b>6 (2<sup>nd</sup> sem.)</b>	<b>2.2. Course</b>	<b>2</b> <b>3</b>	<b>2.3. Laboratories</b>	<b>3</b> <b>3</b>
<b>2.4. Total hours in the curriculum</b>	<b>70 (1<sup>st</sup> sem.)</b> <b>84 (2<sup>nd</sup> sem.)</b>	<b>2.5. Course</b>	<b>42</b> <b>28</b>	<b>2.6. Laboratories</b>	<b>42</b> <b>42</b>
<b>2.4. Distribution of time needed (1<sup>st</sup> sem. / 2<sup>nd</sup> sem.)</b>					<b>Hours</b>
a. Study using text books, lecture notes, bibliography					25/30
b. Individual study within libraries, on-line platforms, field research					25/25
c. Preparing seminars/laboratories, homework, projects, portfolios and essays					20/20
d. Tutoring					2/2
e. Evaluation/ semester					2/2
f. Other activities					2/2
<b>2.7. Total hours for individual study (a+b+c+d)</b>				<b>76 (1<sup>st</sup> sem.)</b> <b>81 (2<sup>nd</sup> sem.)</b>	
<b>2.8. Total hours per semester</b>				<b>146 (1<sup>st</sup> sem.)</b> <b>160 (2<sup>nd</sup> sem.)</b>	
<b>2.9. Number of credits</b>				<b>6 ( 1<sup>st</sup> sem.)</b> <b>6 ( 2<sup>nd</sup> sem.)</b>	

## 3. Pre-requisites:

<b>3.1. Curriculum</b>	Anatomy and physiology knowledge Inorganic, analytical and organic chemistry knowledge Microbiology knowledge
<b>3.2. Competences</b>	Analysis and synthesis abilities The ability to structure and interpret the information

## 4. Requisites:

<b>4.1. For lectures</b>	<ul style="list-style-type: none"> <li>Room with a higher capacity of 100 seats equipped with video and computer</li> </ul>
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<b>4.2. For laboratories sessions</b>	<ul style="list-style-type: none"> <li>• Lab with specific equipment for a chemical laboratory</li> </ul>
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### 5. Specific competences acquired

<b>Professional competences</b>	<ul style="list-style-type: none"> <li>• Accumulating knowledge, skills and approaches regarding the use of anti-infective and anti-tumor drugs, which gives students the ability to apply them in pharmacies</li> <li>• Capacity for analysis and synthesis, applicable to any professional and social context, based on the use of rigorous scientific methods and theoretical information resources</li> <li>• Practical skills in laboratory work, awareness of practical applications as an effective learning method</li> </ul>
<b>Transversal competences</b>	<ul style="list-style-type: none"> <li>• The ability to use interdisciplinary the specific knowledge gained in Pharmaceutical Chemistry for a complete professional formation</li> </ul>

### 6. Course objectives

<b>6.1. General objectives</b>	<ul style="list-style-type: none"> <li>• Knowledge and use of anti-infective and anti-tumor medication</li> </ul>
<b>6.2. Specific objectives</b>	<ul style="list-style-type: none"> <li>• Study of antiseptics, disinfectants, anti-infective chemotherapeutics and anti-cancer medication regarding the following aspects: <ul style="list-style-type: none"> <li>– physico-chemical properties</li> <li>– compounds' nomenclature</li> <li>– ways of chemical synthesis</li> <li>– essential biological properties</li> <li>– pharmaceutical forms</li> <li>– chemical structure - biological activity relations and optimization of biopharmaceutical and pharmacokinetic properties</li> </ul> </li> </ul>

### 7. Content

**Teaching methods for course:** interactive oral lectures, summarizing conversations, aim to review and systematize the presented information

**Teaching methods for laboratory activity:** systematic and independent observing, systematic display of knowledge based on practical experience and reasoning, individual and group experiments, case studies, individual study incitation, evaluative conversation, carried out during the verification and evaluation process

<b>7.1 Course (hours)</b>	<b>Remarks</b>
Strategies in the design and optimization of bioactive substances	4 h
Antiseptics and disinfectants	8 h
General chemotherapeutic agents (nitrofurans derivatives, halogenated 8-hydroxyquinolines, antibacterial sulphonamides, quinolone carboxylic acid derivatives)	10 h
Antiparasitic medication (antiprotozoal and anthelmintic drugs)	4 h
Antibacterial antibiotics	18 h
Antimycobacterial, antiviral and antifungal chemotherapeutics	21 h
Anti-cancer medication	5 h
<b>Bibliography</b>	
1. Ovidiu Oniga, Doina Ghiran, Brîndușa Tîperciuc – Chimie Farmaceutică, Antiseptice, dezinfectante și chimioterapice generale, Ed. Accent, Cluj-Napoca, 1999;	
2. Ovidiu Oniga, Brîndușa Tîperciuc, Antibiotice antibacteriene, Ed. Medicală Universitară "Iuliu	



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<b>7.2. Laboratory activities (hours)</b>	<b>Remarks</b>
1. Chemical identification of inorganic medicinal compounds	12 h
2. Chemical identification of organic medicinal compounds	
2.1. Halogenated derivatives	3 h
2.2. Alcohols	3 h
2.3. Phenols	3 h
2.4. Sulphonamides	3 h
2.5. Antibacterial antibiotics	12 h
3. Control of medicinal substances’ purity according to FRX	18 h
4. Spectral identification (IR, UV) of some antibiotics	3 h
5. Oral presentations of essays elaborated from the scientific literature	15 h
6. Practical exam	12 h
<b>Bibliography</b>	
O. Oniga, B. Tipericiuc, C. Moldovan, I. Ionuț, <i>Chimie Farmaceutică- caiet de lucrări practice</i> , Editura Toderico, Cluj-Napoca, 2010	

## 8. Evaluation

Activity type	8.1.Evaluation criteria	8.2. Evaluation methods	8.3.Percent of final grade
<b>8.4. Course</b>	- verification of the degree of systematization and the use of the learned concepts - logical consistency - the interest for individual study	Written evaluation in the exam session Sequentially evaluation during the semester Active participation in classes	<b>75%</b>
<b>8.5. Laboratory</b>	The ability to operate with the knowledge gained in practical work	Active participation in laboratory sessions and seminars	<b>25%</b>
<b>8.6. Minimal performance standard</b>			
Knowing the fundamentals of theory and practical activities - getting grade 5 in exams			

# PHARMACOGNOSY

## 1. Information about the course

<b>1.1. Discipline</b>		<b>Pharmacognosy</b>					
<b>1.2. Course instructor</b>		<b>Lecturer Anca Toiu</b>					
<b>1.3. Laboratory instructor</b>		<b>Lecturer Anca Toiu</b>					
<b>1.4. Year</b>	<b>3</b>	<b>1.5. Semester</b>	<b>1,2</b>	<b>1.6. Evaluation type</b>	<b>Written exam + Practical exam</b>	<b>1.7. Course type</b>	<b>Compulsory, specialty discipline</b>

## 2. Total estimated time (hours/semester for teaching activity)

<b>2.1. Total hours/week</b>	<b>6 (1<sup>st</sup> sem.)</b> <b>6(2<sup>nd</sup> sem.)</b>	<b>2.2. Course</b>	<b>3</b> <b>3</b>	<b>2.3. Laboratories</b>	<b>3</b> <b>3</b>
<b>2.4. Total hours in the curriculum</b>	<b>84 (1<sup>st</sup> sem.)</b> <b>84 (2<sup>nd</sup> sem.)</b>	<b>2.5. Course</b>	<b>42</b> <b>42</b>	<b>2.6. Laboratories</b>	<b>42</b> <b>42</b>
<b>2.4. Distribution of time needed (1<sup>st</sup> sem. / 2<sup>nd</sup> sem.)</b>					<b>Hours</b>
a. Study using text books, lecture notes, bibliography					35/35
b. Individual study within libraries, on-line platforms, field research					13/13
c. Preparing seminars/laboratories, homework, projects, portfolios and essays					20/00
d. Tutoring					14/14
e. Evaluation/ semester					5/5
f. Other activities					-
<b>2.7. Total hours for individual study (a+b+c+d)</b>					<b>87 (1<sup>st</sup> sem.)</b> <b>87 (2<sup>nd</sup> sem.)</b>
<b>2.8. Total hours per semester</b>					<b>171 (1<sup>st</sup> sem.)</b> <b>171 (2<sup>nd</sup> sem.)</b>
<b>2.9. Number of credits</b>					<b>6 (1<sup>st</sup> sem.)</b> <b>6 (2<sup>nd</sup> sem.)</b>

## 3. Pre-requisites:

<b>3.1. Curriculum</b>	Pharmaceutical botany, organic chemistry, analytical chemistry concepts
<b>3.2. Competences</b>	Knowledge of medicinal plants from botanical point of view and of basic analytical methods

## 4. Requisites:

<b>4.1. For lectures</b>	<ul style="list-style-type: none"> <li>The students will attend the courses with the mobile phones turned off, the telephone calls are not allowed during the lectures, neither the leaving of the classes in order to answer a call</li> <li>Being late at courses is not allowed</li> <li>The students will comply with the University regulations considering didactic activities</li> </ul>
<b>4.2. For laboratories sessions</b>	<ul style="list-style-type: none"> <li>The students will attend the courses with the mobile phones turned off, the telephone calls are not allowed during the lectures, neither the leaving of the classes in order to answer a call</li> <li>Being late at laboratories is not allowed</li> <li>The students will comply with the University regulations considering didactic activities and the general and specific safety regulations in Pharmacognosy laboratory.</li> </ul>

### 5. *Specific competences acquired*

<b>Professional competences</b>	<ul style="list-style-type: none"> <li>• The knowledge and the accurate use of pharmacognostic terms</li> <li>• The knowledge of medicinal plants from scientific phytochemical and pharmacological point of view</li> <li>• The knowledge of active principles and the correlation between their presence in natural products and the pharmacological effects</li> <li>• The knowledge of harvest, storage and preservation of medicinal natural products</li> <li>• Ability to understand and construe the therapeutic effect of a natural product, to know the side effects and the interactions with other products or drugs</li> <li>• The knowledge of processing of natural raw materials for therapeutical exploitation, the obtaining of extracts and of other pharmaceutical forms of conditioning the active compounds from natural products</li> <li>• The knowledge of pharmaceutical specialities of natural origins available on the market, their chemical composition, administration and their deliverance</li> <li>• Ability to advice the patients in natural products area and the phytopreparations obtained from those</li> <li>• The knowledge of analysis and control methods for the quality of natural medicinal products and the phytopreparations, the obtaining of skills in active compounds analysis: to establish the identity and the purity of natural products, the qualitative and quantitative analysis of natural compounds using extractive, chromatographic, volumetric and spectrophotometric methods, the interpretation of results</li> <li>• The knowledge of main research directions in pharmacognosy area.</li> </ul>
<b>Transversal competences</b>	<ul style="list-style-type: none"> <li>• The use of concepts in new contexts</li> <li>• The use of theoretical concepts in order to solve the problems</li> <li>• The optimal exploitation of their own potential in scientific activities</li> <li>• Self professional development</li> </ul>

### 6. *Course objectives*

<b>6.1. General objectives</b>	<ul style="list-style-type: none"> <li>• The knowledge, thoroughgoing study and the accurate use of pharmacognosy concepts, the knowledge of medicinal natural products and the phytopreparations</li> </ul>
<b>6.2. Specific objectives</b>	<ul style="list-style-type: none"> <li>• The knowledge of medicinal plants from scientific phytochemical and pharmacological point of view</li> <li>• The identification and characterization of natural products</li> <li>• The knowledge of active principles and the correlation between their presence in natural products and the pharmacological effects</li> <li>• The knowledge of harvest, storage and preservation of medicinal natural products</li> <li>• The knowledge of processing of natural raw materials for therapeutical exploitation, the obtaining of extracts and of other pharmaceutical forms of conditioning the active compounds from natural products</li> <li>• The knowledge of pharmaceutical specialities of natural origins available on the market, their chemical composition, administration and their deliverance</li> <li>• Ability to advice the patients in natural products area and the phytopreparations obtained from those</li> <li>• The knowledge of analysis and control methods for the quality of natural</li> </ul>

	<p>medicinal products and the phytopreparations, the obtaining of skills in active compounds analysis: to establish the identity and the purity of natural products, the qualitative and quantitative analysis of natural compounds using extractive, chromatographic, volumetric and spectrophotometric methods, the interpretation of results</p> <ul style="list-style-type: none"> <li>• Ability of qualitative and quantitative analysis of active compounds from natural raw materials using available methods in the laboratory: chromatography, volumetry, spectrophotometry</li> <li>• The knowledge of processing the natural products, the selection of solvents and the appropriate methods of extraction, in order to obtain a quality product with optimal therapeutic potential</li> <li>• The exploitation of scientific data and their ranking in speciality bibliographic documentation</li> </ul>
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## 7. Content

**Teaching methods for course:** Lecture, sistematic display and PowerPoint presentations, conversation, asking questions

**Teaching methods for laboratory activity:** Oral display and PowerPoint presentations, conversation, asking questions, practical activity.

7.1 Course (84 hours)	Remarks
<b>1.Introduction, generalities:</b> definitions, pharmacognostic terms, classifications, history, general notions	<b>6 h</b>
<b>2. General pharmacognosy:</b> the obtaining of natural products (harvest, stabilization, fermentation, drying, storage, conservation), pharmaceutical biotechnology, the biosynthesis of active compounds, the classification of active compounds	<b>6 h</b>
<b>3. Particular pharmacognosy</b>	
<b>Natural products with sugars and derivatives:</b> generalities, monographs of natural products (botanical data, chemical composition, actions, uses) Lini semen, Plantaginis folium, Verbasci flos, Althaeae radix, Tiliae flos etc.	<b>3 h</b>
<b>Natural products with lipids:</b> generalities, monographs of natural products (botanical data, chemical composition, actions, uses) Lini semen, Olivae fructus, Cacao semen, Sabalis serrulatae fructus, Cucurbitae peponis semen etc.	<b>3 h</b>
<b>Natural products with proteins:</b> generalities, monographs of natural products (botanical data, chemical composition, actions, uses) Spirulina, Momordiocae fructus, Mori folium, Visci folium	<b>3 h</b>
<b>4. Natural products with immunomodulatory active compounds:</b> generalities, monographs of natural products (botanical data, chemical composition, actions, uses) Echinaceae herba, Astragali radix, Pelargoni radix	<b>3 h</b>
<b>5. Natural products with alkaloids:</b> generalities, monographs of natural products (botanical data, chemical composition, actions, uses) with:	
- Piperidine alkaloids (Lobeliae herba, Granati cortex etc.)	<b>3 h</b>
- Tropane alkaloids (Belladonnae radix, Hyoscyami folium, Cocae folium etc.)	<b>3 h</b>
- Indole alkaloids (Physostigmae semen, Secale cornutum, Rauwolfiae radix, Vincae herba, Catharanthi herba etc.)	<b>3 h</b>
- Quinoline alkaloids (Cinchonae cortex), izoquinoline (Opium, Berberidis cortex, Chelidonii herba, Fumariae herba, Boldo folium etc.)	<b>3 h</b>
- Quinolizidine alkaloids (Cytisi semen, Sarothamni herba), purinici (Coffeae semen, Cacao semen, Theae folium etc.)	<b>3 h</b>
- Terpene alkaloids (Aconiti tuber); protoalkaloids (Ephedrae herba, Colchici semen, Capsici fructus); special structures (Taxus sp., Nivalis bulbus) (3 hours)	<b>3 h</b>

<p><b>6.Natural products with aromatic compounds:</b> generalities, monographs of natural products (botanical data, chemical composition, actions, uses) with:</p> <ul style="list-style-type: none"> <li>- aromatic compounds C<sub>6</sub> type (Vitis idaeae folium, Uvae ursi folium), C<sub>6</sub> - C<sub>1</sub> type (Salicis cortex, Ulmariae flos), C<sub>6</sub>– C<sub>3</sub> type (Cynarae folium)</li> <li>- C<sub>6</sub> – C<sub>3</sub> – O type compounds: coumarins (Fraxini folium, Meliloti herba etc.), flavonoids (Crataegi fructus, Sophorae flos, Ginkgo folium, Taraxaci herba etc.)</li> <li>- tannins (Quercus cortex, Hamamelidis folium, Ratanhiaae radix etc.), (C<sub>6</sub>– C<sub>3</sub>)<sub>n</sub> type : lignans (Podophyli rhizoma, Silybi mariani fructus)</li> <li>- quinons (Rhei rhizoma, Frangulae cortex, Hyperici herba etc.)</li> </ul>	<p><b>3 h</b></p> <p><b>3 h</b></p> <p><b>3 h</b></p> <p><b>3 h</b></p>
<p><b>7.Natural products with terpene compounds:</b> generalities, monographs of natural products (botanical data, chemical composition, actions, uses) with:</p> <ul style="list-style-type: none"> <li>- atypic monoterpens (Valerianaae rhizoma cum radicibus, Gentianaae radix etc.)</li> <li>- sesquiterpenoids, diterpenoids (Cichorii herba, Cardui benedicti herba etc.)</li> <li>- triterpenoids: saponins (Ginseng radix, Primulaae rhizoma, Saponariaae radix, Hippocastani semen, Hederaae folium etc.)</li> <li>- natural steroids</li> <li>- cardiotonic glycosides (Digitalis folium, Convalariaae herba, Adonidis herba etc.)</li> <li>- carotenoids (Tagetes flos, Calendulaae flos, Hippophaae fructus etc.)</li> </ul>	<p><b>3 h</b></p> <p><b>3 h</b></p> <p><b>3 h</b></p> <p><b>3 h</b></p> <p><b>3 h</b></p> <p><b>3 h</b></p>
<p><b>8.Natural products with essential oils:</b> generalities, monographs of natural products (botanical data, chemical composition, actions, uses) with:</p> <ul style="list-style-type: none"> <li>- monoterpenoids (Lavandulaae flos, Carvi fructus, Menthaae folium, Thymi herba, Salviaae folium etc.)</li> <li>-sesquiterpenoids (Chamomillae flos, Millefolii flos etc.), phenylpropanoids (Cinnamomi cortex, Foeniculi fructus, Anisi fructus etc.)</li> </ul> <p><b>Resins, balms</b> (Balsamum peruvianum, Ichtamololum etc.)</p>	<p><b>3 h</b></p> <p><b>3 h</b></p> <p><b>3 h</b></p>
<p><b>Bibliography</b></p> <ol style="list-style-type: none"> <li>1. Bruneton J. – Pharmacognosy, Phytochemistry, Medicinal plants – Ed. Tec et Doc – Lavoisier, 1999</li> <li>2. Oniga Ilioara - Farmacognozie-Alcaloizi, Ed. Medicală Universitară “Iuliu Hațieganu” Cluj-Napoca, 2001</li> <li>3. Hanganu Daniela – Farmacognozie – Materii prime naturale cu compuși aromatici, Ed. Medicală Universitară “Iuliu Hațieganu” Cluj-Napoca, 2005</li> <li>4. Oniga Ilioara - Farmacognozie. Compuși terpenici naturali, Editura Medicală Universitară "Iuliu Hațieganu" Cluj-Napoca, 2007</li> <li>5. Tămaș M., Oniga Ilioara, Benedec Daniela, Florian S. - Ghid pentru recunoașterea și recoltarea plantelor medicinale. Vol. I Flora spontană, Ed. Dacia Cluj-Napoca, 2005</li> <li>6. Oniga Ilioara, Tămaș M., Benedec Daniela, Florian S. - Ghid pentru recunoașterea și recoltarea plantelor medicinale. Vol. II. Plante din culturi, Ed. Supergraph Tipografic, Cluj-Napoca, 2006</li> <li>7. Benedec Daniela, Oniga Ilioara, Toiu A, Tămaș M., Plante medicinale exotice, Ed. Risoprint Cluj Napoca, 2011</li> <li>8. www.farma.umfcluj.ro : Curs Pharmacognosy, suport PowerPoint</li> </ol>	
<b>7.2. Laboratory activities (hours)</b>	<b>Remarks</b>
<ol style="list-style-type: none"> <li>1. General methods of pharmacognostic analysis <ul style="list-style-type: none"> <li>- The identification of natural products</li> <li>- The purity of natural products</li> <li>- General qualitative and quantitative analysis methods of active compounds</li> </ul> </li> </ol>	<b>12 h</b>
<ol style="list-style-type: none"> <li>2. The analysis of natural products with sugars, lipids</li> </ol>	<b>3 h</b>
<ol style="list-style-type: none"> <li>3. The analysis of natural products with: <ul style="list-style-type: none"> <li>- tropane alkaloids</li> <li>- indole alkaloids</li> <li>- quinoline alkaloids</li> <li>- isoquinoline alkaloids</li> <li>- purine alkaloids, alcaloizi terpene alkaloids</li> </ul> </li> </ol>	<p><b>3 h</b></p> <p><b>3 h</b></p> <p><b>3 h</b></p> <p><b>3 h</b></p> <p><b>3 h</b></p>

4.The analysis of alkaloids from unknown natural products, comments on formulations of phytopreparations with alkaloids	<b>12 h</b>
5. The analysis of natural products with aromatic compounds: - Phenyl derivatives - Phenylpropanoid derivatives - coumarins - flavonoids - tannins - anthracene derivatives	<b>3 h</b> <b>3 h</b> <b>3 h</b> <b>3 h</b> <b>3 h</b> <b>3 h</b>
6. The analysis of natural products with terpene compounds - monoterpenoids - saponins - cardiotoxic glycosides, carotenoids	<b>3 h</b> <b>3 h</b> <b>3 h</b>
7.The analysis of natural products with essential oils: - with monoterpenoids - sesquiterpenoids - phenylpropanoids	<b>3 h</b> <b>3 h</b> <b>3 h</b>
8.The analysis of aromatic and terpene compounds from unknown natural products, comments on formulations of phytopreparations	<b>6 h</b>
<b>Bibliography</b>	
1. Ilioara Oniga, Daniela Benedec, Daniela Hanganu - Analiza produselor naturale medicinale, Ed. Medicală Universitară "Iuliu Hațieganu" Cluj-Napoca, 2011	
2. M. Tămaș, Ilioara Oniga, Daniela Benedec, S. Florian - Ghid pentru recunoașterea și recoltarea plantelor medicinale. Vol. I Flora spontană, Ed. Dacia Cluj-Napoca, 2005	
3. Benedec D, Oniga I, Toiu A, Tamas M, Plante medicinale exotice, Ed. Risoprint Cluj Napoca, 2011	
4. Wagner H, Bladt S. Plant Drug Analysis. Berlin: Springer Verlag, 1996	

## 8. Evaluation

Activity type	8.1.Evaluation criteria	8.2. Evaluation methods	8.3.Percent of final grade
<b>8.4. Course</b>	General criteria of evaluation (the complete and precision of knowledge, the ability of learning the information and the right interpretation, logical thinking). The capacity of preluaction of theoretical data in order to apply in practical, the ability to understand and interpret the scientific information concerning the effects and uses of medicinal plants	Written exam (q.m.c)	<b>80%</b>
<b>8.5. Laboratory</b>	The evaluation of theoretical and practical abilities Evaluarea cunoștințelor teoretice și a abilităților pract	Practical exam	<b>20%</b>
<b>8.6. Minimal performance standard</b>			
The knowlwdge of pharmacognosy terms, the knowlwdge of medicinal natural products			
<ul style="list-style-type: none"> <li>• The scientific names of natual products and their obtaining</li> <li>• The chemical composition of natural products ant the correlation with pharmacologic effects</li> <li>• The use of natural products in medicinal purpose</li> <li>• Phytopreparations obtained from vegetal materials</li> <li>• Extraction methods of acvtive compounds</li> <li>• Analysis methods of active compounds from natural products</li> <li>• Quality control of vegetal materials and phytopreparations</li> </ul>			

# PHARMACOLOGY

## 1. Information about the course

<b>1.1. Discipline</b>		<b>Pharmacology, physiology, physiopathology</b>					
<b>1.2. Course instructor</b>		<b>Professor Mogoșan Cristina, PhD</b>					
<b>1.3. Laboratory instructor</b>		<b>Lecturer Pop Cristina, PhD</b> <b>Assistant lecturer Cazacu Irina, PhD</b> <b>Assistant lecturer Cristina Anamaria, PhD Student</b>					
<b>1.4. Year</b>	<b>3</b>	<b>1.5. Semester</b>	<b>2</b>	<b>1.6. Evaluation type</b>	<b>Written exam + Practical exam</b>	<b>1.7. Course type</b>	<b>Fundamental and compulsory discipline</b>

## 2. Total estimated time (hours/semester for teaching activity)

<b>2.1. Total hours/week</b>	<b>3 (2<sup>nd</sup> sem.)</b>	<b>2.2. Course</b>	<b>2</b>	<b>2.3. Laboratories</b>	<b>1</b>
<b>2.4. Total hours in the curriculum</b>	<b>42 (2<sup>nd</sup> sem.)</b>	<b>2.5. Course</b>	<b>28</b>	<b>2.6. Laboratories</b>	<b>14</b>
<b>2.4. Distribution of time needed (2<sup>nd</sup> sem.)</b>					<b>Hours</b>
a. Study using text books, lecture notes, bibliography					25
b. Individual study within libraries, on-line platforms, field research					4
c. Preparing seminars/laboratories, homework, projects, portfolios and essays					14
d. Tutoring					1
e. Evaluation/ semester					3
f. Other activities					-
<b>2.7. Total hours for individual study (a+b+c+d)</b>				<b>47 (2<sup>nd</sup> sem.)</b>	
<b>2.8. Total hours per semester</b>				<b>89 (2<sup>nd</sup> sem.)</b>	
<b>2.9. Number of credits</b>				<b>3 (2<sup>nd</sup> sem.)</b>	

## 3. Pre-requisites:

<b>3.1. Curriculum</b>	basic knowledge of physiology, pathophysiology, biochemistry
<b>3.2. Competences</b>	-

## 4. Requisites:

<b>4.1. For lectures</b>	• Amphitheater with video projector
<b>4.2. For laboratories sessions</b>	• Classroom for practical courses with required facilities

## 5. Specific competences acquired

<b>Professional competences</b>	<ul style="list-style-type: none"> <li>• The ability to use correctly and in the proper context the specific general pharmacology terminology</li> <li>• The ability to use general pharmacokinetics information and to customize it for different drug classes and active substances</li> <li>• The ability to use general pharmacodynamics information and to customize it for different drug classes and active substances</li> <li>• The ability to use general pharmacotoxicology information and to customize it for different drug classes and active substances</li> <li>• The ability to correlate general pharmacokinetics, pharmacodynamics and</li> </ul>
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	<p>pharmacotoxicology information</p> <ul style="list-style-type: none"> <li>• The ability to recognize the main synapses in the human body as targets for different drug classes, and to explain on the basis of their activity, the drugs' mechanism of action</li> <li>• The ability to develop a specific animal model in order to highlight the pharmacokinetics, pharmacodynamics and pharmacotoxicology of a drug</li> <li>• The ability to explain and interpret theoretical and practical pharmacology knowledge in an interdisciplinary approach together with other fundamental biomedical and specialty disciplines: anatomy-physiology, pathophysiology, biochemistry, clinical pharmacy, toxicology</li> </ul>
<b>Transversal competences</b>	<ul style="list-style-type: none"> <li>• The acquisition of an integrative approach to the drugs' mechanism of action in the human body and to the option of pharmacologically influencing a pathologic state</li> <li>• The use of the acquired knowledge in solving problems that can occur in an interdisciplinary or professional context</li> <li>• The optimal use of the acquired knowledge in scientific activities</li> </ul> <p>Personal professional development</p>

## 6. Course objectifs

<b>6.1. General objectives</b>	<ul style="list-style-type: none"> <li>• The assimilation of general and molecular pharmacology.</li> <li>• Knowledge of aspects of general pharmacokinetics, pharmacodynamics and pharmacotoxicology.</li> <li>• Characterization of the main types of chemical synapses as potential targets for drug therapy.</li> <li>• The study, with specific experimental models, of pharmacokinetics, pharmacodynamics and pharmacotoxicology of drugs.</li> </ul>
<b>6.2. Specific objectives</b>	<ul style="list-style-type: none"> <li>• The acquisition of specific general pharmacology knowledge to ensure the use of appropriate medical vocabulary necessary for intercommunication and for the understanding of practical drug therapy concepts necessary for the future pharmacist.</li> <li>• The acquisition of the ability to synthesize, to do bibliographic documentation and to make connections between general (basic), specialized and applied pharmacology.</li> <li>• Familiarization of the student with possible research directions in the field of pharmacology by developing their ability to participate to scientific conferences in the field of pharmacology.</li> </ul>

## 7. Content

**Teaching methods for course:** oral presentations coupled with PowerPoint presentations, interactive communication. Exemplifications, connections with other taught information or known facts, questions.

**Teaching methods for laboratory activity:** Conversations, problem solving, practical demonstration, interactive communication.

<b>7.1 Course (hours)</b>	<b>Remarks</b>
1. Introduction. Stages of the drug in the human body. Biopharmaceutical stage	<b>1 h</b>
2. Pharmacokinetic stage. Drug absorption	<b>2 h</b>



3. Pharmacokinetic stage. Drug distribution	<b>2 h</b>
4. Pharmacokinetic stage. Drug elimination	<b>2 h</b>
5. Pharmacodynamic stage. Parameters characteristic for and factors influencing pharmacodynamic activity	<b>3 h</b>
6. Pharmacodynamic stage. Activity of drugs at the molecular level	<b>3 h</b>
7. Pharmacotoxicology: tolerance, intolerance, addiction, reactions occurring at the abrupt interruption of drug therapy	<b>1 h</b>
8. Basic pharmacovigilance and pharmacoepidemiology	<b>2 h</b>
9. The adrenergic synapse	<b>1.5 h</b>
10. The cholinergic synapse	<b>1.5 h</b>
11. The histaminergic synapse	<b>2 h</b>
12. The serotonergic synapse	<b>2 h</b>
13. The glutamatergic synapse	<b>1.5 h</b>
14. The GABA-ergic synapse	<b>1.5 h</b>
15. Other synapses	<b>2 h</b>
<b>Bibliography</b>	
<ol style="list-style-type: none"> <li>1. Aurelia Cristea, Farmacologie generală, Ed. Didactică și Pedagogică București, 1998.</li> <li>2. Aurelia Cristea, Tratat de Farmacologie, Editura Medicală București 2005.</li> <li>3. Valentin Stroescu, Bazele farmacologice ale practicii medicale, Ediția a VII-a, Editura Medicală, 2001.</li> <li>4. Goodman&amp;Gilman's, The pharmacological basis of therapeutics, Ed. Mc Graw Hill, 2006.</li> <li>5. Katzung B.G. Basic and Clinical Pharmacology. Editia a 10-a, Editura McGraw-Hill, New York 2007.</li> <li>6. Rang H.P., Dale M.M., Ritter J.M., Pharmacology, Ed. Churchill Livingstone, 2007.</li> <li>7. Mogoșan Cristina, Abrégé de PHARMACOLOGIE, Editura Medicală Universitară "Iuliu Hațieganu" Cluj-Napoca, 2005.</li> <li>8. Cohen Y., Jacquot C., Pharmacologie, Ed. Masson, Paris, 2001.</li> <li>9. Landry Y., Gies J-P., Pharmacologie, des cibles vers l'indication thérapeutique, Ed. Dunod, 2003.</li> <li>10. Schorderet M., Pharmacologie, Des concepts fondamentaux aux applications thérapeutiques, Ed. Frison-Roche, Slatkine Geneve 1992.</li> <li>11. Lullman H., Mohr K., Atlas de poche de pharmacologie, Ed. Flammarion Médecine-Sciences, Paris, 2003.</li> </ol>	
<b>7.2. Laboratory activities (hours)</b>	<b>Remarks</b>
1. Introduction: general information, instruments and laboratory animals	<b>1 h</b>
2. Cutaneous and ocular drug absorption	<b>2 h</b>
3. Pulmonary and digestive drug absorption	<b>2 h</b>
4. Parenteral drug absorption. Drug metabolism and elimination	<b>3 h</b>
5. Drug effect variability due to the drug	<b>2 h</b>
6. Drug effect variability due to the organism	<b>3 h</b>
7. Pharmacodynamic antidotism	<b>1 h</b>
<b>Bibliography</b>	
<ol style="list-style-type: none"> <li>1. Aurelia Cristea, Farmacologie generală, Ed. Didactică și Pedagogică București, 2009.</li> <li>2. Mogoșan Cristina, Voștinaru Oliviu, Ghibu Steliana, Bazele experimentale ale farmacologiei, Editura Medicală Universitară „Iuliu Hațieganu” Cluj-Napoca 2012.</li> <li>3. Vogel G, Drug discovery and evaluation, Ed. Springer Verlag, 2002</li> </ol>	

## 8. Evaluation

Activity type	8.1.Evaluation criteria	8.2. Evaluation methods	8.3.Percent of final grade
<b>8.4. Course</b>	<ul style="list-style-type: none"> <li>• General evaluation criteria (knowledge assimilation and correctness, coherence, ability to apply knowledge)</li> </ul>	Written exam – multiple answer questions	<b>80%</b>

	<p>in a given context and to make correlations)</p> <ul style="list-style-type: none"> <li>• Discipline specific criteria</li> <li>• Criteria concerning students' attitude and motivation</li> <li>• Students' ability to understand and apply fundamental problems</li> </ul>		
<b>8.5. Laboratory</b>	<ul style="list-style-type: none"> <li>• Theoretical knowledge and practical skills evaluation</li> </ul>	Practical skills exam	<b>20%</b>
<b>8.6. Minimal performance standard</b>			
<ul style="list-style-type: none"> <li>• Learning the basic general pharmacology information <ul style="list-style-type: none"> <li>○ Description of the drug evolution stages in the human body.</li> <li>○ Characterization of drug –target binding, of the parameters and factors influencing pharmacodynamic activity.</li> <li>○ Defining and explaining pharmacotoxicology and pharmacovigilance basic information.</li> <li>○ Characterization of the main synapses in the human body and of the drug classes influencing them.</li> </ul> </li> </ul>			

# IMMUNOLOGY

## 1. Information about the course

<b>1.1. Discipline</b>		<b>Immunology</b>					
<b>1.2. Course instructor</b>		<b>Lecturer Onitiu-Gherman Nadia, PhD Lecturer Burz Claudia, PhD</b>					
<b>1.3. Laboratory instructor</b>		-					
<b>1.4. Year</b>	<b>3</b>	<b>1.5. Semester</b>	<b>2</b>	<b>1.6. Evaluation type</b>	<b>Written exam</b>	<b>1.7. Course type</b>	<b>Speciality discipline Compulsory discipline</b>

## 2. Total estimated time (hours/semester for teaching activity)

<b>2.1. Total hours/week</b>	<b>2 (2<sup>nd</sup> sem.)</b>	<b>2.2. Lecture</b>	<b>2</b>	<b>2.3. Laboratory activity</b>	<b>0</b>
<b>2.4. Total hours in the curriculum</b>	<b>28</b>	<b>2.5. Lecture</b>	<b>2 8</b>	<b>2.6. Laboratory Activity</b>	<b>0</b>
<b>2.4. Distribution of time needed (1<sup>st</sup> sem. / 2<sup>nd</sup> sem.)</b>					<b>Hours</b>
a. Study using text books, lecture notes, bibliography					20
b. Individual library study, on-line platforms, field research					14
c. Preparing seminars/. Laboratory activities, homework, projects, portfolios and essays					10
d. Tutoring					-
e. Examination/ semester					12
f. Other activities					-
<b>2.7. Total hours of individual study (a+b+c+d)</b>					<b>56 (2<sup>nd</sup> sem.)</b>
<b>2.8. Total hours/semester</b>					<b>84 (2<sup>nd</sup> sem.)</b>
<b>2.9. Number of credits</b>					<b>2 (2<sup>nd</sup> sem.)</b>

## 3. Prerequisites

<b>3.1. Curriculum</b>	Biochemistry, cellular and molecular biology, physiology and pathophysiology, medical terminology
<b>3.2. Competences</b>	-

## 4. Requisites

<b>4.1. For lectures</b>	Amphitheater / room with projection system The delay in the course or practical works is not allowed (disturbs the learning process) Foods, beverages, smoking are prohibited in classrooms Mobile phone use is forbidden during teaching
<b>4.2. For laboratory sessions</b>	-

## 5. Acquired specific competences

<b>Professional competences</b>	<ul style="list-style-type: none"> <li>• Ability to use specialized terms</li> <li>• Understanding the mechanisms of body defence</li> <li>• Understanding Deviant Immune Response (Hypersensitivity, Autoimmunity, Immunodeficiency), and Diseases Generated Contextually</li> <li>• Understanding the mechanisms involved in food hypersensitivity reactions</li> <li>• Knowing the clinical forms of drug interactions</li> <li>• Elaboration of eviction recommendations for drug interactions</li> </ul>
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	<ul style="list-style-type: none"> <li>• Orientation in the interpretation of some haematological and allergeo-immunological analysis bulletins</li> </ul>
<b>Transversal competences</b>	<ul style="list-style-type: none"> <li>• Use of computer resources and resources for learning</li> <li>• Effective communication with both patients and physicians</li> <li>• Participation in research and publication of scientific materials.</li> </ul>

### 6. Course objectives

<b>6.1. General objectives</b>	<ul style="list-style-type: none"> <li>• Knowledge, deepening and correct use of the concepts of immunology and allergology.</li> </ul>
<b>6.2. Specific objectives</b>	<ul style="list-style-type: none"> <li>• Understanding the mechanisms involved in initiating and unfolding the immune response</li> <li>• Understanding the pathological immune response (hypersensitivity, autoimmunity, immunodeficiency) and immune-related diseases</li> <li>• Understanding disease pathogens through drug-induced hypersensitivity mechanism.</li> <li>• Identification of the clinical forms of drug interactions.</li> <li>• Elaboration of eviction recommendations for drug interactions</li> </ul>

### 7. Content

Teaching methods: lecture, systematic exposure, conversation, problem solving, oral exposures and PowerPoint presentations.

<b>7.1. Lecture</b>
Introductory course. Acquired immunity. Antigens. Lymphoid organs and immune system cells.
Lymphoid organs and immune system cells - evaluation, blood count interpretation.
Antibodies - definition, types, cellular cooperation.
Monoclonal antibodies. Preparation. Practical applications.
Cytokine- definition, cytokine classes, practical applications.
The complement system - definition, modes of activation, pathological conditions.
Cell adhesion molecules. receptors
Transplant, Major histocompatibility complex.
Hypersensitivity reactions.
Immunological and allergenic evaluation.
Autoimmunity.
Immunodeficiencies.
Immunotherapy.
Drug allergy.
<b>Bibliography</b>
1. Cristea V, Monica Crişan (sub red.). Curs de Imunologie – Facultatea de Medicină. Ed a-IVa, Ed. Medicală Universitară „Iuliu Haţieganu”, Cluj-Napoca, 2011.
2. Dumitraşcu D. Bolile atopice, Ed. Med. Univ. „Iuliu Haţieganu”, Cluj Napoca, 2002.
3. Doru Dejica. Tratat de imunoterapie, Editura Mega, Cluj-Napoca, 2006.

## 8. Evaluation

Activity type	8.1. Evaluation criteria	8.2. Evaluation methods	8.3. Percent of final grade
8.4. Lectures	According to the general objectives.	Written exam, multiple answer and redaction questions	85%
	Continuous assessment throughout the semester		15%
<b>8.5. Laboratory: -</b>			
<b>8.6. Minimal performance standard</b>			
Understanding the main concepts of immunology and allergology. 1. Definition and types of immune response. 2. Classification and characterization of the elements involved in the immune response. 3. Immunological mechanisms and clinical manifestations in hypersensitivity, immunodeficiency, autoimmunity, tumors. 4. Understanding mechanisms of drug interactions and implications in establishing the treatment plan 5. Ability to interpret specific analyzes in conjunction with pharmacological treatment evaluation			

## DRUG INDUSTRY AND PHARMACEUTICAL BIOTECHNOLOGY

### 1. Information about the course

<b>1.1. Discipline</b>		<b>Drug industry and pharmaceutical biotechnology</b>					
<b>1.2. Course instructor</b>		<b>Lecturer Cristina Laura Bota, PhD</b>					
<b>1.3. Laboratory instructor</b>		<b>Lecturer Cristina Laura Bota, PhD</b>					
<b>1.4. Year</b>	3	<b>1.5. Semester</b>	2	<b>1.6. Evaluation type</b>	<b>Multiple –choise written exam+ Practical exam</b>	<b>1.7. Course type</b>	<b>Speciality discipline, Compulsory discipline</b>

### 2. Total estimated time (hours/semester for teaching activity)

<b>2.1. Total hours/week</b>	5 (2 <sup>nd</sup> sem.)	<b>2.2. Course</b>	2	<b>2.3. Laboratories</b>	3
<b>2.4. Total hours in the curriculum</b>	70 (2 <sup>nd</sup> sem.)	<b>2.5. Course</b>	28	<b>2.6. Laboratories</b>	42
<b>2.4. Distribution of time needed (1<sup>st</sup> sem. / 2<sup>nd</sup> sem.)</b>					Hours
a. Study using text books, lecture notes, bibliography					40
b. Individual study within libraries, on-line platforms, field research					30
c. Preparing seminars/laboratories, homework, projects, portfolios and essays					20
d. Tutoring					10
e. Evaluation/ semester					3
f. Other activities					-
<b>2.7. Total hours for individual study (a+b+c+d)</b>					<b>100 (2<sup>nd</sup> sem.)</b>
<b>2.8. Total hours per semester</b>					<b>173(2<sup>nd</sup> sem.)</b>
<b>2.9. Number of credits</b>					<b>4 ( 2<sup>nd</sup> sem.)</b>

### 3. Pre-requisite:

<b>3.1. Curriculum</b>	Theoretical and practical knowledge of organic chemistry, biochemistry, pharmacogenetics, cell biology
<b>3.2. Competences</b>	Ability to use certain laboratory methodologies and techniques for synthesis and biosynthesis of active pharmaceutical ingredients (API)

### 4. Requisites:

<b>4.1. For lectures</b>	<ul style="list-style-type: none"> <li>• Punctuality</li> <li>• Cell phones must be turned off during classes</li> <li>• To respect the internal regulations of the University</li> </ul>
<b>4.2. For laboratories sessions</b>	<ul style="list-style-type: none"> <li>• Punctuality</li> <li>• Cell phones must be turned off during lab sessions</li> <li>• The use of a suitable equipment during lab sessions</li> <li>• To respect the internal regulations of the University</li> </ul>

### 5. Specific competences acquired

<b>Professional competences</b>	<ul style="list-style-type: none"> <li>• Acquiring and strengthening the knowledges regarding the preparation of API's, using laboratory and industrial methods</li> <li>• Acquiring expertise for choosing the most suitable method to prepare an API.</li> <li>• Ability to explain and interpret the theoretical and practical contents of the course in an interdisciplinary approach with other fundamental and speciality disciplines: cell biology, pharmacogenetics, biochemistry, organic chemistry, pharmaceutical chemistry</li> <li>• Analysis and control of the API's prepared during laboratory sessions</li> <li>• Strengthening the abilities of using specific laboratory methodologies and techniques for synthesis and biosynthesis of API's.</li> <li>• Acquiring expertise in handling the laboratory equipment</li> </ul>
<b>Transversal competences</b>	<ul style="list-style-type: none"> <li>• Using concepts in new contexts</li> <li>• Using theory to solve practical aspects</li> <li>• Identifying the goals to achieve, the available resources, the steps to follow and their duration, the deadlines, the risks involved</li> <li>• Identifying the roles and responsibilities for each student within a team and the methods of applying communication techniques and work efficiency within the team</li> <li>• Development and improvement of the own scientific potential in the research work</li> <li>• Professional self-development</li> <li>• Effective use of informational sources, communication resources and computer-aided professional training(internet websites, specialized software applications, databases, online courses)</li> </ul>

### 6. Course objectifs

<b>6.1.General objectives</b>	<ul style="list-style-type: none"> <li>• Theoretical and practical knowledge and strength of the main methods of industrial and laboratory preparation of API's</li> </ul>
<b>6.2.Specific objectives</b>	<ul style="list-style-type: none"> <li>• Knowledge and understanding of concepts and basic methods for preparing API's: definition and description of the methodologies, models and techniques belonging to this field</li> <li>• Using of basic methods and principles to solve some practical issues, specific for API's preparation, with emphasis on advantages/disadvantages, benefits/risks for each method</li> <li>• Proper use of standard methods for assessing the quality and identity of prepared API's, according to quality standars imposing by FR X and European Pharmacopoeia</li> <li>• Acquiring the ability to compare the laboratory method versus industrial method for prepare an API.</li> <li>• Knowledge of the main research topics for API's synthesis and biosynthesis</li> <li>• Individual study in libraries and on-line platforms about certain topics</li> </ul>

### 7. Content

**Teaching methods for course:** Oral presentation accompanied by PP presentation

**Teaching methods for laboratory activity:** Oral presentation, seminary, questioning, practical work

<b>7.1 Course (hours)</b>	<b>Remarks</b>
I. Preparation of API's using chemical synthesis	
<b>I.1.</b> Overview: history of development of drug industry, drug development process, companies and costs, development of new drug from a laboratory scale to an industrial scale, industrial scale preparation of drugs, industrial chemical technology	<b>2 h</b>
<b>I.2.</b> Study of basic chemical reactions and their industrial applications for API's preparation: condensation, oxidation, reduction, oxidation-reduction, nitration, halogenation, rearrangements	<b>12 h</b>
II. API's preparation using biotechnological methods	
<b>II.1.</b> Overview: Basic information about biotechnology, biotechnological methods, selection of the cell lines and strains, preparation of the microorganisms, preparation of the culture media, life cycle of the microorganisms, influence of different factors on bioprocesses rates, microorganisms and enzymes using in biotechnology	<b>4 h</b>
<b>II.2.</b> Fermentation processes and their industrial applications for API's preparation: antibiotics, steroids, organic acids, vitamins, aminoacids	<b>8 h</b>
<b>II.3.</b> Modern biotechnologies and their industrial applications in pharmaceutical industry : recombinant DNA technology, insulins, rHGH, somatostatin	<b>2 h</b>
<b>Bibliography</b>	
1.Crommelin D.J.A., Sindelar R.D. - „Pharmaceutical Biotechnology. Fundamentals and applications”, Third edition, Informa Healthcare, 2008; 2.Jie-Jack, Li et all – “Contemporary drug synthesis”, Wiley Interscience, 2004; 3.Liese A., Seelbach K., Wandrey C.(Ed.) – “Industrial biotransformation”, Willey- VCH Verlag, 2006; 4.Jie-Jack, Li – “Name reactions”, Springer Verlag, 2006; 5.Vardanyan R. S., Hruby V.J.- “Synthesis of essential drugs”, Elsevier, 2006; 6.Jie-Jack, Li- “The art of drug synthesis”, Wiley, 2007; 7.Walsh, Gary- “Pharmaceutical biotechnology”, Wiley, 2007; 8.Sambamurthy K., Kar A.- “ Pharmaceutical Biotechnology”, New Age International Ltd. Publishers, New Delhi, 2006. 9.Vardanyan R., Hruby V.- “ Synthesis of best-seller drugs“, Editura Elsevier, 2016 10.Junhua T., Liese A.- “ Biocatalysis for the pharmaceutical industry“, Editura Wiley&Sons(Asia), 2009 11.Vandamme E.J., Revuelta J.L.- “ Industrial biotechnology. Vitamins, biopigments and antioxidants“, Editura Wiley VCH, 2016 12.www.farma.umfcluj.ro: Drug Industry, course	
<b>7.2. Laboratory activities (hours)</b>	<b>Remarks</b>
1. Safety rules in API's plants. How it works API's plants. Introducing the laboratory.	<b>3 h</b> Oral presentation, dialogue, questioning
2. Preparation of some API's and intermediates in faculty laboratory, using different reaction types e.g. oxidation, condensation, nitration, rearrangements 2.1.Phenitoinum preparation 2.1.1.Benzyl preparation 2.1.2.Benzylic acid preparation 2.1.3.Phenitoinum preparation 2.2.Phenisanum preparation (12 hours) 2.2.1.Isonitrosoacetanilide preparation 2.2.2.Isatin preparation 2.2.3.Phenisanum preparation	<b>12 h</b> Oral presentation, seminary, questioning, practical work
3. Qualitative analysis and purity analysis for the prepared API's using: the melting point, TLC, according to FR X and Eur Pharmacopoeia	<b>3 h</b> Oral presentation, questioning, practical work



4. Theoretical study of some unit operations and the equipment used for these operations, the study of some theoretical issues regarding drug industry	<b>12 h</b> PP presentations made by the students, seminary
<b>Bibliography</b>	
1.Crommelin D.J.A., Sindelar R.D. - „Pharmaceutical Biotechnology. Fundamentals and applications”, Third edition, Informa Healthcare, 2008;	
2.Jie-Jack, Li et all – “Contemporary drug synthesis”, Wiley Interscience, 2004;	
3.Liese A., Seelbach K., Wandrey C.(Ed.) – “Industrial biotransformation”, Willey- VCH Verlag, 2006;	

### 8. Evaluation

Activity type	8.1.Evaluation criteria	8.2.Evaluation methods	8.3.Percent of final grade
<b>8.4. Course</b>	General evaluation criteria (completeness and correctness of knowledge, logic coherence, fluency of speech, strenght of arguing) Specific discipline criteria Criteria concerning attitudinal and motivational aspects of student activity Ability to understand fundamental issues and to particularize Ability to make connections with other knowledges acquired in previous years of study	Multiple choise written examination	<b>70%</b>
<b>8.5. Laboratory</b>	Evaluation of theoretical knowledges and practical abilities	Practical examination	<b>30%</b>
<b>8.6. Minimal performance standard</b>			
<ul style="list-style-type: none"> <li>• Knowledge the main industrial chemical processes applied to prepare API's.</li> <li>• Knowledge the most important industrial applications for each chemical process</li> <li>• Knowledge the biotechnology types applied at industrial level to prepare API's</li> <li>• Knowledge the most important applications of the fermentation techniques and modern biotechnology techniques used to prepare API's</li> <li>• Preparation of an API according to a given procedure</li> <li>• Identity and purity assesment for prepared substances, according to FR X and Eu Ph</li> </ul>			

# PHARMACEUTICAL TECHNOLOGY

## 1. Information about the course

<b>1.1. Discipline</b>			<b>Pharmaceutical technology and biopharmacy</b>				
<b>1.2. Course instructor</b>			Lecturer PhD Alina Porfire				
<b>1.3. Laboratory instructor</b>			Assistant PhD Dana Hales Assistant PhD Lucia RuxandraTefas				
<b>1.4. Year</b>	3	<b>1.5. Semester</b>	<b>1, 2</b>	<b>1.6. Evaluation type</b>	<b>Written exam + Practical exam</b>	<b>1.7. Course type</b>	<b>Compulsory discipline, Specialized discipline</b>

## 2. Total estimated time (hours/semester for teaching activity)

<b>2.1. Total hours/week</b>	5 (1 <sup>st</sup> sem.) 5 (2 <sup>nd</sup> sem.)	<b>2.2. Course</b>	2 2	<b>2.3. Laboratories</b>	3 3
<b>2.4. Total hours in the curriculum</b>	70 (1 <sup>st</sup> sem.) 70 (2 <sup>nd</sup> sem.)	<b>2.5. Course</b>	28 28	<b>2.6. Laboratories</b>	42 42
<b>2.4. Distribution of time needed (1<sup>st</sup> sem. / 2<sup>nd</sup> sem.)</b>					Hours
a. Study using text books, lecture notes, bibliography					25/25
b. Individual study within libraries, on-line platforms, field research					20/20
c. Preparing seminars/laboratories, homework, projects, portfolios and essays					20/20
d. Tutoring					2/3
e. Evaluation/ semester					2/3
f. Other activities					-
<b>2.7. Total hours for individual study (a+b+c+d)</b>				70 (1 <sup>st</sup> sem.) 70 (2 <sup>nd</sup> sem.)	
<b>2.8. Total hours per semester</b>				140 (1 <sup>st</sup> sem.) 140 (2 <sup>nd</sup> sem.)	
<b>2.9. Number of credits</b>				5 (1 <sup>st</sup> sem.) 5 (2 <sup>nd</sup> sem.)	

## 3. Pre-requisites:

<b>3.1. Curriculum</b>	<ul style="list-style-type: none"> <li>Inorganic chemistry, organic chemistry, physical chemistry, mathematics, anatomy, microbiology</li> </ul>
<b>3.2. Competences</b>	<ul style="list-style-type: none"> <li>Manipulation of instruments, tools and equipment that are characteristic of physics and chemistry laboratories</li> <li>Easy use of mathematical elements</li> </ul>

## 4. Requisites:

<b>4.1. For lectures</b>	<ul style="list-style-type: none"> <li>video projector</li> </ul>
<b>4.2. For laboratories sessions</b>	<ul style="list-style-type: none"> <li>source of gas and electricity</li> <li>Romanian Pharmacopoeia ed.X, Supplements 2004 of RPh X</li> </ul>

## 5. Specific competences acquired

<b>Professional competences</b>	<ul style="list-style-type: none"> <li>Know of dosage forms and their quality conditions</li> <li>Know of the formulation principles of different dosage forms</li> <li>Understand the importance of formulation for the quality of the medicine</li> </ul>
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	<ul style="list-style-type: none"> <li>• Know the excipients used in drug formulation</li> <li>• Know the methods of preparation, reparation and storage of all dosage forms</li> <li>• Know the storage conditions and their impact on the quality of the pharmaceutical forms</li> </ul>
<b>Transversal competences</b>	<ul style="list-style-type: none"> <li>• Develop the ability to treat with maximum responsibility all professional activities</li> <li>• Develop the ability to understand the need for high-level professional training</li> <li>• Evaluate the quality of the medicine from the perspective of therapeutic safety and efficacy</li> <li>• Develop the ability to take responsibility for the decisions made</li> </ul>

## 6. Course objectifs

<b>6.1. General objectives</b>	<ul style="list-style-type: none"> <li>• Know of dosage forms regarding the formulation, preparation and quality assurance</li> </ul>
<b>6.2. Specific objectives</b>	<ul style="list-style-type: none"> <li>• Know of dosage forms and their quality characteristics</li> <li>• Know of excipients used to formulate and prepare dosage forms</li> <li>• Know and understand of the formulation principles</li> <li>• Know of the preparation methods of dosage forms</li> <li>• Understand the influence of the formulation and preparation on the quality of the drug</li> </ul>

## 7. Content

**Teaching methods for course:** oral presentation doubled by PowerPoint presentation

**Teaching methods for laboratory activity:** problem solving, debate, interactive communication, demonstration

7.1 Course (hours)	Remarks
<b>1<sup>st</sup> Semester</b>	
1. Pharmaceutical Technology – history, objectives. Relationship with other sciences. Specialty literature. References. The drug – definition, classifications, quality.	<b>2 h</b>
2. Fluid dosage forms, homogenous dispersions. Solutions. Solvents. Dissolution of active pharmaceutical ingredients. Dissolution thermodynamics. Solubility. Factors influencing the solubility. Dissolution rate. Factors influencing the dissolution rate and their use in the preparation of drugs.	<b>2 h</b>
3. Methods to enhance the solubility of poorly water-soluble active pharmaceutical ingredients: adjusting the pH, use of co-solvents, complexes formation, use of hydrotropes. Micellar solubilization. Examples.	<b>1 h</b>
4. Difficulties encountered when preparing solutions. Pharmaceutical incompatibilities in solutions.	<b>1 h</b>
5. Excipients used in the formulation and preparation of solutions: antimicrobial preservatives, antioxidants, viscosity increasing agents, buffers, surfactants, solubilizing agents, sweeteners, flavoring agents, coloring agents.	<b>2 h</b>
6. Oral solutions. Examples: officinal solutions, magistral solutions, industrial solutions; multidose solutions, single dose solutions; aqueous solutions, alcoholic solutions, oily solutions or prepared with other solvents or solvent mixtures. Solution-type pediatric preparations. Syrups.	<b>3 h</b>
7. Solutions for external use: skin solutions, solutions for mucous application: nasal solutions, auricular solutions, oromucosal preparations, rectal solutions and vaginal solutions. Biopharmaceutical considerations, local pathology. Formulation criteria. Preparation. Examples.	<b>3 h</b>
8. Sterile dosage forms I. Parenteral preparations. Types of preparations. Parenteral	<b>4 h</b>

route of administration. Properties of parenteral preparations: clarity, pH, isotonicity, non-pyrogenicity, sterility. Sterilization methods. Aseptic preparation method.	
9. Injections. Formulation: active pharmaceutical ingredients, excipients, vehicles/solvents, storage containers, workspace. Preparation of injections: solutions, suspensions, emulsions, powders. Examples. Quality conditions. Bioavailability of injections. Prolonged-release injections. Radiopharmaceuticals.	<b>4 h</b>
10. Infusions. Hydro-electrolytic balance of the body. Formulation, preparation. Electrolyte solutions for restoring the hydro-electrolytic and acid-basic balance. Infusions with plasma substitutes. Infusions for total parenteral nutrition. Parenteral use mixes. Irrigation solutions. Dialysis solutions.	<b>3 h</b>
11. Sterile dosage forms II. Ophthalmic preparations. Types. Biopharmaceutical considerations, local pathology. Quality conditions. Formulation, preparation. Eye drops. Eye lotions. Tears replacements. Ophthalmic inserts. Other ophthalmic preparations. Eye-contact lens solutions.	<b>3 h</b>
<b>2<sup>nd</sup> Semester</b>	
12. Extractive preparations. Materials: herbal drugs, solvents (water, alcohol). Factors influencing the extraction and extraction yield. Extractive aqueous solutions: macerates, infusions, decoctions. Extraction methods. Extractive hydro-alcoholic solutions. Tinctures. Extracts (fluid, soft, dry). Quality conditions. Examples.	<b>4 h</b>
13. Fluid dosage forms, heterogeneous dispersions. Classification. Properties of heterogeneous fluid dispersions which can influence their physical stability: degree of dispersion, interfacial energy, wetting, electric charge, adsorption, interactions between particles, viscosity.	<b>2 h</b>
14. Colloidal dispersions. Hydrophobic colloids. Hydrophilic colloids (hydrosoluble macromolecular compounds). Preparations, stability, uses. Association colloids. Amphiphilic surfactants with wetting, solubilizing properties.	<b>2 h</b>
15. Pharmaceutical emulsions. Classification. Formulation. Emulsifiers: classification, hydrophilic-lipophilic balance. Theories of emulsification. Stability of emulsions. Preparation methods. Quality conditions. Examples.	<b>2 h</b>
16. Pharmaceutical suspensions. Flocculated and deflocculated suspensions. Stability of suspensions and factors influencing their stability. Formulation and preparation. Quality conditions. Examples.	<b>2 h</b>
17. Semisolid preparations for topical application. Classification: ointments, creams, gels, pastes. Biopharmaceutical considerations. Excipients used for preparing semisolid preparations. Basis for semisolid preparations. Preparation methods; techniques for dispersing the active pharmaceutical ingredients. Sterile semisolid preparations. Quality conditions. Examples.	<b>4 h</b>
18. Suppositories. Biopharmaceutical considerations. Suppository basis. Excipients for preparing suppositories. Preparation methods. Displacement factor. Other dosage forms for rectal use. Vaginal suppositories. Urethral suppositories. Quality conditions. Examples.	<b>4 h</b>
19. Pharmaceutical powders. Classification. Preparation. Multidose powders. Single dose powders. Powders for oral use. Powders for cutaneous application. Quality conditions. Powders stability. Examples.	<b>2 h</b>
20. Solid dosage forms for oral use. Biopharmaceutical considerations. Excipients. Granules. Dry granulation. Wet granulation. Quality conditions. Examples.	<b>2 h</b>
21. Tablets. Types of tablets. Uncoated tablets. Preparation. Quality conditions. Examples. Coated tablets. Coating methods. Quality conditions. Examples.	<b>2 h</b>
22. Capsules. Hard gelatin capsules, soft gelatin capsules. Preparation. Quality conditions. Examples.	<b>1 h</b>
23. Modified release oral dosage forms. Types, characteristics, advantages.	<b>1 h</b>

<b>References</b>	
1. Leucuța S.E.: Tehnologie farmaceutică industrială, Editura Dacia, Cluj-Napoca, ediția I, 2001, ediția a II-a, 2008	
2. Leucuța S.E.: Tehnologia formelor farmaceutice. Editura Dacia, Cluj-Napoca, 1995	
3. Allen L.V., Popovich N.G., Ansel H.C.: Ansel's Pharmaceutical Dosage Forms and Drug Delivery Systems, 8 <sup>th</sup> edition, Lippincott Williams & Wilkins, 2005	
4. Le Hir A.: Pharmacie galénique. Bonnes Pratiques de Fabrication des médicaments; 9 <sup>e</sup> édition, Elsevier Masson, Paris, 2009.	
5. *** Farmacopeea Română ed. a IX-a, Ed. Medicală, București, 1976	
6. *** Farmacopeea Română ed. a X-a, Ed. Medicală, București, 1993 și suplimentele 2002, 2004 și 2006	
7. ***Farmacopeea Europeană ed. a 7-a, disponibilă la <a href="http://online.phwur.org/EN/entry.htm">http://online.phwur.org/EN/entry.htm</a>	
<b>7.2. Laboratory activities (hours)</b>	<b>Remarks</b>
<b>1<sup>st</sup> Semester</b>	
1. Solutions. Aqueous solutions of ionizable active pharmaceutical ingredients that are obtained by dilution, dissolution, reactions between the components. Aqueous solutions of non-ionizable active pharmaceutical ingredients that are obtained by dissolution.	<b>6 h</b>
2. Verifying the maximum doses for adults and children. Examples of prescriptions with highly active pharmaceutical ingredients and narcotic drugs.	<b>9 h</b>
3. Increasing the solubility of active pharmaceutical ingredients. Micellar solubilization. Enhancing the solubility by adjusting/modifying the pH; by changes to the solvent (co-solvents); by complexes formation; by using hydrotropes.	<b>3 h</b>
4. Physico-chemical interactions in solutions.	<b>3 h</b>
5. Oral solutions. Magistral solutions, officinal solutions, industrial solutions. Syrups.	<b>3 h</b>
6. Solutions for external use. Aqueous solutions, alcoholic solutions, oily solutions. Magistral solutions, officinal solutions, industrial solutions. Nasal drops, ear drops, oromucosal preparations, rectal irrigations, vaginal irrigations, cutaneous solutions.	<b>6 h</b>
7. Injections. Aqueous injections – quality assurance; calculating the amount of izotonizing agent, according to the Ro.Ph. X <sup>th</sup> edition. Physico-chemical interactions that arise from mixing injections.	<b>3 h</b>
8. Infusions. Expressing the active pharmaceutical ingredients content. Electrolyte infusions, infusions for nutrition (energy substances infusions). Reconstitution of infusions, examples.	<b>3 h</b>
9. Ophthalmic preparations. Aqueous eye drops with mydriatic substances, miotic substances, antimicrobial chemotherapeutics: officinal, magistral, industrial. Methods to aseptically reconstitute industrial ophthalmic preparations.	<b>6 h</b>
<b>2<sup>nd</sup> Semester</b>	
10. Extractive solutions. Macerates, infusions, decoctions.	<b>6 h</b>
11. Colloidal solutions. Lyophobic colloids. Lyophilic colloids. Association colloids.	<b>3 h</b>
12. Emulsions. Oral emulsions. The wet gum method and the dry gum method. Emulsions for external use: nasal drops, liniments.	<b>6 h</b>
13. Suspensions. Suspensions for internal use: preparing suspensions by employing the dispersion and the condensation method. Examples. Suspensions for external use: nasal drops, eye drops, suspensions applied in the mouth and pharynx, cutaneous suspensions.	<b>6 h</b>
14. Semisolid preparations applied onto the skin and mucous membranes. Basis for semisolid preparations: lipophilic basis; emulsion basis; hidrosoluble and hydro dispersible basis. Semisolid preparations obtained by various methods of dispersing the active pharmaceutical ingredient: dissolution, emulsification, suspension. Sterile semisolid preparations.	<b>6 h</b>
15. Suppositories. Preparation of rectal, vaginal, urethral suppositories with lipophilic	<b>6 h</b>

and hydrodispersible excipients. Preparation methods: hand rolling, melt molding. Examples for adults and children.	
16. Powders. Powders for oral use: multidose powders and single-dose powders; officinal powders and magistral powders. Powders for cutaneous applications: multidose powders. Preparation. Methods for overcoming difficulties in powder preparation.	<b>6 h</b>
17. Granules, tablets, capsules. Multidose granules for oral use prepared by wet granulation method. Preparing uncoated tablets with the eccentric tablet press. Filling of hard gelatin capsules using the hand-operated capsules filling machine.	<b>3 h</b>
<b>References</b>	
<ol style="list-style-type: none"> <li>1. Leucuța S.E., Achim M., Dinte E.: Prepararea medicamentelor, Ediția a II-a, Editura Universitară "Iuliu Hațieganu" Cluj-Napoca, 2009</li> <li>2. *** Farmacopeea Română ed. a IX-a, Ed. Medicală, București, 1976</li> <li>3. *** Farmacopeea Română ed. a X-a, Ed. Medicală, București, 1993 și suplimentele 2002, 2004 și 2006</li> <li>4. ***Farmacopeea Europeană ed. a 7-a, disponibilă la <a href="http://online.phwur.org/EN/entry.htm">http://online.phwur.org/EN/entry.htm</a></li> </ol>	

### 8. Evaluation

Activity type	8.1. Evaluation criteria	8.2. Evaluation methods	8.3. Percent of final grade
<b>8.4. Course</b>	<ul style="list-style-type: none"> <li>• Knowledge of dosage forms and their quality characteristics</li> <li>• Knowledge of drug formulation principles and materials used</li> <li>• Knowledge of drug preparation methods</li> </ul>	Written exam with multiple choice questions and which require detailed explanation	<b>65%</b>
<b>8.5. Laboratory</b>	<ul style="list-style-type: none"> <li>• Establishing the preparation method for a drug</li> <li>• Choosing and applying the preparation method in order to obtain a drug</li> </ul>	Practical preparation of a prescription drug and drafting a report	<b>35%</b>
<b>8.6. Minimal performance standard</b>			
Laboratory: prepare a dosage form that complies with the requirements of the Pharmacopoeias Course: know of dosage forms and their main quality characteristics know of the main preparation methods of dosage forms			

## APPLIED PHARMACEUTICAL TERMINOLOGY

### 1. Information about the course

<b>1.1. Discipline</b>		<b>Drug industry and pharmaceutical terminology</b>					
<b>1.2. Course instructor</b>		<b>Lecturer Cristina Laura Bota, PhD</b>					
<b>1.3. Laboratory instructor</b>		<b>Lecturer Cristina Laura Bota, PhD</b>					
<b>1.4. Year</b>	3	<b>1.5. Semester</b>	1 + 2	<b>1.6. Evaluation type</b>	<b>Final written examination + Oral examination</b>	<b>1.7. Course type</b>	<b>Specialty discipline, Compulsory discipline</b>

### 2. Total estimated time (hours/semester for teaching activity)

<b>2.1. Total hours/week</b>	1 (1 <sup>st</sup> sem.) 2 (2 <sup>nd</sup> sem.)	<b>2.2. Course</b>	1 -	<b>2.3. Seminars</b>	- 2
<b>2.4. Total hours in the curriculum</b>	14 (1 <sup>st</sup> sem.) 28 (2 <sup>nd</sup> sem.)	<b>2.5. Course</b>	14 -	<b>2.6. Seminars</b>	- 28
<b>2.4. Distribution of time needed (1<sup>st</sup> sem. / 2<sup>nd</sup> sem.)</b>					Hours
a. Study using text books, lecture notes, bibliography					7/7
b. Individual study within libraries, on-line platforms, field research					4/4
c. Preparing seminars/laboratories, homework, projects, portfolios and essays					7/7
d. Tutoring					2/2
e. Evaluation/ semester					2/2
f. Other activities					-
<b>2.7. Total hours for individual study (a+b+c+d)</b>				20 (1 <sup>st</sup> sem.) 20 (2 <sup>nd</sup> sem.)	
<b>2.8. Total hours per semester</b>				36 (1 <sup>st</sup> sem.) 50 (2 <sup>nd</sup> sem.)	
<b>2.9. Number of credits</b>				2 (2 <sup>nd</sup> sem.)	

### 3. Pre-requisites:

<b>3.1. Curriculum</b>	-
<b>3.2. Competences</b>	Knowledge of pharmaceutical and medical terminology (1 <sup>st</sup> year 1 <sup>st</sup> semester and II <sup>nd</sup> year 1 <sup>st</sup> semester + II <sup>nd</sup> semester)

### 4. Requisites:

<b>4.1. For lectures</b>	<ul style="list-style-type: none"> <li>• To respect the internal regulations of University</li> <li>• Punctuality</li> </ul>
<b>4.2. For laboratories sessions</b>	<ul style="list-style-type: none"> <li>• To respect the internal regulations of University</li> <li>• Punctuality</li> </ul>

### 5. Specific competences acquired

<b>Professional competences</b>	<ul style="list-style-type: none"> <li>• Ability to understand and to use in a proper way and in a certain context the specific terminology used in the pharmaceutical field.</li> <li>• Ability to understand medical and pharmaceutical terms learned in English and Romanian in some professional and scientific contexts.</li> <li>• Ability to use the terms learned in Romanian in the usual pharmaceutical language.</li> </ul>
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<b>Transversal competences</b>	<ul style="list-style-type: none"> <li>• Competences to use pharmaceutical terms learned in English and Romanian in new multidisciplinary contexts.</li> <li>• Keeping a dialogue in Romanian with some medical and pharmacy professionals.</li> <li>• Proper use and in a creative manner of medical and pharmaceutical language in different scientific activities .</li> <li>• Effective use of informational resources, communication resources and computer-aided professional training (internet websites, specialized software applications, databases, on-line courses) both in Romanian and English .</li> </ul>
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## 6. Course objectives

<b>6.1. General objectives</b>	<ul style="list-style-type: none"> <li>• Learning and knowledge of basic pharmaceutical terminology, bilingual, English-Romanian, developing and improving the specific medical pharmaceutical vocabulary, in order to facilitate the study of the speciality disciplines in the next years (IV<sup>th</sup> and V<sup>th</sup> years of study) and to develop a dialogue and the cooperation with the pharmacy professionals.</li> </ul>
<b>6.2. Specific objectives</b>	<ul style="list-style-type: none"> <li>• Analyse and correctly identify the component parts of the pharmaceutical terms and correctly understand their meanings.</li> <li>• Building pharmaceutical terms using their definitions.</li> <li>• Proper use of the pharmaceutical terms in professional communication, both in Romanian and in English.</li> <li>• Use in a proper manner the pharmaceutical terms in different scientific contexts (understanding, explanation and interpretation of situations, processes, results for different pharmaceutical specialisations) in Romanian and in English.</li> </ul>

## 7. Content

**Teaching methods for course: systematic exposition, conversation**

**Teaching methods for seminary activity: reading, explanations, exercises, conversation.**

<b>7.1 Course (hours)</b>	<b>Remarks</b>
1. Terms used in biopharmacy and in pharmacokinetics	<b>2 h</b>
2. Terms and abbreviations used for administration routes of API's.	<b>2 h</b>
3. Terms used in pharmaceutical technology: solid dosage forms	<b>2 h</b>
4. Terms used in pharmaceutical technology: liquid and semisolid formulations	<b>4 h</b>
5. Terms used in industrial pharmaceutical technology	<b>2 h</b>
6. Terms used in drug analysis and control	<b>2 h</b>
<b>Bibliography</b>	
Iuliana Popovici, Lăcrămioara Ochiuz, D. Lupuleasa – Terminologie medicală și farmaceutică, Editura Polirom, București, 2007.	
<b>7.2. Seminary activities (hours)</b>	<b>Remarks</b>
1. Terms used in veterinary pharmacy	<b>2 h</b>
2. Terms used for modern criteria to classify the drugs.	<b>2 h</b>
3. Abbreviations and symbols used to naming the pharmaceutical dosage forms	<b>2 h</b>
4. Analysis on specialty texts in order to recognize and translate in a proper manner medical and pharmaceutical terms : fragments of textbooks, other print materials, media articles	<b>20 h</b>
5. Revision for endsemester exam	<b>2 h</b>



<p><b>Bibliography</b></p> <ol style="list-style-type: none"> <li>1. Iuliana Popovici, Lăcrămioara Ochiuz, D. Lupuleasa – Terminologie medicală și farmaceutică, Editura Polirom, București, 2007.</li> <li>2. Different specialty books, different academic sites for articles and other specialty materials</li> </ol>	
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### 8. Evaluation

Activity type	8.1.Evaluation criteria	8.2. Evaluation methods	8.3. Percent of final grade
<b>8.4. Course</b>	-		
<b>8.5. Seminary</b>	General evaluation criteria (quality of acquired knowledge, the correct use of terms in the context of professional speech in Romanian)	Written and oral <u>barrier examination</u> (comprehension of pharmaceutical texts in Romanian, translation of English pharmacy related texts into Romanian and explanation of specific terms)	<b>100%</b>
<b>8.6. Minimal performance standard</b>			
<p>Identify, understand and explain the terms used in the pharmaceutical context of a Romanian specialty text and the correct understanding of information.</p> <p>Students must validate the exam of Applied Pharmaceutical Terminology of the 2<sup>nd</sup> semester in order to be able to access the 4<sup>th</sup> year of study (<b><u>BARRIER EXAMINATION</u></b>)</p>			

## MEDICAL TERMINOLOGY

### 1. Information about the course

<b>1.1. Discipline</b>		<b>Toxicology</b>					
<b>1.2. Course instructor</b>		<b>Lecturer Anca Cherfan, PhD</b>					
<b>1.3. Laboratory instructor</b>		<b>Lecturer Anca Cherfan, PhD</b>					
<b>1.4. Year</b>	<b>3</b>	<b>1.5. Semester</b>	<b>1</b>	<b>1.6. Evaluation type</b>	<b>Written exam</b>	<b>1.7. Course type</b>	<b>Domain discipline Compulsory discipline</b>

### 2. Total estimated time (hours/semester for teaching activity)

<b>2.1. Total hours/week</b>	<b>1 (1<sup>st</sup> sem.)</b>	<b>2.2. Course</b>	<b>-</b>	<b>2.3. Laboratories</b>	<b>1</b>
<b>2.4. Total hours in the curriculum</b>	<b>14 (1<sup>st</sup> sem.)</b>	<b>2.5. Course</b>	<b>-</b>	<b>2.6. Laboratories</b>	<b>14</b>
<b>2.4. Distribution of time needed (1<sup>st</sup> sem.)</b>					<b>Hours</b>
a. Study using text books, lecture notes, bibliography					14
b. Individual study within libraries, on-line platforms, field research					7
c. Preparing seminars/laboratories, homework, projects, portfolios and essays					14
d. Tutoring					7
e. Evaluation/ semester					2
f. Other activities					-
<b>2.7. Total hours for individual study (a+b+c+d)</b>					<b>42 (1<sup>st</sup> sem.)</b>
<b>2.8. Total hours per semester</b>					<b>56 (1<sup>st</sup> sem.)</b>
<b>2.9. Number of credits</b>					<b>1 (1<sup>st</sup> sem.)</b>

### 3. Pre-requisites:

<b>3.1. Curriculum</b>	-
<b>3.2. Competences</b>	Knowlegde of anatomy and physiology, high school level

### 4. Requisites:

<b>4.1. For lectures</b>	-
<b>4.2. For laboratories sessions</b>	• To respect the internal regulations of University

### 5. Specific competences acquired

<b>Professional competences</b>	• Ability to understand and to use in a proper way and in a certain context the specific terminology used in the medical field.
<b>Transversal competences</b>	• Competences to use medical terms learned in English and Romanian in new multidisciplinary contexts.

### 6. Course objectifs

<b>6.1. General objectives</b>	• Learning and knowledge of basic medical terminology, bilingual, English-Romanian, developing and improving the specific medical vocabulary, in order to facilitate the study of the speciality disciplines in the next years (IV <sup>th</sup> and V <sup>th</sup> years of study) and to develop a dialogue and the cooperation with the pharmacy professionals.
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<b>6.2. Specific objectives</b>	<ul style="list-style-type: none"> <li>• Knowledge of the rules applied in the forming of frequently used medical terms by pharmacists and other professionals working in the medical field.</li> <li>• Learn prefixes and suffixes often used in medical terms and their combinations.</li> <li>• Analyze and correctly identify the component parts of medical terms and properly understand their meanings.</li> </ul>
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## 7. Content

Teaching methods for course:

Teaching methods for laboratory activity: **Systematic exposition, exercises, conversation**

7.1 Course (hours)	Remarks
7.2. Laboratory activities (hours)	Remarks
1. Introduction to medical terminology. The units that compose the words. Rules applied in the forming of medical terms.	1 week
2. The general organization of the human body. The roots of terms describing the human body.	3 weeks
3. Applying the rules for the formation of medical terms. The use of prefixes, suffixes and basic radicals to form medical terms.	4 weeks
<b>Bibliography</b>	
Iuliana Popovici, Lăcrămioara Ochiuz, D. Lupuleasa – Terminologie medicală și farmaceutică, Editura Polirom, București, 2007.	

## 8. Evaluation

Activity type	8.1. Evaluation criteria	8.2. Evaluation methods	8.3. Percent of final grade
<b>8.4. Course</b>	-	-	-
<b>8.5. Laboratory</b>	General evaluation criteria (quality of acquired knowledge, the correct use of terms in the context of professional speech in Romanian)	Written exam (exercises: explain the medical terms, form words from their definitions, writing in Romanian)	<b>100%</b>
<b>8.6. Minimal performance standard</b>			
Identify, understand and explain the terms used in the medical context of a Romanian specialty text and the correct understanding of information.			

## PHARMACY PRACTICE 3<sup>rd</sup> YEAR

### 1. Information about the course

<b>1.1. Discipline</b>		<b>Medical devices. Pharmaceutical practice</b>					
<b>1.2. Course instructor</b>		-					
<b>1.3. Laboratory instructor</b>		<b>Lecturer, PhD Liora Colobatiu</b>					
<b>1.4. Year</b>	<b>3</b>	<b>1.5. Semester</b>	<b>2</b>	<b>1.6. Evaluation type</b>	<b>Practical exam</b>	<b>1.7. Course type</b>	<b>Speciality discipline, Compulsory discipline</b>

### 2. Total estimated time (hours/semester for teaching activity)

<b>2.1. Total hours/week</b>	<b>30 (2 weeks, 2<sup>nd</sup> sem.)</b>	<b>2.2. Course</b>	-	<b>2.3. Laboratories</b>	<b>30</b>
<b>2.4. Total hours in the curriculum</b>	<b>60</b>	<b>2.5. Course</b>	-	<b>2.6. Laboratories</b>	<b>60</b>
<b>2.4. Distribution of time needed (1<sup>st</sup> sem. / 2<sup>nd</sup> sem.)</b>					<b>Hours</b>
a. Study using text books, lecture notes, bibliography					5
b. Individual study within libraries, on-line platforms, field research					5
c. Preparing seminars/laboratories, homework, projects, portfolios and essays					10
d. Tutoring					0.5
e. Evaluation/ semester					0.5
f. Other activities					5
<b>2.7. Total hours for individual study (a+b+c+d)</b>				<b>20,5 (2<sup>nd</sup> sem.)</b>	
<b>2.8. Total hours per semester</b>				<b>86 (2<sup>nd</sup> sem.)</b>	
<b>2.9. Number of credits</b>				<b>2 (2<sup>nd</sup> sem.)</b>	

### 3. Pre-requisites:

<b>3.1. Curriculum</b>	Knowledge regarding the Romanian pharmaceutical legislation, pharmaceutical technology, bromatology, pathology.
<b>3.2. Competences</b>	Acquired during the first and second practical internship performed the previous years in pharmacies.

### 4. Requisites:

<b>4.1. For lectures</b>	-
<b>4.2. For laboratories sessions</b>	Authorized pharmacies.

### 5. Specific competences acquired

<b>Professional competences</b>	<ul style="list-style-type: none"> <li>• The understanding of the role, responsibilities and obligations related to the profession of pharmacist</li> <li>• The capacity to identify and know the pharmaceutical forms available in pharmacies</li> <li>• The preparation of medicines</li> <li>• To know the products released from the pharmacy and to understand the characteristics specific for each identified category of such products</li> <li>• To identify and know the medicines containing antibiotics, antiseptics, antivirals</li> </ul>
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	<ul style="list-style-type: none"> <li>and antimycotics</li> <li>To identify and know the phytopharmaceutical medicines available in the pharmacy</li> <li>To identify and know the alimentary supplements available in the pharmacy</li> <li>To understand the steps that must be followed in order to properly release medicines (prescription and OTC)</li> <li>The capacity to identify the medicines that are frequently released from pharmacies</li> <li>The initiation in the dispensing and counseling activities performed in the pharmacy</li> </ul>
<b>Transversal competences</b>	<ul style="list-style-type: none"> <li>The acquirement of an active attitude towards the role of the speciality practice in the professional development of the future pharmacist</li> <li>The identification of the objectives that must be fulfilled during the initial practical stage in pharmacies</li> <li>The identification of the pharmacist's role and responsibilities in society</li> <li>The application of certain communication techniques</li> <li>Individual professional development</li> </ul>

## 6. Course objectives

<b>6.1. General objectives</b>	<ul style="list-style-type: none"> <li>Initiation in the activities performed in a pharmacy (community or hospital pharmacy)</li> <li>The application of the acquired theoretical knowledge into the practical activities performed in pharmacies, under the coordination, surveillance and evaluation of a pharmacist-practical internship coordinator</li> </ul>
<b>6.2. Specific objectives</b>	<ul style="list-style-type: none"> <li>To understand the role, responsibilities and obligations related to the profession of pharmacist</li> <li>To identify and know the pharmaceutical forms available in pharmacies</li> <li>To prepare medicines</li> <li>To know the products released from the pharmacy and to understand the characteristics specific for each identified category</li> <li>To identify and know the medicines containing antibiotics, antiseptics, antivirals and antimycotics</li> <li>To identify and know the phytopharmaceuticals available in the pharmacy</li> <li>To identify and know the alimentary supplements available in the pharmacy</li> <li>To understand the steps that must be followed in order to properly release medicines (prescription and OTC)</li> <li>To identify the medicines that are frequently released from pharmacies</li> <li>To be initiated in the dispensing and counseling activities performed in the pharmacy</li> </ul>

## 7. Content

**Teaching methods for course:** -

**Teaching methods for laboratory activity:** explanation, conversation, questioning, analyse.

<b>7.1 Course (hours)</b>	<b>Remarks</b>
-	-
<b>7.2. Laboratory activities (hours)</b>	<b>Remarks</b>
<b>1. The industrial medicine. The preparation of medicines</b>	Theory into practice
<b>2. Antimicrobials used in the treatment of bacterial, herpetic and mycotic infections</b>	Theory into practice

<b>3. Phytopharmaceuticals</b>	Theory into practice
<b>4. Alimentary supplements</b>	Theory into practice
<b>5. The dispensing of medicines in the community pharmacy</b>	Theory into practice
<b>6. Initiation in the counseling of patients</b>	Theory into practice
<b>Bibliography</b>	
<ol style="list-style-type: none"> <li>1. Mirel S. (coordonator), Stagiul de inițiere și orientare în practica farmaceutică- Ghid pentru studenții anilor I-IV, Editura Medicală Universitară "Iuliu Hațieganu" Cluj-Napoca, 2013.</li> <li>2. Crișan O. (coordonator), Introducere în tehnologie și în legislație farmaceutică, Editura Medicală Universitară «Iuliu Hațieganu», Cluj-Napoca, 2012.</li> <li>3. Farmacopeea română, Ed. X, Editura Medicală, București, 1993.</li> <li>4. Legea nr. 266/2008 a farmaciei, republicată, Monitorul Of.al României, partea I, 448/2009</li> <li>5. Iacob S. (coordonator), Legislație și modele de proceduri pentru aplicarea în farmacie a Regulilor de buna practică farmaceutică, Ed . Risoprint, Cluj, 2011.</li> <li>6. Oniga O., Tiperciuc B., Nastasă C., Ionuț I., Chimia și acțiunea antibioticelor antibacteriene, Edit. Medicală Universitară "Iuliu Hațieganu" Cluj-Napoca, 2013.</li> <li>7. Ordinul Ministerului Sănătății Publice nr. 1069/2007 pentru aprobarea Normelor privind suplimentele alimentare.</li> <li>8. Ordinul comun al M.A.P.D.R., M.S. și A.N.S.V.S.A. nr. 1228/2005/244/63/2006, privind comercializarea suplimentelor alimentare predozate de origine animală și vegetală și/sau a amestecurilor acestora cu vitamine, minerale și alți nutrienți;</li> <li>9. Banu C., Alimente funcționale, suplimente alimentare și plante medicinale, Editura ASAB, București, 2010.</li> <li>10. Agenția Națională a Medicamentului și a Dispozitivelor Medicale, Nomenclatorul medicamentelor de uz uman, disponibil la <a href="http://www.anm.ro/app/nom1/anm_list.asp">http://www.anm.ro/app/nom1/anm_list.asp</a> .</li> <li>11. Agenda medicală, Editura Medicală, București, 2013.</li> <li>12. Memomed, Editura Universitară, București, 2013.</li> </ol>	

## 8. Evaluation

Activity type	8.1.Evaluation criteria	8.2. Evaluation methods	8.3.Percent of final grade
<b>8.4. Course</b>	-	-	-
<b>8.5. Laboratory</b>	Criteria regarding the attitude and motivation of the students	The evaluation of the coordinator pharmacist	<b>30%</b>
	The way in which the applications proposed are solved (Practical stage guide)	The way in which the applications are solved	<b>30%</b>
	The capacity to understand and respond to problems The capacity to discuss and talk adequately	Oral exam	<b>40%</b>
<b>8.6. Minimal performance standard</b>			
The acquirement of basic knowledge regarding:			
<ul style="list-style-type: none"> <li>• The reception and storage of medicines and other health products</li> <li>• The preparation of medicines</li> </ul>			

- Products released from pharmacies and their characteristics (composition, mechanisms, indications):
  - Antibiotics, antiseptics, antivirals
  - Phytopharmaceuticals
  - Alimentary supplements
- The steps to be followed while dispensing medicines or other health products or while counseling patients

## 8.3.2. OPTIONAL COURSES

### PROSTHETIC PRODUCTS

#### 1. Information about the course

<b>1.1. Course</b>		<b>Medical devices. Pharmaceutical practice</b>					
<b>1.2. Course instructor</b>		<b>Associate professor Simona Mirel, PhD</b>					
<b>1.3. Laboratory instructor</b>		-					
<b>1.4. Year</b>	<b>3</b>	<b>1.5. Semester</b>	<b>1</b>	<b>1.6. Evaluation type</b>	<b>Theoretical exam</b>	<b>1.7. Course type</b>	<b>Speciality discipline, Optional discipline</b>

#### 2. Total estimated time (hours/semester for teaching activity)

<b>2.1. Total hours/week</b>	<b>1 (1<sup>st</sup> sem.)</b>	<b>2.2. Course</b>	<b>1</b>	<b>2.3. Laboratories</b>	<b>-</b>
<b>2.4. Total hours in the curriculum</b>	<b>14 (1<sup>st</sup> sem.)</b>	<b>2.5. Course</b>	<b>14</b>	<b>2.6. Laboratories</b>	<b>-</b>
<b>2.4. Distribution of time needed (1<sup>st</sup> sem. / 2<sup>nd</sup> sem.)</b>					<b>Hours</b>
e. Study using text books, lecture notes, bibliography					14
f. Individual study within libraries, on-line platforms, field research					7
g. Preparing seminars/laboratories, homework, projects, portfolios and essays					14
h. Tutoring					3
e. Evaluation/ semester					2
f. Other activities					-
<b>2.7. Total hours for individual study (a+b+c+d)</b>				<b>38 (1<sup>st</sup> sem.)</b>	
<b>2.8. Total hours per semester</b>				<b>54 (1<sup>st</sup> sem.)</b>	
<b>2.9. Number of credits</b>				<b>2 (1<sup>st</sup> sem.)</b>	

#### 3. Pre-requisites:

<b>3.1. Curriculum</b>	- basic knowledge of anatomy, physiology, chemistry, physics
<b>3.2. Competences</b>	-

#### 4. Requisites:

<b>4.1. For lectures</b>	-
<b>4.2. For laboratories sessions</b>	-

#### 5. Specific competences acquired

<b>Professional competences</b>	<ul style="list-style-type: none"> <li>• Getting acquainted with the specific terminology in order to use it adequately;</li> <li>• The capacity to identify and know the main types of prosthetic products frequently released in pharmacies (in correlation with their proper medical indications);</li> <li>• The capacity to know and understand the characteristics of certain prosthetic products (description, advantages, disadvantages);</li> <li>• The capacity to know, to understand and to explain the correct way of use of the prosthetic products</li> </ul>
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	<ul style="list-style-type: none"> <li>• Developing the necessary abilities to analyze requests regarding the procurement of serial prosthetic products, in order to avoid choosing errors;</li> <li>• Acquiring certain communication skills necessary in the act of releasing prosthetic products</li> <li>• The capacity to explain and analyze the theoretical and practical content of the course, in a multidisciplinary approach; Understanding aspects related to the complexity of the research carried out in order to obtain performant prosthetic products</li> </ul>
<b>Transversal competences</b>	<ul style="list-style-type: none"> <li>• The development of a responsible attitude towards the profession</li> <li>• The development of an active attitude regarding the counseling of patients</li> <li>• The ability to use theoretical knowledge in order to solve practical cases</li> <li>• The ability to use new information in new contexts</li> </ul> <p>Individual professional development</p>

### 6. Course objectifs

<b>6.1. General objectives</b>	<ul style="list-style-type: none"> <li>• To know and understand the importance and the role of the prosthetic products (especially serial orthoses) in medicine and to properly use the acquired information in order to adequately counsel patients regarding the selection and use of these specific health products.</li> </ul>
<b>6.2. Specific objectives</b>	<ul style="list-style-type: none"> <li>• Knowing and understanding the functions and the role of serial orthoses</li> <li>• The identification of the main types of serial orthoses frequently found in pharmacies</li> <li>• To understand and know the proper way of use of the main types of prosthetic products</li> <li>• To get acquainted with the indications and medical applications of prosthetic products</li> <li>• To develop the necessary abilities in order to identify and solve problems related to the selection and release of orthoses in pharmacies</li> <li>• To exersize the capacity to document and synthesize information</li> </ul>

### 7. Content

**Teaching methods for course:** Oral discourse doubled by Power Point presentations, systematic display, questioning, conversation.

**Teaching methods for laboratory activity:** -

<b>7.1 Course (hours)</b>	<b>Remarks</b>
<p><b>1. The importance and role of prosthetic products in pharmaceutical practice:</b> Definition. Classification. Difference between prostheses and orthoses. Orthoses. History and evolution. Functions of orthoses. Pathologies. Types of orthoses. Serial orthoses. Raw materials used to manufacture orthoses. The health system regarding the insurance of patients with orthoses necessary to correct organic and physiological deficiencies.</p>	
<p><b>2. Varicose diseases and prosthetic products used in the management of varicose diseases:</b> Varicose diseases-general aspects; Treatment of varicosity-Elastic compressive treatment; Elastic compressive stockings-compressive bandages (mechanism of action, efficiency, materials and characteristics, advantages/disadvantages, choosing and using recommendations).</p>	
<p><b>3. Abdominal diseases and prosthetic products used in the management of</b></p>	

<b>abdominal diseases :</b> Pathologies (hernia, eviscerations, eventrations). Conservatory treatment : abdominal belts (sustaining/contention orthoses). Surgical treatment-the use of reconstruction synthetic materials (surgical nets).	
<b>4. Spinal cord diseases and the prosthetic treatment of spinal cord diseases</b> Functional anatomy of the spinal cord-general notions ; Orthoses for the spinal cord : classification, properties, functions. How to properly recommend orthoses in the case of diseases of the spinal cord. Cervical orthoses. Corsets. Serial orthoses used in the treatment of lombalgies.	
<b>5. Serial orthoses for the lower extremities :</b> Diseases of the lower extremities. Recommendation of the proper orthoses. Classification of serial orthoses used in the treatment of lower extremities diseases. Types of orthoses : hips, knee, ankle, foot.	
<b>6. Serial orthoses for the upper extremities:</b> Diseases of the upper extremities. Recommendation of the proper orthoses. Classification of serial orthoses used in the treatment of upper extremities diseases. Types or orthoses: shoulder, hand-wrist-elbow, elbow, hand wrist, finger.	
<b>Bibliography</b>	
<ol style="list-style-type: none"> <li>1. <b>Marius Roșca</b>, <i>Produce Protetice</i>. Tipografia UMF Cluj, 2000.</li> <li>2. <b>Jacques Callanquin, Pierre Labrude</b>, <i>Les Orthèses De Série - Guide À L'usage Des Praticiens</i>, Ed. Harmathèmes 2009, Collection <i>Les Guides De Pharmathèmes</i></li> <li>3. <b>Laroche J, Laroche C</b>. <i>Leçons d'orthopedie</i>. Ed. Cooperation Pharmaceutique Francaise: Paris; 1988</li> <li>4. <b>Robin J. Harman</b>, <i>Patient care in community practice: a handbook of non-medicinal healthcare</i>, Editura Pharmaceutical Press, 2002</li> <li>5. <b>Jacques Callanquin</b> , <i>Le Matériel De Maintien À Domicile - Avec Cas Pratiques Et Exercices</i>, Ed. Masson, Collection Abrégés, 2008</li> <li>6. <a href="http://www.farma.umfcluj.ro">www.farma.umfcluj.ro</a>: Course <b>Prosthetic products</b>, PowerPoint support</li> </ol>	
<b>7.2. Laboratory activities (hours)</b>	<b>Observation</b>
-	-

## 8. Evaluation

Activity type	8.1.Evaluation criteria	8.2. Evaluation methods	8.3. Percent of final grade
<b>8.4. Course</b>	<p><b>General evaluation criteria:</b> the correct assimilation of the information presented, the argumentation and logical coherence, the adequate vocabulary</p> <p><b>Specific criteria</b> The capacity to understand the general aspects included in the lectures and to apply these aspects in practical cases Criteria concerning the attitude and motivation of students</p>	Project-the redaction and presentation of essays regarding previously established themes	<b>100%</b>
<b>8.6. Minimal performance standard</b>			
<p>The acquirement of the most important notions regarding prosthetic products and their use.</p> <ul style="list-style-type: none"> <li>• To know the main medical applications of the orthoses</li> <li>• The classification and characteristics of serial orthoses</li> <li>• The identification of the main types of orthoses</li> </ul>			

8.4. CURRICULA OF THE IV<sup>th</sup> YEAR OF PHARMACY 2019 - 2020

UNIVERSITY	University of Medicine and Pharmacy " Iuliu Hatieganu" Cluj-Napoca	STUDY PROGRAM	PHARMACY
FACULTY	PHARMACY	GRADUATION TITLE	PHARMACIST
FIELD	HEALTH	PERIOD OF STUDIES	5 YEARS
REGLEMENTATION	SECTORIAL	STUDY UNITS	300

No. crt.	Cod	Course	Category	Total no. of credits			Total hours/ universitary year		I <sup>st</sup> Semester		II <sup>nd</sup> Semester		Examination form	
				Total	S1	S2	Course	Practical lessons	Course/ week	P/ week	Course/ week	P/ week	S1	S2
1	EN_FAR-4-S12-01	Biopharmacy and pharmacokinetics	Oblig DS	4	2	2	28	56	1	2	1	2	E1	E2
3	EN_FAR-4-S12-02	Therapeutical chemistry	Oblig DS	12	6	6	84	84	3	3	3	3	E1	E2
2	EN_FAR-4-S12-03	Pharmacology	Oblig DS	11	6	5	84	70	3	3	3	2	E1	E2
4	EN_FAR-4-S02-04	Biological drugs	Oblig DS	3		3	28	14			2	1		E2
5	EN_FAR-4-S01-05	Research methodology and bioethics	Oblig DC	3	3		14	28	1	2			E1	
6	EN_FAR-4-S12-06	Industrial pharmaceutical technology	Oblig DS	11	6	5	56	84	2	3	2	3	E1	E2
7	EN_FAR-4-S12-07	Toxicology	Oblig DS	10	5	5	56	84	2	3	2	3	E1	E2
8	EN_FAR-4-S12-08	Pharmacy practice 4 weeks – 30 h / week	Oblig DS	4		4		120						C2
9	EN_FAR-4-S12-09	<b>Optional courses</b>		2	2		14		1				E1	
9.1	EN_FAR-4-S12-09.1	Dietotherapy	Optional											
	EN_FAR-4-S12-09.2	Phytotherapy	Optional											
	EN_FAR-4-S12-09.3	Introduction to pharmacoepidemiology and pharmaceconomy	Optional											
9.2	EN_FAR-4-S12-09.4	Career guidance	Optional											
9.3	EN_FAR-4-S12-09.5	Toxic plants	Optional											
<b>Total hours/week</b>														
<b>28.00</b>														
<b>Total</b>				<b>60</b>	<b>30</b>	<b>30</b>	<b>364</b>	<b>540</b>	<b>13</b>	<b>16</b>	<b>13</b>	<b>14</b>	<b>7E</b>	<b>6E +1C</b>
							<b>904</b>		<b>29</b>		<b>27</b>			

E = examen; C = colloque; \* = seminar

RECTOR,  
Prof.dr. Alexandru Irimie

DEAN,  
Prof.dr. Gianina Crisan

## 8.4.1. COMPULSORY COURSES

### BIOPHARMACY AND PHARMACOKINETICS

#### 1. Information about the course

<b>1.1. Discipline</b>		<b>Pharmaceutical technology and biopharmacy</b>					
<b>1.2. Course instructor</b>		<b>Professor Laurian Vlase, PhD</b>					
<b>1.3. Laboratory instructor</b>		<b>Professor Laurian Vlase, PhD</b>					
<b>1.4. Year</b>	<b>4</b>	<b>1.5. Semester</b>	<b>1, 2</b>	<b>1.6. Evaluation type</b>	<b>Written exam + Practical exam</b>	<b>1.7. Course type</b>	<b>Specialized discipline, Compulsory discipline</b>

#### 2. Total estimated time (hours/semester for teaching activity)

<b>2.1. Total hours/week</b>	<b>3 (1<sup>st</sup> sem.) 3 (2<sup>nd</sup> sem.)</b>	<b>2.2. Course</b>	<b>1 1</b>	<b>2.3. Laboratories</b>	<b>2 2</b>
<b>2.4. Total hours in the curriculum</b>	<b>42 (1<sup>st</sup> sem.) 42 (2<sup>nd</sup> sem.)</b>	<b>2.5. Course</b>	<b>14 14</b>	<b>2.6. Laboratories</b>	<b>28 28</b>
<b>2.4. Distribution of time needed (1<sup>st</sup> sem. / 2<sup>nd</sup> sem.)</b>					<b>Hours</b>
a. Study using text books, lecture notes, bibliography					5/5
b. Individual study within libraries, on-line platforms, field research					5/5
c. Preparing seminars/laboratories, homework, projects, portfolios and essays					5/5
d. Tutoring					1/1
e. Evaluation/ semester					2/2
f. Other activities					-
<b>2.7. Total hours for individual study (a+b+c+d)</b>				<b>18 (1<sup>st</sup> sem.) 18 (2<sup>nd</sup> sem.)</b>	
<b>2.8. Total hours per semester</b>				<b>60 (1<sup>st</sup> sem.) 60 (2<sup>nd</sup> sem.)</b>	
<b>2.9. Number of credits</b>				<b>2 (1<sup>st</sup> sem.) 2 (2<sup>nd</sup> sem.)</b>	

#### 3. Pre-requisites:

<b>3.1. Curriculum</b>	Physical Chemistry Mathematics - statistics, pharmacology, toxicology, pharmaceutical technology in accordance with the curriculum of the Faculty of Pharmacy for years I-IV
<b>3.2. Competences</b>	Basics kinetic process analysis Basic knowledge on the preparation of medicines

#### 4. Requisites:

<b>4.1. For lectures</b>	<ul style="list-style-type: none"> <li>• Projector</li> </ul>
<b>4.2. For laboratories sessions</b>	<ul style="list-style-type: none"> <li>• Laboratory class with specific equipment required for the simulation of different administration regimen in order to simulate the kinetic processes</li> <li>• Computers with pharmacokinetic software (Kinetica, Phoenix WinNonlin)</li> <li>• Computers with special functions (logarithmic)</li> </ul>

### 5. Specific competences acquired

<b>Professional competences</b>	<ul style="list-style-type: none"> <li>• Acquiring theoretical and practical skills on analysis of pharmacokinetic data, obtaining pharmacokinetic parameters after administration of the drug on a certain path</li> <li>• Acquiring theoretical and practical knowledge on how to rationalize a dosing regimen</li> <li>• Acquiring theoretical knowledge on the factors that influence the pharmacokinetics</li> <li>• Understanding the importance of formulation and preparation conditions on the bioavailability and bioequivalence of the medicine.</li> </ul>
<b>Transversal competences</b>	<ul style="list-style-type: none"> <li>• Understanding the importance of biopharmacy / pharmacokinetics and their role in determining the best way to deliver the drugs, and the bioavailability and bioequivalence of the drugs</li> <li>• Understanding the importance of biopharmaceutical quality of the drug on therapeutic efficacy.</li> <li>• The formation of an aware and responsible reporting on the role of the pharmacist to optimize drug management arrangements according to pharmacokinetic bases</li> <li>• Skills training on responsible performance of professional duties.</li> </ul>

### 6. Course objectives

<b>6.1. General objectives</b>	<ul style="list-style-type: none"> <li>• Presentation of the principles of pharmacokinetics and biopharmaceutical analysis</li> </ul>
<b>6.2. Specific objectives</b>	<ul style="list-style-type: none"> <li>• Students will learn the principles underlying pharmacokinetic and biopharmaceutical analysis</li> <li>• Providing knowledge on how to mathematically analyse the plasma profile of a drug substance in order to obtain the pharmacokinetic parameters.</li> <li>• Providing knowledge on using software for pharmacokinetic analysis, calculation of drugs bioavailability and determination of their bioequivalence.</li> <li>• Providing knowledge about the influence of factors related to the drug substance, excipients and formulation factors on bioavailability</li> </ul>

### 7. Content

**Teaching methods for course:** Oral lectures, systematic exposure, interactive debate

**Teaching methods for laboratory activity:** Practical experiment, data analysis, interpretation and conclusions

<b>7.1 Course (hours)</b>	<b>Remarks</b>
<b>1<sup>st</sup> semester</b>	
<b>1.</b> The subject of Biopharmacy and pharmacokinetics. Basic pharmacokinetic. The notion of pharmacokinetic compartment. Notions of kinetics. Zero order and first order processes in the body (1)	1 lecture
<b>2.</b> Pharmacokinetic models. One-compartment pharmacokinetic open model. Single intravenous administration. Elimination rate constant. Biological half-life. The volume of distribution (1)	1 lecture
<b>3.</b> The excretion of drug substances in the urine. Urinary excretion rate. The cumulative amount excreted. Renal and metabolic clearance. Total body clearance (1)	1 lecture
<b>4.</b> Extravascular administration. Absorption rate constant. Analysis of data from the absorption site. Plasma data analysis. Method of residuals in absorption constant	1 lecture

calculation (1)	
5. The intravenous infusion. The infusion rate. Steady state concentration. The attack dose. The interruption of the infusion (1)	1 lecture
6. The pharmacokinetics of intravenous and extravascular repeated doses. $C_{max}$ , $C_{min}$ , steady-state period, loading dose, dosing interval (1)	1 lecture
7. The pharmacokinetics of the metabolites. Kinetic analysis models for one or more metabolites. The constant of metabolism and its calculation (1)	1 lecture
8. Two compartment pharmacokinetic model. Other pharmacokinetic models. The pharmacokinetics of biological response (1)	1 lecture
9. Clinical Pharmacokinetics. Factors that influence the pharmacokinetics. The body mass. The pharmacokinetic and the age. Newborn, child and elderly (1)	1 lecture
10. Factors that influence the pharmacokinetics. Sex, menstruation, pregnancy (1)	1 lecture
11. Pharmacogenetics, chronopharmacokinetics, cooperation of the patients and pharmacokinetic implications (1)	1 lecture
12. Kidney, liver and heart diseases and pharmacokinetics (1)	1 lecture
13. Pharmacokinetic drug interactions (1)	1 lecture
14. The individualization of dosage. Monitorization of plasma drug concentrations (1)	1 lecture
<b>2<sup>nd</sup> semester</b>	
1. The subject of Biopharmacy and pharmacokinetics (1)	1 lecture
2. Evaluation methods for the biopharmaceutical quality of the drugs, in vitro dissolution test: in vitro dissolution conditions. Biorelevant dissolution media (1)	
3. Evaluation methods for the biopharmaceutical quality of the drugs, in vitro dissolution test: methods of comparison of in vitro dissolution profiles. In vitro drug release kinetics (1)	1 lecture
4. Evaluation methods for the biopharmaceutical quality of the drugs, clinical trial (in vivo): absolute and relative bioavailability. Clinical trial design for the determination of the bioavailability (1)	1 lecture
5. Noncompartmental pharmacokinetic analysis (1)	1 lecture
6. The influence of the formulation on the biopharmaceutical quality of a drug. Factors related to the drug substance, excipients or technological factors (1)	1 lecture
7. Biopharmaceutical Classification System of the drugs. Use, classes, applications (1)	1 lecture
8. Drug bioequivalence. Multisource drugs (generics) and interchangeability (1)	1 lecture
9. <i>In vitro</i> - <i>in vivo</i> correlations. Definition. Levels of correlations. Advantages of establishing <i>in vitro-in vivo</i> correlations (1)	1 lecture
10. The drug and the route of administration. Physiological and pharmaceutical factors involved in the bioavailability of drug substances. Drug delivery to the oral cavity. Esophageal transit (1)	1 lecture
11. The stomach and its role in drug absorption. The small intestine and drug absorption at this level (1)	1 lecture
12. The large intestine and drug administration. Colonic therapy. Rectal administration (1)	1 lecture
13. Cutaneous medication. Percutaneous absorption. Systemic transdermal therapy. Pulmonary administration (1)	1 lecture
14. Ocular and nasal drug administration for systemic therapy (1)	1 lecture
<b>Bibliography</b>	
<ol style="list-style-type: none"> <li>1. Leucuța S.E., R.D.Pop : Farmacocinetica, Editura Dacia, Cluj-Napoca, 1981</li> <li>2. Leucuța S.E., Bodea A.: Biofarmacie - Farmacocinetica. Lucrări practice. Lito U.M.F.Cluj-Napoca, 1986</li> <li>3. Leucuța S.E.: Farmacocinetica în terapia medicamentoasă, Editura Medicală, București, 1989.</li> <li>4. Leucuța S.E.: Biofarmacie si Farmacocinetica, Editura Dacia, Cluj-Napoca, 2002</li> </ol>	

<b>7.2. Laboratory activities (hours)</b>	<b>Observation</b>
<b>1<sup>st</sup> semester</b>	
1. Description of the equipment for „ <i>in vitro</i> ” pharmacokinetic experimental model used for the determination of pharmacokinetics constants and drug administration regimes. First-order kinetics simulation. The use of sodium salicylate as model substance. The calibration curve for salicylic acid, spectrometer dosing (2)	1 laboratory
2. Pharmacokinetics of intravenous single dose. Elimination rate constant determination using blood and urine data. Half-life determination in the terminal phase of elimination. Volume of distribution determination. Clearance determination (4)	2 laboratories
3. Pharmacokinetics of extravascular single dose. Absorption rate constant determination by the method of residuals (4)	2 laboratories
4. Pharmacokinetics of intravenous infusion. Without bolus infusion. The bolus infusion. The attack dose (2)	1 laboratory
5. Pharmacokinetics of repeated doses. Intravenous administration. Determination of $C_{min}$ , $C_{max}$ (4)	2 laboratories
6. Pharmacokinetics of repeated doses. Extravascular administration (4)	2 laboratories
7. Two compartment pharmacokinetic model, intravenous administration (2)	1 laboratory
8. Pharmacokinetic analysis using specialized computer programs (2)	1 laboratory
9. Synthesis of scientific literature and practical applications on data from literature (2)	1 laboratory
<b>2<sup>nd</sup> semester</b>	
1. Methods for comparison of <i>in vitro</i> dissolution profiles (2)	1 laboratory
2. Comparison of dissolution profiles of aspirin in commercial pharmaceutical formulations (2)	1 laboratory
3. Analysis of the release kinetics of drug substances from pharmaceutical formulations (4)	2 laboratories
4. Absolute and relative bioavailability determination	2 laboratories
5. Biopharmaceutical factors that may influence the drug disposal from the pharmaceutical formulation. Influence of lubricant on the release and absorption of salicylic acid from tablets (2)	1 laboratory
6. Pharmacokinetics of the immediate release and extended release salicylic acid tablets (2)	1 laboratory
7. Ointment base influence and incorporation method of salicylic acid influence on its <i>in vitro</i> disposal (2)	1 laboratory
8. Particle size influence on the absorption of salicylic acid (tablets with different granulometries) (2)	1 laboratory
9. Factors that influence the absorption of phenobarbital administered to rats: the route of administration (iv, im, oral, sc., Ip); pharmaceutical formulation (solution, suspension, aqueous, oil); chemical status of the drug substance (acid, sodium salt, calcium salt); particle size (suspensions of particles of different sizes). The measurement of the drug inducing sleep time in rats (2)	1 laboratory
10. Factors that influence the absorption of phenobarbital administered to rats: influence of adjuvants (polysorbate 80, methyl cellulose); urinary pH (acidification with ascorbic acid, basifying with saturated sodium bicarbonate, administered intraperitoneally); Induction and inhibition of the enzyme (rats pretreated with phenobarbital for 7 days, and another group with carbon tetrachloride) (2)	1 laboratory
11. Use of the computer to determine the pharmacokinetic constants, the dosing regime, calculation of drugs bioavailability and bioequivalence. Examples on real data obtained from bioequivalence studies (2)	1 laboratory

**Bibliography**

1. Leucuța S.E., R.D. Pop: Farmacocinetica, Editura Dacia, Cluj-Napoca, 1981
2. Leucuța S.E., Bodea A.: Biofarmacie - Farmacocinetica. Lucrări practice. Lito U.M.F.Cluj-Napoca, 1986
3. Leucuța S.E.: Farmacocinetica în terapia medicamentoasă, Editura Medicală, București, 1989.
4. Leucuța S.E.: Biofarmacie si Farmacocinetica, Editura Dacia, Cluj-Napoca, 2002

**8. Evaluation**

<b>Activity type</b>	<b>8.1.Evaluation criteria</b>	<b>8.2. Evaluation methods</b>	<b>8.3.Percent of final grade</b>
<b>8.4. Course</b>	<ul style="list-style-type: none"><li>• Knowledge of the notions and concepts presented in lectures</li></ul>	Written exam: - 40 multiple choice questions	<b>66%</b>
<b>8.5. Laboratory</b>	<ul style="list-style-type: none"><li>• Practical skills demonstration- the ability to calculate pharmacokinetic parameters or drug bioavailability.</li><li>• Capability demonstration for processing and analysis of experimental results.</li><li>• Demonstration of the ability to argue the findings with experimental results.</li></ul>	Practical exam- pharmacokinetic analysis of a data set or the evaluation of a drug absolute or relative bioavailability	<b>34%</b>
<b>8.6. Minimal performance standard</b>			
Knowledge, understanding and use of basic concepts underlying pharmacokinetic and biopharmaceutical analysis.			



# THERAPEUTIC CHEMISTRY

## 1. Information about the course

<b>1.1. Discipline</b>			<b>Therapeutic Chemistry</b>				
<b>1.2. Course instructor</b>			<b>Lecturer Cătălin Araniciu, PhD</b>				
<b>1.3. Laboratory instructor</b>			<b>Assistant professor Cristina Ioana Stoica, PhD</b>				
<b>1.4. Year</b>	<b>4</b>	<b>1.5. Semester</b>	<b>1,2</b>	<b>1.6. Evaluation type</b>	<b>Written exam+ Practical exam</b>	<b>1.7. Course type</b>	<b>Speciality discipline Compulsory discipline</b>

## 2. Total estimated time (hours/semester for teaching activity)

<b>2.1. Total hours/week</b>	<b>6 (1<sup>st</sup> sem.) 6 (2<sup>nd</sup> sem.)</b>	<b>2.2. Course</b>	<b>3 3</b>	<b>2.3. Laboratories</b>	<b>3 3</b>
<b>2.4. Total hours in the curriculum</b>	<b>84 (1<sup>st</sup> sem.) 84 (2<sup>nd</sup> sem.)</b>	<b>2.5. Course</b>	<b>42 42</b>	<b>2.6. Laboratories</b>	<b>42 42</b>
<b>2.4. Distribution of time needed (1<sup>st</sup> sem. / 2<sup>nd</sup> sem.)</b>					<b>Hours</b>
a. Study using text books, lecture notes, bibliography					30/30
b. Individual study within libraries, on-line platforms, field research					24/24
c. Preparing seminars/laboratories, homework, projects, portfolios and essays					14/14
d. Tutoring					2/2
e. Evaluation/ semester					20/20
f. Other activities					-
<b>2.7. Total hours for individual study (a+b+c+d)</b>					<b>90 (1<sup>st</sup> sem.) 90 (2<sup>nd</sup> sem.)</b>
<b>2.8. Total hours per semester</b>					<b>174 (1<sup>st</sup> sem.) 174 (2<sup>nd</sup> sem.)</b>
<b>2.9. Number of credits</b>					<b>6 (1<sup>st</sup> sem.) 6 (2<sup>nd</sup> sem.)</b>

## 3. Prerequisites:

<b>3.1. Curriculum</b>	Inorganic Chemistry, Organic Chemistry, Analytical Chemistry, Biochemistry, Semeiology, General Pharmacology, Pathological Physiology.
<b>3.2. Competences</b>	To know the corresponding terms and the basics: Inorganic Chemistry, Organic Chemistry, Analytical Chemistry, Biochemistry, Semeiology, General Pharmacology, Pathological Physiology

## 4. Requisites:

<b>4.1. For lectures</b>	<ul style="list-style-type: none"> <li>the use of mobile phones is not allowed during laboratory activities and lectures</li> <li>in order to avoid interruptions and distractions from the debated issues, students will be advised to adhere to the laboratory classes and lectures' program</li> </ul>
<b>4.2. For laboratories sessions</b>	<ul style="list-style-type: none"> <li>students will use the necessary personal protective equipment in order to conduct the practical work in good conditions (gloves, safety glasses, respiratory protective equipment and lab coats)</li> </ul>

	<ul style="list-style-type: none"> <li>• students will know and follow the Laboratory Safety Rules and Regulations</li> <li>• Students will attend the practical activities only with the group in which they were assigned.</li> </ul>
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### 5. *Specific competences acquired*

<b>Professional competences</b>	<ul style="list-style-type: none"> <li>• Identify the main physicochemical properties that are important for the stability of the drug substances and their conservation;</li> <li>• Anticipate possible physicochemical incompatibilities between the drugs and / or excipients on the basis of the functional groups that are present in their chemical structures.</li> <li>• Know the various chemical synthesis routes of drug substances.</li> <li>• Recognize the connections between the various structural elements and the pharmacokinetic profile of a drug substance.</li> <li>• Identify possibilities to optimize structural modulations in order to optimize the pharmacokinetic profile of a drug substance and to develop new pharmaceutical formulations.</li> <li>• Know the structural elements that are involved in the interaction with biologically active structures (receptors, enzymes) with consequences for the therapeutic and adverse effects of the substance.</li> <li>• Understand the importance of the chemical structure for the determination of the pharmacodynamic and toxicological profile of a molecule.</li> <li>• Know and demonstrate the ability of identifying the relationships between structure and biological activity.</li> <li>• Recognize the structure of a compound based on the exact chemical name.</li> <li>• Explain and interpret the theoretical and practical contents of Therapeutic Chemistry in an interdisciplinary approach with other fundamental biomedical and specialty disciplines: Biochemistry, Pharmacology, Clinical Pharmacy, Pharmaceutical Technology, Drug Analysis.</li> <li>• Apply theoretical concepts to practical problem solving that is suitable for the workplace: proper conservation of the product, proposal of evaluation methods for the identification of a drug substance, explaining therapeutic schemes.</li> <li>• Demonstrate skills of using specific methodologies and laboratory techniques to study synthetic drug substances.</li> <li>• Develop dexterity in handling laboratory equipment and techniques that are specific for life sciences research: the use of specific tools and appliances for the chemistry laboratory.</li> <li>• Identify and choose the means of identification of a compound based on specific functional groups that are present in its structure and the ability to rationally motivate the choice.</li> </ul>
<b>Transversal competences</b>	<ul style="list-style-type: none"> <li>• Demonstrate skills of identifying problems and the ability to develop strategies in order to solve them rationally.</li> <li>• Demonstrate concern for the continuing professional development in order to permanently adapt the theoretical knowledge to the evolution of the profession.</li> <li>• Participate in research projects aimed at applying the methods of synthesis to obtain new drugs, propose ways to improve the pharmacokinetic and pharmacodynamic properties of drug substances.</li> <li>• Identify the roles and responsibilities in a team and apply networking techniques and effective work relationships within a team.</li> <li>• Efficient use of the information sources and communication resources (internet)</li> </ul>

	portals, specialized software, databases, online courses) both in Romanian and English or French language.
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## 6. Course objectifs

<b>6.1. General objectives</b>	<ul style="list-style-type: none"> <li>• Development of the capacity to apply methods of synthesis for new drug molecules.</li> <li>• Understand the importance of the chemical structure for the physicochemical and metabolic stability of a drug substance and the interaction with biological targets, with consequences in the development of therapeutic effects.</li> </ul>
<b>6.2. Specific objectives</b>	<ul style="list-style-type: none"> <li>• Know the main physicochemical characteristics involved in the stability of drug substances, their storage and conditioning in pharmaceutical formulations.</li> <li>• To be familiar with the main lines of research which aim the synthesis of drug substances.</li> <li>• Know the involvement and influence of various structural elements on the pharmacokinetics of a drug substance.</li> <li>• To correctly reflect about the interaction between the structure of a drug substance and the macromolecular structure of the target.</li> <li>• Know the relationship between the structure and the biological activity of a compound with implications upon the toxicological and pharmacodynamic profile.</li> <li>• To develop the capacity for synthesis of the main aspects of a bibliographic material.</li> <li>• Develop the argumentative abilities of students.</li> <li>• Know the specific chemical reactions for the identification of different structural classes of compounds.</li> <li>• Understand the reasons and mechanisms underlying the choice of a particular work protocol in characterizing a drug substance.</li> </ul>

## 7. Content

**Teaching methods for course:** oral lecture, systematic exposure backed by PowerPoint presentations, conversation, interactive communication, problem solving.

**Teaching methods for laboratory activity:** conversation, problem solving, practical experiments, oral presentation doubled by written support, interactive communication.

<b>7.1 Course (hours)</b>	<b>Observation</b>
<b>1. Introductory lectures</b> The importance of the chemical structure in understanding the stability, the pharmacokinetic properties and the therapeutic action of drug substances. Functional groups, heterocycles present in the drug substance, physicochemical properties, drug metabolic processes.	<b>6 h</b>
<b>2. The autonomic nervous system</b> <b>2.1. Adrenomimetics drug substances:</b> representatives of - phenyl-ethylamine derivatives, imidazolium derivatives; possibilities for obtaining epinephrine, ephedrine, naphazoline, physicochemical properties, structural features, structure-activity relationship, the main therapeutic indications, side effects and	<b>6 h</b>

pharmaceutical formulations.	
<b>2.2. Adrenolytic drug substances:</b> representatives of - alpha-adrenolytic D.S.: imidazolium derivatives, quinazoline derivatives, phenyl-ethylamine derivatives; Beta-adrenolytic D.S. phenyl-ethyl-amine derivatives, phenyl-oxipropanolamine derivatives: physicochemical properties, structural features, structure-activity relationship, main therapeutic indications and pharmaceutical formulations.	<b>4 h</b>
<b>2.3. Cholinergic drug substances:</b> representatives – acetylcholine: structural modulations and their effects on the pharmacokinetics; direct cholinomimetics and anticholinesterases, physicochemical properties, structural features, structure-activity relationship, main therapeutic indications and pharmaceutical formulations.	<b>3 h</b>
<b>2.4. Anticholinergic drug substances:</b> representatives: structural modulations and effects on the pharmacokinetic properties, physicochemical properties, structural features, structure-activity relationship, the main therapeutic indications, side effects and pharmaceutical formulations.	<b>2 h</b>
<b>3. Neuromuscular blocking agents:</b> representatives, tetrahydroquinoline and androstane derivatives, physicochemical properties, structural features which explain the main therapeutic indications, side effects and pharmaceutical formulations.	<b>1 h</b>
<b>4. Anti-allergic agents</b> H1 antihistamine drug substances and mast cell degranulation inhibitors. Histamine - important structural elements in binding to histamine receptors. H1 antihistamines representatives: ethylene diamine derivatives, ethanolamine derivatives, alkylated derivatives, tricyclic derivatives. Structural characteristics of the compounds of the 1st generation compared with the 2nd generation. Physicochemical properties, structural features, the main therapeutic indications, side effects and pharmaceutical formulation.	<b>3 h</b>
<b>5. Glucocorticoids</b> – hydrocortisone, structural modulation, representatives, structure-activity relationship, physicochemical properties, prodrugs, the main therapeutic indications and possible pharmaceutical formulations, physicochemical incompatibilities.	<b>3 h</b>
<b>6. Drug substances with analgesic, antipyretic, anti-inflammatory, uricosuric effect</b> <b>6.1. Analgesic and antipyretic drug substances represented by:</b> <b>Phenolic derivatives</b> –possibilities for the synthesis of paracetamol, physicochemical properties, the main therapeutic indications, metabolic transformations and pharmaceutical formulations. <b>Pyrazolinone derivatives</b> – synthesis of sodium metamizole, physicochemical properties, therapeutic indications and pharmaceutical formulations. <b>Salicylic acid derivatives</b> – synthesis of acetylsalicylic acid, structure-activity relationship, therapeutic indications, side effects and pharmaceutical formulation. <b>6.2. Nonsteroidal anti-inflammatory agents</b> <b>Acetic acid and propionic acid derivatives:</b> representatives, possibilities for the synthesis of diclofenac, ibuprofen, physicochemical properties, structural features, structure-activity relationship, the main therapeutic indications, side effects and pharmaceutical formulations. <b>Enolic derivatives: phenylbutazone and oxicams</b> – synthesis of piroxicam (meloxicam), physicochemical properties, structural features, structure-activity relationship, the main therapeutic indications, side effects and possible pharmaceutical formulations.	<b>4 h</b>

<p><b>6.3. Slow-acting antirheumatic agents:</b> representatives, possibilities of extending the effects - prodrugs.</p> <p><b>Antigout agents:</b> representatives - allopurinol, febuxostat.</p>	
<p><b>7. Drug substances for the management of cough.</b></p> <p><b>7.1. Drug substances indicated in irritating dry cough</b>– isoquinoline-fenantrene derivatives, synthetic derivatives containing an ester function. Physicochemical properties, structural characteristics, the chemical transformations in the metabolic processes with implications in the therapy, main therapeutic indications and side effects.</p> <p><b>7.2. Mucolytic and expectorant drug substances</b> – sulphur compounds and compounds without sulphur in the molecule, prodrugs. Characteristic structural elements that influence the action, bromhexin synthesis, physicochemical properties, the main therapeutic indications, side effects and pharmaceutical formulation, physicochemical incompatibilities.</p> <p><b>7.3. Antiasthmatic drug substances:</b> xanthine derivatives, montelukast, zileuton, structural characteristics implicated in the therapeutic effect, physicochemical properties, particularities in the therapeutic use.</p>	<b>3 h</b>
<p><b>8. Drug substances indicated in the management of digestive dysfunctions</b></p> <p><b>8.1. Inhibitors of gastric secretion</b></p> <p><b>Drug substances from the class of proton pump inhibitors:</b> representatives, structural characteristics, physicochemical properties, chemical transformations that enable the explanation of the drug substance activation, the main therapeutic indications, side effects and pharmaceutical formulation, physicochemical incompatibilities.</p> <p><b>Drug substances from the class of H<sub>2</sub> antihistamines:</b> structural modulations that led to their discovery, representatives, structural characteristics, physicochemical properties, the main therapeutic indications and side effects.</p> <p><b>8.2. Antacid drug substances and agents used for gastric mucosal protection:</b> representatives, physicochemical properties, associations, the main therapeutic indications, pharmaceutical formulations, physicochemical incompatibilities.</p> <p><b>8.3. Prokinetic and antiemetic agents:</b> representatives, structural characteristics, physicochemical properties, the main therapeutic indications, side effects and possible pharmaceutical formulations.</p> <p><b>8.4. Hepatoprotective drug substances:</b> representatives, structural characteristics, physicochemical properties, the main indications.</p> <p><b>8.5. Antidiarrheal and laxative-purgative agents:</b> representatives, structural features, prodrugs, physicochemical properties, the main therapeutic indications, physicochemical incompatibilities.</p>	<b>6 h</b>
<p><b>9. Local anaesthetics</b></p> <p>Drug substances with ester function, amide function and halogenated derivatives. Representatives, possibilities for obtaining benzocaine, procaine, lidocaine, physicochemical properties, structural features, structure-activity relationship, main indications and pharmaceutical formulations.</p>	<b>2 h</b>
<p><b>10. Opioid analgesics</b></p> <p>Morphine, semi-synthetic analogues: agonists and antagonists, synthetic analogues: agonists and antagonists: representatives, physicochemical properties, structural features, structure-activity relationship, main indications and side effects.</p>	<b>3 h</b>

<p><b>11. Drug substances that act on the central nervous system</b></p> <p><b>11.1. Centrally acting skeletal muscle relaxants:</b> representatives, therapeutic indications.</p> <p><b>11.2. General anaesthetics:</b> representatives, thiopental synthesis, physicochemical properties, conditioning and conservation possibilities.</p> <p><b>11.3. Sedative and hypnotic drug substances:</b> barbiturate derivatives, other heterocyclic compounds: representatives, physicochemical properties, structure-activity relationship, indications and precautions for use.</p> <p><b>11.4. Anxiolytic drug substances:</b> benzodiazepine derivatives, representatives, structure-activity relationship, main indications and side effects.</p> <p><b>11.5. Antipsychotic drug substances:</b> phenothiazine derivatives, thioxanthenes derivatives, butyrophenone derivatives, dibenzo-azepine derivatives, heterocyclic derivatives: representatives, structure-activity relationship, main indications and side effects.</p> <p><b>11.6. Antidepressants:</b> classical tricyclic derivatives, selective serotonin reuptake inhibitors and norepinephrine and serotonin reuptake inhibitors – representatives, structure-activity relationship, main indications and side effects.</p> <p><b>11.7. Nootropic drug substances</b> – derivatives with pyrrolidin and xanthine structure.</p> <p><b>11.8. Antiseizure drug substances:</b> Structural classification highlighting structural elements involved in the usage in various forms of epilepsy: cyclic ureides derivatives, imidazolidindionic derivatives, oxazolidinedione derivatives, valproic acid derivatives, <math>\gamma</math>-aminobutyric acid derivatives, triazine derivatives, sulfonamide derivatives, benzodiazepines. The importance of the structural elements in the metabolism processes and their consequences on the side effects.</p> <p><b>11.9. Antiparkinsonian drug substances:</b> representatives, structural elements, metabolic transformations involving the appearance of side effects.</p> <p><b>11.10. Antimigraine drug substances</b> – triptans, structural elements, structure-activity relationship, major side effects, pharmaceutical formulation.</p>	<p><b>15 h</b></p>
<p><b>12. Drug substances that act on the cardiovascular system</b></p> <p><b>12.1. Antihypertensive drug substances:</b> dihydropyridine derivatives, alkylamine derivatives, proline derivatives, sartans. Representatives, physicochemical properties, structural features, structure-activity relationship, main indications and side effects.</p> <p><b>12.2. Antianginal drug substances:</b> Representatives, physicochemical properties, structural features, structure-activity relationship, main indications and side effects.</p> <p><b>12.3. Central and peripheral vasodilators:</b> Representatives, physicochemical properties, structural features, the main therapeutic indications and side effects.</p> <p><b>12.4. Antiarrhythmics:</b> Representatives, physicochemical properties, structural features, structure-activity relationship, main indications and side effects.</p> <p><b>12.5. Antihyperlipoproteinemics and inhibitors of cholesterol biosynthesis:</b> Representatives, physicochemical properties, structural features, structure-activity relationship, main indications and side effects.</p> <p><b>12.6. Diuretics:</b> Representatives, furosemid synthesis, hydrochlorothiazide synthesis, physicochemical properties, structural features, structure-activity relationship, main indications and side effects.</p>	<p><b>12 h</b></p>
<p><b>13. Antianemics, antithrombotics, haemostatic agents</b> – representatives, prodrugs, physicochemical and pharmacokinetic incompatibilities, main</p>	<p><b>2 h</b></p>

therapeutic indications and side effects.	
<b>14. Hormones, synthesis and semisynthesis analogs</b> <b>Thyroid hormones and antithyroid drug substances</b> structural elements that are important for the action, therapeutic indications, pharmaceutical formulations. <b>Sexual hormones</b> – representatives, physicochemical properties, structure-activity relationship, structural modulations with consequences for the therapeutic indications and side effects, possible pharmaceutical formulations.	<b>3 h</b>
<b>15. Bisphosphonates:</b> representatives, structure-activity relationship, main indications and side effects, possible pharmaceutical formulations, association possibilities, physicochemical incompatibilities.	<b>2 h</b>
<b>16. Fat-soluble vitamins and their synthesis derivatives</b> Structural changes of Vitamins A and D with implications for therapeutic use.	<b>1 h</b>
<b>17. Drug substances used in the treatment of type-2 diabetes mellitus.</b> Representatives, physicochemical properties, metabolic processes structural features, structure-activity relationship, structural modulations with consequences for the therapeutic indications and side effects, possible pharmaceutical formulations.	<b>2 h</b>
<b>Bibliography</b>	
<ol style="list-style-type: none"> <li>1. Gareth Thomas, Medicinal Chemistry, Second Edition, John Wiley &amp; Sons, New Jersey 2007.</li> <li>2. Ashutosh Kar, Medicinal Chemistry, Fourth Edition, New Age International, New Delhi Publishers, 2007.</li> <li>3. Laurence L. Brunton, Keith L. Parker, Donald K. Blumenthal, Iain L.O. Buxton, Goodman &amp; Gilmanan's Manual of Pharmacology and Therapeutics The McGraw-Hill Companies, New York, 2008.</li> <li>4. Jie Jack Li, Douglas S. Johnson, Modern Drug Synthesis, John Wiley &amp; Sons, New Jersey, 2010.</li> <li>5. Louis D. Quin, John A. Tyrell, Fundamentals of Heterocyclic Chemistry, Importance in Nature and in the Synthesis of Pharmaceuticals, John Wiley &amp; Sons, Inc., Publication, New Jersey, 2010.</li> <li>6. Serge Kirkiacharian, Guide de chimie médicinale et médicaments, Lavoisier, Paris, 2010.</li> <li>7. John M. Beale, Jr., John H. Block, <i>Wilson and Gisvold's a Textbook of Organic Medicinal and Pharmaceutical Chemistry</i>, Twelfth Edition, Lippincott Williams &amp; Wilkins, Baltimore, 2011.</li> <li>8. Block J.H., Beale J, <i>Wilson and Gisvold's Textbook of Organic Medicinal and Pharmaceutical Chemistry</i>, 12th Edition, Lippincott - Williams &amp; Wilkins, Philadelphia, 2011 .</li> <li>9. Graham L.P. An introduction to Medicinal Chemistry 5<sup>th</sup> Edition, Oxford University Press, 2013.</li> <li>10. Lemke J.H., Williams D. A., Roche V.F., Zito W. S., Foye's Principles of Medicinal Chemistry, Sixth edition, Lippincott - Williams&amp;Wilkins, Philadelphia, 2013.</li> <li>11. <a href="http://www.farma.umfcluj.ro">www.farma.umfcluj.ro</a> : Therapeutic Chemistry lectures, PowerPoint support</li> </ol>	
<b>7.2. Laboratory activities (hours)</b>	<b>Remarks</b>
<b>1.</b> Chemical and physicochemical characterization of drug substances belonging to the group of amines: - Primary aromatic amines - Secondary amines - Tertiary amines	<b>9 h</b>
<b>2.</b> Chemical and physicochemical characterization of drug substances belonging to the group of carboxylic acids and carboxylic acid derivatives: - Carboxylic acids - Esters	<b>3 h</b>
<b>3.</b> Chemical and physicochemical characterization of drug substances belonging to the group of hydroxi-acids:	<b>3 h</b>

- Hydroxi-alcohols - Hydroxi-phenols	
4. Chemical and physicochemical characterization of drug substances belonging to the group of amides	<b>3 h</b>
6. Chemical and physicochemical characterization of drug substances belonging to the group of carbohydrates.	<b>3 h</b>
7. Chemical and physicochemical characterization of drug substances with xanthine structure.	<b>6 h</b>
8. Chemical and physicochemical characterization of drug substances: cyclic ureides.	<b>3 h</b>
9. Chemical and physicochemical characterization of drug substances with benzodiazepine structure.	<b>3 h</b>
10. Chemical and physicochemical characterization of drug substances with phenothiazine structure.	<b>3 h</b>
11. Chemical and physicochemical characterization of drug substances with quinoline structure.	<b>3 h</b>
12. Chemical and physicochemical characterization of drug substances with isoquinoline structure.	<b>3 h</b>
13. Chemical and physicochemical characterization of drug substances with isoquinoline-phenantrene structure. Individual activity – presentation of reports	<b>3 h</b>
14. Chemical and physicochemical characterization of drug substances with tropane structure. Individual activity – presentation of reports	<b>3 h</b>
15. Chemical and physicochemical characterization of drug substances with aryloxyamine structure. Individual activity – presentation of reports	<b>6 h</b>
16. Chemical and physicochemical characterization of drug substances belonging to the group of vitamins.	<b>3 h</b>
Chemical and physicochemical characterization of drug substances belonging to the group of hormones. Glucocorticoids Sexual hormones	<b>3 h</b>
18. The development of argument skills. Drug Design of new drugs Functional groups involved in receptor binding	<b>3 h</b>
19. Solving issues concerning chemical stability, storage conditions and possible pharmaceutical formulations based on the chemical structures of drugs	<b>6 h</b>
20. The selection of appropriate physico-chemical identification methods considering a given chemical structures	<b>6 h</b>
<b>Bibliography</b> 1. FRX 2. European Pharmacopoeia (Ph. Eur.) 9th Edition 3. Mariana Palage, Smaranda Oniga, Cătălin Araniciu: Posibilități de identificare ale substanțelor medicamentoase, Editura Tadesco, Cluj – Napoca, 2012. 4. Dumitru Dobrescu, Simona Negreș, Liliana Dobrescu, Ruxandra Popescu, Memomed, Editura Universitară, București, 2015. 5. www.anm.ro 6. www.ema.europa.eu 7. www.fda.com 8. www.mediatly.co/ro/ 9. www.medscape.com 10. www.medicines.org.uk/emc	



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 11. <https://pubchem.ncbi.nlm.nih.gov/>  
 12. [www.drugs.com](http://www.drugs.com)

## 8. Evaluation

Activity type	8.1.Evaluation criteria	8.2. Evaluation methods	8.3.Percent of final grade
<b>8.4. Course</b>	<ul style="list-style-type: none"> <li>• Know the chemical synthesis methods used for obtaining medicinal substances.</li> <li>• Ability to recognize structural elements that are characteristic for a group of drugs.</li> <li>• The ability to correlate the structural elements with the physicochemical and the therapeutic properties of a substance.</li> <li>• Know the structural elements involved in the interaction with the biologically active structures (receptors, enzymes), with consequences on the therapeutic effect and the adverse effects of the drug substance.</li> <li>• Understand the importance of the chemical structure for the mechanisms of action and for obtaining pharmaceutical formulations.</li> <li>• Ability to propose structural changes to improve the pharmacological and pharmacokinetic properties of the chemical molecules.</li> </ul>	Multiple-choice exam	<b>70%</b>
<b>8.5. Laboratory</b>	<ul style="list-style-type: none"> <li>• Know the specific chemical reactions for the identification of compounds from different structural classes.</li> <li>• Understand and argument the reasons and mechanisms that are underlying the selection of a specific work protocol in characterizing a drug substance.</li> <li>• Evaluation of theoretical knowledge and the ability to implement them in practice.</li> <li>• Assess the understanding of fundamental issues and customize them.</li> <li>• Evaluation of problem solving ability. Assessment of fluency in speech and reasoning ability.</li> </ul>	Practical exam	<b>30%</b>
<b>8.6. Minimal performance standard</b>			
Learning the main concepts of therapeutic chemistry: <ul style="list-style-type: none"> <li>• Recognition of the general structures of the main classes of drug substances</li> <li>• Identification of the main chemical groups that explain the reduced physicochemical stability of drug substances.</li> <li>• Know the main indications of drug substances according to the general structure.</li> <li>• Know the specific chemical reactions that are used for the identification of the compounds from different structural classes.</li> </ul>			

# PHARMACOLOGY

## 1. Information about the course

<b>1.1. Discipline</b>			<b>Pharmacology</b>				
<b>1.2. Course instructor</b>			Professor Mogoșan Cristina, PhD (1 <sup>st</sup> sem.) Associate Professor Voștinariu Oliviu, PhD (2 <sup>nd</sup> sem.)				
<b>1.3. Laboratory instructor</b>			Associate Professor Voștinariu Oliviu, PhD Associate Professor. Ghibu Morgovan Steliana Mihaela, PhD Lecturer Pop Cristina, PhD Lecturer dr. Cazacu Irina, PhD Assistant professor Cristina Anamaria, PhD student				
<b>1.4. Year</b>	<b>4</b>	<b>1.5. Semester</b>	<b>I, II</b>	<b>1.6. Evaluation type</b>	<b>Written exam + practical exam</b>	<b>1.7. Course type</b>	<b>Specialty discipline Compulsory discipline</b>

## 2. Total estimated time (hours/semester for teaching activity)

<b>2.1. Total hours/week</b>	<b>6 (1<sup>st</sup> sem.) 5 (2<sup>nd</sup> sem.)</b>	<b>2.2. Course</b>	<b>3 3</b>	<b>2.3. Laboratories</b>	<b>3 2</b>
<b>2.4. Total hours in the curriculum</b>	<b>84 (1<sup>st</sup> sem.) 70 (2<sup>nd</sup> sem.)</b>	<b>2.5. Course</b>	<b>42 42</b>	<b>2.6. Laboratories</b>	<b>42 28</b>
<b>2.4. Distribution of time needed (1<sup>st</sup> sem. / 2<sup>nd</sup> sem.)</b>					<b>Hours</b>
a. Study using text books, lecture notes, bibliography					42/45
b. Individual study within libraries, on-line platforms, field research					15/5
c. Preparing seminars/laboratories, homework, projects, portfolios and essays					21/3
d. Tutoring					3/2
e. Evaluation/ semester					3/3
f. Other activities					-
<b>2.7. Total hours for individual study (a+b+c+d)</b>					<b>81 (1<sup>st</sup> sem.) 55 (2<sup>nd</sup> sem.)</b>
<b>2.8. Total hours per semester</b>					<b>165 (1<sup>st</sup> sem.) 125 (2<sup>nd</sup> sem.)</b>
<b>2.9. Number of credits</b>					<b>6 (1<sup>st</sup> sem.) 5 (2<sup>nd</sup> sem.)</b>

## 3. Pre-requisites:

<b>3.1. Curriculum</b>	- knowledge of physiology, pathophysiology, biochemistry, general pharmacology, immunology, pathology
<b>3.2. Competences</b>	-

## 4. Requisites:

<b>4.1. For lectures</b>	• Multimedia equipped auditorium
<b>4.2. For laboratories sessions</b>	• Laboratory with specific pharmacologic equipment

## 5. Specific competences acquired

<b>Professional</b>	• Capacity to characterize different drug classes used in therapy regarding their
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<b>competences</b>	<p>pharmacokinetics, mechanism of action, pharmacologic effects, indications, adverse reactions and contraindications, routes of administration and pharmaceutical formulations.</p> <ul style="list-style-type: none"> <li>• Capacity to use these notions in a clinical context.</li> <li>• Capacity to choose the best drug in a clinical context according to the pharmacokinetic and pharmacodynamic characteristics.</li> <li>• Capacity to individualize treatment according to patient and drug particularities</li> <li>• Capacity to explain and interpret theoretical and practical knowledge of pharmacology in an inter-disciplinary approach with other fundamental or specialized biomedical disciplines: anatomy, physiology, biochemistry, toxicology, clinical pharmacy.</li> <li>• Capacity to dispense prescription or non-prescription drugs and to perform patient counseling on the basis of the acquired knowledge.</li> <li>• Capacity to provide consultancy and expertise in the drug field.</li> <li>• Capacity to collaborate with the prescribing physician in order to initiate and monitor drug treatments.</li> </ul>
<b>Transversal competences</b>	<ul style="list-style-type: none"> <li>• Acquiring an integrative approach of the drug mechanisms of action in the human body and the possibilities of pharmacological influence of pathologic conditions.</li> <li>• Using the acquired concepts in problem solving which may appear in a professional or inter-disciplinary context.</li> <li>• Optimal use of the acquired concepts in scientific activities</li> <li>• Professional development.</li> </ul>

## 6. Course objectifs

<b>6.1.General objectives</b>	<ul style="list-style-type: none"> <li>• Assimilation of key pharmacology concepts. Knowledge of the main therapeutically used drug classes regarding their pharmacokinetics, mechanism of action, pharmacologic effects, indications, adverse reactions and contraindications, routes of administration and pharmaceutical formulations.</li> <li>• Study in specific experimental models of pharmacokinetic, pharmacodynamic and toxicologic behavior of drugs.</li> </ul>
<b>6.2.Specific objectives</b>	<ul style="list-style-type: none"> <li>• By acquiring specific notions of pharmacology, the future pharmacist is provided with adequate knowledge for understanding treatment options for pathologic conditions.</li> <li>• Acquiring an integrative approach to the mechanisms of drugs in the human body.</li> <li>• Capacity to interrogate specific databases.</li> <li>• Acquiring the capacity of synthesis and bibliographical documentation.</li> <li>• Acquaintance of the student with possible research directions in pharmacology which will facilitate the participation in scientific events.</li> </ul>

## 7. Content

**Teaching methods for course:** Lecture, interactive methods. Oral lecture with PowerPoint presentation.

**Teaching methods for laboratory activity:** Lecture, conversation, problem solving, practical demonstration.

<b>7.1 Course (hours)</b>	<b>Remarks</b>
<b>1<sup>st</sup> semester</b>	
1. Pharmacology of the sympathetic nervous system. Sympathomimetic drugs	<b>3 h</b>
2. Pharmacology of the sympathetic nervous system. $\alpha$ -Sympatholytic drugs	<b>1 h</b>
3. Pharmacology of the sympathetic nervous system. Beta-blockers. Neurosympatholytic drugs	<b>3 h</b>
4. Pharmacology of the parasympathetic nervous system. Parasympathomimetic drugs	<b>2 h</b>
5. Pharmacology of the parasympathetic nervous system. Parasympatholytic drugs	<b>2 h</b>
6. Pharmacology of peripheral muscle relaxants and nicotine receptor agonist drugs. Central muscle relaxants	<b>2 h</b>
7. Pharmacology of histamine and H1-receptor antagonist drugs	<b>2 h</b>
8. Pharmacology of H2-receptor antagonist drugs	<b>1 h</b>
9. Pharmacology of steroidal anti-inflammatory drugs	<b>2 h</b>
10. Pharmacology of non-steroidal anti-inflammatory drugs. DMARD	<b>3.5 h</b>
11. Pharmacology of analgesic-antipyretic drugs	<b>1 h</b>
12. Pharmacology of opioid analgesic drugs	<b>2 h</b>
13. Pharmacology of local and anesthetics	<b>1 h</b>
14. Pharmacology of general anesthetics	<b>1.5 h</b>
15. Pharmacology of sedative-hypnotic and tranquillizer drugs	<b>3 h</b>
16. Pharmacology of anticonvulsant drugs	<b>3 h</b>
17. Pharmacology of antidepressant drugs	<b>2 h</b>
18. Pharmacology of antipsychotic drugs	<b>3 h</b>
19. Pharmacology of antiparkinsonian drugs	<b>1 h</b>
20. Pharmacology of CNS-stimulating drugs. Neurotonics	<b>1 h</b>
21. Pharmacology of drugs used in Alzheimer disease	<b>1 h</b>
22. Pharmacology of antimigraine drugs	<b>1 h</b>
<b>2<sup>nd</sup> semester</b>	
1. Pharmacology of the cardiovascular system. Cardiotonic drugs	<b>2 h</b>
2. Pharmacology of the cardiovascular system. Anti-arrhythmic drugs	<b>1 h</b>
3. Pharmacology of the cardiovascular system. Antihypertensive drugs	<b>3 h</b>
4. Pharmacology of the cardiovascular system. Diuretic drugs	<b>2 h</b>
5. Pharmacology of the cardiovascular system. Antianginal drugs. Antihypotensive drugs	<b>2 h</b>
6. Pharmacology of cardiovascular system. Peripheral vasodilators. Veno-active drugs	<b>1 h</b>
7. Pharmacology of the blood. Anticoagulants. Antiplatelet drugs. Fibrinolytics. Hemostatic drugs	<b>3 h</b>
8. Pharmacology of the blood. Antianemic drugs	<b>1 h</b>
9. Pharmacology of the respiratory system. Antitussive and expectorant drugs. Antiasthmatic drugs	<b>3 h</b>
10. Pharmacology of the digestive system. Anti-ulcer drugs	<b>2 h</b>
11. Pharmacology of the digestive system. Emetic and antiemetic drugs. Gastric and pancreas secretion substituents, antiflatulent drugs	<b>1 h</b>
12. Pharmacology of the digestive system. Laxatives and purgatives. Antidiarrheal drugs. Spasmolytic drugs	<b>2 h</b>
13. Pharmacology of metabolic disorders. Hypolipemiant drugs	<b>1.5 h</b>
14. Pharmacology of metabolic disorders. Antidiabetic drugs	<b>2 h</b>
15. Pharmacology of metabolic disorders. Antigout drugs	<b>1 h</b>
16. Pharmacology of endocrine system. Thyroid hormones and antithyroid drugs	<b>1 h</b>
17. Pharmacology of endocrine system. Sexual hormones	<b>2.5 h</b>
18. Pharmacology of antibiotic drugs	<b>6 h</b>
19. Pharmacology of antifungal, antiviral and antiparasitary drugs	<b>3 h</b>

<b>20. Pharmacology of anticancer drugs</b>	<b>2 h</b>
<b>Bibliography</b>	
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16. Nathan A. <i>Managing Symptoms in the Pharmacy</i> . Ed. Pharmaceutical Press London Chicago 2008	
17. Mogoșan Cristina, <i>Abrégé de PHARMACOLOGIE</i> , Editura Medicală Universitară "Iuliu Hațieganu" Cluj-Napoca, 2005.	
<b>7.2. Laboratory activities (hours)</b>	<b>Remarks</b>
<b>1<sup>st</sup> semester</b>	
1. Pharmacology of the sympathetic nervous system	<b>3 h</b>
2. Pharmacology of the sympathetic nervous system	<b>3 h</b>
3. Pharmacology of the parasympathetic nervous system	<b>3 h</b>
4. Pharmacology of the parasympathetic nervous system	<b>3 h</b>
5. Pharmacology of peripheral muscle relaxants and nicotine receptor agonist drugs	<b>3 h</b>
6. Pharmacology of H1-receptor antagonist drugs. Pharmacology of anti-inflammatory drugs	<b>3 h</b>
7. Pharmacology of analgesic drugs	<b>3 h</b>
8. Pharmacology of local and general anesthetics	<b>3 h</b>
9. Pharmacology of sedative-hypnotic and tranquillizer drugs	<b>3 h</b>
10. Pharmacology of anticonvulsant drugs	<b>3 h</b>
11. Pharmacology of antipsychotic drugs	<b>3 h</b>
12. Pharmacology of antiparkinsonian drugs	<b>3 h</b>
13. Pharmacology of antidepressant drugs	<b>3 h</b>
14. Pharmacology of CNS-stimulating drugs	<b>3 h</b>
<b>2<sup>nd</sup> semester</b>	
1. Pharmacology of the drugs acting on cardiovascular system	<b>6 h</b>

2. Pharmacology of the drugs acting on the blood	<b>6 h</b>
3. Pharmacology of the drugs with renal actions	<b>2 h</b>
4. Pharmacology of the drugs acting on digestive system	<b>2 h</b>
5. Pharmacology of the drugs acting on respiratory system	<b>2 h</b>
6. Pharmacology of the drugs acting in metabolic disorders	<b>2 h</b>
7. Pharmacology of the drugs with endocrine effects	<b>2 h</b>
8. Pharmacology of antibiotic drugs	<b>2 h</b>
9. Pharmacology of antifungal, antiviral and antiparasitic drugs	<b>2 h</b>
10. Pharmacology of anticancer drugs	<b>2 h</b>
<b>Bibliography</b>	
<ol style="list-style-type: none"> <li>1. Mogoșan Cristina, Voștinariu Oliviu, Ghibu Steliana, Bazele experimentale ale farmacologiei, Editura Medicală Universitară „Iuliu Hațieganu” Cluj-Napoca 2012.</li> <li>2. Aurelia Cristea, Tratat de Farmacologie, Editura Medicală București, 2005.</li> <li>3. Dobrescu D, Negreș S, Dobrescu L, McKinnon R. Memomed 2018, ed. a 24-a, Editura Universitară București, 2018</li> <li>4. Vogel G, Drug discovery and evaluation, Ed. Springer Verlag, 2002</li> </ol>	

## 8. Evaluation

Activity type	8.1.Evaluation criteria	8.2. Evaluation methods	8.3.Percent of final grade
<b>8.4. Course</b>	General evaluation criteria (assimilation of knowledge, logical coherence, capacity to contextually apply the acquired knowledge and to make correlations). Specific criteria for the Discipline. Capacity to understand fundamental problems and to particularize them.	Written examination, MCQ type	<b>80%</b>
<b>8.5. Laboratory</b>	Evaluation of theoretical knowledge and practical abilities.	Practical examination	<b>20%</b>
<b>8.6. Minimal performance standard</b>			
<ul style="list-style-type: none"> <li>• Pharmacologic characterization of the drug classes presented in the curricula.</li> <li>• Comparing efficacy and safety of different drug classes and individual representatives in a specific pathologic context.</li> <li>• Applying experimental models able to characterize the pharmacologic profile of drugs.</li> </ul>			

## BIOLOGICAL DRUGS

### 1. Information about the course

<b>1.1. Discipline</b>		<b>Pharmaceutical Analysis</b>					
<b>1.2. Course instructor</b>		<b>Associate professor Simona-Codruta Hegheș, PhD</b>					
<b>1.3. Laboratory instructor</b>		<b>Associate professor Simona-Codruta Hegheș, PhD</b>					
<b>1.4. Year</b>	4	<b>1.5. Semester</b>	2	<b>1.6. Evaluation type</b>	<b>Theoretical and practical exam</b>	<b>1.7. Course type</b>	<b>Fundamental discipline Compulsory discipline</b>

### 2. Total estimated time (hours/semester for teaching activity)

<b>2.1. Total hours/week</b>	<b>0 (1<sup>st</sup> sem.) 3 (2<sup>nd</sup> sem.)</b>	<b>2.2. Course</b>	<b>0 2</b>	<b>2.3. Laboratories</b>	<b>0 1</b>
<b>2.4. Total hours in the curriculum</b>	<b>0 (1<sup>st</sup> sem.) 42(2<sup>nd</sup> sem.)</b>	<b>2.5. Course</b>	<b>0 28</b>	<b>2.6. Laboratories</b>	<b>0 14</b>
<b>2.4. Distribution of time needed (1<sup>st</sup> sem. / 2<sup>nd</sup> sem.)</b>					<b>Hours</b>
a. Study using text books, lecture notes, bibliography					0/16
b. Individual study within libraries, on-line platforms, field research					0/7
c. Preparing seminars/laboratories, homework, projects, portfolios and essays					0/4
d. Tutoring					0/2
e. Evaluation/ semester					0/4
f. Other activities					-
<b>2.7. Total hours for individual study (a+b+c+d)</b>				<b>33 (2<sup>nd</sup> sem.)</b>	
<b>2.8. Total hours per semester</b>				<b>75 (2<sup>nd</sup> sem.)</b>	
<b>2.9. Number of credits</b>				<b>3 (2<sup>nd</sup> sem.)</b>	

### 3. Pre-requisites:

<b>3.1. Curriculum</b>	<ul style="list-style-type: none"> <li>Anatomy, Physiology, Immunology, Pharmacogenetic, Microbiology, Biochemistry, Analytical chemistry - instrumental methods of analysis (separative methods, mass spectrometry)</li> </ul>
<b>3.2. Competences</b>	<ul style="list-style-type: none"> <li>Knowledge of the concepts of human anatomy and physiology</li> <li>Knowledge of the concepts of immunology regarding the immune system components: organs, cells and molecules</li> <li>Knowledge of the mechanisms of the immune system response in different situations: immunizing, hypersensitivity, immunodeficiencies, autoimmunity</li> <li>Knowledge of the molecular basis of heredity</li> <li>Knowledge of the concepts of pharmacogenetics on gene expression, genetic recombination, DNA sequencing, genetically modified organisms</li> <li>Knowledge of medical microbiology concepts and taxonomy of microorganisms</li> <li>Knowledge of pathogenic microorganisms and their involvement in human diseases</li> <li>Knowledge of biochemistry concepts concerning the protein structure and function</li> </ul>

	<ul style="list-style-type: none"> <li>Knowing the basic concepts related to instrumental methods of analysis (separative methods, mass spectrometry)</li> </ul>
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#### 4. Requisites:

<b>4.1. For lectures</b>	<ul style="list-style-type: none"> <li>Students will not attend classes and labs with the mobile phones open. Also, telephone calls will not be tolerated during the course or the students leaving the classroom to retrieve personal phone calls.</li> <li>No delay of the students will be tolerated in class as it proves disruptive to the educational process</li> </ul>
<b>4.2. For laboratories sessions</b>	<ul style="list-style-type: none"> <li>Students will be presented to the lab with protective white coats. Telephone calls will not be tolerated during the practical activities or the students leaving the classroom to retrieve personal phone calls.</li> <li>No delay of the students will be tolerated in class as it proves disruptive to the educational process</li> </ul>

#### 5. Specific competences acquired

<b>Professional competences</b>	<ul style="list-style-type: none"> <li>Formulation, preparation and dosage forms of biological drugs</li> <li>Conservation and distribution of biological drugs</li> <li>The release of biological medicinal products</li> <li>Analysis and quality control of biological medicinal products</li> </ul>
<b>Transversal competences</b>	<ul style="list-style-type: none"> <li>Effective use of information sources and communication resources of professional training assistance (Internet portals, specialized software applications, databases, online courses etc.) both in Romanian and in an international language</li> </ul>

#### 6. Course objectives

<b>6.1. General objectives</b>	<ul style="list-style-type: none"> <li>To familiarize students with biological medicines obtained either by conventional extraction techniques from animal organs, either by genetic engineering and used in therapy. To familiarize students with analytical methods used for quality assurance of those drugs</li> </ul>
<b>6.2. Specific objectives</b>	<ul style="list-style-type: none"> <li>Knowledge of the main biological drugs derived from blood and their therapeutic use</li> <li>Knowledge of the national vaccination program, mandatory and optional vaccines, travelers vaccines</li> <li>Knowledge of the main biological drugs containing mono- and polyclonal antibodies and their therapeutic use</li> <li>Knowledge and application specific analytical methodology applicable to peptides and proteins</li> </ul>

#### 7. Content

**Teaching methods for course:** Lectures supported by PowerPoint presentations, interactive communication

**Teaching methods for laboratory activity:** Oral communication, problem-based learning, demo videos, practical activities of individual

7.1 Course (hours)	Remarks
1. Extraction methods for obtaining biological drugs. Genetic engineering – recombinant DNA technology, transgenic animal technology phage libraries - applied	4 h



for biological drugs	
<b>2.</b> Blood and blood derivatives. Labile and stable blood, biological drugs involved in the coagulation cascade: coagulation factors, anticoagulants, fibrinolytic, drugs that intervene in biological hematopoiesis	<b>6 h</b>
<b>3.</b> Biologic drugs used in immunoprophylaxis: serums and vaccines. Immunoprevention - national vaccination scheme, mandatory vaccines, vaccines recommended vaccines travelers	<b>12 h</b>
<b>4.</b> Biological products containing mono and polyclonal antibodies	<b>6 h</b>
<b>5.</b> Extraction methods for obtaining biological drugs. Genetic engineering – recombinant DNA technology, transgenic animal technology phage libraries - applied for biological drugs	
<b>Bibliography</b>	
<ol style="list-style-type: none"> <li>www.farma.umfcluj.ro: curs Medicamente Biologice, suport PowerPoint, 2018/2019</li> <li>Hegheş S.C., Iuga C. A., Rus L. M., Uifălean A., Ilieş M., Nicoară R. Analiza medicamentelor biologice. Aplicații practice. Cluj Napoca: Ed. Med. Univ. Iuliu Hatieganu, 2018</li> <li>Leucuța S.E. Biotehnologia farmaceutică a proteinelor terapeutice. Cluj-Napoca: Editura Dacia; 2008.</li> <li>Plotkin S.A., Orenstein W.A., Offit P.A. Vaccines: Expert Consult. 5th edition. Oxford: Elsevier; 2008.</li> <li>***. Farmacopeea Europeană ediția 9.5 online <a href="http://online6.edqm.eu/ep905/">http://online6.edqm.eu/ep905/</a></li> <li>Ionescu C., Caira M. Drug Metabolism Current Concepts. Dordrecht: Springer; 2005.</li> <li>Ritter M.A., Ladyman H.M. Monoclonal Antibodies. Cambridge: Cambridge University Press; 2005.</li> <li>***. Farmacopeea Americană. USP XXV. 2004.</li> <li>Marshall G.S, Dennehy P.H., Greenberg D.P., Offit P.A., Tan T.Q. The Vaccine Handbook: A Practical Guide for Clinicians, Philadelphia: Lippincott Williams &amp; Wilkins; 2004.</li> <li>Wells D. A. High Throughput Bioanalytical Sample Preparation, Methods and Automation Strategies. Oxford: Elsevier; 2003.</li> <li>Swarbrick J., Boylan J.C. - Encyclopedia of Pharmaceutical Technology, Vol.15, Marcel Dekker Inc., 1988</li> </ol> <p>Vaida T., Cristea V. Elemente de imunologie. Arad: Editura Vasile Goldiș; 1996.</p>	
<b>7.2. Laboratory activities (hours)</b>	<b>Remarks</b>
<b>1.</b> Evaluation of the quality of influenza vaccine by SDS-PAGE. Preparation of discontinuous polyacrylamide gel used for electrophoretic analysis	<b>3 h</b>
<b>2.</b> Evaluation of the quality of influenza vaccine by SDS-PAGE. Sample preparation, application on acrylamide gel, electrophoretic migration, gel staining after protein migration	<b>4 h</b>
<b>3.</b> Evaluation of the quality of influenza vaccine by SDS-PAGE. Identification of vaccine proteins based on molecular weight	<b>3 h</b>
<b>4.</b> Evaluation of the quality of influenza vaccine by SDS-PAGE. Quantitative evaluation of vaccine proteins. GelAnalyzer	<b>4 h</b>
<b>Bibliography</b>	
<ol style="list-style-type: none"> <li>Heghes SC, Iuga CA Rus LM, Uifalean A, Ilieş M, Nicoară R. Analiza Medicamentelor Biologice. Aplicatii practice . Editura Medicala Universitara "Iuliu Hatieganu", Cluj Napoca. 2018</li> <li>***. Farmacopeea Europeană ediția 9.5 online <a href="http://online6.edqm.eu/ep905/">http://online6.edqm.eu/ep905/</a></li> </ol>	

## 8. Evaluation

Activity type	8.1.Evaluation criteria	8.2. Evaluation methods	8.3. Percent of final grade
<b>8.4. Course</b>	<ul style="list-style-type: none"><li>• The ability to appropriate use of specific theoretical concepts</li><li>• Understanding the importance of biological drugs in human therapy</li><li>• Understanding the importance of biological drugs quality assurance process from beginning to the finished product.</li><li>• Identifying biological medicines and how to release them from pharmacy</li></ul>	Multiple choice written exam	<b>75%</b>
<b>8.5. Laboratory</b>	<ul style="list-style-type: none"><li>• Evaluation of practical skills aquired</li><li>• Evaluation of the capacity to elaborate and fully understand an analysis report</li></ul>	Practical exam	<b>25%</b>
<b>8.6. Minimal performance standard</b>			
<ul style="list-style-type: none"><li>• To choose the appropriate conditions for storage, preservation and distribution of biological drugs</li><li>• To know the proper use of biological drugs</li><li>• To collect the results of qualitative and quantitative analysis of biologicallyactive substances in pharmaceutical dosage form and to elaborate the analysis report</li><li>• To evaluate and discuss the analysis report</li></ul>			

## RESEARCH METODOLOGY AND BIOETHICS

### 1. Information about the course

<b>1.1. Discipline</b>		<b>Pharmaceutical Analysis</b>					
<b>1.2. Course instructor</b>		<b>Associate professor Lucia Maria Rus, PhD</b>					
<b>1.3. Laboratory instructor</b>		<b>Assistant professor Raul Nicoară, PhD student</b>					
<b>1.4. Year</b>	<b>4</b>	<b>1.5. Semester</b>	<b>1</b>	<b>1.6. Evaluation type</b>	<b>Theoretical exam, Practical exam</b>	<b>1.7. Course type</b>	<b>Fundamental discipline Compulsory discipline</b>

### 2. Total estimated time (hours/semester for teaching activity)

<b>2.1. Total hours/week</b>	<b>3 (1<sup>st</sup> sem.) 0 (2<sup>nd</sup> sem.)</b>	<b>2.2. Course</b>	<b>1 0</b>	<b>2.3. Laboratories</b>	<b>2 0</b>
<b>2.4. Total hours in the curriculum</b>	<b>42 (1<sup>st</sup> sem.) 0 (2<sup>nd</sup> sem.)</b>	<b>2.5. Course</b>	<b>14 0</b>	<b>2.6. Laboratories</b>	<b>28 0</b>
<b>2.4. Distribution of time needed (1<sup>st</sup> sem. / 2<sup>nd</sup> sem.)</b>					<b>Hours</b>
a. Study using text books, lecture notes, bibliography					6/0
b. Individual study within libraries, on-line platforms, field research					15/0
c. Preparing seminars/laboratories, homework, projects, portfolios and essays					8/0
d. Tutoring					2/0
e. Evaluation/ semester					2/0
f. Other activities					-
<b>2.7. Total hours for individual study (a+b+c+d)</b>					<b>33 (1<sup>st</sup> sem.)</b>
<b>2.8. Total hours per semester</b>					<b>75 (1<sup>st</sup> sem.)</b>
<b>2.9. Number of credits</b>					<b>3 (1<sup>st</sup> sem.)</b>

### 3. Pre-requisites:

<b>3.1. Curriculum</b>	Pharmaceutical terminology, informatics and biostatistics, English/French
<b>3.2. Competences</b>	Using the Windows <sup>®</sup> operating system (Word, PowerPoint, Excel)

### 4. Requisites:

<b>4.1. For lectures</b>	Oral lecture based on PowerPoint <sup>®</sup> presentation, of maximum 50 minutes
<b>4.2. For laboratories sessions</b>	Practical work begins with the discussion of the work/s scheduled on that day; pause time is individually dependent on the needs of practical work

### 5. Specific competences acquired

<b>Professional competences</b>	<ul style="list-style-type: none"> <li>• Proper bibliographic documentation for the realization of a project on a scientific topic</li> <li>• Elaboration of professional projects with the use of established principles and methods in the field</li> <li>• The correct writing of the bibliography of a scientific project in the writing system of the bibliography requested by the institution to which the work is addressed</li> <li>• Knowing the principles and regulations of bioethics in scientific research</li> </ul>
<b>Transversal competences</b>	<ul style="list-style-type: none"> <li>• Identify roles and responsibilities in a multidisciplinary team and apply effective relationship and work techniques within the team</li> </ul>

	<ul style="list-style-type: none"> <li>• Effective use of information sources and communication resources and assisted training (Internet portals, specialized software applications, databases, on-line courses, etc.) both in Romanian and in an international language</li> </ul>
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## 6. Course objectives

<b>6.1.General objectives</b>	<ul style="list-style-type: none"> <li>• Family students with the principles, stages and methodology of ethical scientific research</li> </ul>
<b>6.2.Specific objectives</b>	<ul style="list-style-type: none"> <li>• Knowing the valid ways and sources of scientific bibliographic documentation in the medical/ pharmaceutical field (books, journals, databases) and the ability to discern in their use</li> <li>• Organization and evaluation of experimental data for publication/ presentation of results</li> <li>• Scientifically sound editing of publishing materials, proper use of audiovisual media for the oral communication of scientific data</li> <li>• Knowledge of the ethical principles of scientific research</li> </ul>

## 7. Content

**Teaching methods for course:** Oral exposures coupled with PowerPoint® presentations, interactive communication

**Teaching methods for laboratory activity:** Conversation, questioning, demonstration, oral presentation doubled by electronic support, interactive communication

7.1 Course (hours)	Remarks
1. Stages of scientific research. Formulating a research theme. Conceiving the design of research. Choosing the method of data collection. Sampling. Develop a research proposal. Data collection. Data processing. Interpretation of the evaluation results. Applications.	<b>6 h</b>
2. Scientific Writing. Recommendations. IMRAD structure. Introduction, material and methods, results and discussions, conclusions. Data visualization methods. Abstract - general writing principles, errors in abstracts. Drafting written text. Bibliography - quality of the bibliographic indices cataloging data, bibliography writing systems. Plagiarism in scientific research.	<b>5 h</b>
3. Audiovisual support in practice. General principles, giving a presentation.	<b>1 h</b>
4. Bioethics in research and clinical studies. History of bioethics. Bioethics in Modern Medical Research. Conventional approach, modern approach, perspective approach. Bioethics regulations in current medical research.	<b>2 h</b>
<b>Bibliography</b>	
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Cluj- Napoca.

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<b>7.2. Laboratory activities (hours)</b>	<b>Remarks</b>
1. Presentation and search in UMF subscriptions databases: With access through ANELIS Plus national consortium (PubMed, Science Direct, Springer Link, ProQuest, Oxford Journals, Cambridge Journals, Nature Journals, Clarivate Analytics (Web of Science, InCite, Derwent Innovations Index), Wiley Online Library, Scopus etc.). With access through direct subscription of UMF Cluj (Clinical Key, Dyna Med, Ebsco Host, Thieme, Embase, Research Gate, Google Scholar). Exercises	<b>8 h</b>
2. Presentation and searching in official websites of regulatory bodies in the pharmacy field: ANM, EMA, FDA Presentation and searching in Francophone databases: VIDAL, Thériaque, CISMEF. Exercises	<b>2 h</b>
3. Organizing and evaluating data in order to publish the results.	<b>6 h</b>
4. Presentation and using software from the management of bibliographic index and references (EndNote Web, Mendeley). Exercises. Plagiarism detection exercises.	<b>8 h</b>
5. Presentation and using audio-visual support (oral communication and presentation PowerPoint )	<b>2 h</b>
6. Presentation and evaluation of individual projects	<b>2 h</b>
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3. European Medicines Agency, <a href="http://www.ema.europa.eu/ema/">http://www.ema.europa.eu/ema/</a>	
4. Food and Drug Administration, <a href="http://www.fda.gov/">http://www.fda.gov/</a>	
5. BioMed Central, <a href="http://www.biomedcentral.com/">http://www.biomedcentral.com/</a>	
6. British Medical Journal, <a href="http://www.bmj.com/">http://www.bmj.com/</a>	
7. Clinical Key Elsevier, <a href="https://www.clinicalkey.com/">https://www.clinicalkey.com/</a>	
8. Cochrane, <a href="https://www.cochrane.org/">https://www.cochrane.org/</a>	
9. Drug Info Portal, <a href="http://druginfo.nlm.nih.gov/drugportal/drugportal.jsp">http://druginfo.nlm.nih.gov/drugportal/drugportal.jsp</a>	
10. Ebsco Host, <a href="http://search.ebscohost.com/Community.aspx?authtype=ip&amp;ugt=723731563C3635573776351632653E5225E366D36713689362E324E331133603&amp;stsug=AjR3AzIR8K5xSS9Bbx8W7Z78TiQB3MKcZpNF8Kj7vXSLnWZWs8xah6Z_DNqlXiOQyOIUF-V17o8etOeKYQ1iPy_IPrjffHR_CroUwATai-A7-mLIEDnUdJbf2CT0bp9x3ZZjA2w2GT4L7cWMBvzDXa626tPvMDWIExyseLJbMf2FE&amp;IsAdminMobile=N&amp;encid=22D731163C6635773726355632053C67356376C377C378C372C374C371C376C33013&amp;selectServicesToken=AzR_bXsqPwb8dhquvbN-OXPameWqzTBH9_hhj_Ur2ZsjZfK3zTGXC9SUCbmMvY9u_6DZuuPAnnriYawzQY2a6BZ591vzpbqJMiXMu_15FINQwzDpE3TpMoTSNCU55g5t5om6-bm2Oh1gOYKCJAVPHI4lzVpK3Sk8liaJG0FFgNz1eO1N5EY_y8320plh3fH-HJtYtdfCgvZ4SZHUgVWEDrMRVuEpMe0deU4h2g3v_6rxAgRVDAhebjG932e0An98IfX0LYF34yH4fva5HQbVAXo6JeFvVOP9YXojYEPILx4RbA7NoNI3e0ISNdTX2EJPkM3i">http://search.ebscohost.com/Community.aspx?authtype=ip&amp;ugt=723731563C3635573776351632653E5225E366D36713689362E324E331133603&amp;stsug=AjR3AzIR8K5xSS9Bbx8W7Z78TiQB3MKcZpNF8Kj7vXSLnWZWs8xah6Z_DNqlXiOQyOIUF-V17o8etOeKYQ1iPy_IPrjffHR_CroUwATai-A7-mLIEDnUdJbf2CT0bp9x3ZZjA2w2GT4L7cWMBvzDXa626tPvMDWIExyseLJbMf2FE&amp;IsAdminMobile=N&amp;encid=22D731163C6635773726355632053C67356376C377C378C372C374C371C376C33013&amp;selectServicesToken=AzR_bXsqPwb8dhquvbN-OXPameWqzTBH9_hhj_Ur2ZsjZfK3zTGXC9SUCbmMvY9u_6DZuuPAnnriYawzQY2a6BZ591vzpbqJMiXMu_15FINQwzDpE3TpMoTSNCU55g5t5om6-bm2Oh1gOYKCJAVPHI4lzVpK3Sk8liaJG0FFgNz1eO1N5EY_y8320plh3fH-HJtYtdfCgvZ4SZHUgVWEDrMRVuEpMe0deU4h2g3v_6rxAgRVDAhebjG932e0An98IfX0LYF34yH4fva5HQbVAXo6JeFvVOP9YXojYEPILx4RbA7NoNI3e0ISNdTX2EJPkM3i</a>	
11. Oxford Journals, <a href="http://www.oxfordjournals.org/">http://www.oxfordjournals.org/</a>	
12. Pro Quest, <a href="http://search.proquest.com/health/publicationbrowse?accountid=29820">http://search.proquest.com/health/publicationbrowse?accountid=29820</a>	
13. PubChem, <a href="http://pubchem.ncbi.nlm.nih.gov/">http://pubchem.ncbi.nlm.nih.gov/</a>	
14. PubMed, <a href="http://www.ncbi.nlm.nih.gov/pubmed">http://www.ncbi.nlm.nih.gov/pubmed</a>	
15. Science direct, <a href="http://www.sciencedirect.com/">http://www.sciencedirect.com/</a>	
16. Scopus, <a href="http://www.scopus.com/">http://www.scopus.com/</a>	
17. Springer link, <a href="http://www.springerlink.com/">http://www.springerlink.com/</a>	

18. Cambridge Journals, <https://www.cambridge.org/core>
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20. Embase, [https://www.embase.com/?org.apache.catalina.filters.CSRF\\_NONCE=CCD1412AC48D25F9E24AA06813309063#search](https://www.embase.com/?org.apache.catalina.filters.CSRF_NONCE=CCD1412AC48D25F9E24AA06813309063#search)
21. Research Gate, <https://www.researchgate.net/>
22. Google Scholar, <https://scholar.google.ro/>
23. Clarivate Analytics -Web of science, [http://apps.webofknowledge.com/WOS\\_GeneralSearch\\_input.do?product=WOS&search\\_mode=GeneralSearch&SID=F21uyS6GWNdqptkXzc&preferencesSaved=](http://apps.webofknowledge.com/WOS_GeneralSearch_input.do?product=WOS&search_mode=GeneralSearch&SID=F21uyS6GWNdqptkXzc&preferencesSaved=)
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## 8. Evaluation

Activity type	8.1.Evaluation criteria	8.2. Evaluation methods	8.3.Percent of final grade
<b>8.4. Course</b>	<ul style="list-style-type: none"> <li>• Appropriate use of theoretical notions specific to ethical scientific research methodology</li> <li>• Ability to understand and apply the methodology of ethical scientific research at all stages specific to the realization of a scientific project</li> </ul>	Theoretical multiple choice questions exam	<b>60%</b>
<b>8.5. Laboratory</b>	<ul style="list-style-type: none"> <li>• Ability to develop a project on a research topic specific to the field</li> <li>• Ability to communicate the most important research results to a specialized audience</li> </ul>	Practical exam	<b>40%</b>
<b>8.6. Minimal performance standard</b>			
<ul style="list-style-type: none"> <li>• Achieving a project, performing with responsibility specific roles in a multidisciplinary team</li> <li>• Elaboration, drafting and presentation, in Romanian and in an international language, of a specialized work on a current topic in the field, using various sources and tools of information</li> </ul>			

# INDUSTRIAL PHARMACEUTICAL TECHNOLOGY

## 1. Information about the course

<b>1.1. Discipline</b>		<b>Pharmaceutical Technology and biopharmacy</b>					
<b>1.2. Course instructor</b>		<b>Associate professor Alina Porfire, PhD</b>					
<b>1.3. Laboratory instructor</b>		<b>Associate professor Alina Porfire, PhD</b> <b>Asistant professor Dana Hales, PhD</b> <b>Asistant professor Sonia Iurian, PhD</b> <b>Asistant professor Lucia Tefas, PhD</b>					
<b>1.4. Year</b>	<b>4</b>	<b>1.5. Semester</b>	<b>I, II</b>	<b>1.6. Evaluation type</b>	<b>Written exam + Practical exam</b>	<b>1.7. Course type</b>	<b>Specialized discipline, Compulsory discipline</b>

## 2. Total estimated time (hours/semester for teaching activity)

<b>2.1. Total hours/week</b>	<b>5 (1<sup>st</sup> sem.)</b> <b>5 (2<sup>nd</sup> sem.)</b>	<b>2.2. Course</b>	<b>2</b> <b>2</b>	<b>2.3. Laboratories</b>	<b>3</b> <b>3</b>
<b>2.4. Total hours in the curriculum</b>	<b>70 (1<sup>st</sup> sem.)</b> <b>70 (2<sup>nd</sup> sem.)</b>	<b>2.5. Course</b>	<b>42</b> <b>28</b>	<b>2.6. Laboratories</b>	<b>42</b> <b>42</b>
<b>2.4. Distribution of time needed (1<sup>st</sup> sem. / 2<sup>nd</sup> sem.)</b>					<b>Hours</b>
a. Study using text books, lecture notes, bibliography					55/40
b. Individual study within libraries, on-line platforms, field research					25/20
c. Preparing seminars/laboratories, homework, projects, portfolios and essays					20/11
d. Tutoring					2/2
e. Evaluation/ semester					5/5
f. Other activities					-
<b>2.7. Total hours for individual study (a+b+c+d)</b>				<b>102 (1<sup>st</sup> sem.)</b> <b>73 (2<sup>nd</sup> sem.)</b>	
<b>2.8. Total hours per semester</b>				<b>172 (1<sup>st</sup> sem.)</b> <b>143 (2<sup>nd</sup> sem.)</b>	
<b>2.9. Number of credits</b>				<b>6 (1<sup>st</sup> sem.)</b> <b>5 (2<sup>nd</sup> sem.)</b>	

## 3. Pre-requisites

<b>3.1. Curriculum</b>	<ul style="list-style-type: none"> <li>Inorganic chemistry, organic chemistry, physical-chemistry, microbiology, mathematics, informatics, pharmaceutical technology, in accordance with the curricula of the Faculty of Pharmacy for the years I to IV.</li> </ul>
<b>3.2. Competences</b>	<ul style="list-style-type: none"> <li>Basic knowledges regarding the preparation of medicinal products.</li> <li>Basic knowledges regarding the use of equipment and glassware in a laboratory.</li> <li>Computer skills for on-line documentation, statistical calculations and graphical representations in Excel.</li> </ul>

## 4. Requisites

<b>4.1. For lectures</b>	<ul style="list-style-type: none"> <li>Videoprojector</li> </ul>
<b>4.2. For laboratories sessions</b>	<ul style="list-style-type: none"> <li>Laboratory equipped with laboratory/pilot apparatus specific for the preparation and pharmacotechnique analysis of industrial dosage forms</li> </ul>



	<ul style="list-style-type: none"> <li>• A network comprising minimum 5 computers with the Microsoft Office Excel software for processing of the results of experimental data obtained during the work</li> <li>• Internet connection for the computers for on-line access to European Pharmacopoeia</li> <li>• Videoprojector</li> </ul>
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### 5. *Specific competences acquired*

<b>Professional competences</b>	<ul style="list-style-type: none"> <li>• Acquiring theoretical and practical skills regarding the design, formulation, preparation, packaging and pharmacotechnique analysis of industrial drugs (dosage forms).</li> <li>• Acquisition of theoretical and practical knowledge concerning the quality conditions that must be satisfied by a drug and the concept of quality assurance in the pharmaceutical industry.</li> <li>• Acquiring theoretical knowledge concerning the conditions under which a drug may be authorised, manufactured and marketed.</li> <li>• Understanding the importance of the formulation and of the conditions of preparation on the quality of medicinal products prepared by industry.</li> </ul>
<b>Transversal competences</b>	<ul style="list-style-type: none"> <li>• Understanding the importance of active substance characteristics over the pharmaceutical dosage form, the formulation, the manufacturing process, the conditioning and stability of pharmaceutical products.</li> <li>• Understanding the importance of dosage form design and manufacturing conditions over active substance release profile and therapeutic effect.</li> <li>• Understanding the importance of drug's quality over the therapeutic effect.</li> <li>• Understanding the special requirements regarding storage conditions, preservation and distribution of the medicinal products prepared industrially.</li> <li>• Formation of a conscious and responsible reporting on the role of the pharmacist in the preparation and quality of industrial drug.</li> <li>• Acquisition of skills concerning responsible achievement of professional tasks.</li> </ul>

### 6. *Course objectifs*

<b>6.1. General objectives</b>	<ul style="list-style-type: none"> <li>• To know and to understand the principles and technologies for industrial preparation of medicinal products.</li> </ul>
<b>6.2. Specific objectives</b>	<ul style="list-style-type: none"> <li>• To know the principles underlying the design, development, manufacturing and authorisation of drugs.</li> <li>• To know the design, formulation, manufacturing and quality of industrial drug products.</li> <li>• To know the technologies involved in industrial drug manufacturing.</li> <li>• To know the characteristics of active substances, excipients and packaging materials used in industrial manufacturing.</li> <li>• To acquire knowledge on the quality of industrial medicinal products and the Quality Assurance concept in pharmaceutical industry.</li> <li>• To know the pharmaceutical industry regulations regarding the manufacturing and marketing of pharmaceutical drug products.</li> </ul>

### 7. *Content*

**Teaching methods for course:** Oral lecture coupled with Power Point presentation. Systematic exposure. Interactive debate.

**Teaching methods for laboratory activity:** Perform pharmaceutical operations related to preparation and pharmacotechnical control of drugs. Processing the experimental data obtained using MS Office Excel. Analysis and interpretation of experimental results. Preparation of weekly reports containing the presentation and analysis of experimental data obtained. Teamwork.

7.1 Course (hours)	Observation
<b>1<sup>st</sup> semester</b>	
1. Drug design and development. Stages of drug development: preclinical studies, pharmaceutical development and clinical studies. The Quality by Design concept in drug development.	1 Lecture
2. Manufacturing authorization and marketing authorization for drugs. The application dossier for marketing authorization (CTD format). Types of applications. European authorization procedures.	1 Lecture
3. Good Manufacturing Practice and the Quality Assurance concept. The qualification and validation concepts in pharmaceutical industry. Validation of technological processes.	1 Lecture
4. Pre-formulation and formulation of drugs. Optimization of formulation and of technological processes. Experimental plans. Optimization methods.	1 Lecture
5. The quality of industrial pharmaceutical products I. Drugs' stability. Degradation of active substances: mechanisms, kinetics, factors and means of avoiding degradation during manufacturing process. The valability of medicinal product; determination of the shelf-life; official guidelines for stability studies.	1 Lecture
6. The quality of industrial pharmaceutical products II. Contamination of drugs. Mechanical, chemical and microbiological contamination. Sources of contamination. Measures to avoid contamination. Innocuity of drugs. The safety and efficacy of drugs.	1 Lecture
7. Medicated solutions I. Formulation and pharmaceutical operations. Industrial preparation of medicated solutions (technologies and equipment). Preparation of purified water used in drug manufacturing. Pharmaceutica operations: dissolving, mixing, filtering, filling the containers (methods, technologies, equipment).	1 Lecture
8. Medicated solutions II. Types of dosage forms. Formulation and industrial preparation of pharmaceutical syrups. Formulation and industrial preparation of solutions for ophthalmic use. Formulation and industrial preparation of ear preparations. Formulation and industrial preparation of extractives.	1 Lecture
9. Parenteral preparations I. Formulation and industrial preparation of parenteral drugs. Clean and aseptic rooms. Rules for the design, construction and operation.	1 Lecture
10. Parenteral preparations II. Sterilization. Principles, methods and industrial equipment for sterilization. Validation of sterilization methods. Sterility control. Apyrogenity. Pyrogenic substances: structure, properties, methods for the removal and destruction. Avoid of contamination with pyrogens and removal of pyrogens. Evaluation of apyrogenity of parenteral preparations.	1 Lecture
11. Formulation and industrial preparation of pharmaceutical products with therapeutic peptides and proteins. Obtaining and purification of peptides and proteins. Physical and chemical stability of peptides and proteins. Pharmaceutical dosage forms with peptides and proteins and administration routes.	1 Lecture
12. Heterogeneous drugs. Colloidal dispersions, emulsions and suspensions. Formulation and technologies for industrial preparation. Apparatus. Quality control.	1 Lecture
13. Semisolid preparations for cutaneous application (ointments, creams, gels, pastes): formulation, industrial preparation. Methods and equipment used for industrial preparation. Quality attributes and quality control. Suppositories: formulation, industrial preparation. Methods and equipment used for industrial preparation. Quality attributes and quality control.	1 Lecture

14. Aerosols: formulation, preparation, quality conditions. Methods and equipment used for industrial preparation and packaging of aerosols.	1 Lecture
<b>2<sup>nd</sup> semester</b>	
1. Solid dosage forms for oral administration: tablets and capsules. Tablets: preformulation, formulation, industrial preparation and quality attributes. Hard gelatin capsules: preformulation, formulation, industrial preparation (preparation of the content, preparation of the shells, filling the capsules) and quality attributes. Equipment for industrial preparation of capsules and tablets.	1 Lecture
2. Pharmaceutical technologies I. Drying. Theory of drying. Stages of solids drying. Equipments for drying. Dryers for solids (drying by convection, static, dynamic; drying by conduction; drying by radiation). Dryers for solutions, suspensions. Freeze-drying: theory, equipment, techniques, advantages, applications.	
3. Pharmaceutical technologies II. Pulverization. The mechanisms of solid fragmentation. The energy used during pulverization. The equipment for size reducing, pulverization, micronization. The selection of the pulverization method.	1 Lecture
4. Pharmaceutical technologies III. Particle size analysis. Methods and apparatus for measuring the particles' size. Expressing particle size and particle size distribution.	1 Lecture
5. Pharmaceutical technologies IV. The rheology of powders. Cohesion and adhesion of particles. Particles' properties and powders' flow. Packing geometry. The flow through orifices. Methods to establish the type of flow. Improvement of particles' flow.	1 Lecture
6. Pharmaceutical technologies V. Mixing of powders. The theory of mixing and evaluation of powders' homogeneity. Segregation of powders. Ordered mixtures. Industrial mixers for powders.	1 Lecture
7. Pharmaceutical technologies VI. Granulation. The objectives. The methods and equipment for granulation: dry granulation, wet granulation, extrusion – spherulization, thermoplastic granulation. Quality attributes and methods of analysis of the granules.	1 Lecture
8. Pharmaceutical technologies VII. The compression. Compression machines. The physics of powders compression. Methods for pharmacotechnic analysis of tablets.	1 Lecture
9. Pharmaceutical technologies VIII. Coating of tablets and granules. Methods of coating: sugar coating, film coating, coating by compression. Excipients used for coating. Apparatus for coating.	1 Lecture
10. Soft gelatin capsules. Formulation and preparation by Scherer procedure. Quality control of capsules. Microcapsules. Microcapsulation techniques, the use microcapsules. Continuous flow processes in pharmaceutical industry. Justification, regulation, examples, process monitoring.	1 Lecture
11. Packaging of pharmaceutical products. The functions of packaging materials. Packaging materials: glass, plastics - elastomer, metal, paper and cardboard. Systems for closures and content security. Packaging in blisters.	1 Lecture
12. Prolonged release pharmaceutical dosage forms. Principles used for the extension of prolonging the duration of action. Injections for prolonged action. Oral dosage forms with prolonged action.	1 Lecture
14. Controlled release pharmaceutical systems. Polymers used in the manufacture of controlled release systems. Systems with pre-programmed release. Systems with activated release (physical, chemical). Systems for self-regulated release. Targeting of drugs. Pharmaceutical systems for the delivery and release of active substances at the site of action: liposomes, nanoparticles, microparticles. Formulation, preparation, applications, examples.	1 Lecture

<b>Bibliography</b>	
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7. L. Hovgaard, S. Frokjaer, M. van de Weert. Pharmaceutical formulation development of peptides and proteins. Taylor & Francis Group, 2013	
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<b>7.2. Laboratory activities (hours)</b>	<b>Observation</b>
<b>1<sup>st</sup> semester</b>	
1. The development of the medicinal product: from formulation to industrial manufacturing.	1 Laboratory
2. Preparation and quality control of deflocculated suspensions. Determination of suspension's stability as a function of the viscosity of the disperse phase, the presence of a viscosity increasing agent. Determining the sedimentation rate and the ability of resuspension.	1 Laboratory
3. Preparation and stability control of emulsions. Preparation of emulsions by different methods. Methods for the evaluation of stability: behavior after centrifugation, the size of droplets of the internal phase, viscosity.	1 Laboratory
4. Preparation and quality control of semisolids (homogeneity, particles size, consistency, spreadability).	1 Laboratory
5. Suppositories. Determination of the displacement factor. Preparation of suppositories by melt molding method, quality control of suppositories.	1 Laboratory
6. Pulverization of powders. Determination of size distribution by sieving (drawing histograms, the curve of cumulative frequency, the determination of the average particles' size). Factors influencing size distribution (the pulverization device).	1 Laboratory
7. The rheology of powders. Determination of the time of flow and of the contact angle. Study of the compaction kinetics and determination of apparent density, porosity, Hausner's report and Carr's Index.	1 Laboratory
8. Mixing of powders. Determination of the influence of mixing time and of particle size on the homogeneity of powders, by quantitative determination of one component and statistical analysis (SD).	1 Laboratory
9. Hard gelatin capsules filling by the use of a hand-operated filling machine. Quality control of capsules (uniformity of mass, disintegration).	1 Laboratory
10. Classical granulation. Preparation of granules by wet granulation and studying the effect of binder's concentration on their properties (particle size distribution, disintegration time).	1 Laboratory
11. Compression. Preparation of tablets through wet granulation and quality control of tablets (uniformity of mass, disintegration, friability, mechanical strength, <i>in vitro</i> dissolution).	1 Laboratory
12. Determination of the shelf-life of tablets and capsules using accelerated degradation studies.	1 Laboratory
13. Determination of the parameters that characterize the sterilization process: the time of decimal reduction, thermal inactivation, the equivalent time, the level of	1 Laboratory

lethality, the sterilizing value.	
<b>2<sup>nd</sup> semester</b>	
1. Formulation and development of the manufacturing process of semisolid preparations for cutaneous applications and suppositories.	2 Laboratories
2. Formulation and development of the manufacturing process of tablets and capsules.	2 Laboratories
3. Preparation and pharmacotechnical evaluation of semisolid preparations for skin applications (ointment, cream, gel) as a generic drug product.	2 Laboratories
4. Preparation and pharmacotechnical evaluation of suppositories as a generic drug product.	2 Laboratories
5. Preparation and pharmacotechnical evaluation of hard gelatin capsules as a generic drug product.	2 Laboratories
6. Preparation and pharmacotechnical evaluation of tablets obtained by wet granulation as a generic drug product.	2 Laboratories
7. Preparation and pharmacotechnical evaluation of coated tablets as a generic drug product.	2 Laboratories
<b>Bibliography</b>	
<ol style="list-style-type: none"> <li>1. S. E. Leucuta, M. Achim I. Tomuta , A. Porfire, R. Iovanov. Industrial Pharmaceutical technology. The laboratory processes. 3rd Edition. University Iuliu Hatieganu Publishing House, Cluj Napoca, 2010.</li> <li>2. <a href="http://www.farma.umfcluj.ro/course/view.php?id=179">http://www.farma.umfcluj.ro/course/view.php?id=179</a></li> <li>3. European Pharmacopoeia Online, current edition, available at: <a href="http://online.phEur.org/EN/entry.htm">http://online.phEur.org/EN/entry.htm</a></li> </ol>	

### 8. Evaluation

Activity type	8.1. Evaluation criteria	8.2. Evaluation methods	8.3. Percent of final grade
<b>8.4. Course</b>	<ul style="list-style-type: none"> <li>• Acquisition of concepts and informations from the course</li> <li>• The ability to identify the specific features of various technologies and pharmaceutical dosage forms</li> </ul>	Written examination: 60 multiple choice questions	<b>60%</b>
<b>8.5. Laboratory</b>	<ul style="list-style-type: none"> <li>• Acquisition of practical skills regarding the preparation and pharmacotechnical control of industrial dosage forms;</li> <li>• The ability to process and analyse the experimental results;</li> <li>• The ability to discuss the results and explain the conclusions in accordance with the obtained results .</li> </ul>	<i>Report</i> - prepared up to the end of each practical work (1 <sup>st</sup> semester) / <i>The project</i> regarding the development of a generic product (2nd semester). (35%) <i>Practical examination</i> – performing pharmaceutical operations of preparation and pharmacotechnical analysis of a pharmaceutical dosage form. (65%)	<b>40%</b>
<b>8.6. Minimal performance standard</b>			
<ul style="list-style-type: none"> <li>• Knowing, understanding and using the basic concepts of formulation, preparation and quality conditions that must be satisfied by medicinal products prepared by pharmaceutical industry.</li> <li>• Preparation of the project on development of a generic drug and preparation of reports comprising the presentation and analysis of results obtained during each practical work.</li> </ul>			

# TOXICOLOGY

## 1. Information about the course

<b>1.1. Discipline</b>			<b>Toxicology</b>				
<b>1.2. Course instructor</b>			<b>Professor Felicia Loghin, PhD Lecturer Anca Cherfan, PhD</b>				
<b>1.3. Laboratory instructor</b>			<b>Professor Bela Kiss, PhD Lecturer Anca Cherfan, PhD Asistant professor Diana Lupu, PhD Asistant professor Ionel Fizeşan, PhD</b>				
<b>1.4. Year</b>	<b>4</b>	<b>1.5. Semester</b>	<b>1,2</b>	<b>1.6. Evaluation type</b>	<b>Written exam + Practical exam</b>	<b>1.7. Course type</b>	<b>Discipline in specialty, Compulsory discipline</b>

## 2. Total estimated time (hours/semester for teaching activity)

<b>2.1. Total hours/week</b>	<b>5 (1<sup>st</sup> sem.) 5 (2<sup>nd</sup> sem.)</b>	<b>2.2. Course</b>	<b>2 2</b>	<b>2.3. Laboratories</b>	<b>3 3</b>
<b>2.4. Total hours in the curriculum</b>	<b>70 (1<sup>st</sup> sem.) 70 (2<sup>nd</sup> sem.)</b>	<b>2.5. Course</b>	<b>28 28</b>	<b>2.6. Laboratories</b>	<b>42 42</b>
<b>2.4. Distribution of time needed (1<sup>st</sup> sem. / 2<sup>nd</sup> sem.)</b>					<b>Hours</b>
a. Study using text books, lecture notes, bibliography					30/30
b. Individual study within libraries, on-line platforms, field research					15/15
c. Preparing seminars/laboratories, homework, projects, portfolios and essays					15/15
d. Tutoring					5/5
e. Evaluation/ semester					5/5
f. Other activities					-
<b>2.7. Total hours for individual study (a+b+c+d)</b>				<b>65 (1<sup>st</sup> sem.) 65 (2<sup>nd</sup> sem.)</b>	
<b>2.8. Total hours per semester</b>				<b>140 (1<sup>st</sup> sem.) 140 (2<sup>nd</sup> sem.)</b>	
<b>2.9. Number of credits</b>				<b>5 (1<sup>st</sup> sem.) 5 (2<sup>nd</sup> sem.)</b>	

## 3. Pre-requisites:

<b>3.1. Curriculum</b>	Knowledge of Analytical chemistry, Organic chemistry, Physiology and physiopathology, Cell Biology, genetics, pathology, Biochemistry, general pharmacology
<b>3.2. Competences</b>	Manipulation of laboratory equipments and instruments

## 4. Requisites:

<b>4.1. For lectures</b>	<ul style="list-style-type: none"> <li>• The students will turn off their mobile phones during the lecture.</li> <li>• The students should be present in the amphitheatre before the beginning of the lecture.</li> <li>• The students should comply with the Regulations of teaching activity of the University.</li> </ul>
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<b>4.2. For laboratories sessions</b>	<ul style="list-style-type: none"> <li>• The students should turn off their mobile phones during the practical lessons.</li> <li>• The students should be present in the laboratory at the time scheduled, according to the timetable.</li> <li>• The students should comply with the Regulations of teaching activity of the university and the protection norms at the work place specific for a Toxicology laboratory.</li> <li>• The students should wear protection clothes when they work in the laboratory.</li> <li>• The results of the analysis must be hand over at the end of each practical lesson.</li> </ul>
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### 5. Specific competences acquired

<b>Professional competences</b>	<p>At the end of the course, the students should be able to:</p> <ul style="list-style-type: none"> <li>- identify a situation when the administration of a drug could be associated with a risk of toxicity and provide the adequate counselling when delivering the drug</li> <li>- identify an intoxication and suggest an emergency treatment</li> <li>- select the steps of a toxicological analysis and apply them for analysing toxic substances in biological or environmental samples and correctly interpret the results, but also correlate the laboratory data with the evolution of the intoxication</li> <li>- participate in the process of the safety evaluation of a new drug, food supplement, cosmetic or health product</li> </ul>
<b>Transversal competences</b>	<p>At the end of the course, the students should:</p> <ul style="list-style-type: none"> <li>- be able to participate in organising champagnes to promote the rational use of drugs, smoking abandonment, reducing alcohol, drugs of abuse and other controlled substances abuse, the protection of the environment, including by drafting leaflets for informing the public</li> <li>- be able to participate in research activities and in writing scientific papers</li> <li>- be able to plan a career in Toxicology and choose the steps to be followed in their continuing education</li> </ul>

### 6. Course objectifs

<b>6.1. General objectives</b>	To give students the basic theoretical and practical Toxicology knowledge with relevance for the pharmaceutical field.
<b>6.2. Specific objectives</b>	<p>To facilitate the learning of:</p> <p>A) theoretical basis regarding:</p> <ul style="list-style-type: none"> <li>- the pathways of a toxicant into the body, the mechanisms of interaction with the body and the main effects as consequence of the interaction</li> <li>- the toxicity and specific effects of the main classes of toxic substances, as well as the methods to prevent and to treat the intoxications</li> </ul> <p>B) practical basis regarding:</p> <ul style="list-style-type: none"> <li>- the types of samples analysed in Toxicology laboratories, their treatment, the specific analytical methods and the principles of interpreting a toxicological analysis for the main classes of toxicants;</li> <li>- the types of tests used for the toxicological evaluation of toxic substances.</li> </ul>

## 7. Content

**Teaching methods for course:** Lectures (PowerPoint presentation), examples, case studies, discussions

**Teaching methods for laboratory activity:** Systematic presentation, examples, demonstrations, laboratory manipulation, problem solving, discussions, seminar

7.1 Course (hours)	Remarks
<b>1. General toxicology:</b> Toxic substances and types of intoxications; Toxicokinetics; Dose-effect relationships in toxicology; Risk evaluation; Factors influencing toxicity; Mechanisms of toxic action; Pathological processes of toxic origin; Prophylaxis and treatment of intoxications.	
<b>2. Clinical toxicology – Toxic gases</b> (Etiology, toxicokinetics, mechanisms of toxicity, clinical presentation, treatment of intoxications): Carbon monoxide; Halogens derivatives; Gaseous compound of nitrogen; Gaseous compounds of sulphur; Hydrocyanic acid.	
<b>3. Clinical toxicology – Volatile substances</b> (Etiology, toxicokinetics, mechanisms of toxicity, clinical presentation, treatment of intoxications): Oil distillates; Aromatic hydrocarbons; halogenated hydrocarbons; Aromatic nitro- and amino-derivatives; Nitrosamines; Alcohols and glycols; carbon disulfide.	
<b>4. Clinical toxicology- Mineral substances</b> (Etiology, toxicokinetics, mechanisms of toxicity, clinical presentation, treatment of intoxications): Strong acids and bases; metals (lead, cadmium, mercury, chromium, manganese, nickel, zinc); Non-metallic substances (arsenic)	
<b>5. Clinical toxicology – Drugs</b> (Etiology, toxicokinetics, mechanisms of toxicity, clinical presentation, treatment of intoxications): hypnotics, tranquilisers, antipsychotics, antidepressants, drugs acting on VNS, antihistaminic drugs, anticonvulsants, analgesic-antipyretic drugs, cardiovascular drugs, anti-infectious drugs	
<b>6. Clinical toxicology – Drugs of abuse</b> (Etiology, toxicokinetics, mechanisms of toxicity, clinical presentation, treatment of intoxications): opioids, cocaine, natural and synthetic hallucinogens, club-drugs, volatiles, new psychoactive substances, doping agents, nicotine	
<b>7. Clinical toxicology – Pesticides</b> (Etiology, toxicokinetics, mechanisms of toxicity, clinical presentation, treatment of intoxications): insecticides, fungicides, rodenticides, herbicides,	
<b>8. Clinical toxicology – Toxins</b> (Etiology, toxicokinetics, mechanisms of toxicity, clinical presentation, treatment of intoxications): Mycotoxins, Toxic mushrooms.	
<b>Bibliography</b>	
<ol style="list-style-type: none"> <li>1. Flomenbaum N.E., Goldfrank L.R., Hoffman R.S, Howland M.A., Lewin N.A., Nelson L.S.: Goldfrank's Toxicologic Emergencies, 8<sup>th</sup> edition, McGraw-Hill, New York, 2006</li> <li>2. Klaassen C.D., ed.: Casarett&amp;Doull's Toxicology. The Basic Science of Poisons, 7<sup>th</sup> edition, McGraw Hill, New York, 2008</li> <li>3. Lee B.-M., Kacew S., Kim H.S., eds.: Lu's Basic Toxicology. Fundamentals, Target Organs and Risk Assessment, 8<sup>th</sup> Edition, CRC Press, Boca Raton 2018</li> <li>4. Loghin F., Toxicologie generală, Editura Medicală Universitară „Iuliu Hațieganu”, Cluj-Napoca, 2002</li> <li>5. Mulder G.J., Dencker L.: Pharmaceutical Toxicology, Pharmaceutical Press, London 2006</li> <li>6. Shannon M.W., Borron S.W., Burns M.J.: Haddad and Winchester's Clinical Management of Poisoning and Drug Overdose, 4<sup>th</sup> edition, Saunders Elsevier, Philadelphia, 2007</li> </ol>	



7. Viala A., Botta A., Toxicologie, ed. 2, Edition TEC & DOC Lavoisier, Paris, 2005	
8. www.farma.umfcluj.ro : Curs Toxicologie, suport PowerPoint	
9. Electronic book data basis AccessPharmacy: <a href="https://accesspharmacy.mhmedical.com/">https://accesspharmacy.mhmedical.com/</a>	
10. Goldfrank's Toxicologic Emergencies, 10e, Robert S. Hoffman, Mary Ann Howland, Neal A. Lewin, Lewis S. Nelson, Lewis R. Goldfrank;	
11. Casarett and Doull's Toxicology: The Basic Science of Poisons, 8e, Curtis D. Klaassen, PhD, <i>editor</i> ;	
12. Casarett & Doull's Essentials of Toxicology, 3e, Curtis D. Klaassen, John B. Watkins III,	
13. Goldfrank's Toxicologic Emergencies, 11e, Lewis S. Nelson, Mary Ann Howland, Neal A. Lewin, Silas W. Smith, Lewis R. Goldfrank, Robert S. Hoffman)	
<b>7.2. Laboratory activities (hours)</b>	<b>Remarks</b>
1. Introduction in Analytical toxicology: types of analysis, types of samples, steps of a toxicological analysis	1 practical session
2. Methods of systematic toxicological analysis: isolation of gases and vapours, isolation of mineral toxic substances, isolation of organic non-volatile substances	3 practical sessions
3. Toxicological evaluation of drugs: conventional and special toxicity studies, testing of mutagenicity by micronucleus test	2 practical sessions
4. Identification of toxic substances in a poly-drug intoxication by chromatographic methods	1 practical session
5. Toxicological analysis of gases (carbon monoxide, hydrogen disulfide, nitrogen oxides) and of certain biological markers (carboxyhemoglobin)	2 practical sessions
6. Toxicological analysis of volatile substances (ethyl alcohol, methyl alcohol, ethylene glycol, phenol, formaldehyde, aniline, hydrocyanic acid)	3 practical sessions
7. Determination of biological markers of intoxications with volatile substances (p-amino-phenol, methemoglobin, thiocyanates, sulphate-index)	2 practical sessions
8. Toxicological analysis of certain drugs from biological samples (barbiturates, benzodiazepines, phenothiazines, tricyclic antidepressants, isoniazid, aspirin, acetaminophen)	5 practical sessions
9. Toxicological analysis of certain drugs (total morphine in urine, analysis of illicit powders by TLC)	1 practical session
10. Toxicological analysis of certain pesticides from biological samples (malathion, paraquat, DNOC)	1 practical lesson
11. Quantification of certain biomarkers of pesticide intoxications (total p-nitrophenol in urine, cholinesterase's activity in blood)	1 practical session
12. Analysis of clinical cases of intoxications	2 practical sessions
13. Application of the toxicological analysis in the diagnosis of certain cases of intoxication	2 practical sessions
<b>Bibliography</b>	
1. Flanagan R.J., Taylor A., Watson I.D., Whelpton R.: Fundamentals of Analytical Toxicology, Wiley, Chichester 2007.	
2. Jickells S., Negrusz A., eds.: Clarke's Analytical Forensic Toxicology, Pharmaceutical Press, London 2008.	
3. Loghin F., Popa D., Kiss B., Anton R., Analize și evaluări toxicologice, Editura Medicală Universitară „Iuliu Hațieganu”, Cluj-Napoca, 2003.	
4. Loghin. F., Popa D., Kiss B., Analyses et evaluations toxicologiques, Editura Medicală Universitară „Iuliu Hațieganu”, Cluj-Napoca, 2004.	

## 8. Evaluation

Activity type	8.1. Evaluation criteria	8.2. Evaluation methods	8.3. Percent of final grade
<b>8.4. Course</b>	<ul style="list-style-type: none"> <li>- Correct understanding and learning of basic knowledge</li> <li>- Capacity to apply the theoretical knowledge to problem solving</li> <li>- Capacity to integrate clinical data with laboratory results in solving a case of intoxication</li> </ul>	Multiple choice exam + problem solving + clinical case analysis	<b>80%</b>
<b>8.5. Laboratory</b>	<ul style="list-style-type: none"> <li>- Knowledge of the principles of a toxicological analysis</li> <li>- Precision of the workflow and of results</li> <li>- Capacity to interpret the results</li> </ul>	Practical exam	<b>20%</b>
<b>8.6. Minimal performance standard</b>			
<ul style="list-style-type: none"> <li>- Knowledge of the main types of intoxications</li> <li>- Knowledge of the main pathways of toxic substances in the organism</li> <li>- Knowledge of the main mechanisms responsible of toxicity</li> <li>- Knowledge of the major toxic effect and specific signs in the most frequent intoxications</li> <li>- Capacity to perform a toxicological analysis based on a given workflow</li> </ul>			

## PHARMACY PRACTICE 4<sup>th</sup> YEAR

### 1. Information about the course

<b>1.1. Discipline</b>		<b>Medical devices. Pharmaceutical practice</b>					
<b>1.2. Course instructor</b>		-					
<b>1.3. Laboratory instructor</b>		Teaching assisntan, PhD stud. Alexandru Gâvan					
<b>1.4. Year</b>	4	<b>1.5. Semester</b>	2	<b>1.6. Evaluation type</b>	Practical exam	<b>1.7. Course type</b>	<b>Speciality discipline, Compulsory discipline</b>

### 2. Total estimated time (hours/semester for teaching activity)

<b>2.1. Total hours/week</b>	<b>30 (2 weeks, 2<sup>nd</sup> sem.)</b>	<b>2.2. Course</b>	-	<b>2.3. Laboratories</b>	<b>30</b>
<b>2.4. Total hours in the curriculum</b>	<b>120</b>	<b>2.5. Course</b>	-	<b>2.6. Laboratories</b>	<b>120</b>
<b>2.4. Distribution of time needed (1<sup>st</sup> sem. / 2<sup>nd</sup> sem.)</b>					Hours
a. Study using text books, lecture notes, bibliography					3
b. Individual study within libraries, on-line platforms, field research					5
c. Preparing seminars/laboratories, homework, projects, portfolios and essays					10
d. Tutoring					1
e. Evaluation/ semester					1
f. Other activities					3
<b>2.7. Total hours for individual study (a+b+c+d)</b>				<b>19 (2<sup>nd</sup> sem.)</b>	
<b>2.8. Total hours per semester</b>				<b>143 (2<sup>nd</sup> sem.)</b>	
<b>2.9. Number of credits</b>				<b>4 (2<sup>nd</sup> sem.)</b>	

### 3. Pre-requisites:

<b>3.1. Curriculum</b>	Knowledge regarding the Romanian pharmaceutical legislation, pharmaceutical technology, drug industry, toxicology, bromatology, pathology, pharmacology, pharmaceutical chemistry, therapeutical chemistry, informatics
<b>3.2. Competences</b>	Acquired during the previous practical internships in pharmacies

### 4. Requisites:

<b>4.1. For lectures</b>	-
<b>4.2. For laboratories sessions</b>	Practice conventions (protocols) elaborated between the Faculty of Pharmacy and partner institutions

### 5. Specific competences acquired

<b>Professional competences</b>	<ul style="list-style-type: none"> <li>• The understanding of the role, responsibilities and obligations related to the profession of pharmacist in other fields of activity (except community pharmacies)</li> <li>• The capacity to observe and know the specific characteristics of the locations where the practical internship takes place</li> <li>• The familiarization with the current legislation regarding the activities performed</li> </ul>
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	<ul style="list-style-type: none"> <li>• The familiarization with specific work principles and methods</li> <li>• The familiarization with specific practical abilities</li> <li>• The capacity to analyse the results obtained during specific activities</li> </ul>
<b>Transversal competences</b>	<ul style="list-style-type: none"> <li>• The identification of the objectives that must be fulfilled during the practical stage</li> <li>• The application of certain communication techniques</li> <li>• Individual professional development</li> </ul>

## 6. Course objectifs

<b>6.1. General objectives</b>	<ul style="list-style-type: none"> <li>• To get to know the specifics of the profession of pharmacist in other sectors/fields in which the pharmacist could perform activities, with the purpose of professional guidance <ul style="list-style-type: none"> <li>○ Hospital pharmacies</li> <li>○ Pharmaceutical storage units</li> <li>○ Industry (production of drugs, phytopharmaceuticals, homeopathic products, alimentary supplements, cosmetics, etc)</li> <li>○ Laboratories (toxicology, environmental hygiene, biomedical)</li> </ul> </li> <li>• The application of the acquired theoretical knowledge into the practical activities performed in pharmacies, under the coordination, surveillance and evaluation of a pharmacist-practical internship coordinator</li> </ul>
<b>6.2. Specific objectives</b>	<ul style="list-style-type: none"> <li>• To understand the role, responsibilities and obligations related to the profession of pharmacist in other fields of activity (except community pharmacies)</li> <li>• To observe and know the specific characteristics of the locations where the practical stage takes place</li> <li>• To get familiar with the current legislation regarding the activities performed</li> <li>• To get familiar with specific work principles and methods</li> <li>• To get familiar with specific practical abilities</li> <li>• To analyse the results obtained during specific activities</li> </ul> <p><i>The specific objectives are established together with the practical internship coordinator (appointed by the practice partner), according to the specific activities performed in the department in which the practical internship takes place.</i></p>

## 7. Content

**Teaching methods for course:** -

**Teaching methods for laboratory activity:** explanation, conversation, questioning, analysis. The analysis how to solve the professional problems encountered.

<b>7.1 Course (hours)</b>	<b>Remarks</b>
-	-
<b>7.2. Laboratory activities (hours)</b>	<b>Remarks</b>
<b>2. Hospital pharmacy</b> <ul style="list-style-type: none"> <li>• The pharmacist's role and responsibilities in the hospital pharmacy</li> <li>• Pharmacist's activity in the hospital pharmacy</li> <li>• The pharmacological characterization of medicinal substances</li> </ul>	
<b>2. Pharmaceutical storage units</b> <ul style="list-style-type: none"> <li>• Principles and good distribution practice guides</li> <li>• Specific procedures for the storage units</li> </ul>	
<b>3. Pharmaceutical industry : main aspects specific for the industrial activity:</b> <ul style="list-style-type: none"> <li>• Quality Assurance system</li> </ul>	

<ul style="list-style-type: none"> <li>• Spaces, equipments, available facilities</li> <li>• The production of medicines</li> <li>• Quality control</li> </ul>	
<b>4. Medical testing laboratories</b> <ul style="list-style-type: none"> <li>• Factors that influence the laboratory testing results</li> <li>• The evaluation and analysis of laboratory data</li> <li>• The informational value of laboratory data</li> </ul>	
<b>5. Toxicology laboratory</b> <ul style="list-style-type: none"> <li>• The identification of toxic substances frequently implied in intoxications</li> <li>• Specific quantitative analysis</li> </ul>	
<b>6. Bromatology laboratory</b> <ul style="list-style-type: none"> <li>• Specific activities and responsibilities</li> <li>• The analysis of water, aer and food</li> </ul>	
<b>Bibliography</b> <ol style="list-style-type: none"> <li>1. Mirel S. (coordonator), Stagiul de inițiere și orientare în practica farmaceutică - Ghid pentru studenții anilor I-IV, Editura Medicală Universitară "Iuliu Hațieganu" Cluj-Napoca, 2013</li> <li>2. Farmacopeea română, Ed. X, Editura Medicală, București, 1993</li> <li>3. Legea nr. 266/2008 a farmaciei, republicată, Monitorul Oficial al României, partea I, nr. 448/2009</li> <li>4. Legea nr. 95/2006 privind reforma în domeniul sănătății, publicată în Monitorul Oficial al României, Partea I nr. 372 din 28/04/2006.</li> <li>5. Ordin al Ministrului Sănătății Publice nr. 1964/02.12.2008 pentru aprobarea Normelor privind înființarea, organizarea și funcționarea unităților de distribuție angro de medicamente de uz uman, publicat în Monitorul Oficial al României, Partea 1, nr. 855/19.12.2008</li> <li>6. Ordin al Ministrului Sănătății Publice nr. 1963/02.12.2008 pentru aprobarea Ghidului privind buna practică de distribuție angro a medicamentelor, publicat în Monitorul Oficial al României, Partea 1, nr. 865/22.12.2008.</li> </ol> <p>Specific bibliography: established by the practice partner, according to the specific activities performed in the sector/field in which the practical stage takes place.</p>	

## 8. Evaluation

Activity type	8.1.Evaluation criteria	8.2. Evaluation methods	8.3.Percent of final grade
<b>8.4. Course</b>	-	-	-
<b>8.5. Laboratory</b>	Criteria regarding the attitude and motivation of the students The way in which the applications proposed are solved (Practical stage guide) The capacity to understand and respond to problems The capacity to discuss and talk adequately	The evaluation of the coordinator pharmacist The way in which the applications are solved  Oral exam	<b>30%</b>  <b>30%</b>  <b>40%</b>
<b>8.6. Minimal performance standard</b>			
The acquirement of basic knowledge regarding: <ul style="list-style-type: none"> <li>• The specific aspects related to the sector/field in which the practical internship takes place</li> <li>• The current legislation regarding the performed activities</li> <li>• The identification of specific work principles and methods</li> </ul>			

## 8.4.2. OPTIONAL COURSES

### DIET THERAPY

#### 1. Information about the course

<b>1.1. Discipline</b>		<b>Bromatology, hygiene, nutrition</b>					
<b>1.2. Course instructor</b>		<b>Prof. Doina Miere, PhD</b>					
<b>1.3. Laboratory instructor</b>		-					
<b>1.4. Year</b>	<b>4</b>	<b>1.5. Semester</b>	<b>1</b>	<b>1.6. Evaluation type</b>	<b>Written exam + Projects</b>	<b>1.7. Course type</b>	<b>Optional discipline</b>

#### 2. Total estimated time (hours/semester for teaching activity)

<b>2.1. Total hours/week</b>	<b>1 (1<sup>st</sup> sem.)</b>	<b>2.2. Course</b>	<b>1</b>	<b>2.3. Laboratories</b>	<b>-</b>
<b>3.4. Total hours in the curriculum</b>	<b>14 (1<sup>st</sup> sem.)</b>	<b>2.5. Course</b>	<b>14</b>	<b>2.6. Laboratories</b>	<b>-</b>
<b>2.4. Distribution of time needed (1<sup>st</sup> sem.)</b>					<b>Hours</b>
a. Study using text books, lecture notes, bibliography					14
b. Individual study within libraries, on-line platforms, field research					14
c. Preparing seminars/laboratories, homework, <b>projects</b> , portfolios and essays					14
d. Tutoring					4
e. Evaluation/ semester					2
f. Other activities					-
<b>2.7. Total hours for individual study (a+b+c+d)</b>				<b>46 (1<sup>st</sup> sem.)</b>	
<b>2.8. Total hours per semester</b>				<b>60 (1<sup>st</sup> sem.)</b>	
<b>2.9. Number of credits</b>				<b>2 (1<sup>st</sup> sem.)</b>	

#### 3. Prerequisites

<b>3.1. Curriculum</b>	Bromatology, Hygiene, Nutrition; Biochemistry; Pathology; Physiology; Pathophysiology.
<b>3.2. Competences</b>	-

#### 4. Requisites

<b>4.1. For lectures</b>	Compliance with the regulation for conducting the teaching activity.
<b>4.2. For laboratories sessions</b>	-

#### 5. Specific competences acquired

<b>Professional competences</b>	<ul style="list-style-type: none"> <li>• Knowing the nutritional requirements of the healthy organism at different physiological stages of life.</li> <li>• Knowing the nutritional requirements of the organism in different pathological conditions.</li> <li>• Acquiring knowledge for dietary intervention in various pathologies.</li> <li>• Ability to explain and interpret the contents of theoretical activities in an interdisciplinary approach with the other fundamental and specialty biomedical disciplines: bromatology, hygiene, nutrition, biochemistry, phytotherapy, biotechnology, genetics, pathophysiology, pharmacology.</li> <li>• Ability to use the specialized terminology adequately and in the right context.</li> </ul>
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	<ul style="list-style-type: none"> <li>Forming an active attitude in counseling patients to adopt an adequate diet therapy depending on pathology and drug therapy.</li> <li>Acquiring pharmacist ability to participate, along with other health professionals, in the formation of a conscious attitude towards the role of a healthy diet and a healthy eating behavior.</li> <li>Understanding the aspects related to the particularities of the research in the diet therapy domain.</li> </ul>
<b>Transversal competences</b>	<ul style="list-style-type: none"> <li>Using the learned concepts in new contexts.</li> <li>Using the theoretical knowledge in solving problems.</li> <li>Optimum and creative use of own potential in scientific activities.</li> <li>Own professional development.</li> </ul>

## 6. Course objectives

<b>6.1. General objectives</b>	<ul style="list-style-type: none"> <li>Knowing, deepening and correctly using the concepts of diet therapy and nutritional intervention.</li> </ul>
<b>6.2. Specific objectives</b>	<ul style="list-style-type: none"> <li>Familiarizing students with the theoretical aspects of dietary intervention in various pathologies.</li> <li>Acquiring knowledge required by future pharmacists to involve in counseling patients to adapt their diet depending on the specific condition and drug therapy.</li> <li>Knowing dietary risk factors in various pathologies.</li> <li>Knowing the principles of diet therapy according to pathology.</li> <li>Understanding the reasons and mechanisms underlying the choosing of a particular dietary intervention.</li> <li>Familiarizing with the main directions of research targeting the diet therapy domain.</li> <li>Practicing the ability of synthesis and bibliographic documentation.</li> </ul>

## 7. Content

<b>7.1.Lectures (hours)</b>	<b>Teaching methods</b>	<b>Observation</b>
<b>Nutrition throughout the life cycle.</b> General principles of nutrition throughout the life cycle: nutrition in pregnancy, nutrition in lactation, nutrition in infants, children, adolescents, adults, elderly. (1 hour)	Lecture, systematic exposure, conversation, problematization.	Oral presentation with PowerPoint presentation.
<b>Diet Therapy.</b> Definition. Objectives. Nutrition in pathological situations - general aspects. <b>1.1.The diet therapy of chronic non-communicable diseases.</b> Oxidative stress. Nutrients and the immune system. <b>1.2.Nutritional interventions</b> in: obesity, diabetes, atherosclerotic cardiovascular diseases, hypertension, cancers. (5 hours)	Lecture, systematic exposure, conversation, problematization.	Oral presentation with PowerPoint presentation.
<b>2.1. Nutritional interventions</b> in hyperuricemia and gout. <b>2.2. Nutritional interventions</b> in diseases of bones: rickets, osteoporosis, osteomalacia. (1 hour)	Lecture, systematic exposure, conversation, Problematization	Oral presentation with PowerPoint presentation.
<b>3. The diet therapy of digestive diseases.</b> Digestive sparing regimen. Nutritional interventions in <i>digestive diseases: oro-pharyngeal, esophageal, gastric</i> (gastritis, ulcer, gastric surgery, gastric cancer),	Lecture, systematic exposure, conversation, problematization.	Oral presentation with PowerPoint

<i>intestinal</i> (diarrhea, malabsorption syndrome - malabsorption of carbohydrates, allergy and intolerance to cow's milk, short bowel syndrome, celiac disease, inflammatory bowel disease, disorders of intestinal motility), <i>hepatic</i> (hepatitis, cirrhosis), <i>pancreatic</i> (acute and chronic pancreatitis, cystic fibrosis) and <i>biliary</i> (gall stones, acute and chronic cholecystitis) diseases. (3 hours)		presentation.
<b>4. Diet therapy in kidney diseases.</b> (1 hour)	Lecture, systematic exposure, conversation, problematization.	Oral presentation with PowerPoint presentation.
<b>5.1. Diet therapy in food allergies.</b> <b>5.2. Diet therapy in skin diseases.</b> (1 hour)	Lecture, systematic exposure, conversation, problematization.	Oral presentation with PowerPoint presentation.
<b>6.1. Diet therapy in eating disorders.</b> Bulimia. Anorexia. <b>6.2. Diet therapy of neurodegenerative disorders</b> (1 hour)	Lecture, systematic exposure, conversation, problematization.	Oral presentation with PowerPoint presentation.
<b>7.1. Diet therapy in anemias.</b> <b>7.2. Diet therapy in inborn errors of metabolism.</b> (1 hour)	Lecture, systematic exposure, conversation, problematization.	Oral presentation with PowerPoint presentation.
<b>8. Food – drug interactions.</b> (1 hour)	Lecture, systematic exposure, conversation, problematization.	Oral presentation with PowerPoint presentation.
<b>Bibliography</b>		
<ol style="list-style-type: none"> <li>Mahan LK, Raymond JL, Krause's Food and the Nutrition Care Process. 13th Edition. USA: Elsevier Saunders, 2017</li> <li>Mahan LK, Raymond JL, Escott-Stump S. Krause's Food and the Nutrition Care Process. 13th Edition. USA: Elsevier Saunders, 2012.</li> <li>Mataix Verdu J. Nutricion y alimentacion humana. Vol. I. Nutrientes y alimentos. 2 ed. Madrid: Ed. Ergon, 2009.</li> <li>Soriano del Castillo JM. Nutricion basica humana, Educacio. Materials 91. Universidad de Valencia, 2006.</li> <li>Salas – Salvado J, Bonada i Sanjuame A, Trallero Casanas R, Salo i Sola ME, Burgos Pelaez R. Nutricion y Dietetica clinica. 2 ed. Barcelona: Elsevier, 2008.</li> <li>Basdevant A, Laville M, Lerebours E. Trait� de nutrition clinique de l'adulte. Paris: Ed. Flammarion M�decine-Sciences, 2001.</li> <li>Mann J, Stewart Truswell A. Essentials of human nutrition. Second edition. Oxford: Ed. University Press, 2003.</li> <li>Encyclopedia of foods. A guide to healthy nutrition. San Diego: Academic Press, 2002.</li> <li>Rance F, Dutau G. Food allergies. Paris: Expansion Formation et Edition, 2008.</li> <li>Brostoff J, Gamlin L. Alergii �i intoleran�e alimentare. Cluj-Napoca: Ed. Polirom, 2009.</li> <li>Creff AF. Manual de dietetic� �n practica medical� curent�. Ia�i: Polirom, 2010.</li> </ol>		



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## 8. Evaluation

Activity type	8.1.Evaluation criteria	8.2. Evaluation methods	8.3.Percent of final grade
<b>8.4. Lectures</b>	General criteria for evaluation (completeness and correctness of knowledge, logical coherence, fluency of expression, force of argumentation). Criteria specific for the discipline. Criteria focusing on aspects of attitude and motivation of students' activities. Ability to understand fundamental issues and to customize.	Written exam: multiple choice exam	<b>50%</b>
	Projects prepared and presented by students (critical analysis of scientific studies on diet therapy – ability to understand the research studied, ability to systematize information, correctness of knowledge, logical coherence, fluency of expression, force of argumentation, quality of bibliography to which the critical analysis has been performed).	Project	<b>50%</b>
<b>8.5. Laboratory</b>	-	-	-
<b>8.6. Minimal performance standard</b>			
Assimilation of the main concepts of nutritional intervention in pathologies such as: <ul style="list-style-type: none"> <li>• digestive diseases,</li> <li>• obesity,</li> <li>• diabetes,</li> <li>• hypertension,</li> <li>• atherosclerotic cardiovascular diseases,</li> <li>• prevention and treatment of cancer,</li> <li>• kidney diseases,</li> <li>• hyperuricemia and gout,</li> <li>• skin diseases,</li> <li>• food allergies,</li> <li>• eating disorders,</li> <li>• anemias,</li> <li>• food-drug interactions etc.</li> </ul>			

# PHYTOTHERAPY

## 1. Information about the course

<b>1.1. Discipline</b>		<b>Pharmacognosy</b>					
<b>1.2. Course instructor</b>		<b>Professor Ilioara Oniga, PhD</b>					
<b>1.3. Laboratory instructor</b>		<b>-</b>					
<b>1.4. Year</b>	<b>4</b>	<b>1.5. Semester</b>	<b>1</b>	<b>1.6. Evaluation type</b>	<b>Project presentation</b>	<b>1.7. Course type</b>	<b>Optional discipline</b>

## 2. Total estimated time (hours/semester for teaching activity)

<b>2.1. Total hours/week</b>	<b>1 (1<sup>st</sup> sem.)</b>	<b>2.2. Course</b>	<b>1</b>	<b>2.3. Laboratories</b>	<b>-</b>
<b>2.4. Total hours in the curriculum</b>	<b>14 (1<sup>st</sup> sem.)</b>	<b>2.5. Course</b>	<b>14</b>	<b>2.6. Laboratories</b>	<b>-</b>
<b>2.4. Distribution of time needed (1<sup>st</sup> sem. / 2<sup>nd</sup> sem.)</b>					<b>Hours</b>
a. Study using text books, lecture notes, bibliography					15
b. Individual study within libraries, on-line platforms, field research					15
c. Preparing seminars/laboratories, homework, projects, portfolios and essays					10
d. Tutoring					1
e. Evaluation/ semester					2 /Isem
f. Other activities					-
<b>2.7. Total hours for individual study (a+b+c+d)</b>				<b>43 (1<sup>st</sup> sem.)</b>	
<b>2.8. Total hours per semester</b>				<b>57 (1<sup>st</sup> sem.)</b>	
<b>2.9. Number of credits</b>				<b>2 (1<sup>st</sup> sem.)</b>	

## 3. Pre-requisites:

<b>3.1. Curriculum</b>	Pharmacognosy, physiology, pathology concepts
<b>3.2. Competences</b>	Knowledge of medicinal plants and their pharmacological properties

## 4. Requisites:

<b>4.1. For lectures</b>	<ul style="list-style-type: none"> <li>The students will attend the courses with the mobile phones turned off, the telephone calls are not allowed during the lectures, neither the leaving of the classes in order to answer a call</li> <li>Being late at courses is not allowed</li> <li>The students will comply with the University regulations considering didactic activities</li> </ul>
<b>4.2. For laboratories sessions</b>	<ul style="list-style-type: none"> <li>-</li> </ul>

## 5. Specific competences acquired

<b>Professional competences</b>	<ul style="list-style-type: none"> <li>The knowledge and the accurate use of phytotherapy terms</li> <li>The knowledge of medicinal plants from scientific phytochemical and pharmacological point of view</li> <li>Ability to understand the therapeutic effect of a phytopreparation, to know the side effects and the interactions with other products or drugs</li> </ul>
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	<ul style="list-style-type: none"> <li>• Ability to evaluate the quality of a phytopreparation</li> <li>• Ability to recommend correctly a phytopreparation, scientifically based phytotherapy</li> <li>• Ability to advice the patients in natural products area and the phytopreparations obtained from those</li> <li>• The knowledge of main research directions in phytotherapy area</li> </ul>
<b>Transversal competences</b>	<ul style="list-style-type: none"> <li>• The use of concepts in new contexts</li> <li>• The use of theoretical concepts in order to solve the problems</li> <li>• The optimal exploitation of their own potential in scientific activities</li> </ul> Self professional development

## 6. Course objectives

<b>6.1. General objectives</b>	<ul style="list-style-type: none"> <li>• The knowledge of medicinal natural products and the phytopreparations considering their applications in therapy</li> </ul>
<b>6.2. Specific objectives</b>	<ul style="list-style-type: none"> <li>• Explanation of therapeutic effects of phytopreparations in correlation with active compounds</li> <li>• The knowledge of scientific basis of natural products use in therapy to treat different diseases, for a adequate therapeutic recommendation</li> <li>• The ability to evaluate the quality and the therapeutic efficacy of a phytopreparation, based on chemical composition</li> <li>• Ability to advice the patients in natural products area and the phytopreparations obtained from those, the knowledge of delivrance conditions and the administration of phytopreparations, side effects, identification of interractions with other products</li> <li>• The knowledge of limits in therapeutical use of medicinal plants</li> <li>• The exploitation of scientific data and their ranking in speciality bibliographic documentation</li> </ul>

## 7. Content

**Teaching methods for course:** Lecture, sistematic oral display and PowerPoint presentations, conversation, asking questions

**Teaching methods for laboratory activity: -**

<b>7.1 Course (14 hours)</b>	<b>Remarks</b>
<b>1. Introduction ,generalities:</b> Pharmaceutical forms, the quality of phytopreparations, alimentary supplements, the actions of main natural compounds, interactions with other substances	<b>2 h</b>
<b>2. Phytotherapy in digestive system diseases – natural products, phytopreparations</b>	<b>1 h</b>
<b>3. Phytotherapy in respiratory system diseases - – natural products, phytopreparations</b>	<b>1 h</b>
<b>4. Phytotherapy in urinary diseases – natural products, phytopreparations</b>	<b>1 h</b>
<b>5. Phytotherapy in cardiovascular diseases – natural products, phytopreparations</b>	<b>1 h</b>
<b>6. Phytotherapy in CNS diseases – natural products, phytopreparations</b>	<b>1 h</b>
<b>7. Phytotherapy in hormonal diseases – natural products, phytopreparations</b>	<b>1 h</b>
<b>8. Phytotherapy in diabetes mellitus – natural products, phytopreparations</b>	<b>1 h</b>
<b>9. Phytotherapy in locomotor system diseases – natural products, phytopreparations</b>	<b>1 h</b>
<b>10. Natural products with immunomodulatory and adaptogen properties - natural products, phytopreparations</b>	<b>1 h</b>

<b>11. Natural products with antioxidant properties - natural products, phytopreparations</b>	<b>1 h</b>
<b>12. Natural products used in dermatology - natural products, phytopreparations</b>	<b>1 h</b>
<b>13. Natural products with vitamins</b>	<b>0.5 h</b>
<b>14. Natural products contraindicated in pregnancy</b>	<b>0.5 h</b>
<b>Bibliography</b>	
<ol style="list-style-type: none"> <li>1. Stănescu U, Miron A, Hăncianu M, Aprotosoiaie C. Bazele farmaceutice, farmacologice și clinice ale fitoterapiei. Ed. "Gr.T.Popa" UMF Iași vol.I-II, 2002.</li> <li>2. Hăncianu M, Stănescu U, Aprotosoiaie C. Bazele farmaceutice, farmacologice și clinice ale fitoterapiei. Ed. "Gr.T.Popa" UMF Iași, vol.III, 2008.</li> <li>3. Schulz V, Hänsel R, Blumenthal M, Tyler VE. Rational Phytotherapy, Springer 2004.</li> <li>4. Scarlat MA, Tohănceanu M. Bazele fitoterapiei. Ed. World Galaxy, 2009.</li> <li>5. Rombi M. Phytothérapie. Conseils et Prescriptions. Ed. Romart, Paris, 2004.</li> <li>6. Mills S, Bone K. Principles and Practice of Phytotherapy, Churchill Livingstone, 2000</li> <li>7. Tămaș M., Oniga Iliora, Benedec Daniela, Florian S. - Ghid pentru recunoașterea și recoltarea plantelor medicinale. Vol. I Flora spontană, Ed. Dacia Cluj-Napoca, 2005</li> <li>8. Oniga Iliora, Tămaș M., Benedec Daniela, Florian S. - Ghid pentru recunoașterea și recoltarea plantelor medicinale. Vol. II. Plante din culturi, Ed. Supergraph Tipo, Cluj-Napoca, 2006</li> <li>9. Benedec Daniela, Oniga Iliora, Toiu A, Tămaș M., Plante medicinale exotice, Ed. Risoprint Cluj Napoca, 2011</li> <li>10. <a href="http://www.farma.umfcluj.ro">www.farma.umfcluj.ro</a> : Curs Fitoterapie, suport PowerPoint</li> </ol>	
<b>7.2. Laboratory activities (hours)</b>	<b>Remarks</b>

## 8. Evaluation

<b>Activity type</b>	<b>8.1.Evaluation criteria</b>	<b>8.2. Evaluation methods</b>	<b>8.3.Percent of final grade</b>
<b>8.4. Course</b>	General criteria of evaluation (the complete and precision of knowledge, the ability of learning the information and the right interpretation, logical thinking).	Projects presentation	<b>100%</b>
<b>8.5. Laboratory</b>			
<b>8.6. Minimal performance standard</b>			
The knowlwdge of phytotherapy terms, the knowlwdge of medicinal natural products <ul style="list-style-type: none"> <li>• The pharmaceutical forms used in phytotherapy, the quality evaluation of phytopreparations</li> <li>• Phytopreparations used in respiratory and digestive disorders</li> <li>• Phytopreparations used in CNS, urinary diseases, locomotor system, diabetes mellitus</li> <li>• Natural products with antioxidant, immunomodulatory, adaptogen, hormonal diseases</li> <li>• Interractions of natural compounds with other substances</li> </ul>			

# INTRODUCTION TO PHARMACOEPIDEMIOLOGY AND PHARMACOECONOMY

## 1. Information about the course

<b>1.1. Discipline</b>		<b>Farmacology, physiology, physiopathology</b>					
<b>1.2. Course instructor</b>		<b>Lecturer Irina Cazacu, PhD</b>					
<b>1.3. Laboratory instructor</b>		<b>-</b>					
<b>1.4. Year</b>	<b>4</b>	<b>1.5. Semester</b>	<b>1</b>	<b>1.6. Evaluation type</b>	<b>Multiple choice questions exam</b>	<b>1.7. Course type</b>	<b>Optional Discipline</b>

## 2. Total estimated time (hours/semester for teaching activity)

<b>2.1. Total hours/week</b>	<b>1 (1<sup>st</sup> sem.)</b> <b>0 (2<sup>nd</sup> sem.)</b>	<b>2.2. Course</b>	<b>1</b> <b>0</b>	<b>2.3. Laboratories</b>	<b>0</b> <b>0</b>
<b>2.4. Total hours in the curriculum</b>	<b>14 (1<sup>st</sup> sem.)</b> <b>0 (2<sup>nd</sup> sem.)</b>	<b>2.5. Course</b>	<b>14</b> <b>0</b>	<b>2.6. Laboratories</b>	<b>0</b> <b>0</b>
<b>2.4. Distribution of time needed (1<sup>st</sup> sem. / 2<sup>nd</sup> sem.)</b>					<b>Hours</b>
a. Study using text books, lecture notes, bibliography					14/0
b. Individual study within libraries, on-line platforms, field research					7/0
c. Preparing seminars/laboratories, homework, projects, portfolios and essays					7/0
d. Tutoring					3/1
e. Evaluation/ semester					1/0
f. Other activities					-
<b>2.7. Total hours for individual study (a+b+c+d)</b>					<b>31 (1<sup>st</sup> sem.)</b>
<b>2.8. Total hours per semester</b>					<b>45 (1<sup>st</sup> sem.)</b>
<b>2.9. Number of credits</b>					<b>2 (1<sup>st</sup> sem.)</b>

## 3. Pre-requisites:

<b>3.1. Curriculum</b>	General and special pharmacology, Biostatistics, Methodology of Scientific Research
<b>3.2. Competences</b>	Knowledge specific to the disciplines studied Ability to analyze and synthesize information

## 4. Requisites:

<b>4.1. For lectures</b>	<ul style="list-style-type: none"> <li>Ongoing compliance with the program and regulation of the activities of the University staff</li> <li>Required materials: laptop, video projector, pointer</li> </ul>
<b>4.2. For laboratories sessions</b>	-

## 5. Specific competences acquired

<b>Professional competences</b>	<ul style="list-style-type: none"> <li>Students will be able to define pharmacoepidemiology and will know the roles of this field in the study of the use and safety of medicines.</li> <li>Students will be able to distinguish between observational and experimental studies.</li> <li>Students will be able to define and differentiate different study methodologies in pharmacoepidemiology (cross-sectional studies, case-control studies, cohort studies and randomized clinical trials) and to know their advantages</li> </ul>
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	<p>and disadvantages.</p> <ul style="list-style-type: none"> <li>• Students will be able to differentiate epidemiological terms such as prevalence, incidence, odds ratio, relative risk, mortality, morbidity, bias, confounding factors and final outcomes.</li> <li>• Students will know the characteristics and usefulness of meta-analysis and systematic review.</li> <li>• Students will be able to define the pharmacoeconomics and will know the roles of this field in assessing the economic impact of pharmaceutical interventions on health systems.</li> <li>• Students will be able to define and differentiate the different study methodologies in the pharmacoeconomics (cost-cost minimization, cost-effectiveness, cost-benefit, cost-utility, quality of life assessment).</li> <li>• Students will know when and how to conduct pharmacoepidemiology and pharmaco-economic studies.</li> <li>• Students will know the usefulness of pharmacoepidemiology and pharmacoeconomics in pharmaceutical practice.</li> </ul>
<b>Transversal competences</b>	<ul style="list-style-type: none"> <li>• Basic knowledge of pharmacoepidemiology and pharmacoeconomics will enable students as future health professionals to conduct research in the field of pharmacy/medicine, in academia or pharmaceutical industry, participate in clinical trials, work in consultancy companies pharmaceutical or regulatory agencies.</li> <li>• Students will be able to use the knowledge of pharmacoepidemiology and pharmacoeconomics in the understanding of the specialized literature and the elaboration of the bachelor's thesis.</li> </ul> <p>Students will link the following subjects: General and Special Pharmacology, Genetic Variability in Pharmacology, Pharmacovigilance, Scientific Research Methodology, Biostatistics</p>

## 6. Course objectifs

<b>6.1.General objectives</b>	<ul style="list-style-type: none"> <li>• Familiarize and sensitize students with the most important concepts and methods in the field of pharmacoepidemiology and pharmacoeconomics</li> </ul>
<b>6.2.Specific objectives</b>	<ul style="list-style-type: none"> <li>• Exploring the ways in which drugs present unique research issues and opportunities</li> <li>• Defining the objectives of pharmacoepidemiology and its role in exploring the use and safety of the drug</li> <li>• Description, understanding and comparison of study methodologies in pharmacoepidemiology and presentation of their usefulness</li> <li>• Presentation of population databases and the importance of their exploration for health systems</li> <li>• Definition of pharmacoeconomics objectives and its role in assessing the economic impact of pharmaceutical interventions on health systems</li> <li>• Description, understanding and comparison of study methodologies in the pharmaco-economics and presentation of their usefulness</li> <li>• Presentation of the pharmacist's role in pharmacoepidemiology and pharmacoeconomics</li> <li>• Discuss the applicability of pharmacoepidemiological and pharmacoeconomic concepts and methods in current pharmaceutical practice</li> </ul>

## 7. Content

**Teaching methods for course:** lecture, systematic exposure, conversation, problem-solving, oral exposures coupled with PowerPoint presentations, interactive communication

**Teaching methods for laboratory activity:** -

<b>7.1 Course (hours)</b>	<b>Remarks</b>
Course 1: Pharmacoepidemiology: History and Definitions. The role of pharmacist in pharmacoepidemiology	<b>1 h</b>
Course 2: Principles of Clinical Pharmacology Relevant to Pharmacoepidemiology	<b>1 h</b>
Course 3: Clinical epidemiology principles relevant to pharmacoepidemiology	<b>1 h</b>
Course 4: Methodology of study in pharmacoepidemiology I	<b>1 h</b>
Course 5: Methodology of study in pharmacoepidemiology II	<b>1 h</b>
Course 6: Data source in pharmacoepidemiology	<b>1 h</b>
Course 7: Systematic synthesis and meta-analysis	<b>1 h</b>
Course 8: Pharmacoeconomics: History and Definitions. Pharmacist's role in pharmacoeconomics	<b>1 h</b>
Course 9: Methodology of study in pharmacoeconomics I	<b>1 h</b>
Course 10: Methodology of study in pharmacoeconomics II	<b>1 h</b>
Course 11: Methodology of study in pharmaco-economics III	<b>1 h</b>
Course 12: When and how should pharmacoepidemiology and pharmaco-economics studies be conducted?	<b>1 h</b>
Course 13: Pharmacoepidemiology and Pharmacoeconomics in Pharmaceutical Practice	<b>1 h</b>
Course 14: Final Course Conclusions. Knowledge assessment	<b>1 h</b>
<b>Bibliography</b>	
<b>Books</b>	
1. Strom BL, Kimmel SE, Hennessy S. Textbook of Pharmacoepidemiology. 2nd Edition, 2013 Wiley Blackwell	
2. Yang YI, West-Strum D. Understanding Pharmacoepidemiology. 2011 McGraw-Hill	
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<b>Articles</b>	
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<b>7.2. Laboratory activities (hours)</b>	<b>Observation</b>
-	-
<b>Bibliography -</b>	-

## 8. Evaluation

Activity type	8.1.Evaluation criteria	8.2. Evaluation methods	8.3. Percent of final grade
<b>8.4. Course</b>	<ul style="list-style-type: none"> <li>• Knowledge gained in the field of pharmacoepidemiology and pharmacoconomics following participation in courses</li> <li>• Knowledge of the definition and roles of pharmacoepidemiology</li> <li>• Knowledge of terms: rate, ratio, proportion, prevalence, incidence, association, exposure, odds ratio, relative risk, mortality, morbidity, bias, confounding factors, outcomes</li> <li>• Knowledge of pharmacoepidemiology research methodologies (randomized clinical trials, case reports, case series, ecological studies, case-control studies, cohort studies, meta-analysis, systematic review)</li> <li>• Knowledge of data sources in</li> </ul>	Multiple choice questions exam	<b>100%</b>



	<p>pharmacoepidemiology</p> <ul style="list-style-type: none"> <li>• Knowledge of the definition and roles of the pharmacoeconomics</li> <li>• Knowledge of terms: effectiveness, efficiency, direct / indirect / intangible costs</li> <li>• Knowledge of pharmacology research methodologies (cost-cost minimization, cost-effectiveness, cost-benefit, cost-utility, patient quality assessment)</li> <li>• Knowing the stages of conducting pharmacoepidemiology and pharmacoeconomics studies</li> <li>• Knowing the applicability of pharmacoepidemiology and pharmacoeconomics in pharmaceutical practice</li> </ul>		
<b>8.5. Laboratory</b>	-	-	-
<b>8.6. Minimal performance standard</b>			
<ul style="list-style-type: none"> <li>• Knowledge of the definition and roles of pharmacoepidemiology</li> <li>• Knowledge of research methodologies in pharmacoepidemiology</li> <li>• Knowledge of the definition and roles of the pharmacoeconomics</li> <li>• Knowledge of research methodologies in pharmacoeconomics</li> <li>• Knowing the role of the pharmacist in pharmacoepidemiology and pharmacoeconomics</li> </ul>			

## CAREER GUIDANCE

### 1. Information about the course

<b>1.1. Discipline</b>		<b>Pharmaceutical technology and biopharmacy</b>					
<b>1.2. Course instructor</b>		<b>Associate Professor Elena Dinte, PhD</b>					
<b>1.3. Laboratory instructor</b>							
<b>1.4. Year</b>	<b>4</b>	<b>1.5. Semester</b>	<b>1<sup>st</sup></b>	<b>1.6. Evaluation type</b>	<b>Written exam</b>	<b>1.7. Course type</b>	<b>Optional discipline</b>

### 2. Total estimated time (hours/semester for teaching activity)

<b>2.1. Total hours/week</b>	<b>1 (1<sup>st</sup> sem.)</b>	<b>2.2. Course</b>	<b>1</b>	<b>2.3. Laboratories</b>	<b>-</b>
<b>2.4. Total hours in the curriculum</b>	<b>14 (1<sup>st</sup> sem.)</b>	<b>2.5. Course</b>	<b>14</b>	<b>2.6. Laboratories</b>	<b>-</b>
<b>2.4. Distribution of time needed (1<sup>st</sup> sem.)</b>					<b>Hours</b>
a. Study using text books, lecture notes, bibliography					15
b. Individual study within libraries, on-line platforms, field research					10
c. Preparing seminars/laboratories, homework, projects, portfolios and essays					10
d. Tutoring					3
e. Evaluation/ semester					1
f. Other activities					-
<b>2.7. Total hours for individual study (a+b+c+d)</b>				<b>38 (1<sup>st</sup> sem.)</b>	
<b>2.8. Total hours per semester</b>				<b>52 (1<sup>st</sup> sem.)</b>	
<b>2.9. Number of credits</b>				<b>2 (1<sup>st</sup> sem.)</b>	

### 3. Pre-requisites:

<b>3.1. Curriculum</b>	<ul style="list-style-type: none"> <li>Pharmaceutical Technology, Pharmaceutical organization, Pharmacology, Pharmaceutical chemistry and therapeutics, physico-chemical analysis of the drug.</li> </ul>
<b>3.2. Competences</b>	-

### 4. Requisites:

<b>4.1. For lectures</b>	<ul style="list-style-type: none"> <li>Laptop and Projector</li> </ul>
<b>4.2. For laboratories sessions</b>	<ul style="list-style-type: none"> <li></li> </ul>

### 5. Specific competences acquired

<b>Professional competences</b>	<ul style="list-style-type: none"> <li>Recognition of competences and specific requirements of each area of activity of the profession of pharmacy;</li> <li>The importance of making connections between learning and practical application of theoretical concepts acquired in conjunction with the stages of career development;</li> <li>Understanding the importance of information, guidance and counseling through the characteristics of the beneficiaries and the specific difficulties in career;</li> <li>Ability to select a career field/job based on professional objectives and values and personality traits;</li> </ul>
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	<ul style="list-style-type: none"> <li>• Developing a positive attitude towards career development</li> </ul>
<b>Transversal competences</b>	<ul style="list-style-type: none"> <li>• Communication and teamwork.</li> </ul>

## 6. Course objectifs

<b>6.1. General objectives</b>	<ul style="list-style-type: none"> <li>• Increasing academic performance of students by targeting learning and knowledge acquired by the student to/towards practice;</li> </ul>
<b>6.2. Specific objectives</b>	<ul style="list-style-type: none"> <li>• Knowing the competencies and skills required by each field of pharmaceutical activity;</li> <li>• Developing skills to interact with pharmacists/pharmaceutical professionals; Developing the skills to identify professional goals consistent with the personality;</li> <li>• Creating a positive attitude towards career development.</li> </ul>

## 7. Content

**Teaching methods for course:** Academic lectures, systematic exposure, conversation, conceptual clarification, interactive communication, debate with guest in the field.

<b>7.1 Course (hours)</b>	<b>Remarks</b>
1. Occupation - definitions, items, skills levels. Pharmacy-profession-specific attributes; the general framework of specific meanings and interactions in pharmaceutical field, specialized knowledge, professional ethics, self-organization, etc. The pharmacist: health professional. Professional career- definitions, positions, activities, work experience. Career concept from the perspective of counseling during professional training and career guidance: evolution and meaning, mechanisms involved. Importance of programs and career counseling activities. Preliminary issues concerning vocational development: conceptual clarifications, key concepts, applications for the context in Romania.	<b>2 h</b>
2. The pharmacist in the community pharmacy–urban pharmacy, rural pharmacy, independent pharmacy, chain, etc.	<b>2 h</b>
3. Pharmacists and pharmaceutical marketing.	<b>1 h</b>
4. Pharmacists in hospital pharmacy- member of medical team.	<b>1 h</b>
5. Activity of pharmacist in pharmaceutical industry.	<b>2 h</b>
6. The pharmacist as researcher and teacher.	<b>1 h</b>
7. The activity of the pharmacist in the lab (clinical, toxicology, etc.)	<b>1 h</b>
8. The activity of the pharmacist in other fields (cosmetic industry, food industry, etc.). The pharmacist as member of the governing bodies of the medical and pharmaceutical field, involvement and support in the development of health policies; verification/ inspection activity of regulatory compliance and ethical norms; the economic role of the pharmacist; work in ministries, health insurance funds, public health, the National Medicines Agency (1 hour).	<b>1 h</b>
9. Career guidance as a source of self-knowledge. Personality types. Career change. Identifying objectives and skills. Selection criteria of the professional field / job. Matching person–environment interaction and career development. Interests, abilities and personal and professional values. The management of the transition from school to work. Career planning, career management at the individual level and at the level of professional organizations. Leadership. CV elaboration. Interview preparation. Exercises/tests establishing professional goals, identifying personality.	<b>3 h</b>

**Bibliography**

1. Lemeni, G., Negru, O. (2004). Planificarea carierei. În Lemeni, G și Miclea, M. (Eds), *Consiliere și orientare – Ghid de educație pentru carieră*, (pp. 143-190). Editura ASCR, Cluj-Napoca. (accesibil la biblioteca Facultății de Psihologie și Științe ale Educației)
2. Crocetti, E., Schwartz, S.J., Fermani, A., & Meeus, W. (2010). The Utrecht-Management of Identity Commitments Scale (U-MICS). Italian Validation and Cross-National Comparisons. *European Journal of Psychological Assessment*, 26, 172–186.
3. Lent, R. W., & Brown, S. D. (2006). On conceptualizing and assessing social cognitive constructs in career research: a measurement guide, *Journal of Career Assessment*, 14, 12-35.
4. Whiston S. C. (2002). Application of the Principles: Career Counseling and Interventions. *The Counseling Psychologist*; 30; 218-237.

**8. Evaluation**

<b>Activity type</b>	<b>8.1. Evaluation criteria</b>	<b>8.2. Evaluation methods</b>	<b>8.3. Percent of final grade</b>
<b>8.4. Course</b>	- Knowledge of competencies and skills requirements imposed by each pharmaceutical field; -Identifying professional goals.	Written exam	<b>100%</b>
<b>8.5. Laboratory</b>	-	-	-
<b>8.6. Minimal performance standard</b>			
Course: knowledge of competencies and skills requirements imposed by each pharmaceutical field; identifying the area of professional interest. Conditions for passing the exam: at least 5points (based on the written exam).			

# TOXIC PLANTS

## 1. Information about the course

<b>1.1. Discipline</b>		<b>Pharmacognosy</b>					
<b>1.2. Course instructor</b>		<b>Associate professor Daniela Hanganu, PhD</b>					
<b>1.3. Laboratory instructor</b>		<b>-</b>					
<b>1.4. Year</b>	<b>4</b>	<b>1.5. Semester</b>	<b>1</b>	<b>1.6. Evaluation type</b>	<b>written exam</b>	<b>1.7. Course type</b>	<b>Optional discipline</b>

## 2. Total estimated time (hours/semester for teaching activity)

<b>2.1. Total hours/week</b>	<b>1 (1<sup>st</sup> sem.)</b>	<b>2.2. Course</b>	<b>1</b>	<b>2.3. Laboratories</b>	<b>-</b>
<b>2.4. Total hours in the curriculum</b>	<b>14 (1<sup>st</sup> sem.)</b>	<b>2.5. Course</b>	<b>14</b>	<b>2.6. Laboratories</b>	<b>-</b>
<b>2.4. Distribution of time needed (1<sup>st</sup> sem. / 2<sup>nd</sup> sem.)</b>					<b>Hours</b>
a. Study using text books, lecture notes, bibliography					15/-
b. Individual study within libraries, on-line platforms, field research					15/-
c. Preparing seminars/laboratories, homework, projects, portfolios and essays					10/-
d. Tutoring					1
e. Evaluation/ semester					2
f. Other activities					-
<b>2.7. Total hours for individual study (a+b+c+d)</b>				<b>43 (1<sup>st</sup> sem.)</b>	
<b>2.8. Total hours per semester</b>				<b>57 (1<sup>st</sup> sem.)</b>	
<b>2.9. Number of credits</b>				<b>2 (1<sup>st</sup> sem.)</b>	

## 3. Pre-requisites:

<b>3.1. Curriculum</b>	Knowledge of pharmaceutical botany, organic chemistry, pharmacognosy
<b>3.2. Competences</b>	To know the medicinal plants botanically and phytochemically

## 4. Requisites:

<b>4.1. For lectures</b>	<ul style="list-style-type: none"> <li>• Students' mobile phones must be turned off during the course. Telephone conversations during the course will not be tolerated; students may not leave the course room to take personal phone calls.</li> <li>• Students must be on time for the course, no delays will be tolerated.</li> <li>• Students must comply with the Academic Regulations of the University.</li> </ul>
<b>4.2. For laboratories sessions</b>	-

## 5. Specific competences acquired

<b>Professional competences</b>	<ul style="list-style-type: none"> <li>• ability to use the specialty terminology appropriately and in context</li> <li>• knowing the medicinal plants with toxic and allergenic potential from a botanical point of view</li> <li>• knowing the symptomatology of various types of acute and chronic plant intoxications</li> <li>• knowing the first aid therapeutic means in case of plant intoxications</li> <li>• developing a conscientious and responsible rapport when giving first aid in</li> </ul>
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	<p>case of plant intoxications</p> <ul style="list-style-type: none"> <li>• developing an active attitude in preventing intoxication with plants in general and with medicinal plants in particular</li> <li>• using the information about vegetal toxicology when delivering medicines, dietary supplements, cosmetics and other health products</li> <li>• counselling on the toxic risk of some active biological compounds</li> <li>• developing the ability to apply the botanical and phytochemical knowledge of plants in the pharmaceutical and medical field, in population education</li> <li>• using the vegetal toxicology information in informing and educating the population</li> </ul>
<b>Transversal competences</b>	<ul style="list-style-type: none"> <li>• Own professional development</li> <li>• Using the theoretical notions in solving problems</li> <li>• Using the notions in new contexts</li> <li>• Optimum, creative employment of own potential in scientific activities</li> </ul>

## 6. Course objectifs

<b>6.1. General objectives</b>	<ul style="list-style-type: none"> <li>• Acquiring, deepening and using appropriately the notions of vegetal toxicology</li> </ul>
<b>6.2. Specific objectives</b>	<ul style="list-style-type: none"> <li>• Familiarizing students with aspects regarding the application of theoretical and practical principles of vegetal toxicology, laying emphasis on identifying the toxic plants, on marking out the toxic natural compounds</li> <li>• Acquiring knowledge of the main botanical, phytochemical and toxicological characteristics of the plants with toxic, allergenic potential</li> <li>• Acquiring knowledge of the plant intoxication symptomatology</li> <li>• Familiarizing with the main research directions regarding this field</li> <li>• Practising the ability of synthesis and bibliographic documentation</li> <li>• Emphasizing the pharmacist's role in informing and educating the population with regard to toxicity of plants</li> </ul>

## 7. Content

Teaching methods for course:

Teaching methods for laboratory activity: -

<b>7.1 Course (hours)</b>	<b>Remarks</b>
<p><b>1. Generalities.</b> Intoxications with plants. The circumstances of incidents and accidents with plants in children and adults. The risks of plant intoxication associated with phytotherapy and nutrition. The side effects of using medicinal plants. Difficulties in ascribing adverse effects. Statistics regarding frequency of plant intoxications. The legislative framework regarding the legal status of toxic plants.</p> <p>Chemical classification of toxic chemical components of vegetal origin.</p> <p>Pharmacist's role in informing and educating the masses with regard to plant toxicity.</p>	<b>3 h</b>
<p><b>2. Cultivated, ornamental and wild toxic plants.</b></p> <p>Atropa belladonna, Convallaria majalis, Rheum sp. Digitalis sp., Solanum sp., Datura innoxia, Arum maculatum, Conium maculatum, Euonymus europaeus, Cicuta virosa, Brionia sp., Aconitum sp., Melilotus officinalis, Xanthium sp., Pteridium aquilinum, Buxus sempervirens, Narcissus sp., Primula sp., Taxus baccata, Hedera helix, Dieffenbachia sp, Nerium oleander, etc. – botanical, phytochemical, toxicological data.</p>	<b>3 h</b>
<p><b>3. Plants causing dermatitis, allergy and photosensitivity.</b></p>	<b>3 h</b>

Tamus communis, Euphorbia sp., Daphne mezereum, Hypericum perforatum, Fagopyrum sagittatum, Ruta graveolens, Ammi majus, Angelica archangelica, etc. - botanical, phytochemical, toxicological data.	
<b>4. Toxicity of aromatic plants. Plants containing toxalbumines. Plants with hallucinogenic potential.</b> Artemisia absinthium, Humulus lupulus, Thuja occidentalis, Viscum album, Ricinus communis, Phytolacca americana, Echinocactus williamsii Catha edulis, Pssilocybe sp., Peganum harmala, Secale cornutum Rivea corymbosa, Ipomoea violacea, Tabernanthe iboga, Myristica fragrans, Amanita muscaria, Datura arborescens, Datura metel, Datura sanguinea, Atropa belladonna, Erythroxyton coca, etc. - botanical, phytochemical, toxicological data.	<b>3 h</b>
<b>5. Medical conduct in case of plant intoxication.</b> Intoxication etiology. Symptomatology. Botanical diagnosis. Intoxication evolution. Clinical diagnosis. Treatment. Prognosis.	<b>2 h</b>
<b>Bibliography</b> 1. Daniela Benedec, Ilioara Oniga, Anca Toiu, Mircea Tămaș, Plante medicinale exotice, Cluj-Napoca, Ed. Risoprint, 2011 2. Ilioara Oniga, Mircea Tămaș, Daniela Benedec, Simion Florian, Ghid de recunoașterea și recoltarea plantelor medicinale, vol.II, Plante din cultură, Cluj-Napoca, Ed. Supergraph, 2006 3. Daniela Hanganu, H. Popescu. Plante toxice. Cluj-Napoca: Ed. Medicală Universitară "Iuliu Hatieganu", 2002. 4. J. Bruneton. Plantes toxique. Vegetaux dangereux pour l'homme et les animaux. Londra, Paris, New York: Edition TEC& DOC, 1996. 5. J. Bruneton. Pharnacognosie. Phytochimie. Plantes medicinales. Londra, Paris, New York: Edition TEC & DOC, 1999. 6. V. Zanoschi, E. Turenschi, M.Toma. Plante toxice din România. București: Ed. Ceres, 1981. 7. <a href="http://www.farma.umcluj.ro">www.farma.umcluj.ro</a> : <b>Curs Plante toxice, PowerPoint handout</b>	
<b>7.2. Laboratory activities (hours)</b>	-

## 8. Evaluation

Activity type	8.1.Evaluation criteria	8.2. Evaluation methods	8.3.Percent of final grade
<b>8.4. Course</b>	General evaluation criteria (completeness and accuracy of knowledge, logical coherence, fluency, argumentative power) Criteria specific to discipline Criteria regarding attitudinal and motivational aspects of students' activities Ability to understand fundamental problems and particularize	Essays, written multiple choice exam	<b>100%</b>
<b>8.5. Laboratory</b>	-	-	-
<b>8.6. Minimal performance standard</b>			
Acquiring the main notions of vegetal toxicology <ul style="list-style-type: none"> <li>• Classification of the toxic chemical components of vegetal origin</li> <li>• Knowledge of the botanical characteristics of toxic plants</li> <li>• Cultivated toxic plants (medicinal, food, ornamental) and wild toxic plants</li> <li>• Risks of plant intoxications associated with phytotherapy or food</li> <li>• Symptomatology of intoxications with various plants</li> <li>• Medical conduct in case of plant intoxications</li> <li>• The legislative framework regarding the legal status of toxic plants</li> </ul>			

8.5. CURRICULA OF THE V<sup>th</sup> YEAR OF PHARMACY 2019 - 2020

UNIVERSITY	University of Medicine and Pharmacy " Iuliu Hațieganu" Cluj-Napoca	STUDY PROGRAM	PHARMACY
FACULTY	PHARMACY	GRADUATION TITLE	PHARMACIST
FIELD	HEALTH	PERIOD OF STUDIES	5 YEARS
REGLEMENTATION	SECTORIAL	STUDY UNITS	300

No. crt.	Cod	Course	Category	Total no. of credits			Total hours/ university year		I <sup>st</sup> Semester		II <sup>nd</sup> Semester		Examination form	
				Total	S1	S2	Course	Practical lessons	Course/ week	P/ week	Course/ week	P/ week	S1	S2
1	EN_FAR-5-S02-01	Pharmaceutical analysis	Oblig DS	6	6		42	42	3	3			E1	
2	EN_FAR-5-S01-02	Pharmaceutical care	Oblig DS	5		5	14	28			1	2		E2
3	EN_FAR-5-S02-03	Patient communication and counseling in the Pharmacy - Integrated Course	Oblig DS	5		5	14	14			1	1		E2
5	EN_FAR-5-S02-04	Dermatopharmacy and cosmetology	Oblig DS	4	4		28	28	2	2			E1	
6	EN_FAR-5-S02-05	Clinical pharmacy-Pharmacotherapy	Oblig DS	6	6		42	42	3	3			E1	
7	EN_FAR-5-S02-06	Pharmacovigilance	Oblig DS	2	2		14		1				E1	
8	EN_FAR-5-S02-07	Public health and health policies	Oblig DD	2	2		14	14	1	1			E1	
9	EN_FAR-5-S02-08	Pharmaceutical legislation and deontology	Oblig DS	4	4		28	28	2	2			E1	
10	EN_FAR-5-S02-09	Management and marketing	Oblig DS	2	2		28		2				E1	
11	EN_FAR-5-S02-10	Homeopathic drugs and veterinary drugs	Oblig DS	2	2		14	14	1	1			E1	
12	EN_FAR-5-S02-11	First aid	Oblig DS	2		2	8	6						E2
13	EN_FAR-5-S02-12	In service training - 26 weeks, 30 hours / week	Oblig DS	18		18		780						C2
14	EN_FAR-5-S02-13	The elaboration of the licence thesis 100 hours	Oblig DS	2 suppl.		2		100						C2
15	EN_FAR-5-S02-15	<b>Optional courses</b>		2	2		14		1				V1	
15.1	EN_FAR-5-S02-15.1	Pharmacy as business	Optional											
15.2	EN_FAR-5-S02-15.2	Geriatric pharmacotherapy	Optional											
15.3	EN_FAR-5-S02-15.3	Gemotherapeutic products	Optional											
15.4	EN_FAR-5-S02-15.4	Genetic variability in pharmacology	Optional											
15.5	EN_FAR-5-S02-15.5	Intellectual property protection by means of patents	Optional											
	<b>Total hours/week</b>	<b>TOTAL</b>		<b>60</b>	<b>30</b>	<b>30</b>	<b>260</b>	<b>1096</b>	<b>16</b>	<b>12</b>	<b>2</b>	<b>3</b>	<b>9E</b>	<b>4E+2C</b>
	<b>16.50</b>			<b>60+2S</b>		<b>30+2S</b>	<b>1356</b>		<b>28</b>		<b>5</b>			

E = examen; C = colloque; \* = seminar

RECTOR,  
Prof.dr. Alexandru Irimie

DEAN,  
Prof.dr. Gianina Crișan



## 8.5.1. COMPULSORY COURSES

### PHARMACEUTICAL ANALYSIS

#### 1. Information about the course

<b>1.1. Discipline</b>		<b>Pharmaceutical Analysis</b>					
<b>1.2. Course instructor</b>		<b>Associate professor Cristina Adela Iuga, PhD</b>					
<b>1.3. Laboratory instructor</b>		<b>Assistant professor Alina Uifălean, PhD</b>					
<b>1.4. Year</b>	5	<b>1.5. Semester</b>	1	<b>1.6. Evaluation type</b>	Written exam + Practical exam	<b>1.7. Course type</b>	<b>Specialty Compulsory</b>

#### 2. Total estimated time (hours/semester for teaching activity)

<b>Total hours/week</b>	<b>6 (1<sup>st</sup> sem.)</b>	<b>2.1. Course</b>	<b>3</b>	<b>2.2. Laboratories</b>	<b>3</b>
<b>2.3. Total hours in the curriculum</b>	<b>84 (1<sup>st</sup> sem.)</b>	<b>2.4. Course</b>	<b>42</b>	<b>2.5. Laboratories</b>	<b>42</b>
<b>2.6. Distribution of time needed (1<sup>st</sup> sem.)</b>					<b>Hours</b>
a. Study using text books, lecture notes, bibliography					42
b. Individual study within libraries, on-line platforms, field research					15
c. Preparing seminars/laboratories, homework, projects, portfolios and essays					24
d. Tutoring					2
e. Evaluation/ semester					8
f. Other activities					
<b>2.7. Total hours for individual study (a+b+c+d)</b>					<b>91 (1<sup>st</sup> sem.)</b>
<b>2.8. Total hours per semester</b>					<b>175 (1<sup>st</sup> sem.)</b>
<b>2.9. Number of credits</b>					<b>6 (1<sup>st</sup> sem.)</b>

#### 3. Prerequisites:

<b>3.1. Curriculum</b>	<ul style="list-style-type: none"> <li>– Inorganic chemistry – chemical reactions classification; neutralization reactions, hydrolysis reactions, precipitation reactions; redox reactions. Acid-base theories. Acid-base classification. Acid-base strength assessment</li> <li>– Organic chemistry – heterocyclic compounds</li> <li>– Physical chemistry - chemical kinetics - reaction orders 0, 1 and 2; Arrhenius equation; factors affecting reaction rate; influence of polarity, ionic strength and dielectric constant on speed of reaction</li> <li>– Mathematics and biostatistics: correlation and regression, statistical hypothesis testing, nonparametric methods</li> <li>– Analytical chemistry: volumetric and instrumental methods of analysis (separative, spectral, mass spectrometry, nuclear magnetic resonance)</li> </ul>
<b>3.2. Competences</b>	<ul style="list-style-type: none"> <li>– Conceptual knowledge for characterization of chemicals by physico-chemical methods</li> <li>– Conceptual knowledge of chemical reaction kinetics</li> <li>– Conceptual knowledge and correlations between physico-chemical properties and analytical methodologies applied to drugs identification</li> <li>– Conceptual knowledge of qualitative and quantitative evaluation of</li> </ul>

	pharmaceutical dosage forms – Conceptual knowledge and interpretation of factors affecting pharmaceutical dosage forms stability and shelf-life
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#### 4. Requisites:

<b>4.1. For lectures</b>	Prelegere orală pe baza de prezentare powerpoint de trei ore repartizată, în sesiuni de maxim 50 minute cu pauze de minim de 10 minute
<b>4.2. For laboratories sessions</b>	Studentii se vor prezenta la activitățile practice de laborator cu halate de protecție; activitatea practică începe cu discutarea lucrării/lor programate în ziua respectivă și se încheie cu predarea unui buletin de analiză pentru fiecare formă farmaceutică analizată; timpul de pauză este individual dependent de necesitățile impuse de tehnicile de lucru.

#### 5. Specific competences acquired

<b>5.1. Professional competences</b>	<ul style="list-style-type: none"> <li>• To evaluate compatibility between excipient/excipient, drug/excipient, drug/drug in the preformulation stage of development of drugs, food supplements/nutraceuticals, cosmetics and other health products;</li> <li>• To evaluate the stability of drugs, food supplements/nutraceuticals, cosmetics and other health products and to establish the appropriate shelf-life, storage and distribution;</li> <li>• To perform qualitative and quantitative analysis of pharmaceuticals, food supplements/nutraceuticals, cosmetics and other health products;</li> <li>• To understand and apply the quality standards recommended by the European Pharmacopoeia, Good Laboratory Practice Principles and other international standards.</li> <li>• To offer consultancy and expertise for elaboration of quality control dossier of the final product</li> <li>• To offer consultancy and expertise for analytical and bioanalytical method validation.</li> </ul>
<b>5.2. Transversal competences</b>	<ul style="list-style-type: none"> <li>• To conceive the framework for the implementation of the specific tasks (control dossier of the final product, stability testing protocols, analytical and bioanalytical method validation protocols) taking in account working hours, available resources and appropriate time framing.</li> <li>• To perform specific tasks in a multidisciplinary team (development stage, testing and final product)</li> <li>• To use efficiently informatic tools, communication and professional assisted training resources (Internet, software applications, databases, on-line courses etc.) both in Romanian and other international language.</li> </ul>

#### 6. Course objectives (derived from the specific competences acquired)

<b>6.1. General objectives</b>	– Learning and understanding the standards of quality and methodology of analysis necessary for quality assurance of industrial medicine and galenicals in order for students to know, interpret and apply them in practice.
<b>6.2. Specific</b>	– Learning, understanding and applying appropriate regulations to ensure the

<b>objectives</b>	quality of pharmaceuticals – Selecting and applying appropriate analytical methods to evaluate the quality of pharmaceuticals, food supplements, cosmetics and other health products – Interpretation of the experimental results – Writing an analysis report
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## 7. Content

**Teaching methods for course:** lectures supported by PowerPoint presentations, interactive communication

**Teaching methods for laboratory activity:** Oral communication, problem-based learning, demo videos, practical activities of individual

Lectures (hours)	Remarks
1. Drug control organization in Romania. Rules of Good Laboratory Practice	<b>3 h</b>
2. Physical and chemical properties used for drug analysis (density, refractive index, optical rotation).	<b>3 h</b>
3. Extractive methods applied in pharmaceutical analysis	
4. Applications of volumetric methods used for analysis of pharmaceutical dosage forms. Aqueous and non-aqueous volumetry. Argentometry. Complexometry. Redox titration. Karl – Fischer determination of water. Automatization of volumetric methods.	<b>8 h</b>
5. Applications of spectrophotometric UV-VIS method in pharmaceutical analysis. Qualitative and quantitative applications. Derivative UV-VIS. Applications of spectrofluorimetry in pharmaceutical analysis. Spectrophotometric methods IR / NIR in pharmaceutical analysis.	<b>5 h</b>
6. Application of separative methods (HPLC, GC, HPLC, CE) in pharmaceutical analysis.	<b>9 h</b>
7. Application of mass spectrometry in pharmaceutical analysis. Coupling with other analytical methods.	<b>3 h</b>
8. Applications of thermal analysis (TG, DSC) in pharmaceutical analysis.	<b>2 h</b>
9. Validation of analytical and bioanalytical methods. Standard Operating Procedures (SOP).	<b>3 h</b>
10. Drugs stability. Factors affecting the stability. Improving the stability of pharmaceutical dosage forms. Shelf-life evaluation in stress and normal storage condition Applications.	<b>6 h</b>
<b>References</b>	
1. Analiza Medicamentului. www.farma.umfcluj.ro 2. *** - Farmacopeea Europeana, ed. a 9.7, online, 2018 <a href="http://www.umfcluj.ro/component/k2/item/1178-abonamente-curente">http://www.umfcluj.ro/component/k2/item/1178-abonamente-curente</a> 3. Watson D. G. Pharmaceutical Analysis, A textbook for pharmacy students and pharmaceutical chemists. Second edition. Oxford: Elsevier; 2005 4. Muntean D.L., Bojita M. – Controlul Medicamentelor, Metode spectrale, cromatografice, si electroforetice de analiza, Ed.Medicala Universitara „Iuliu Hatieganu”,2004. 5. Bojiță M., Roman L., Sandulescu R., Oprean R. -Analiza si controlul medicamentelor. Volumul 2 Metode instrumentale in analiza si controlul medicamentelor, Ed. Intelcredo, Deva, 2003 6. Bojiță M., Roman L., Sandulescu R., Oprean R. - Analiza si controlul medicamentelor. Volumul 1 Bazele teoretice si practice, Ed. Intelcredo, Deva, 2002	

7. Xu Q.A., Trissel L.A.- Stability-Indicating HPLC Methods for Drug Analysis. WashingtonDC: American Pharmaceutical Association; 1990.	
<b>Laboratory activities (hours)</b>	<b>Remarks</b>
1. Qualitative and quantitative analysis of aqueous hydro-alcoholic and oily solutions.	<b>12 h</b>
2. Qualitative and quantitative analysis of syrups	<b>3 h</b>
3. Qualitative and quantitative analysis of suspensions and emulsions	<b>3 h</b>
4. Qualitative and quantitative analysis of ointments	<b>3 h</b>
5. Qualitative and quantitative analysis of suppositories	<b>3 h</b>
6. Qualitative and quantitative analysis of powders, tablets and capsules	<b>18 h</b>
<b>Bibliography</b>	
1. Iuga CA, Heghes SC, Rus LM, Uifalean A, Ilieş M, Nicoară R. Ghid practic de analiza medicamentului. Editura Medicala Universitara "Iuliu Hatieganu", Cluj Napoca, 2017	
2. Science direct. <a href="http://www.sciencedirect.com/">http://www.sciencedirect.com/</a>	
3. PubMed. <a href="http://www.ncbi.nlm.nih.gov/pubmed">http://www.ncbi.nlm.nih.gov/pubmed</a>	
4. PubChem. <a href="http://pubchem.ncbi.nlm.nih.gov/">http://pubchem.ncbi.nlm.nih.gov/</a>	
5. FDA. <a href="http://www.fda.gov/">http://www.fda.gov/</a>	
6. BioMed Central. <a href="http://www.biomedcentral.com/">http://www.biomedcentral.com/</a>	
8. *** - Farmacopeea Europeana, ed. a 9.7, online, 2018 <a href="http://www.umfcluj.ro/component/k2/item/1178-abonamente-curente">http://www.umfcluj.ro/component/k2/item/1178-abonamente-curente</a>	

## 8. Evaluation

Activity type	8.1.Evaluation criteria	8.2. Evaluation methods	8.3.Percent of final grade
<b>8.4. Course</b>	<ul style="list-style-type: none"> <li>– Appropriate use of theoretical concepts specific for pharmaceutical analysis</li> <li>– Ability to understand and apply the methodology of analysis to specific situations</li> <li>– Understanding the importance of ensuring the quality of pharmaceuticals, food supplements and cosmetics starting from research and development stage up to the finished product</li> </ul>	Multiple choice written exam	<b>60%</b>
<b>8.5. Laboratory</b>	<ul style="list-style-type: none"> <li>– Evaluation of practical skills</li> <li>– Ability to elaborate an analysis report and to discuss the results</li> </ul>	Practical exam	<b>40%</b>
<b>8.6. Minimal performance standard</b>			
<ul style="list-style-type: none"> <li>– To acquire the UV-VIS, IR, FLD spectra and to discuss the results for pharmaceuticals, food supplements, cosmetics and other health products</li> <li>– To acquire the chromatograms and to discuss the results generated by the separative methods for pharmaceuticals, food supplements, cosmetics and other health products</li> <li>– To evaluate according to national and international quality standards the results of quantitative analysis of pharmaceuticals, food supplements, cosmetics and other health products</li> <li>– Writing a certificate of analysis</li> </ul>			

## PHARMACEUTICAL CARE

### 1. Information about the course

<b>1.1. Discipline</b>		<b>Clinical pharmacy</b>					
<b>1.2. Course instructor</b>		<b>Associate professor Adina Popa, PhD</b>					
<b>1.3. Laboratory instructor</b>		<b>Associate professor Adina Popa, PhD</b> <b>Lecturer Daniela Primejdie, PhD</b> <b>Lecturer Corina Briciu, PhD</b>					
<b>1.4. Year</b>	<b>5</b>	<b>1.5. Semester</b>	<b>2</b>	<b>1.6. Evaluation type</b>	<b>Written exam + Practical exam (written and oral exam)</b>	<b>1.7. Course type</b>	<b>Specialized discipline, Compulsory discipline</b>

### 2. Total estimated time (hours/semester for teaching activity)

<b>2.1. Total hours/week</b>	<b>3</b>	<b>2.2. Course</b>	<b>1</b>	<b>2.3. Laboratories</b>	<b>2</b>
<b>2.4. Total hours in the curriculum</b>	<b>42</b>	<b>2.5. Course</b>	<b>14</b>	<b>2.6. Laboratories</b>	<b>28</b>
<b>2.4. Distribution of time needed</b>					<b>Hours</b>
a. Study using text books, lecture notes, bibliography					14
b. Individual study within libraries, on-line platforms, field research					28
c. Preparing seminars/laboratories, homework, projects, portfolios and essays					42
d. Tutoring					3
e. Evaluation					4
f. Other activities					-
<b>2.7. Total hours for individual study (a+b+c+d)</b>					<b>87 (2<sup>nd</sup> sem.)</b>
<b>2.8. Total hours per semester</b>					<b>133 (2<sup>nd</sup> sem.)</b>
<b>2.9. Number of credits</b>					<b>5 (2<sup>nd</sup> sem.)</b>

### 3. Prerequisites

<b>4.1. Curriculum</b>	Participation in the theoretical and practical activities of the course of Clinical Pharmacy and Pharmacotherapy
<b>4.2. Competences</b>	Specific competences acquired at the Clinical Pharmacy and Pharmacotherapy course

### 4. Requisites

<b>5.1. For lectures</b>	-
<b>5.2. For laboratories sessions</b>	<ul style="list-style-type: none"> <li>Through individual study, the students are required to prepare, in advance, an analysis of drug prescriptions and case scenarios involving self-medication. This requirement is essential in order to ensure an interactive approach during the laboratory session.</li> <li>Also, all students are required to complete a Pharmaceutical Care - Patient Pharmacy Record after selecting a patient with chronic diseases and polymedication.</li> </ul>

### 5. Specific competences acquired

<b>Professional competences</b>	<ul style="list-style-type: none"> <li>• To understand the principles of clinical pharmacy and pharmaceutical care</li> <li>• To systematically collect and record patient-specific subjective information which includes general information and data regarding the patient's medical and medication history</li> <li>• To evaluate the data included in the patient pharmacy record, including information about the patient, its illness and medication</li> <li>• To identify drug-related problems</li> <li>• To establish monitoring endpoints for every drug-related problem</li> <li>• To propose optimal solutions with the purpose of managing all drug-related problems identified</li> <li>• To conduct a critical analysis of any drug prescription</li> <li>• To know the principles of rational drug use in self-medication</li> <li>• To apply a patient-centered approach during drug dispensing process, whether dispensing physician-prescribed medication or nonprescription drugs</li> </ul>
<b>Transversal competences</b>	<ul style="list-style-type: none"> <li>• To formulate professional opinions considering evidence-based arguments</li> <li>• To select and use only reliable sources of information</li> <li>• To possess critical assessment skills during drug information analysis</li> <li>• To acknowledge the role of the pharmacist as a healthcare provider</li> <li>• To support inter-professional collaboration with other healthcare providers while demonstrating adherence to professional ethical principles</li> <li>• To have the ability to make correlation within all the different types of knowledge acquired during previous years</li> <li>• To demonstrate autonomy, responsibility and initiative</li> </ul>

### 6. Course objectives

<b>6.1.General objectives</b>	<ul style="list-style-type: none"> <li>• To study, discuss and apply the principles of the practice of pharmaceutical care, considered to be a modern pharmaceutical practice</li> </ul>
<b>6.2.Specific objectives</b>	<ul style="list-style-type: none"> <li>• To comprehend the principles of clinical pharmacy and pharmaceutical care practice</li> <li>• To know all the professional and legal responsibilities of the pharmacist associated with the dispensing practice, whether the drugs involved are physician-prescribed drugs or self-medication</li> <li>• To know the OTC drugs frequently used as self-medication for the treatment of common symptoms</li> <li>• To describe the systematic steps that should be followed for OTC drugs dispensing procedure</li> <li>• To acquire the necessary abilities in order to identify, prevent and resolve drug-related problems</li> <li>• To possess the required abilities for the OTC drugs dispensing procedure, in order to ensure an efficient and safe rational self-medication practice, according to the principles of Pharmaceutical Care and the rules of Good Pharmaceutical Practice</li> <li>• To possess the required abilities for the analysis of medical prescriptions, in order to validate its contents and to prevent potential medication errors, according to the principles of Pharmaceutical Care and the rules of Good Pharmaceutical Practice</li> </ul>

	<ul style="list-style-type: none"> <li>To apply the principles of effective communication during patient education and counseling process</li> </ul>
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## 7. Content

**Teaching methods for course:** lecture, PowerPoint presentation, discussion, applications/case studies. The lecture notes are available to students through the Moodle platform.

**Teaching methods for laboratory activity:** case based learning; problems based learning, demonstrations, role play, searching for information in databases and other relevant bibliographic sources

7.1.Lectures (hours)	Remarks
<b>1. Introductory course.</b> The definition of Pharmaceutical Care concept. Drug-related problems. Pharmaceutical care process. The pharmacist's responsibilities according to the pharmaceutical care principles. The worldwide evolution of pharmaceutical care practice. Standards of professional behavior.	<b>2 h</b>
<b>4. Medication errors.</b> Causes, prevention strategies. Pharmacist role.	<b>2 h</b>
<b>5. Pharmacist role in improving patient adherence to drug therapy.</b> Definition of the concept. Factors that influence adherence to treatment. Strategies to improve adherence.	<b>2 h</b>
<b>6. Rational self-medication.</b> General principles	<b>0.5 h</b>
<b>7. Self-medication for pain relief.</b> OTC medication to alleviate symptoms. Protocols for assessing symptoms and general treatment approach. Patient counseling	<b>1.5 h</b>
<b>8. Self-medication for cough, fever and upper respiratory tract viral infections.</b> OTC medication to alleviate symptoms. Protocols for assessing symptoms and general treatment approach. Patient counseling	<b>2 h</b>
<b>9. Self-medication for functional disorders of the gastrointestinal tract.</b> OTC medication to alleviate symptoms. Protocols for assessing symptoms and general treatment approach. Patient counseling	<b>4 h</b>
<b>Bibliography</b> <ol style="list-style-type: none"> <li>Cipolle RJ, Strand LM, Morley PC. Pharmaceutical care practice. The clinician's guide. 2nd Edition, McGraw-Hill, 2004</li> <li>Rovers JP, Currie JD, Hagel HP, McDonough RP, Sobotca JL. A practical guide to Pharmaceutical care, 2nd Edition, American Pharmaceutical Association, 2003</li> <li>Sexton J, Nickless G, Green C. Pharmaceutical care made easy. Pharmaceutical Press, 2006</li> <li>Tietze KJ. Clinical skills for pharmacists. A patient-focused approach, Mosby, 1997</li> <li>Krinsky DL et al. Handbook of Nonprescription Drugs: An Interactive Approach to Self-Care. 18th ed, American Pharmacist Association, 2015</li> <li>Rutter P. Community Pharmacy. Symptoms, Diagnosis and Treatment. Churchill Livingstone, Elsevier, 2004</li> <li>Belon JP. Conseils a l'officine. Aide au suivi pharmaceutique. 6e edition, Masson, 2006</li> <li>Nathan A. Non-prescription Medicines. 4th ed, Pharmaceutical Press, 2010</li> <li>McLeod PJ, Allen M, Conly J et al (eds.). Patient self-care. Helping your patients make therapeutic Choices. 2<sup>nd</sup> edition. Canadian Pharmacists Association, 2010</li> <li>Popa A (coord.). Ghid de practică în farmacie pentru studenții anului V. Editura Medicală Universitară "Iuliu Hațieganu", reeditare anuală</li> <li>Access Pharmacy - <a href="http://www.umfcluj.ro/ro/component/k2/item/1178-abonamente-curente">http://www.umfcluj.ro/ro/component/k2/item/1178-abonamente-curente</a></li> </ol>	

12. www.farma.umfcluj.ro : Pharmaceutical care course 2017-2018

<b>7.2.Laboratory activities (hours)</b>	<b>Remarks</b>
<b>1. Tasks and responsibilities in the pharmaceutical care process</b>	<b>2 h</b>
<b>2. How to complete a Pharmaceutical Care - Patient Pharmacy Record</b> Methods used for collecting, recording and analyzing patient information. Periodically assessment of ongoing progress regarding the completion of patient pharmacy record, including recording of all drug-related problems that were identified and proposing adequate solutions for solving them.	<b>2 h</b>
<b>3. Pharmacist attitude during dispensing of physician-prescribed medication in a community pharmacy.</b> Analysis of medical prescriptions collected during pharmacy practice. Patient counseling	<b>6 h</b>
<b>4. Pharmacist attitude during dispensing of OTC drugs.</b> Pharmacological or non-pharmacological treatment approaches based on protocols used for intervention. Cases when the pharmacist can't recommend drug therapy because there is a lack of information to ensure decision making or the pharmacist considers that a medical referral is appropriate. Cases when the pharmacist can intervene by recommending OTC drugs and/or non-pharmacological measures. Patient counseling	<b>16 h</b> One week before the laboratory, the students are provided with scenarios accompanied by recommended bibliography on the Moodle platform
<b>5. Revision</b>	<b>2 h</b>
<b>Bibliography</b> 1. The bibliography recommended for course 2. Product information summary ANMDM (National Agency of Medicines and Medical Devices): <a href="http://www.anm.ro/app/nom1/anm_list.asp">http://www.anm.ro/app/nom1/anm_list.asp</a> EMA (European Medicines Agency) : <a href="http://www.ema.europa.eu/ema/index.jsp?curl=pages/home/Home_Page.jsp&amp;mid=AFSSAPS">http://www.ema.europa.eu/ema/index.jsp?curl=pages/home/Home_Page.jsp&amp;mid=AFSSAPS</a> AFSSAPS (Agence nationale de sécurité du médicament et des produits de de santé): <a href="http://www.anism.sante.fr/">http://www.anism.sante.fr/</a> 3. Drug monographies and drug interaction databases (Drug Interactions Checker) Medscape: <a href="http://www.medscape.com">http://www.medscape.com</a> Drugs.com <a href="http://www.drugs.com">www.drugs.com</a> Micromedex: <a href="http://www.micromedexsolutions.com/micromedex2/librarian/">http://www.micromedexsolutions.com/micromedex2/librarian/</a>	

### 8. Evaluation

<b>Activity type</b>	<b>8.1.Evaluation criteria</b>	<b>8.2. Evaluation methods</b>	<b>8.3. Percent of final grade</b>
<b>8.4. Course</b>	Learning, understanding and using the concepts that were taught	Written test (multiple-choice questions and one free-response question)	<b>50 %</b>
<b>8.5.Laboratory</b>	The ability to analyze patient-specific information, including data regarding	Practical exam that consists of two	<b>50 %</b>



	<p>medical and drug history, which were entered in the Patient Pharmacy Record. The ability to identify drug-related problems, whether real or potential. The ability to conceive a drug therapy plan in order to prevent or resolve drug-related problems. The ability to support the choices made in order to prevent or resolve the drug-related problems, by using clear and concise scientific arguments, whether written or oral. The ability to use relevant information sources. The ability to analyze medical prescription The ability to make recommendations for a rational self-medication based on a given scenario</p>	<p>parts: written exam (recording and afterwards evaluating the data included in a Pharmaceutical care – Patient pharmacy record that was created for a real patient, medical prescription analysis, self-medication situation analysis) and oral exam (Pharmaceutical care personalized plan presentation)</p>	
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**8.6. Minimal performance standard**

Lectures

- To fully understand the principles of clinical pharmacy and pharmaceutical care practice
- To be aware of any method that could help the pharmacist in reducing medication errors
- To know different strategies that could be useful for increasing patient adherence to treatment
- To know the main criteria that defines an effective and safe use of OTC drugs

Laboratory

- To create an adequate Pharmaceutical Care – Patient pharmacy record
- To properly identify drug-related problems
- To choose optimal solutions in order to resolve drug-related problems
- To know the steps to be taken to dispense the prescription and OTC drugs

## PATIENT COUNSELING AND COMMUNICATION SKILLS IN COMMUNITY PHARMACY - AN INTEGRATED COURSE

### 1. Information about the course

<b>1.1. Course</b>		<b>Patient counseling and communication skills in community pharmacy - an integrated course</b>					
<b>1.2. Course instructor</b>		<b>Associate professor Adina Popa, PhD</b>					
<b>1.3. Laboratory instructor</b>		<b>Associate Professor Adina Popa, PhD Lecturer Daniela Primejdie, PhD Lecturer Corina Briciu, PhD</b>					
<b>1.4. Year</b>	<b>5</b>	<b>1.5. Semester</b>	<b>2</b>	<b>1.6. Evaluation type</b>	<b>Evaluation during the semester Final exam with both theoretical and practical component</b>	<b>1.7. Course type</b>	<b>Specialty discipline, Compulsory discipline</b>

### 2. Total estimated time (hours/semester for teaching activity)

<b>2.1. Total hours/week</b>	<b>0 (1<sup>st</sup> sem.) 2 (2<sup>nd</sup> sem.)</b>	<b>2.2. Course</b>	<b>0 1</b>	<b>2.3. Laboratories</b>	<b>0 1</b>
<b>2.4. Total hours in the curriculum</b>	<b>0 (1<sup>st</sup> sem.) 28 (2<sup>nd</sup> sem.)</b>	<b>2.5. Course</b>	<b>0 14</b>	<b>2.6. Laboratories</b>	<b>0 14</b>
<b>2.4. Distribution of time needed/semester</b>					<b>Hours</b>
e. Study using text books, lecture notes, bibliography					20
f. Individual study within libraries, on-line platforms, field research					25
g. Preparing seminars/laboratories, homework, projects, portfolios and essays					40
h. Tutoring					5
Evaluation/ semester					7
Other activities					-
<b>2.7. Total hours for individual study (a+b+c+d)</b>				<b>90 (2<sup>nd</sup> sem.)</b>	
<b>2.8. Total hours per semester</b>				<b>125 (2<sup>nd</sup> sem.)</b>	
<b>2.9. Number of credits</b>				<b>5 (2<sup>nd</sup> sem.)</b>	

### 3. Pre-requisites

<b>3.1. Curriculum</b>	- knowledge gained from various specialty courses that take place in the 3 <sup>rd</sup> , 4 <sup>th</sup> and 5 <sup>th</sup> year of study
<b>3.2. Competences</b>	- specific, acquired through these courses

### 4. Requisites

<b>4.1. For lectures</b>	-
<b>4.2. For laboratories sessions</b>	-

### 5. *Specific competences acquired*

<b>Professional competences</b>	<ul style="list-style-type: none"> <li>• To assist the patient in choosing medicines and other health care products according to their needs</li> <li>• To accurately and effectively communicate to the patient the necessary information regarding the proper use of medicines and other health products</li> <li>• To identify the causes for poor treatment adherence and the means to increase adherence through modern counseling techniques</li> <li>• To develop the ability to respect the principles of law and ethics in patient counselling</li> <li>• To develop a conscientious and responsible rapport toward quality assurance in patient counselling</li> <li>• To effectively communicate with the patient in frequent situations encountered in the professional practice</li> <li>• To apply different patient communication techniques at the right time</li> <li>• To practice active listening, empathy and respect in the relationship with the patient</li> <li>• To handle difficult situations encountered in the relationship with the patient</li> </ul>
<b>Transversal competences</b>	<ul style="list-style-type: none"> <li>• To be aware of the pharmacist's role in health care</li> <li>• To apply the basic requirements of a quality communication in interpersonal relationships</li> <li>• To respect the principles of ethics in the professional activity</li> <li>• To demonstrate autonomy, responsibility and initiative</li> </ul>

### 6. *Course objectives*

<b>6.1. General objectives</b>	<ul style="list-style-type: none"> <li>• To know the pharmacist's role regarding patient counseling and education in order to ensure an effective and safe use of medicines and other health products and to know the importance of quality interpersonal communication in the pharmacist-patient relationship</li> </ul>
<b>6.2. Specific objectives</b>	<ul style="list-style-type: none"> <li>• To know the importance of patient counseling in the pharmacy</li> <li>• To know the steps included in the patient counseling process</li> <li>• To know the modern patient counseling techniques</li> <li>• To understand the need to develop appropriate counseling skills</li> <li>• To understand the basic rules of regulating the quality assurance in patient counselling</li> <li>• To develop the students' abilities to analyse and reflect on the quality assurance in patient counselling</li> <li>• To know the particularities of the counseling process that apply to specific situations encountered in practice</li> <li>• To recognize the different components of quality interpersonal communication</li> <li>• To know the ways in which the pharmacist can interact and change the patient's attitude through the communication process</li> <li>• To know and apply the rules of effective communication</li> <li>• To know various patient typologies and how to adapt the behavior to each typology</li> </ul>

## 7. Content

**Teaching methods for course:** interactive lecture, PowerPoint presentation, discussion upon examples, case studies. Teaching has an integrated horizontal approach between the contents and competences of different disciplines at the same level of study. All course support notes are available to students on the Moodle platform.

**Teaching methods for laboratory activity:** presentation, discussion, debate, case study, role play, individual / group exercises. All lab notes are available to students on the Moodle platform.

7.1. Course	Remarks
1. Theoretical basis and context of patient counseling in the pharmacy. Behavioral aspects that influence the patient's counseling process. Components of the counseling process	2 h
2. Law and ethics on patient counselling in pharmacy	2 h
3. Patient counseling in choosing the pharmaceutical dosage form	2 h
4. Counseling the patients using psychoactive drugs in order to prevent dependence and tolerance. Counseling the patient with dependence on psychoactive drugs	2 h
5. Pharmacist involvement in immunoprophylaxis: general issues and issues regarding the role of pharmacist and how they could intervene in increasing the health status of the population.	2 h
6. Patient counselling at the delivery of herbal medicinal products: particularities of use and administration, warning on some common side effects, precautions at the association of some herbal medicinal products with other medications, the use of herbal medicinal products in pregnancy etc.	2 h
7. Pharmacy counselling for parents on newborn and infant skin care. Particularities of newborn and infant skin. Dermatological problems related to these specific periods (seborrheic dermatitis of the scalp, diaper dermatitis). Cosmetics for hygiene, skin care and skin protection. Counselling for product use.	2 h
<p><b>Bibliography:</b></p> <ol style="list-style-type: none"> <li>Oniga O. (coord.), Consilierea pacientului în farmacia comunitară, Editura Medicală Universitară "Iuliu Hațieganu", Cluj-Napoca, 2018</li> <li>Colegiul Farmaciștilor din România, Iacob S. (coord.), Legislație și modele de proceduri pentru aplicarea în farmacie a regulilor de bună practică farmaceutică, disponibil la: <a href="http://colegfarmbv.ro/legislatie/">http://colegfarmbv.ro/legislatie/</a>, accesat la: 02.2019.</li> <li>Crișan O., Profesiunea de farmacist – probleme de legislație, ediția a III-a revizuită, Editura Medicală Universitară "Iuliu Hațieganu", Cluj-Napoca, 2015.</li> <li>Decizia Colegiului Farmaciștilor din România nr. 2/2009 privind aprobarea Statutului Colegiului Farmaciștilor din România și a Codului deontologic al farmacistului, Monitorul Oficial al României, partea I, nr. 490/2009.</li> <li>Legea nr. 95/2006 privind reforma în domeniul sănătății, republicată, Monitorul Oficial al României, partea I, nr. 652/2015, cu modificările și completările ulterioare.</li> <li>Legea nr. 266/2008 a farmaciei, republicată, Monitorul Oficial al României, partea I, nr. 85/2015, cu modificările și completările ulterioare.</li> <li>Popa A. (coord.), Ghid de practică în farmacie pentru studenții anului V, Editura Medicală Universitară "Iuliu Hațieganu" Cluj-Napoca, ediție revizuită 2018.</li> <li>Krinsky DL et al. Handbook of Nonprescription Drugs: An Interactive Approach to Self-Care.</li> </ol>	

<p>19th ed, American Pharmacists Association, 2017</p> <p>9. Belon JP. Conseils a l'officine. Aide au suivi pharmaceutique. 6e edition, Masson, 2006</p> <p>10. www.farma.umfcluj.ro : Curs Consilierea pacientului în farmacie.</p>	
<b>7.2. Laboratory activities</b>	<b>Remarks</b>
<p><b>Topic 1. Introduction</b></p> <p>Communication as a process</p> <p>The purpose of communication in pharmacy</p> <p>The climate of pharmacy communication</p> <p>Factors influencing the climate of pharmacy communication</p>	<b>2 h</b>
<p><b>Topic 2. Patient counseling</b></p> <p>Setting and counseling</p> <p>Factors influencing patient counseling</p> <p>Counseling skills: unconditional positive regard, congruence, empathy, collaboration</p>	<b>2 h</b>
<p><b>Topic 3. Particularities of communication in pharmacy</b></p> <p>Effective vs ineffective communication</p> <p>Communication and neurosciences</p> <p>Positive vs negative message and their impact on the pharmacist-patient relationship</p>	<b>2 h</b>
<p><b>Topic 4. Components of communication</b></p> <p>Verbal component – specific elements of the verbal channel</p> <p>Nonverbal component –specific elements of the nonverbal channel</p> <p>Paraverbal component –specific elements of the paraverbal channel</p>	<b>2 h</b>
<p><b>Topic 5. Communication styles and the impact on the pharmacist-patient relationship</b></p> <p>The passive style</p> <p>The passive-aggressive style</p> <p>The aggressive style</p> <p>The assertive style</p>	<b>2 h</b>
<p><b>Topic 6. Techniques of effective communication in pharmacy</b></p> <p>The role of the active listening in the pharmacist-patient relationship</p> <p>Types of questions and their role in increasing treatment adherence</p> <p>Paraphrasing the message and empathic reflection-</p> <p>tools to manage difficult situations in pharmacy</p> <p>Summarization role in the dialogue with the patient</p> <p>To ask and give feedback; types of feedback</p>	<b>2 h</b>
<p><b>Topic 7. Patient typologies</b></p> <p>Difficult patients vs. difficult situations</p> <p>General criteria for addressing difficult situations in the pharmacy</p> <p>The specific approach of the anxious patient</p> <p>The specific approach of the depressive patient</p> <p>The specific approach of the aggressive patient</p>	<b>2 h</b>
<p><b>Bibliography</b></p> <ol style="list-style-type: none"> <li>1. Abric JC. Psihologia comunicării. Editura Polirom Iași, 2002</li> <li>2. Berger BA. Communication Skills for Pharmacists: Building Relationships, Improving Patient Care. Published by American Pharmaceutical Association. Jobson Publishing, L.L.C, 2002</li> <li>3. Hugman B, Healthcare communication, Pharmaceutical Press, 2009</li> <li>4. Rantucci MJ. Pharmacist Talking with patients. A guide to patient counseling 2nd ed, Lippincott</li> </ol>	

Williams & Wilkins, 2007

5. Tindall WN, Beardsley RS, Kimberlin CL. Communication skills in pharmacy practice 4th ed, Lippincott Williams & Wilkins, 2003

6. Turk. C. (2009). Comunicarea eficientă. București . Editura Trei

### 8. Evaluation

Activity type	8.1.Evaluation criteria	8.2. Evaluation methods	8.3. Percent of final grade
<b>8.4. Course</b>	<ul style="list-style-type: none"> <li>• The degree of appropriation of information regarding patient counseling and the ability to apply the acquired knowledge in specific situations</li> <li>• The capacity to develop and present a certain topic in a group project</li> </ul>	<ul style="list-style-type: none"> <li>• Written examination (multiple-choice question exam)</li> <li>• Oral exam - presentation of a topic in accordance with the course themes; the topics are chosen randomly</li> </ul>	<b>50%</b>
<b>8.5. Laboratory</b>	<ul style="list-style-type: none"> <li>• To recognize the elements of an assertive communication style</li> <li>• To know the elements of an effective communication</li> <li>• To identify different patient typologies</li> <li>• To know how to manage the relationship with each patient typology</li> <li>• To know each type of constructive feedback and how to use it in the relationship with the patient</li> </ul>	<ul style="list-style-type: none"> <li>• Written examination (multiple-choice question exam)</li> <li>• Simulation of a practical situation</li> </ul>	<b>50%</b>
<b>8.6. Minimal performance standard</b>			
<ul style="list-style-type: none"> <li>• To know the essential elements of the patient counseling process in the pharmacy</li> <li>• To know what are the most important elements required in order to establish an effective communication process between the pharmacist and the patient</li> </ul>			

## DERMOPHARMACY AND COSMETICS

### 1. Information about the course

<b>1.1. Discipline</b>		<b>Dermopharmacy and Cosmetics</b>					
<b>1.2. Course instructor</b>		<b>Associate Professor Mirela Moldovan, PhD</b>					
<b>1.3. Laboratory instructor</b>		<b>Associate Professor Mirela Moldovan, PhD</b>					
<b>1.4. Year</b>	<b>5</b>	<b>1.5. Semester</b>	<b>1</b>	<b>1.6. Evaluation type</b>	<b>Written exam + Practical exam</b>	<b>1.7. Course type</b>	<b>Specialty discipline Compulsory discipline</b>

### 2. Total estimated time (hours/semester for teaching activity)

<b>2.1. Total hours/week</b>	<b>4</b>	<b>2.2. Course</b>	<b>2</b>	<b>2.3. Laboratories</b>	<b>2</b>
<b>2.4. Total hours in the curriculum</b>	<b>56</b>	<b>2.5. Course</b>	<b>28</b>	<b>2.6. Laboratories</b>	<b>28</b>
<b>2.4. Distribution of time needed</b>					<b>Hours</b>
a. Study using text books, lecture notes, bibliography					30
b. Individual study within libraries, on-line platforms, field research					10
c. Preparing seminars/laboratories, homework, projects, portfolios and essays					15
d. Tutoring					2
e. Evaluation/ semester					2
f. Other activities					-
<b>2.7. Total hours for individual study (a+b+c+d)</b>					<b>57 (1<sup>st</sup> sem.)</b>
<b>2.8. Total hours per semester</b>					<b>115 (1<sup>st</sup> sem.)</b>
<b>2.9. Number of credits</b>					<b>4 (1<sup>st</sup> sem.)</b>

### 3. Prerequisites

<b>3.1. Curriculum</b>	- Botany, pharmacognosy, chemistry, biochemistry knowledge applied to the pharmaceutical field and pharmaceutical technology knowledge
<b>3.2. Competences</b>	- Acquired specific competencies of botany, pharmacognosy, chemistry, biochemistry and pharmaceutical technology

### 4. Requisites

<b>4.1. For lectures</b>	<ul style="list-style-type: none"> <li>• Classroom equipped with computer and projector</li> <li>• Being aware of, and complying with the Regulation governing the functioning and organization of the teaching activity in undergraduate study</li> <li>• Turn off the mobile phones and other electronic devices during the course</li> </ul>
<b>4.2. For laboratories sessions</b>	<ul style="list-style-type: none"> <li>• Laboratories with proper equipment</li> <li>• Being aware of, and complying with labor protection requirements in the laboratories</li> <li>• Being aware of, and complying with the Regulation governing the functioning and organization of the teaching activity in undergraduate study programs</li> <li>• Turn off the mobile phones and other electronic devices during the laboratories sessions</li> </ul>

	<ul style="list-style-type: none"> <li>• Knowing the theoretical issues taught in class regarding the topic dealt with during laboratories</li> </ul>
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### 5. *Specific competences acquired*

<b>Professional competences</b>	<ul style="list-style-type: none"> <li>• Ability to properly use the specialized terminology.</li> <li>• Ability to recognize the clinical symptoms of pathologic changes in the skin.</li> <li>• Ability to express personalized recommendations on the dermatologic treatment to ensure best efficacy and patient compliance.</li> <li>• Ability to express recommendations so as to prevent undesirable adverse reactions when topical medicinal products and cosmetics are being used.</li> <li>• Ability to analyze cosmetic products in terms of composition and their properties</li> <li>• Ability to identify the skin type (visually or by using specific equipment) and choose among the known typologies.</li> <li>• Ability to express personalized recommendations on the use of body care products taking the skin type and cosmetic products properties into account.</li> <li>• Ability to express personalized recommendations on the use of skin care products taking the skin type and cosmetic products properties into account.</li> </ul>
<b>Transversal competences</b>	<ul style="list-style-type: none"> <li>• Ability to use domain-specific concepts in new contexts.</li> <li>• Ability to apply theoretical knowledge to cope with actual situations.</li> <li>• Ability to efficiently use the information resources for own professional development.</li> <li>• Ability to optimally and creatively use the potential in conducting scientific activities.</li> <li>• Developing communication skills.</li> </ul>

### 6. *Course objectives*

<b>6.1. General objectives</b>	<ul style="list-style-type: none"> <li>• Being aware of, thoroughly studying and correctly using the specialized terminology pertaining to dermopharmacy and cosmetology</li> <li>• Teaching dermopharmacy to students by studying the most common skin diseases</li> <li>• Teaching cosmetology to students by studying the cosmetic products and skin types in order to elaborate appropriate skin care plans.</li> </ul>
<b>6.2. Specific objectives</b>	<ul style="list-style-type: none"> <li>• Getting students familiar with the specific terminology used in the field of dermopharmacy.</li> <li>• Knowing the common skin pathology, symptomatology, the required treatment and recommendations in order to increase treatment efficacy.</li> <li>• Classification and analysis of skin types.</li> <li>• Skin care steps depending on skin type.</li> <li>• Knowing the main categories of cosmetic products, their characterization and evaluation methods in order to be able to easily recommend them.</li> <li>• Identifying the active ingredients and raw materials in the composition of cosmetic products.</li> <li>• Identifying the cosmetic properties of the product by analyzing the role of its ingredients.</li> <li>• Identifying the ingredients of cosmetic products which may be responsible for</li> </ul>



	<p>the occurrence of undesired reactions.</p> <ul style="list-style-type: none"> <li>• Identifying the cosmetic problems and drafting a skin care plan.</li> <li>• Practicing the summarizing and bibliographic documentation skills.</li> </ul>
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## 7. Content

**Teaching methods courses:** Oral presentation, systematic presentation, discussion, questioning. The Oral presentation is doubled by a PowerPoint presentation.

**Teaching methods laboratory activities:** Systematic presentation (oral presentations and multimedia support). Demonstration, debate, practical activity (groups of 2 students), case study.

7.1.Lectures (hours)	Remarks
<b>1. Introductory notions, study of the specific terminology in the field of dermatopharmacy.</b>	2 h
<b>2. Legal aspects related to cosmetic products.</b>	2 h
<b>3. Anatomy and physiology of the skin.</b>	2 h
<b>4. Skin types.</b> Classification, characteristics of skin types and their cosmetic care.	2 h
<b>5. Cosmetic products for the hygiene of skin and skin appendages.</b> Soaps, cleansing cosmetics, facial tonics, exfoliation products.	2 h
<b>6. Cosmetic products for the hygiene of skin and skin appendages.</b> Cosmetic shampoos. Antiperspirants and deodorants.	2 h
<b>7. Skin care cosmetics.</b> Aspects of skin hydration; skin moisturizers, dry skin care. Atopic dermatitis. Dry skin care.	2 h
<b>8. Skin care cosmetics.</b> Aspects of skin aging, anti-aging ingredients in skin care products, aging skin care.	2 h
<b>9. Skin care cosmetics.</b> Cosmetic products for cellulite. Cosmetic products for removing unwanted hairiness from the face and the body.	2 h
<b>10. Cosmetics for skin protection.</b> Skin photoprotection. Sunscreen cosmetics. Cosmetic products for self-tanning.	2 h
<b>11. Dermopharmacy.</b> Principles of topical therapy, skin lesions. Sebaceous gland pathology: seborrheic dermatitis (causes, characteristic lesions, treatment, patient counselling)	2 h
<b>12. Sebaceous gland pathology.</b> <b>Acne</b> (causes, characteristic lesions, clinical forms, treatment, patient counselling).	2 h
<b>13. Study of several dermatoses.</b> Infectious dermatoses with bacterial, fungal and viral aetiology (characteristic skin lesions, treatment, patient counselling)	2 h
<b>14. Study of several dermatoses.</b> Parasitic dermatoses. Psoriasis vulgarism (aetiology, characteristic skin lesions, treatment, patient counselling)	2 h
<b>Bibliography</b>	
<ol style="list-style-type: none"> <li>1. Moldovan M. Cours Dermopharmacy and cosmetics, handout 2019-2020; www.farma.umfcluj.ro.</li> <li>2. Moldovan M. Dermatofarmacie și Cosmetologie. Aplicații practice, Ed. a 2-a. Editura Risoprint", Cluj-Napoca, 2016.</li> <li>3. Rotaru M. Dermatologie practică - de la simptom la boală. Ed TehniMedia, 2011.</li> <li>4. Wittner L. Bien choisir vos cosmétiques: comment préserver sa peau et sa santé. Ed. Medicis, 2009.</li> </ol>	

<p>5. *** Prendre soin de son visage. Ed. Hors-Collection, 2010.</p> <p>6. Lees M. The skin care answer book. Ed. Cengage Learning, 2011.</p> <p>7. Lees M. Skin care: Beyond the basics. Ed. Cengage Learning, 2012.</p> <p>8. Ledreney-Grosjean L. ABC... du conseil dermatocosmétique en pharmacie. Ed. Le Moniteur des pharmacies, 2012.</p> <p>9. Michalun M.V, DiNardo J.C. Skin care and cosmetic ingredients dictionary. Ed. Cengage Learning, 2015</p> <p>10. Baumann L. Cosmeceuticals and cosmetic ingredients. Ed.McGraw-Hill, 2015.</p> <p>11. Dubertret L. Therapeutique dermatologique. <a href="http://www.therapeutique-dermatologique.org">http://www.therapeutique-dermatologique.org</a></p> <p>12. *** Dermatology image atlas, disponibil la <a href="http://dermatlas.med.jhmi.edu/derm/">http://dermatlas.med.jhmi.edu/derm/</a>.</p> <p>13. *** Ghiduri de practică medicală pentru specialitatea dermatovenerologie, Ministerul Sănătății, disponibil la <a href="http://www.ms.ro/index.php?pag=181&amp;pg=3">http://www.ms.ro/index.php?pag=181&amp;pg=3</a></p>	
<b>7.2.Laboratory activities (hours)</b>	<b>Remarks</b>
<p><b>1. Cosmetic products for skin hygiene - soaps.</b> Study of soap ingredients. Determining to what extent the type of soap influences the skin hydration level, the barrier function and the pH of the skin. Choosing soaps depending on skin type.</p>	Demonstration, debate. 1 session (3 h)
<p><b>2. Cosmetic products for hair hygiene.</b> Cosmetics for hair hygiene - shampoos assessment. The choice of shampoos according to hair type.</p>	Practical activity (groups of 2 students), debate. 1 session (3 h)
<p><b>3. Cosmetic products oral hygiene.</b> Cosmetic products for oral hygiene: toothpastes, mouthwashes. Preparation, study of toothpaste ingredients. Choice of oral care cosmetics.</p>	Practical activity (groups of 2 students), debate. 1 session (3 h)
<p><b>4. Skin type determination. Cosmetic products used for skin cleansing.</b> Preparation and characterization of cleansing products. Preparation and characterization of facial lotions. Choice of cleansing products according to skin type.</p>	Practical activity (groups of 2 students), case study, demonstration, debate, 1 session (3 h)
<p><b>5. Cosmetic masks and products for skin exfoliation.</b> The preparation, characterization and the use of cosmetic masks. Choice of cosmetic masks according to the skin type.</p>	Practical activity (groups of 2 students), debate. 1 session (3 h)
<p><b>6. Cosmetic creams.</b> Preparation and characterization. Comparative analysis of marketed products. Choice of cosmetic creams according to the skin type.</p>	Practical activity (groups of 2 students), debate. 1 session (3 h)
<p><b>7. Sunscreen cosmetics.</b> Analysis of ingredients in sunscreen products. Recommendation of sunscreen products according to the level of exposure and skin type.</p>	Debate, demonstration. 1 session (3 h)
<p><b>8. Skin care for seborrheic and acneic skin type.</b> Analysis and preparation of prescriptions for seborrheic skin care and acne skin care. Choice of cosmetic products used for seborrheic skin care and acne skin care; skin care plans.</p>	Practical activity (groups of 2 students), debate. 1 session (3 h)
<p><b>9. Cosmetic product analyse.</b> Report presentation.</p>	Case studies, debate. 1 session (3 h)
<p><b>10. Examination</b></p>	1 h
<p><b>Bibliography</b></p> <p>1. Moldovan M. Cours Dermopharmacy and cosmetics, handout 2019-2020; <a href="http://www.farma.umfcluj.ro">www.farma.umfcluj.ro</a>.</p> <p>2. *** Prendre soin de son visage. Ed. Hors-Collection, 2010.</p> <p>3. Wittner L. Bien choisir vos cosmétiques: comment préserver sa peau et sa santé. Ed. Medicis, 2009.</p> <p>4. Moldovan M. Dermatofarmacie și Cosmetologie. Aplicații practice, Ed. a 3-a. Editura</p>	

Risoprint", Cluj-Napoca, 2016.

5. Inventory and a common nomenclature of ingredients employed in cosmetic products. Official Journal of the European Union, 2006, disponibil la <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2006:097:0001:0528:EN:PDF>.
6. Martini M.C. Introduction à la dermatopharmacie et à la cosmétologie, Ed. Lavoisier Tec & Doc, ediția a 2-a, Paris, 2006.
7. \*\*\*Farmacopeea Română Ed X-a, Editura Medicală, București, 1993 și suplimentele sale.
8. Lees M. The skin care answer book. Ed. Cengage Learning, 2011.
9. Lees M. Skin care: Beyond the basics. Ed. Cengage Learning, 2012.
10. Lorette P, Georgescu G. Peau sèche; de la clinique au traitement. Ed. Med'Com, Paris, 2014.
11. Michalun M.V, DiNardo J.C. Skin care and cosmetic ingredients dictionary. Ed. Cengage Learning, 2015.
12. Baumann L. Cosmeceuticals and cosmetic ingredients. Ed. McGraw-Hill, 2015.
13. Borelli U. Cosmetologia. Ed. Salus Media, București, 2017.

## 8. Evaluation

Activity type	8.1.Evaluation criteria	8.2. Evaluation methods	8.3.Percent of final grade
<b>8.4. Lectures</b>	<p>Knowledge of the specialized terminology pertaining to dermatopharmacy and cosmetology and the issues discussed.</p> <p>Ability to appropriately use the specialized terminology (consistency, logic, fluent rendering).</p> <p>Ability to identify fundamental and specific problems.</p> <p>Ability to support the solutions proposed.</p>	<p>Written exam</p> <p>Multiple choice questions (80-90%) and written test (10-20%)</p>	<b>70%</b>
<b>8.5. Laboratory</b>	<p>Evaluation of theoretical knowledge and practical skills.</p> <p>Ability to identify the skin type and phototype.</p> <p>Ability to accurately interpret formulas of cosmetic products, depending on the ingredients contained.</p> <p>Ability to identify and to justify the role of cosmetic products in reference to the active principles contained.</p> <p>The ability to correctly use the techniques and selection criteria taught in order to express recommendations for the use of cosmetic products.</p>	<p>Practical exam (75% of the mark) and report presentation (25% of the mark)</p>	<b>30%</b>
<b>8.6. Minimal performance standard</b>			
<p>Learning the main concepts pertaining to cosmetology and dermatopharmacy</p> <ul style="list-style-type: none"> <li>• Definition of the terms used.</li> <li>• The main cutaneous manifestations, treatment of dermatosis discussed during the course.</li> <li>• The information that needs to be submitted to the patient to ensure the best efficacy and</li> </ul>			

innocuousness of the treatment.

- Classification of skin types and their characteristics.
- Knowledge of the skin care stages of different skin types.
- Knowledge of referral criteria for the categories of cosmetic products discussed.

# CLINICAL PHARMACY AND PHARMACOTHERAPY

## 1. Information about the course

<b>1.1. Dicipline</b>		<b>Clinical pharmacy</b>					
<b>1.2. Course instructor</b>		Associate Professor Adina Popa Lecturer Daniela Primejdie, PhD Lecturer Corina Briciu, PhD					
<b>1.3. Laboratory instructor</b>		Associate Professor Adina Popa, PhD Lecturer Daniela Primejdie, PhD Lecturer Corina Briciu, PhD					
<b>1.4. Year</b>	5	<b>1.5. Semester</b>	1	<b>1.6. Evaluation type</b>	Written exam + Practical exam (written and oral evaluation)	<b>1.7. Course type</b>	<b>Specialty discipline, Compulsory discipline</b>

## 2. Total estimated time (hours/semester for teaching activity)

<b>2.1. Total hours/week</b>	6	<b>2.2. Course</b>	3	<b>2.3. Laboratories</b>	3
<b>2.4. Total hours in the curriculum</b>	84	<b>2.5. Course</b>	42	<b>2.6. Laboratories</b>	42
<b>Distribution of time needed (1<sup>st</sup> sem. / 2<sup>nd</sup> sem.)</b>					Hours
a. Study using text books, lecture notes, bibliography					21
b. Individual study within libraries, on-line platforms, field research					21
c. Preparing seminars/laboratories, homework, projects, portfolios and essays					42
d. Tutoring					3
e. Evaluation/ semester					6
f. Other activities					-
<b>2.7. Total hours for individual study (a+b+c+d)</b>				<b>87 (1<sup>st</sup> sem.)</b>	
<b>2.8. Total hours per semester</b>				<b>177 (1<sup>st</sup> sem.)</b>	
<b>2.9. Number of credits</b>				<b>6 (1<sup>st</sup> sem.)</b>	

## 3. Prerequisites

<b>4.1. Curriculum</b>	Various information acquired during physiology, semiology, pharmacology, toxicology, biopharmacy and pharmacokinetics or clinical laboratory courses
<b>4.2. Competences</b>	Specific competences acquired during theoretical and practical activities conducted during these courses.

## 4. Requisites

<b>5.1. For lectures</b>	-
<b>5.2. For laboratories sessions</b>	Prior preparation of the clinical case discussed during laboratories sessions, through individual study, is necessary.

### 5. *Specific competences acquired*

<b>Professional competences</b>	<ul style="list-style-type: none"> <li>• to understand the principles of the clinical pharmacy and pharmaceutical care practice</li> <li>• to prove the understanding and knowledge specific to the pharmacotherapeutic approach of several frequent pathologies</li> <li>• to identify drug related problems</li> <li>• to identify the therapeutic objectives associated to each drug related problem</li> <li>• to search and justify pertinent solutions for the identified drug related problems.</li> </ul>
<b>Transversal competences</b>	<ul style="list-style-type: none"> <li>• to use scientific arguments for giving a professional opinion</li> <li>• to select and use valid sources of scientific information</li> <li>• to acquire a critical appraisal capacity referring to drug related information</li> <li>• to recognize the role of the pharmacist as a health care professional</li> <li>• to conduct professional activities that promote collaboration with other health care professionals, based on common ethical grounds</li> <li>• to have the capacity to correlate professional information acquired during previous semesters.</li> <li>• to prove autonomy, responsibility and initiative during professional activities.</li> </ul>

### 6. *Course objectives*

<b>6.1. General objectives</b>	<ul style="list-style-type: none"> <li>• To learn, to exercise and to argue the available ways of choosing, evaluating and monitoring the appropriate drug therapy necessary for frequent pathologies and also, the patients' counseling activities.</li> </ul>
<b>6.2. Specific objectives</b>	<ul style="list-style-type: none"> <li>• To know the principles implied by the clinical pharmacy and pharmaceutical care activities</li> <li>• To obtain information referring to the therapeutic approach chosen using the evidence-based resources available.</li> <li>• To develop the capacity of making correlations between the information obtained during previous years of study.</li> <li>• To integrate information concerning the patient, his pathology and related to the recommended medication and to use that information for the pharmacotherapy optimization using clinical case scenarios.</li> <li>• To learn the methodology involved in the clinical case analysis aiming for drug related problem identification</li> <li>• To gain the capacity of identification, prevention and resolution of the drug related problems identified, using a systematic process of elaboration of a therapeutic plan.</li> <li>• To identify the information needed by the patient to correctly follow the recommended treatment, for the achievement of the desired results and to use that information for the resolution of the analyzed scenarios.</li> </ul>

### 7. *Content*

**Teaching methods for course:** lecture, PowerPoint presentation, discussion, applications/case studies. Lecture notes available to students through the Moodle Platform.

**Teaching methods for laboratory activity:** case based learning, problems based learning, demonstrations, searching for information in databases and other relevant bibliographic sources

7.1.Course	Remarks
<p><b>1. Introductory course.</b> Definition. Clinical pharmacist responsibilities. Present level of development for the clinical pharmacy practice. The impact of clinical pharmacy activities in the hospital pharmacy and community pharmacy settings.</p>	<p><b>2 h</b></p>
<p><b>2. Evaluation of the medical literature for drug therapy optimization.</b> Evidence-based medicine: definition, asking the specific clinical question, study designs, levels of evidence, clinical practice guidelines. Resources for evidence-based information. Examples.</p>	<p><b>2 h</b></p>
<p><b>3. The therapeutic approach in certain physiologic and pathophysiologic contexts:</b> children, elderly, pregnancy and lactation, renal disease.</p>	<p><b>8 h</b></p>
<p><b>4. The impact of drug interactions on pharmacotherapy.</b> General approach (definition, classification, factors that increase the risk of drug interactions). The clinical relevance of drug interactions. Examples of drug interactions. The role of the pharmacist regarding the identification, prevention and management of drug interactions..</p>	<p><b>2 h</b></p>
<p><b>5. Principles of antimicrobial therapy optimization.</b> Introduction (present state, subtypes, steps in choosing antimicrobial therapy). Prophylactic use of antimicrobials. Frequent errors. Pharmacist's role in antimicrobial stewardship.</p>	<p><b>2 h</b></p>
<p><b>6. Pharmacotherapy of arterial hypertension.</b> General information (definition, etiology, pathophysiology, classification, clinical presentation). Principles of treatment (desired outcomes, nonpharmacological and pharmacological treatment). Therapy optimization (treatment strategies, drug interactions, identification, prevention and management of adverse reactions and drug interactions). Patient's counseling and the pharmacist's role.</p>	<p><b>2 h</b></p>
<p><b>7. Pharmacotherapy of ischemic heart disease.</b> General information (definition, etiology, pathophysiology, classification, clinical presentation). Principles of treatment (desired outcomes, nonpharmacological and pharmacological treatment). Therapy optimization (treatment strategies, identification, prevention and management of adverse reactions and drug interactions). Patient's counseling and the pharmacist's role.</p>	<p><b>2 h</b></p>
<p><b>8. Pharmacotherapy of heart failure.</b> General information (definition, etiology, pathophysiology, classification, clinical presentation). Principles of treatment (desired outcomes, nonpharmacological and pharmacological treatment). Therapy optimization (treatment strategies, identification, prevention and management of adverse reactions and drug interactions). Patient's counseling and the pharmacist's role.</p>	<p><b>2 h</b></p>
<p><b>9. Pharmacotherapy of venous thromboembolism.</b> General information (definition, etiology, pathophysiology, classification, clinical presentation). Principles of treatment (desired outcomes, nonpharmacological and pharmacological treatment). Therapy optimization (treatment strategies, identification, prevention and management of adverse reactions and drug interactions). Patient's counseling and the pharmacist's role.</p>	<p><b>2 h</b></p>
<p><b>10. Pharmacotherapy of hyperlipidemia.</b> General information (definition, etiology, pathophysiology, classification, clinical presentation). Principles of treatment (desired outcomes, nonpharmacological and pharmacological treatment). Therapy optimization (treatment strategies, identification, prevention and management of adverse reactions and drug interactions). Patient's counseling and the pharmacist's role.</p>	<p><b>2 h</b></p>

<b>11. Pharmacotherapy of diabetes mellitus.</b> General information (definition, etiology, pathophysiology, classification, clinical presentation). Principles of treatment (desired outcomes, nonpharmacological and pharmacological treatment). Therapy optimization (treatment strategies, identification, prevention and management of adverse reactions and drug interactions). Patient's counseling and the pharmacist's role.	<b>2 h</b>
<b>12. Pain management.</b> Introduction (definition, pathophysiology, classification, assessment). Principles of treatment (goals, nonpharmacological and pharmacological treatment). Treatment algorithms. Pharmacist's role. Examples of analgesic therapy.	<b>2 h</b>
<b>13. Pharmacotherapy of depression.</b> General information (definition, etiology, pathophysiology, classification, clinical presentation). Principles of treatment (desired outcomes, nonpharmacological and pharmacological treatment). Therapy optimization (treatment strategies, identification, prevention and management of adverse reactions and drug interactions). Patient's counseling and the pharmacist's role.	<b>2 h</b>
<b>14. Pharmacotherapy of asthma.</b> General information (definition, etiology, pathophysiology, classification, clinical presentation). Principles of treatment (desired outcomes, nonpharmacological and pharmacological treatment). Therapy optimization (treatment strategies, identification, prevention and management of adverse reactions and drug interactions). Patient's counseling and the pharmacist's role.	<b>2 h</b>
<b>15. Pharmacotherapy of peptic ulcer disease.</b> General information (definition, etiology, pathophysiology, classification, clinical presentation). Principles of treatment (desired outcomes, nonpharmacological and pharmacological treatment). Therapy optimization (treatment strategies, identification, prevention and management of adverse reactions and drug interactions). Patient's counseling and the pharmacist's role.	<b>2 h</b>
<b>16. Pharmacotherapy of cirrhosis.</b> General information (definition, etiology, pathophysiology, classification, clinical presentation). Principles of treatment (desired outcomes, nonpharmacological and pharmacological treatment). Therapy optimization (treatment strategies, identification, prevention and management of adverse reactions and drug interactions). Patient's counseling and the pharmacist's role.	<b>2 h</b>
<b>17. Supportive care in cancer.</b> Introduction (common types of cancer, frequent side effects of cancer therapy). Management of hematologic, gastrointestinal, cutaneous, cardiovascular, neurologic side-effects. Management of some specific drug interactions. Pharmacist's role. Examples.	<b>2 h</b>
<b>18. Applications. Theoretical exam preparation</b>	<b>2 h</b>
<b>Bibliography</b> <ol style="list-style-type: none"> <li>1. Chisholm-Burns MA et al – Pharmacotherapy, principles and practice, 2nd ed, McGraw-Hill Medical, 2010</li> <li>2. Dipiro J T et al – Pharmacotherapy, a pathophysiologic approach, 10th ed, McGraw-Hill Medical, 2017</li> <li>3. Koda-Kimble M.A et al - Applied Therapeutics: The clinical use of drugs, 9th ed, Lippincott Williams&amp;Wilkins, 2009</li> <li>4. In Abraham J et al (eds). The Bethesda Handbook of Clinical Oncology. 4th ed. Lippincott Williams &amp; Wilkins. 2014</li> </ol>	



<p>5. Malone PM, Kier KL, Stanovich JE, Malone MJ. eds. Drug Information: A Guide for Pharmacists 5th ed, McGraw-Hill.2013</p> <p>6. Walker R, Whittlesea C – Clinical Pharmacy and Therapeutics, 5<sup>th</sup> ed, Churchill Livingstone/ Elsevier, 2012</p> <p>7. Olver IN editor. The MASCC Textbook of Cancer Supportive Care and Survivorship. Multinational Association for Supportive Care in Cancer Society. Springer. 2011</p> <p>8. Cunha BA, editor. Overview of Antimicrobial Therapy. Antibiotic Essentials, 14th ed. 2015. Gallagher JC, MacDougall C. Antibiotics simplified, 3rd ed. 2014</p> <p>9. Gimenez F et al – Pharmacie clinique et thérapeutique, 4e ed, Masson, 2011</p> <p>10. ESCP – Pharmacie clinique. Stratégies et communications, Editions Médicales Internationales, 1990</p> <p>11. Access Pharmacy - <a href="http://www.umfcluj.ro/ro/component/k2/item/1178-abonamente-curente">http://www.umfcluj.ro/ro/component/k2/item/1178-abonamente-curente</a></p> <p>12. <a href="http://www.farma.umfcluj.ro">www.farma.umfcluj.ro</a> : Clinical Pharmacy lectures.</p>	
<b>7.2.Laboratory activities</b>	<b>Remarks</b>
<b>1.</b> Clinical case analysis, aiming for drug optimization, through a systematic approach. The steps of the analysis are: reading the case scenario, identification and evaluation of the relevant information, identification of the drug related problems, identifying solutions to prevent and to resolve the identified drug related problems, establishing monitoring parameters, counseling the patient.	<b>39 h</b> The case scenario and the recommended references are transmitted to the patients one week before the laboratory, through the Moodle Platform.
<b>2.</b> Practical exam	<b>3 h</b>
<b>Bibliography</b>	
<p>1. The bibliography recommended for course.</p> <p>2. Specific bibliography adapted to the pathology analyzed in the case scenario: updated clinical guidelines.</p> <p>3. Medicinal Product Monograph. – ANMDM (National Agency for medicines and Medical Devices): <a href="https://www.anm.ro/nomenclator/medicamente">https://www.anm.ro/nomenclator/medicamente</a> – EMA (European Medicines Agency) : <a href="http://www.ema.europa.eu/ema/index.jsp?curl=pages/home/Home_Page.jsp&amp;mid=">http://www.ema.europa.eu/ema/index.jsp?curl=pages/home/Home_Page.jsp&amp;mid=</a> – ANSM (Agence nationale de sécurité du médicament et des produits de de santé): <a href="http://www.ansm.sante.fr/">http://www.ansm.sante.fr/</a></p> <p>4. Drug related information and drug interactions checker electronic engines – Medscape: <a href="http://www.medscape.com">http://www.medscape.com</a> – Drugs.com <a href="http://www.drugs.com">www.drugs.com</a> – Micromedex: <a href="http://www.umfcluj.ro/component/k2/item/1178-abonamente-curente">http://www.umfcluj.ro/component/k2/item/1178-abonamente-curente</a> <a href="http://www.micromedexsolutions.com/micromedex2/librarian/">http://www.micromedexsolutions.com/micromedex2/librarian/</a></p>	

## 8. Evaluation

Activity type	8.1.Evaluation criteria	8.2. Evaluation methods	8.3.Percent of final grade
<b>8.4. Course</b>	Knowledge, comprehension and use of the presented information.	written exam (multiple choice questions)	<b>50%</b>

<b>8.5. Laboratory</b>	The capacity to analyze the information regarding the patient, the disease state and the corresponding treatment, included in the case report. The capacity to identify the real or potential drug related problems. The capacity to suggest a therapeutic plan in order to prevent and solve the drug related problems.	practical exam with 2 parts: written (clinical case analysis) and oral	<b>50%</b>
	Constant preparation of the therapeutic plan for practical activities. Involvement in discussions on the patient case analysis.	ongoing evaluation (10% from note)	
<b>8.6. Minimal performance standard</b>			
Lecture <ul style="list-style-type: none"> <li>• The knowledge of clinical pharmacy and pharmaceutical care principles of practice</li> <li>• The knowledge of the key concepts applied for the therapeutic management of the diseases studied</li> <li>• The knowledge of the main criteria used for a safe and efficient medication used for the management of the analyzed diseases.</li> </ul> Laboratories <ul style="list-style-type: none"> <li>• Appropriate identification of drug related problems</li> <li>• Appropriate identification of the correct solutions for the solving of the identified drug related problems.</li> <li>• Clear presentation of the therapeutic plan.</li> </ul>			

# PHARMACOVIGILANCE

## 1. Information about the course

<b>1.1. Discipline</b>		<b>Pharmaceutical chemistry</b>					
<b>1.2. Course instructor</b>		<b>Professor Ovidiu Oniga, PhD</b>					
<b>1.3. Laboratory instructor</b>							
<b>1.4. Year</b>	5	<b>1.5. Semester</b>	1	<b>1.6. Evaluation type</b>	<b>Written exam</b>	<b>1.7. Course type</b>	<b>Specialty discipline Compulsory discipline</b>

## 2. Total estimated time (hours/semester for teaching activity)

<b>2.1. Total hours/week</b>	1 (1 <sup>st</sup> sem.)	<b>2.2. Course</b>	1	<b>2.3. Laboratories</b>	-
<b>2.4. Total hours in the curriculum</b>	14 (1 <sup>st</sup> sem.)	<b>2.5. Course</b>	14	<b>2.6. Laboratories</b>	-
<b>2.4. Distribution of time needed (1<sup>st</sup> sem.)</b>					Hours
a. Study using text books, lecture notes, bibliography					14
b. Individual study within libraries, on-line platforms, field research					6
c. Preparing seminars/laboratories, homework, projects, portfolios and essays					-
d. Tutoring					2
e. Evaluation/ semester					1
f. Other activities					-
<b>2.7. Total hours for individual study (a+b+c+d)</b>				<b>23 (1<sup>st</sup> sem.)</b>	
<b>2.8. Total hours per semester</b>				<b>14 (1<sup>st</sup> sem.)</b>	
<b>2.9. Number of credits</b>				<b>2 (1<sup>st</sup> sem.)</b>	

## 3. Pre-requisites:

<b>3.1. Curriculum</b>	Pharmacology knowledge Toxicology knowledge
<b>3.2. Competences</b>	Analysis and synthesis abilities The ability to structure and interpret the information

## 4. Requisites:

<b>4.1. For lectures</b>	<ul style="list-style-type: none"> <li>Room with a higher capacity of 100 seats equipped with video and computer</li> </ul>
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## 5. Specific competences acquired

<b>Professional competences</b>	<ul style="list-style-type: none"> <li>Accumulating knowledge, skills and approaches regarding the identification, validation and monitoring the undesirable reactions of drugs</li> </ul>
<b>Transversal competences</b>	<ul style="list-style-type: none"> <li>The ability to use interdisciplinary the specific knowledge gained in Pharmacovigilance for a complete professional formation</li> </ul>

## 6. Course objectives

<b>6.1. General objectives</b>	<ul style="list-style-type: none"> <li>Pharmacovigilance aspects</li> </ul>
<b>6.2. Specific objectives</b>	<ul style="list-style-type: none"> <li>Knowledge of the main types of side effects, of the objectives and methods used in pharmacovigilance and pharmacovigilance's organization at a global, european and national level</li> </ul>

## 7. Content

**Teaching methods for course:** interactive oral lectures and summarizing conversations with the aim to review and systematize the presented information

<b>7.1 Course (hours)</b>	<b>Remarks</b>
1. General aspects of pharmacovigilance and adverse reactions	<b>2 h</b>
2. The place of pharmacovigilance in drug research	<b>1 h</b>
3. The importance of pharmacovigilance for a safe drug administration during pregnancy and lactation	<b>5 h</b>
4. Pharmacovigilance aspects concerning the use of hormonal contraceptives	<b>1 h</b>
5. Pharmacovigilance aspects concerning the use of medicines in pediatrics and elderly	<b>1 h</b>
6. Establishing the causal relationships between drug administration and the emergence of side effects	<b>4 h</b>
<b>Total</b>	<b>14 h</b>
<b>Bibliography</b>	
1. O. Oniga, Corina Ionescu, Reacții adverse și interacțiuni medicamentoase, Editura UMF Iuliu Hațieganu Cluj Napoca 2004	
2. Ron Mann, Elizabeth Andrews, Pharmacovigilance, Second Edition, Ed. Wiley 2008	

## 8. Evaluation

<b>Activity type</b>	<b>8.1. Evaluation criteria</b>	<b>8.2. Evaluation methods</b>	<b>8.3. Percent of final grade</b>
<b>8.4. Course</b>	<ul style="list-style-type: none"> <li>verification of the degree of systematization and the use of the learned concepts</li> <li>logical coherence</li> <li>the interest for individual study</li> </ul>	Written evaluation in the exam session	<b>100%</b>
<b>8.6. Minimal performance standard</b>			
Knowing the fundamentals of theory and practical activities - getting grade 5 at evaluation			

## PUBLIC HEALTH AND HEALTH POLICIES

### 1. Information about the course

<b>1.1. Discipline</b>		<b>Physical Chemistry</b>					
<b>1.2. Course instructor</b>		<b>Lecturer Ioana Daniela Felecan, PhD</b>					
<b>1.3. Laboratory/ seminar instructor</b>		<b>Lecturer Ioana Daniela Felecan, PhD</b>					
<b>1.4. Year</b>	<b>5</b>	<b>1.5. Semester</b>	<b>1</b>	<b>1.6. Evaluation type</b>	<b>Multiple choice exam + Essays</b>	<b>1.7. Course type</b>	<b>Field discipline Compulsory discipline</b>

### 2. Total estimated time (hours/semester for teaching activity)

<b>2.1. Total hours/week</b>	<b>2</b>	<b>2.2. Course</b>	<b>1</b>	<b>2.3. Laboratories/ seminars</b>	<b>1</b>
<b>2.4. Total hours in the curriculum</b>	<b>28</b>	<b>2.5. Course</b>	<b>14</b>	<b>2.6. Laboratories</b>	<b>14</b>
<b>2.4. Distribution of time needed</b>					<b>Hours</b>
a. Study using text books, lecture notes, bibliography					14
b. Individual study within libraries, on-line platforms, field research					14
c. Preparing seminars/laboratories, homework, projects, portfolios and essays					14
d. Tutoring					2
e. Evaluation/ semester					1
f. Other activities					3
<b>2.7. Total hours for individual study (a+b+c+d)</b>					<b>44 (1<sup>st</sup> sem.)</b>
<b>2.8. Total hours per semester</b>					<b>76 (1<sup>st</sup> sem.)</b>
<b>2.9. Number of credits</b>					<b>2 (1<sup>st</sup> sem.)</b>

### 3. Pre-requisites:

<b>3.1. Curriculum</b>	Introduction to pharmaceutical legislation
<b>3.2. Competences</b>	

### 4. Requisites:

<b>4.1. For lectures</b>	•
<b>4.2. For laboratories sessions</b>	•

### 5. Specific competences acquired

<b>Professional competences</b>	<ul style="list-style-type: none"> <li>• Ability to analyze, synthesize, interpret theoretical concepts / results of medical studies in public health</li> <li>• Knowledge of the specific vocabulary in public health / health policies</li> <li>• Ability to promote a firm and optimistic attitude towards improving the health culture and the health of the population</li> </ul>
<b>Transversal</b>	<ul style="list-style-type: none"> <li>• Personal development and the enrichment of the professional knowledge</li> </ul>

<b>competences</b>	<ul style="list-style-type: none"> <li>The ability to perform an individually / team project on a chosen theme, based on a bibliographic documentation</li> </ul>
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## 6. Course objectifs

<b>6.1. General objectives</b>	<ul style="list-style-type: none"> <li>Understanding the concepts of Public Health</li> </ul>
<b>6.2. Specific objectives</b>	<ul style="list-style-type: none"> <li>Knowledge of complex measures to protect the health of the population</li> <li>Knowledge of different models of existing policies and health systems around the world</li> <li>Adequate positioning of the pharmacy profession in the public health system</li> </ul>

## 7. Content

**Teaching methods for course: Oral presentation, pptx presentation, debate, demonstrations**

**Teaching methods for laboratory activity: Oral presentation, pptx presentation, debate, demonstrations, role play**

<b>7.1 Course (hours)</b>	<b>Remarks</b>
1. Public health - definition. The health status of the population - definitions, assessment methods, indicators, the profile of the health status in Romania.	<b>1 h</b>
2. Health systems - objectives, examples: European models - French, German, British, American model.	<b>1 h</b>
3. Public health policies and strategies - the role of the state in the health system.	<b>1 h</b>
4. Financing of health systems - the state budget, social / private health insurance, direct payments.	<b>1 h</b>
5. Pressure groups in health policies - NGOs, patient groups, professional associations, trade unions.	<b>1 h</b>
6. The public health system in Romania - organization, strategies, institutions.	<b>1 h</b>
7. Determinants of health - types, importance of economic and social determinants.	<b>1 h</b>
8. The importance of demography in public health. Vulnerable or disadvantaged population categories in public health.	<b>1 h</b>
9. Collecting data in public health.	<b>1 h</b>
10. Drug policy - objectives, components. Introduction to health technology assessment (HTA)	<b>1 h</b>
11. Prevention and health promotion	<b>1 h</b>
12. Pharmacists' interventions in the strategies of prevention and health promotion through programs on: reproductive health, smoke cessation, vaccination of the population, healthy lifestyle, rational use of drugs, etc.	<b>2 h</b>
13. Expanding the pharmacist's role in public health - needs, limitations, solutions.	<b>1 h</b>
<b>Bibliography</b>	
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2. Borzan CM. Mocean F. Sănătate Publică. Editura Med. Univ. „I. Hațieganu” Cluj-Napoca; 2002.	
3. Negoescu R. Introducere în noua sănătate publică. Institutul de sănătate publică București; 2001.	
4. Collège Universitaire des Enseignants de Santé Publique (CUESP). Santé Publique. Elsevier Masson 3ED; 2015.	
5. Jacques Raimondeau. L'épreuve de santé publique. Presses de l'EHESP; Édition 2; 2016.	

6. Bruno Palier. La réforme des systèmes de santé. Presses Universitaires de France; Édition : 8e édition; 2017.
7. Epstein D. The use of Comparative Effectiveness Research and Health Technology Assessment in European countries: current situation and prospects for the future; 2014.
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[http://ec.europa.eu/economy\\_finance/publications/economic\\_paper/2012/pdf/ecp\\_461\\_en.pdf](http://ec.europa.eu/economy_finance/publications/economic_paper/2012/pdf/ecp_461_en.pdf)
10. Rotariu T. Demografie și sociologia populației. Structuri și procese demografice. Editura Polirom Iași; 2009.
11. <http://old.ms.ro/upload/Anexa%201%20-%20Strategia%20Nationala%20de%20Sanatate%202014-2020.pdf>
12. Beaglehole R. Global Public Health: a new era. Oxford University Press; 2003.
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14. Alița pentru sănătate din România – România: Starea de fapt în asigurările de sănătate. 2014
15. Noreen Dadirai Mdege, Stanley Chindove. Effectiveness of tobacco use cessation interventions delivered by pharmacy personnel: A systematic review. Research in Social and Administrative Pharmacy; 2013: 1-24.
16. John D. Grabenstein, John D. Grabenstein, Harry A. Guess, Abraham G. Hartzema. People Vaccinated by Pharmacists: Descriptive Epidemiology. JAPhA; 2001; 41: 46-52.
17. Maithili Deshpande, Jennifer Schauer, David A. Mott, Henry N. Young, Patrick Cory. Parents' perceptions of pharmacists as providers of influenza vaccine to children. JAPhA; 2013; 53 (5): 488-495.
18. Kristi K. Van. Emergency Contraceptive Pills: Dispensing Practices, Knowledge and Attitudes of South Dakota Pharmacists. Perspectives on Sexual and Reproductive Health; 2005; 37 (1): 19-24.
19. Jerome E.Kotecki, Sona I.Elanjian, Mohammad R.Torabi. Health Promotion Beliefs and Practices Among Pharmacists. JAPhA; 2000; 40 (6): 773-779.
20. Saramunee K. How to enhance public health service utilization in community pharmacy? General public and health providers' perspectives. Research in Social and Adm. Pharm. 2012; 1-13.
21. Legea nr. 95/2006 privind reforma în domeniul sănătății, republicată, Monitorul Oficial al României, partea I, nr. 652/2015, cu modificările și completările ulterioare.
22. Decizia Colegiului Farmaciștilor din România nr. 2/2009 privind aprobarea Statutului Colegiului Farmaciștilor din România și a Codului Deontologic al Farmacistului, Monitorul Oficial al României, partea I, nr. 490/2009.
23. Legea nr. 227/2015 – Codul Fiscal din 2015, Monitorul Oficial al României, nr. 688 din 2015.09.10.

<b>7.2. Laboratory/ seminars activities (hours)</b>	<b>Remarks</b>
1. Health status of the population - Study of the document on the national health strategy 2014-2020 in Romania	<b>4 h</b>
2. Health Profile in Romania - 2017OECD Report	<b>1 h</b>
3. Evaluation of antibiotic consumption, microbial resistance and nosocomial infections in Romania	<b>1 h</b>
4. Determinants of health: alcohol and tobacco consumption in Romania	<b>1 h</b>
5. Demographic indicators. Population structure of the population in Romania, by large age groups	<b>1 h</b>
6. Collect data in public health. Write a questionnaire	<b>1 h</b>

7. Pharmaceutical policies	<b>1 h</b>
8. Pharmacists' interventions in prevention and health promotion strategies. Perspectives on extending the role of the pharmacist in public health	<b>4 h</b>
<b>Bibliography</b>	
<ol style="list-style-type: none"> <li>1. Vlădescu C. Sănătate publică și management sanitar. Editura Cartea universitară, București; 2004.</li> <li>2. Borzan CM. Mocean F. Sănătate Publică. Editura Med. Univ. „I. Hațieganu” Cluj-Napoca; 2002.</li> <li>3. Negoescu R. Introducere în noua sănătate publică. Institutul de sănătate publică București; 2001.</li> <li>4. Collège Universitaire des Enseignants de Santé Publique (CUESP). Santé Publique. Elsevier Masson 3ED; 2015.</li> <li>5. Jacques Raimondeau. L'épreuve de santé publique. Presses de l'EHESP; Édition : 2; 2016.</li> <li>6. Bruno Palier. La réforme des systèmes de santé. Presses Universitaires de France; Édition : 8e édition; 2017.</li> <li>7. Epstein D. The use of Comparative Effectiveness Research and Health Technology Assessment in European countries: current situation and prospects for the future; 2014. <a href="http://www.ugr.es/~davidepstein/HTA%20in%20european%20countries.docx">http://www.ugr.es/~davidepstein/HTA%20in%20european%20countries.docx</a></li> <li>8. Carone G, Schwierz C, Xavier A. Cost-containment policies in public pharmaceutical spending in the EU. Economic Papers 461; 2012. <a href="http://ec.europa.eu/economy_finance/publications/economic_paper/2012/pdf/ecp_461_en.pdf">http://ec.europa.eu/economy_finance/publications/economic_paper/2012/pdf/ecp_461_en.pdf</a></li> <li>9. Rotariu T. Demografie și sociologia populației. Structuri și procese demografice. Editura Polirom Iași; 2009.</li> <li>10. <a href="http://old.ms.ro/upload/Anexa%201%20-%20Strategia%20Nationala%20de%20Sanatate%202014-2020.pdf">http://old.ms.ro/upload/Anexa%201%20-%20Strategia%20Nationala%20de%20Sanatate%202014-2020.pdf</a></li> <li>11. <a href="https://www.oecd-ilibrary.org/docserver/9789264283534-en.pdf?expires=1545045729&amp;id=id&amp;accname=guest&amp;checksum=59AD66CA5C4354B94A1AAFEF7CCD9692">https://www.oecd-ilibrary.org/docserver/9789264283534-en.pdf?expires=1545045729&amp;id=id&amp;accname=guest&amp;checksum=59AD66CA5C4354B94A1AAFEF7CCD9692</a></li> <li>12. <a href="http://www.cnscbt.ro/index.php/analiza-date-supraveghere/infectii-nosocomiale-1/961-consumul-de-antibiotice-rezistenta-microbiana-si-infectiile-asociate-asistentei-medicale-in-romania-2016/file">http://www.cnscbt.ro/index.php/analiza-date-supraveghere/infectii-nosocomiale-1/961-consumul-de-antibiotice-rezistenta-microbiana-si-infectiile-asociate-asistentei-medicale-in-romania-2016/file</a></li> <li>13. <a href="http://insp.gov.ro/sites/cnepss/resurse-imc-alcool/">http://insp.gov.ro/sites/cnepss/resurse-imc-alcool/</a></li> <li>14. <a href="http://insp.gov.ro/sites/cnepss/fumatul-controlul-tutunului/">http://insp.gov.ro/sites/cnepss/fumatul-controlul-tutunului/</a></li> <li>15. <a href="http://www.insse.ro/cms/">http://www.insse.ro/cms/</a></li> <li>16. Legea nr. 95/2006 privind reforma în domeniul sănătății, republicată, Monitorul Oficial al României, partea I, nr. 652/2015, cu modificările și completările ulterioare.</li> <li>17. Decizia Colegiului Farmaciștilor din România nr. 2/2009 privind aprobarea Statutului Colegiului Farmaciștilor din România și a Codului Deontologic al Farmacistului, Monitorul Oficial al României, partea I, nr. 490/2009.</li> <li>18. Legea nr. 227/2015 – Codul Fiscal din 2015, Monitorul Oficial al României, nr. 688 din 2015.09.10.</li> </ol>	

## 8. Evaluation

Activity type	8.1.Evaluation criteria	8.2. Evaluation methods	8.3.Percent of final grade
<b>8.4. Course</b>	Knowledge of bibliographic material	Multiple choice questions	<b>70%</b>
<b>8.5. Laboratory/ seminars</b>	1. The relevance of the theme chosen for the field of study of the course. 2. The logical organization of the text; structure by section (introduction,	Writing and presentation of an essay on a pre-established theme,	<b>30%</b>



	sections, conclusions, bibliography). 3. Well-argued presentation of the problems studied. 5. Concise style, clear, complete. 4. Correct writing - from the point of view of grammar, orthography, in accordance with the recommendations of writing the thesis of license of the regulation of the Faculty of Pharmacy.	documented by the analysis of the specialty literature in the field.	
<b>8.6. Minimal performance standard</b>			
Obtain at least 50% of the final grade of the multiple-choice examination and the evaluation of the activity during the seminars			

## PHARMACEUTICAL LEGISLATION AND DEONTOLOGY

### 1. Information about the course

<b>1.1. Discipline</b>		<b>Pharmaceutical legislation</b>					
<b>1.2. Course instructor</b>				<b>Professor Ofelia Crișan, PhD</b>			
<b>1.3. Laboratory instructor</b>				<b>Lecturer Anamaria Boboia, PhD Assistant professor Alexandra Toma, PhD</b>			
<b>1.4. Year</b>	<b>5</b>	<b>1.5. Semester</b>	<b>1</b>	<b>1.6. Evaluation type</b>	<b>Practical exam + Written exam</b>	<b>1.7. Course type</b>	<b>Specialized discipline Compulsory discipline</b>

### 2. Total estimated time (hours / semester for teaching activity)

<b>2.1. Total hours / week</b>	<b>4</b>	<b>2.2. course</b>	<b>2</b>	<b>2.3. laboratories</b>	<b>2</b>
<b>2.4. Total hours in the curriculum</b>	<b>56</b>	<b>2.5. course</b>	<b>28</b>	<b>2.6. laboratories</b>	<b>28</b>
<b>Distribution of time needed</b>					<b>Hours</b>
a. Study using text books, lecture notes, bibliography					34
b. Individual study within libraries, on-line platforms, field research					8
c. Preparing seminars/laboratories, homework, projects, portfolios and essays					8
d. Tutoring					6
e. Evaluation/semester					4
f. Other activities: pursuit of televised debates on current legislative changes					4
<b>2.7. Total hours for individual study</b>				<b>64 (1<sup>st</sup> sem.)</b>	
<b>2.8. Total hours per semester</b>				<b>120 (1<sup>st</sup> sem.)</b>	
<b>2.9. Number of credits</b>				<b>4 (1<sup>st</sup> sem.)</b>	

### 3. Prerequisites

<b>3.1. Curriculum</b>	<ul style="list-style-type: none"> <li>- Pharmacology</li> <li>- Biological medical products</li> <li>- Research methodology</li> <li>- Pharmaceutical technology</li> <li>- Toxicology</li> </ul>
<b>3.2. Competences</b>	<p>The students need to be able to:</p> <ul style="list-style-type: none"> <li>- understand the mechanism of action of medicinal products;</li> <li>- understand the special status of biological medicinal products;</li> <li>- understand the importance of complying with the scientific research methodology;</li> <li>- understand the importance of quality assurance in formulation and preparation /manufacturing of medicinal products;</li> <li>- understand the mechanism of action of toxic substances in the human organism.</li> </ul>

#### 4. Requisites

<b>4.1. For lectures</b>	Compliance with the Charter and University regulations.
<b>4.2. For laboratories sessions</b>	Compliance with the Charter and University regulations.

#### 5. Specific competences acquired

<b>Professional competences</b>	<p>The students are able to:</p> <ul style="list-style-type: none"> <li>- understand the evolution, adoption and implementation process for the national and European legislation;</li> <li>- understand the role and the importance of respecting the professional legislation and ethics;</li> <li>- develop their capacity of analysing and complying with the pharmaceutical legislation and deontology during professional activity: conception, formulation, preparation/manufacture, testing, storage, preservation, distribution, supply of medicinal products, food supplements, cosmetics and other health products; testing in laboratory (medical, toxicology, food and environment hygiene); management, marketing, administration in health field; provision of information and advice on medicinal products, food supplements, cosmetics and other health products;</li> <li>- develop a conscientious and responsible rapport toward the pharmaceutical legislation and ethics;</li> <li>- develop an active attitude of complying with the pharmaceutical legislation and deontology;</li> <li>- develop their ability to relate with professional staff and with patients in the pharmacy;</li> <li>- understand how to reflect on issues regarding the pharmaceutical legislation and deontology;</li> <li>- develop their ability of right use of digital information sources (websites, specialised software, data bases, online courses etc.) on pharmaceutical legislation, available at national and European level, including in at least an international language;</li> </ul>
<b>Transversal competences</b>	<ul style="list-style-type: none"> <li>- prove their ability of active participation, as informed European citizens, to the community, society and humanity issues;</li> <li>- develop their personal autonomy, the responsibility and the capacity of lifelong learning;</li> <li>- develop their ability of quality assurance in professional activities;</li> <li>- develop their ability to communicate on subjects of legislation and ethics in general;</li> <li>- develop their skills in legal and ethical interpretation.</li> </ul>

#### 6. Course objectives

<b>6.1. General objective</b>	- To familiarize the students with the field of health and pharmaceutical legislation and ethics.
<b>6.2. Specific objectives</b>	<ul style="list-style-type: none"> <li>- To understand the basic rules of adopting the national and European legislation.</li> <li>- To understand the legal and ethical context for pursuing health care,</li> </ul>

	<p>professional activity as a pharmacist and other activities concerning the medicinal products, at national and European level.</p> <ul style="list-style-type: none"> <li>- To observe the specific legal and ethical aspects in professional activity as a pharmacist and other activities concerning the medicinal products, especially in pharmacy.</li> <li>- To develop their abilities of analysing and applying the legal and ethical principles in the professional activity.</li> <li>- To develop their ability of using the pharmaceutical software in the pharmacy activity, according to the law.</li> </ul>
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## 7. Content

**Teaching methods for course:** academic lecture with ppt support, analyses, discussions.

**Teaching methods for laboratory activity:** presentation ppt and discussion of the legal framework, applications to the computer by using pharmacy management software, presenting and signing binding documents.

7.1. Course (hours)	Remarks
Pharmaceutical legislation: definition, objectives, structure, importance for the pharmaceutical activity. (1)	1 lecture
Legislation: categories of norms at national and European level, hierarchy of norms. (1)	1 lecture
Health system and social security system: cross border healthcare in the European Union, principles, public authorities, healthcare providers, role of the pharmacy. (2)	2 lectures
Pharmacist's profession: training, requirements for access to and pursuit of the profession at the European and national level, professional association, indignities and incompatibilities, pharmaceutical deontology. (10)	10 lectures
Legal framework for medicinal products at the European and national level: definition, pharmaceutical establishments and activities, pharmacist career, medicinal products liability, falsification and counterfeiting. (10)	10 lectures
Medicinal products with special legal status: narcotics and psychotropic substances, drug precursors, doping agents. (4)	4 lectures
<p><b>Bibliography:</b></p> <ol style="list-style-type: none"> <li>1. Appelbe G.E., Wingfield J., Pharmacy Law and Ethics, The Pharmaceutical Press, London 1997;</li> <li>2. Badea (Mureşan) A., Răspunderea penală în domeniul farmaceutic, Teză de doctorat, UMF "Iuliu Hațieganu" Cluj-Napoca, 2010;</li> <li>3. Clark M.E., Pharmaceutical Law: Regulation of Research, Development, and Marketing, Bloomberg BNA, Arlington, 2007, with 2011 Cumulative Supplement;</li> <li>4. Crişan O., Profesiunea de farmacist – probleme de legislație, ediția a III-a revizuită, Editura Medicală Universitară "Iuliu Hațieganu", Cluj-Napoca, 2015;</li> <li>5. Crişan O., Legislația cercetării – studiu privind drepturile omului în domeniul sănătății, Editura Medicală Universitară "Iuliu Hațieganu" Cluj-Napoca, 2006;</li> <li>6. Decizia Colegiului Farmaciștilor din România nr. 2/2009 privind aprobarea Statutului Colegiului Farmaciștilor din România și a Codului deontologic al farmacistului, Monitorul Oficial al României, partea I, nr. 490/2009;</li> <li>7. Directive 2001/83/CE of the European Parliament and of the Council on the Community code relating to medicinal products for human use, Official Journal of the European Union no. L311/2001, consolidated version;</li> </ol>	

8. Directive 2005/36/CE of the European Parliament and of the Council on the recognition of professional qualifications, Official Journal of the European Union no. L 255/2005, consolidated version;
9. European Medicines Agency, <http://www.ema.europa.eu/ema/>, 2018;
10. European Union, EU Law, [https://europa.eu/european-union/law\\_en](https://europa.eu/european-union/law_en), 2018;
11. Hotărârea Guvernului României nr. 1915/2006 pentru aprobarea Normelor metodologice de aplicare a prevederilor Legii nr. 339/2005 privind regimul juridic al plantelor, substanțelor și preparatelor stupefiante și psihotrope, Monitorul Oficial al României, partea I, nr. 18/2007, cu modificările și completările ulterioare;
12. Iacob S.M., Cercetări privind codificarea legislației farmaceutice din România, Teză de doctorat, UMF "Iuliu Hațieganu" Cluj-Napoca, 2009;
13. Leca A., Droit pharmaceutique, Presses Universitaires d'Aix-Marseille, 2006;
14. Legea nr. 339/2005 privind regimul juridic al plantelor, substanțelor și preparatelor stupefiante și psihotrope, Monitorul Oficial al României, partea I, nr. 1095/2005, cu modificările și completările ulterioare;
15. Legea nr. 95/2006 privind reforma în domeniul sănătății, republicată, Monitorul Oficial al României, partea I, nr. 652/2015, cu modificările și completările ulterioare;
16. Legea nr. 227/2006 privind prevenirea și combaterea dopajului în sport, republicată, Monitorul Oficial al României, partea I nr. 156/2016, cu modificările și completările ulterioare;
17. Legea nr. 104/2008 privind prevenirea și combaterea producerii și traficului ilicit de substanțe dopante cu grad mare de risc, republicată, Monitorul Oficial al României, partea I nr. 451/2011, cu modificările și completările ulterioare;
18. Legea nr. 266/2008 a farmaciei, republicată, Monitorul Oficial al României, partea I, nr. 85/2015, cu modificările și completările ulterioare;
19. Maurain C., Bélanger M., Droit pharmaceutique, vol. I-III, Lexis Nexis, Paris, 2012, ediție actualizată permanent;
20. Mignolet O., Traité de droit pharmaceutique - La commercialisation des médicaments à usage humain, Ed. Kluwer, Waterloo, 2011;
21. National Agency for Medicines and Medical Devices, Medicinal products for human use, <https://www.anm.ro/en/>, 2018;
22. National Agency for Medicines and Medical Devices, Medicinal products for human use, Legislation, <https://www.anm.ro/en/medicamente-de-uz-uman/legislatie/legi-ordonante-si-hotarari-de-guvern/>, 2018;
23. Ordinul ministrului sănătății nr. 75/2010 pentru aprobarea Regulilor de bună practică farmaceutică, Monitorul Oficial al României, partea I, nr. 91/2010;
24. Ordonanța de urgență a Guvernului României nr. 121/2006 privind regimul juridic al precursorilor de droguri, Monitorul Oficial al României, partea I, nr. 1039/2006, cu modificările și completările ulterioare;
25. Sabau R., Studiu privind legislația suplimentelor nutritive și a produselor dopante în România, Teză de doctorat, UMF "Iuliu Hațieganu" Cluj-Napoca, 2012;
26. Strauss S., Federal Drug Laws and Examination Review, Technomic Publishing, Lancaster, fifth edition.

<b>7.2. Laboratory activities (hours)</b>	<b>Remarks</b>
1. Presentation of the curriculum. Laboratory safety rules. (2)	1 laboratory session
2. Procurement process in pharmacy (2)	1 laboratory session
3. Reception of medicines and other health products in pharmacy (4)	2 laboratory

	sessions
4. Arrangement and storage of medicines and other health products in pharmacy (2)	1 laboratory session
5. Preparation of medicines and other health products in pharmacy (4)	2 laboratory sessions
6. Dispensing of medicines and other health products in pharmacy (2)	1 laboratory session
7. Dispensing of medicines in the social security system (4)	2 laboratory sessions
8. Pharmacy inventory management (2)	1 laboratory session
9. Inventory control within a pharmacy (2)	1 laboratory session
10. Occupational safety and fire prevention in pharmacy (2)	1 laboratory session
11. Reviewing the pharmacy activities (2)	1 laboratory session

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1. Boboia A., Crişan O., Polinicencu C., Activitatea din farmacie – Ghid pentru lucrări practice de legislaţie farmaceutică, Editura Medicală Universitară “Iuliu Haţieganu”, Cluj-Napoca, 2012;
2. Codul Muncii al României, republicat, Monitorul Oficial al României, partea I, nr. 345/2011, cu modificările şi completările ulterioare;
3. Farmacopeea Română, ediţia a X-a, Editura Medicală, Bucureşti, 1993;
4. Legea contabilităţii nr. 82/1991, republicată, Monitorul Oficial al României, partea I, nr. 454/2008, cu modificările şi completările ulterioare;
5. Legea nr. 339/2005 privind regimul juridic al plantelor, substanţelor şi preparatelor stupefiante şi psihotrope, Monitorul Oficial al României, partea I, nr. 1095/2005, cu modificările şi completările ulterioare;
6. Legea nr. 95/2006 privind reforma în domeniul sănătăţii, republicată, Monitorul Oficial al României, partea I, nr. 652/2015, cu modificările şi completările ulterioare;
7. Legea nr. 307/2006 privind apărarea împotriva incendiilor, Monitorul Oficial al României, partea I, nr. 633/2006, cu modificările şi completările ulterioare.
8. Legea nr. 319/2006 a securităţii şi sănătăţii în muncă, Monitorul Oficial al României, partea I, nr. 646/2006, cu modificările şi completările ulterioare;
9. Legea nr. 266/2008 a farmaciei, republicată, Monitorul Oficial al României, partea I, nr. 85/2015, cu modificările şi completările ulterioare;
10. Hotărârea Guvernului României nr. 1028/2006 privind cerinţele minime de securitate şi sănătate în muncă referitoare la utilizarea echipamentelor cu ecran de vizualizare, Monitorul Oficial, partea I, nr. 710/2006;
11. Hotărârea Guvernului României nr. 1425/2006 pentru aprobarea normelor metodologice de aplicare a prevederilor Legii securităţii şi sănătăţii în muncă nr. 319/2006, Monitorul Oficial al României, partea I, nr. 882/2006, cu modificările şi completările ulterioare;
12. Hotărârea Guvernului României nr. 1915/2006 pentru aprobarea Normelor metodologice de aplicare a prevederilor Legii nr. 339/2005 privind regimul juridic al plantelor, substanţelor şi preparatelor stupefiante şi psihotrope, Monitorul Oficial al României, partea I, nr. 18/2007, cu modificările şi completările ulterioare;
13. Hotărârea Guvernului României nr. 720/2008 pentru aprobarea Listei cuprinzând denumirile comune internaţionale corespunzătoare medicamentelor de care beneficiază asiguraţii, cu sau fără

<p>contribuție personală, pe bază de prescripție medicală, în sistemul de asigurări sociale de sănătate, Monitorul Oficial al României, partea I, nr. 523/2008, cu modificările și completările ulterioare;</p> <p>14. Hotărârea Guvernului României nr. 161/2016 pentru aprobarea pachetelor de servicii și a Contractului-cadru care reglementează condițiile acordării asistenței medicale, a medicamentelor și a dispozitivelor medicale în cadrul sistemului de asigurări sociale de sănătate pentru anii 2016-2017, Monitorul Oficial al României, partea I, nr. 215/2016, cu modificările și completările ulterioare;</p> <p>15. Hotărârea Guvernului României nr. 155/2017 privind aprobarea programelor naționale de sănătate pentru anii 2017 și 2018, Monitorul Oficial al României, partea I, nr. 222/2017;</p> <p>16. National Agency for Medicines and Medical Devices, Index of medicinal products for human use, <a href="https://www.anm.ro/nomenclator/medicamente">https://www.anm.ro/nomenclator/medicamente</a>, 2018;</p> <p>17. Ordinul ministrului sănătății nr. 962/2009 pentru aprobarea Normelor privind înființarea, organizarea și funcționarea farmaciilor și drogheriilor, Monitorul Oficial al României, partea I, nr. 538/2009, cu modificările și completările ulterioare;</p> <p>18. Ordinul ministrului sănătății nr. 75/2010 pentru aprobarea Regulilor de bună practică farmaceutică, Monitorul Oficial al României, partea I, nr. 91/2010;</p> <p>19. Ordinul ministrului sănătății nr. 1602/2010 pentru aprobarea Normelor privind clasificarea pentru eliberare a medicamentelor de uz uman, Monitorul Oficial al României, partea I, nr. 27/2011;</p> <p>20. Ordinul ministrului sănătății nr. 368/2017 pentru aprobarea Normelor privind modul de calcul și procedura de aprobare a prețurilor maxime ale medicamentelor de uz uman, Monitorul Oficial al României, partea I, nr. 215/2017, cu modificările și completările ulterioare.</p>
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## 8. Evaluation

Activity type	8.1. Evaluation criteria	8.2. Evaluation methods	8.3. Percent of final grade
<b>8.4. Course</b>	<ul style="list-style-type: none"> <li>- Knowledge of the categories of norms and the basic rules of adopting the legislation at national and European level.</li> <li>- Understanding of the legal and deontological context for the health care, the professional activity as a pharmacist and all the activities concerning the medicinal products, at national and European level.</li> <li>- Knowledge of the specific legal and deontological aspects of the professional activity as a pharmacist and all the activities concerning the medicines and other health products, at national and European level.</li> <li>- Capacity of analysing and applying the legal and deontological principles in the</li> </ul>	<p>Written exam with multiple choice questions (MCQ), in order to evaluate not only the knowledges, but also the competences, by simulating situations from practice:</p> <ul style="list-style-type: none"> <li>- single answer;</li> <li>- multiple answer;</li> <li>- grouped answer;</li> <li>- associations;</li> <li>- pattern recognition;</li> <li>- relationship analysis.</li> </ul>	<b>50%</b>

	professional activity. - Understanding of the essence and importance of complying with pharmaceutical legislation and deontology, in order to provide quality services and to protect the patient' rights.		
<b>8.5. Laboratory</b>	- Knowledge of the in force legislation regarding the pharmacy activities. - Understanding of the application of pharmacy management software for the pharmacy activities. - Ability of using the pharmacy management software in the pharmacy activity.	Practical exam with two parts: - short questions on the legislation regarding the pharmacy activities; - applications to the computer, with topics simulating situations from practice.	<b>50%</b>
<b>8.6. Minimal performance standards</b>			
- Knowledge of the categories of norms, at national and European level, regarding the pharmaceutical activity. - Understanding of the importance of the pharmaceutical legislation and deontology in the professional activity. - Understanding of the application of pharmacy management software for the pharmacy activities.			



## MANAGEMENT AND MARKETING

### 1. Information about the course

<b>1.1. Discipline</b>		<b>Pharmaceutical legislation</b>					
<b>1.2. Course instructor</b>				<b>PhD Lecturer Anamaria Boboia</b>			
<b>1.3. Laboratory instructor</b>				<b>Not necessary.</b>			
<b>1.4. Year</b>	<b>5</b>	<b>1.5. Semester</b>	<b>1</b>	<b>1.6. Evaluation type</b>	<b>Written exam</b>	<b>1.7. Course type</b>	<b>Specialized discipline Compulsory discipline</b>

### 2. Total estimated time (hours / semester for teaching activity)

<b>2.1. Total hours / week</b>	<b>2</b>	<b>2.2. course</b>	<b>2</b>	<b>2.3. laboratories</b>	<b>0</b>
<b>2.4. Total hours in the curriculum</b>	<b>28</b>	<b>2.5. course</b>	<b>28</b>	<b>2.6. laboratories</b>	<b>0</b>
<b>Distribution of time needed</b>					<b>Hours</b>
a. Study using text books, lecture notes, bibliography					24
b. Individual study within libraries, on-line platforms, field research					2
c. Preparing seminars/laboratories, homework, projects, portfolios and essays					0
d. Tutoring					2
e. Evaluation/semester					2
f. Other activities: watching TV programs on management and marketing topics					2
<b>2.7. Total hours for individual study</b>					<b>32 (1<sup>st</sup> sem.)</b>
<b>2.8. Total hours per semester</b>					<b>60 (1<sup>st</sup> sem.)</b>
<b>2.9. Number of credits</b>					<b>2 (1<sup>st</sup> sem.)</b>

### 3. Prerequisites

<b>3.1. Curriculum</b>	<ul style="list-style-type: none"> <li>- Pharmacology</li> <li>- Methodology of scientific research</li> <li>- Industrial Pharmaceutical Technology</li> <li>- Introduction to pharmaceutical technology and legislation (IPTL)</li> </ul>
<b>3.2. Competences</b>	<p>The students need to be able to:</p> <ul style="list-style-type: none"> <li>- understand the pharmacological action, therapeutic uses and mechanism of action of medicinal products;</li> <li>- understand the importance of complying with the scientific research methodology;</li> <li>- understand the importance of quality assurance in formulation and preparation /manufacturing of medicinal products;</li> <li>- understand the importance of complying with the legislation in the commercial domain.</li> </ul>

### 4. Requisites

<b>4.1. For lectures</b>	Compliance with the Charter and University regulations.
<b>4.2. For laboratories sessions</b>	Not needed.

### 5. Specific competences acquired

<b>Professional competences</b>	<p>The students are able to:</p> <ul style="list-style-type: none"> <li>- understand the managerial process, particularly in the pharmaceutical domain;</li> <li>- understand the principles and the marketing activity, particularly in the pharmaceutical domain;</li> <li>- prove their ability of appropriate use of the concepts of management and marketing;</li> <li>- prove the ability to interpret and apply the principles and rules of the management and marketing in the pharmaceutical domain, respectively for the units that have as object of activity: conception, formulation, preparation/manufacture, testing, storage, preservation, distribution, supply of medicinal products, food supplements, cosmetics and other health products; testing in laboratory (medical, toxicology, food and environment hygiene); management, marketing, administration in health field; provision of information and advice on medicinal products, food supplements, cosmetics and other health products;</li> <li>- develop skills of correct use of management and marketing tools in the professional life: decision making, negotiation, communication, argumentation of a point of view;</li> <li>- develop a conscious and responsible reporting toward the position of manager;</li> <li>- develop an active attitude to the needs of management and marketing;</li> <li>- develop the ability to analyze the actions of management and pharmaceutical marketing;</li> <li>- develop their ability of right use of digital information sources (websites, specialised software, data bases, online courses etc.) in the pharmaceutical field, especially for management and marketing issues.</li> </ul>
<b>Transversal competences</b>	<ul style="list-style-type: none"> <li>- prove their ability of active participation, as informed European citizens, to the community, society and humanity issues;</li> <li>- develop their ability to relate and to communicate at interpersonal, intercultural, social and civic level;</li> <li>- develop their personal autonomy, the responsibility and the capacity of lifelong learning;</li> <li>- develop their ability of optimum and creative capitalizing of their potential in the scientific activities;</li> <li>- prove their preoccupation for quality assurance in professional activities.</li> </ul>

### 6. Course objectives

<b>6.1. General objective</b>	<ul style="list-style-type: none"> <li>- To familiarize the students with the main management approaches, management issues of pharmaceutical units, as well as general marketing concepts and principles.</li> </ul>
<b>6.2. Specific objectives</b>	<ul style="list-style-type: none"> <li>- To understand the context of appearance and development of management and marketing;</li> <li>- To correctly reflect to the specifics of development of applying the management and the marketing at national and international economic issues;</li> <li>- To develop students' skills of analysis and interpretation of the principles of management and marketing, for the correct application in practice;</li> <li>- To develop the abilities of professional communication;</li> </ul>

	<ul style="list-style-type: none"> <li>- To correctly reflect at the management issues of pharmaceutical units, so that pharmacists be able to practice on a post of manager in the pharmaceutical activity;</li> <li>- To develop students' ability to use and apply the marketing concepts in the field of medicament, for the profitability of the activity in the pharmaceutical units.</li> </ul>
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## 7. Content

**Teaching methods for course:** academic lecture with ppt support, conversation, problematisation.

**Teaching methods for laboratory activity:** not needed.

7.1. Course (hours)	Remarks
1. Defining management. Introductory aspects. Brief history of management. (2)	2 lectures
2. The evolution of managerial thinking: management schools. (2)	2 lectures
3. The managerial process. The functions of management: planning, organization, direction, control. Managerial methods. (4)	4 lectures
4. Essential activities within management (decision making, managerial communication, negotiating, motivating, delegating, resolving conflicts, coordinating the team). Pharmacy management issues. Rules of Good Pharmaceutical Practice. (6)	6 lectures
5. Introduction to marketing. Particularities of pharmaceutical marketing. (2)	2 lectures
6. Marketing environment. The market (general aspects, market segmentation, differentiation and positioning). Medicines market. (4)	4 lectures
7. Strategic marketing. (2)	2 lectures
8. Tactical marketing (product, price, distribution, promotion). (4)	4 lectures
9. Administrative marketing. Marketing activities in community pharmacy. (2)	2 lectures
<b>Bibliography:</b>	
<ol style="list-style-type: none"> <li>1. Boboia A., Cercetări privind aplicarea unor metode moderne de management în domeniul farmaceutic, Teză de doctorat, UMF „Iuliu Hațieganu” Cluj-Napoca, 2009;</li> <li>2. Borza I.S., Marketingul produselor cosmetice românești. Strategii și metode de creștere a consumului de creme produse în România, Teză de doctorat, UMF „Iuliu Hațieganu” Cluj-Napoca, 2008;</li> <li>3. Bucurescu S.T., Cuparencu B., Ponoran V., Marketing pentru industria farmaceutică, Ed. Dacia, Cluj-Napoca, 1999;</li> <li>4. Certo S., Managementul modern, Ed. Teora, București, 2002;</li> <li>5. Chatain R., Marketing pharmaceutique, vol. I et II, Technique et Documentation – Lavoisier, Paris, 1986;</li> <li>6. Clark M.E., Pharmaceutical Law: Regulation of Research, Development, and Marketing, Bloomberg BNA, Arlington, 2007, with 2011 Cumulative Supplement;</li> <li>7. Danzon P.M., Nicholson S., The Oxford Handbook of the Economics of the Biopharmaceutical Industry, Oxford Handbooks, 2012;</li> <li>8. Desselle S. P., Zgarrick D. P., Managementul farmaciilor. Informații esențiale pentru practica farmaceutică, ediția a doua, Ed. Printco, Iași, 2011;</li> <li>9. Drăgan L.E., Marketingul ambalajelor farmaceutice, Teză de doctorat, UMF „Iuliu Hațieganu” Cluj-Napoca, 2008;</li> <li>10. Elliot R., Payne K., Essentials of Economic Evaluation in Healthcare, The Pharmaceutical Press, London, 2005;</li> <li>11. Fărcaș F.S., Promovarea produselor medicamentoase, Teză de doctorat, UMF „Iuliu Hațieganu” Cluj-Napoca, 2007;</li> </ol>	

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20. Mariotti S., Glackin C., Antreprenariat: lansarea și administrarea unei afaceri, Ed. Bizzkit, București, 2012;
21. Mintzberg H., Le management – Voyage au centre des organisations, Éditions d’Organisation, Paris, 2001;
22. Morgovan C., Marketingul medicamentelor antidiabetice, Teză de doctorat, UMF „Iuliu Hațieganu” Cluj-Napoca, 2008;
23. Ollivier A., Hurteloup C., Le marketing du médicament en question(s), Ed. Vuibert, 2008;
24. Peterson A.M., Managing Pharmacy Practice: Principles, Strategies and Systems, CRC Press Pharmacy Education Series, 2004;
25. Ribierre D., Comment manager son équipe, Masson, Paris, 2002;
26. Săndulescu (Matescu) I.V., Marketingul medicamentelor antiseptice orale, Teză de doctorat, UMF „Iuliu Hațieganu” Cluj-Napoca, 2007;
27. Voitcu M., Căraușu E.-M., Marketingul medicamentelor, Ed. Gr. T. Popa, Iași, 2004;
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29. \*\*\* Marché, création et gestion d’une pharmacie, Arcane Institut, 2002.

<b>7.2. Laboratory activities (hours)</b>	<b>Remarks</b>
Not needed.	
<b>Bibliography:</b> Not needed.	

### 8. Evaluation

Activity type	8.1. Evaluation criteria	8.2. Evaluation methods	8.3. Percent of final grade
<b>8.4. Course</b>	<ul style="list-style-type: none"> <li>- Knowledge of the terminology used in management and marketing.</li> <li>- Capacity of the adequate use of the concepts of management and marketing.</li> <li>- Understanding of the importance of the management and marketing for the pharmaceutical field.</li> <li>- Capacity of using correctly the methods, models and principles of management and marketing, in order to apply in</li> </ul>	Written exam with multiple choice questions (MCQ): <ul style="list-style-type: none"> <li>- single answer;</li> <li>- multiple answer.</li> </ul>	<b>100%</b>

	<p>practice.</p> <ul style="list-style-type: none"> <li>- Knowledge of the main rules of the professional communication.</li> <li>- Knowledge of the economic context of achieving activities having as object the medicament.</li> <li>- Understanding of the essence and importance of the management and marketing in the pharmaceutical field and in society.</li> </ul>		
<b>8.5. Laboratory</b>	Not needed.		
<b>8.6. Minimal performance standards</b>			
<ul style="list-style-type: none"> <li>- Knowledge of the terminology used in management and marketing.</li> <li>- Capacity of adequate use of the concepts of management and marketing.</li> <li>- Understanding of the essence and importance of management and marketing in the pharmaceutical field and in society.</li> </ul>			

## HOMEOPATHIC DRUGS AND VETERINARY DRUGS

### 1. Information about the course

<b>1.1. Discipline</b>		<b>Dermopharmacy and cosmetics</b>					
<b>1.2. Course instructor</b>		<b>Lecturer Cătălina Bogdan, PhD</b>					
<b>1.3. Laboratory instructor</b>		<b>Associate Professor Mirela Moldovan, PhD</b> <b>Lecturer Cătălina Bogdan, PhD</b>					
<b>1.4. Year</b>	<b>5</b>	<b>1.5. Semester</b>	<b>1</b>	<b>1.6. Evaluation type</b>	<b>Written exam</b>	<b>1.7. Course type</b>	<b>Specialty discipline, Compulsory discipline</b>

### 2. Total estimated time (hours/semester for teaching activity)

<b>2.1. Total hours/week</b>	<b>2</b>	<b>2.2. Course</b>	<b>1</b>	<b>2.3. Laboratories</b>	<b>1</b>
<b>2.4. Total hours in the curriculum</b>	<b>28</b>	<b>2.5. Course</b>	<b>14</b>	<b>2.6. Laboratories</b>	<b>14</b>
<b>2.4. Distribution of time needed</b>					Hours
a. Study using text books, lecture notes, bibliography					18
b. Individual study within libraries, on-line platforms, field research					4
c. Preparing seminars/laboratories, homework, projects, portfolios and essays					5
d. Tutoring					1.5
e. Evaluation/ semester					1.5
f. Other activities					-
<b>2.7. Total hours for individual study (a+b+c+d)</b>					<b>28.5 (1<sup>st</sup> sem.)</b>
<b>2.8. Total hours per semester</b>					<b>58 (1<sup>st</sup> sem.)</b>
<b>2.9. Number of credits</b>					<b>2 (1<sup>st</sup> sem.)</b>

### 3. Prerequisites

<b>3.1. Curriculum</b>	- To acquire botany, pharmacognosy knowledge applied to the pharmaceutical field, as well as pharmaceutical technology knowledge
<b>3.2. Competences</b>	- Acquired specific competencies of botany, pharmacognosy and pharmaceutical technology

### 4. Requisites

<b>4.1. For lectures</b>	<ul style="list-style-type: none"> <li>• Classroom equipped with computer and projector</li> <li>• Being aware of, and complying with the Regulation governing the functioning and organization of the teaching activity in undergraduate study programs</li> </ul>
<b>4.2. For laboratories sessions</b>	<ul style="list-style-type: none"> <li>• Laboratories with proper equipment</li> <li>• Complying with labor protection requirements in the laboratories</li> <li>• Being aware of, and complying with the Regulation governing the functioning and organization of the teaching activity in undergraduate study programs</li> <li>• Turning off the mobile phones and other electronic devices during the laboratories sessions</li> </ul>

### 5. *Specific competences acquired*

<b>Professional competences</b>	<ul style="list-style-type: none"> <li>• Ability to properly use the specialized terminology.</li> <li>• Ability to understand and use the principles and specific concepts of homeopathy.</li> <li>• Ability to identify the methods for the preparation of homeopathic drugs.</li> <li>• Ability to understand and explain the elements forming the name of unitary homeopathic drugs.</li> <li>• Ability to prepare various homeopathic formulations.</li> <li>• Ability to express recommendations for use of OTC homeopathic medicinal products.</li> <li>• Ability to express recommendations for use of unitary homeopathic medicines to reduce the acute symptoms.</li> <li>• Ability to explain to the patients the general recommendations to be followed during a homeopathic treatment.</li> <li>• Ability to express recommendations on the administration and use of veterinary drugs.</li> </ul>
<b>Transversal competences</b>	<ul style="list-style-type: none"> <li>• Ability to use domain-specific concepts in new contexts.</li> <li>• Ability to apply theoretical knowledge to cope with actual situations.</li> <li>• Ability to efficiently use the information resources for own professional development.</li> <li>• Ability to optimally and creatively use the potential in conducting scientific activities.</li> <li>• Developing communication skills.</li> </ul>

### 6. *Course objectives*

<b>6.1.General objectives</b>	<ul style="list-style-type: none"> <li>• Acquiring general knowledge relating to the principles and the concepts of homeopathic therapy approach.</li> <li>• Acquiring the necessary knowledge for the use homeopathy as alternative or complementary treatment method to allopathic therapy for the purpose of treating certain conditions.</li> <li>• Acquiring veterinary pharmacy specific concepts to facilitate dispensing of veterinary drugs.</li> </ul>
<b>6.2.Specific objectives</b>	<ul style="list-style-type: none"> <li>• Getting the students familiar with the specific terminology used in the field.</li> <li>• Knowing the principles and the concepts of homeopathy and the main differences compared to allopathy.</li> <li>• Knowing the raw materials used for the homeopathic drugs preparation.</li> <li>• Knowing the methods for the preparation of homeopathic drugs.</li> <li>• Knowing the homeopathic pharmaceutical forms.</li> <li>• Knowing the OTC homeopathic medicinal products, unitary homeopathic drugs and their principles of use.</li> <li>• Knowing the particular aspects of formulation and administration of veterinary drugs.</li> <li>• Knowing the therapeutic classes used to treat some common diseases of animals.</li> </ul>

## 7. Content

**Teaching methods course:** Oral presentation with PowerPoint presentation, systematic presentation, discussion, questioning.

**Teaching methods Laboratory activities:** Systematic presentation, laboratory sessions (groups of 2 students), debate.

7.1.Lectures (hours)	Remarks
<b>1. Introduction to homeopathy.</b> Defining the homeopathic therapy approach, the homeopathic drug, defining other specific terms used. Brief history.	<b>1 h</b>
<b>2. The basic principles of homeopathy.</b> The principle of similitude, principle of infinitesimal doses, principle of globality, principle of experimentation on healthy subjects.	<b>1 h</b>
<b>3. The concept of terrain in homeopathy.</b> The components of the terrain: constitution, temperament, diathesis. The role of terrain in homeopathy.	<b>1 h</b>
<b>4. Preparation of homeopathic drugs.</b> Raw materials, preparation methods of homeopathic drugs. Good manufacturing practice guidelines in a homeopathic laboratory.	<b>1 h</b>
<b>5. Preparation of homeopathic drugs using herbal raw materials.</b> Examples- pathogenetic actions, clinical indications. Gemmotherapy products- definition, general aspects.	<b>1 h</b>
<b>6. Preparation of homeopathic drugs using mineral raw materials and animal raw materials.</b> Examples- pathogenetic actions, clinical indications.	<b>1 h</b>
<b>7. Homeopathic pharmaceutical forms.</b> Classification, preparation. Examples.	<b>2 h</b>
<b>8. Recommendations for use of homeopathic medicinal products.</b> Components of homeopathic prescription, prescribing ways (unicism, complexism).	<b>1 h</b>
<b>9. Homeopathic therapeutics.</b> The use of homeopathic drugs for the treatment of different conditions (ORL, digestive, respiratory, dermatological diseases).	<b>2 h</b>
<b>10. Veterinary pharmacy.</b> Definition, legal framework, veterinary drugs, dispensing veterinary drugs.	<b>1 h</b>
<b>11. Pharmaceutical forms used in veterinary medicine.</b> Classification, preparation. Examples. Administration of veterinary drugs.	<b>1 h</b>
<b>12. Common animals' pathologies- treatment.</b> Medication for parasitic disease in animals (ecto and endoparasites), medication for digestive disorders of animals, medication for skin disorders.	<b>1 h</b>
<b>Bibliography</b>	
<ol style="list-style-type: none"> <li>Hahnemann S. Organon al medicinei, Ed. Tehnopress, Iasi, 2012.</li> <li>Demarque D., Jouanny J., Poitevin B., Saint-jean Y. Pharmacologie et Matière médicale homéopathique, Ed. CEDH, Paris, 2007.</li> <li>Nash E.B. Materia Medica completă, Ed. Tehnopress, Iasi, 2012.</li> <li>Dobrescu D. Farmacologie homeopată, Ed. Universitară, ed. a 3-a, București, 2011.</li> <li>Moldovan M. Medicamente homeopate. Note de curs. Ghid pentru lucrări practice. Ed. Medicală</li> </ol>	



<p>“Iuliu Hațieganu”, Cluj-Napoca, 2010.</p> <p>6. Medicaments homeopathiques. Notes de cours. Guide pour travaux pratiques. Ed. Medicală “Iuliu Hațieganu”, Cluj-Napoca, 2010.</p> <p>7. Roberts H.A. Senzații ca și cum..., Ed. Tehnopress, Iași, 2013.</p> <p>8. Jahr G.H.G. Ghid therapeutic, Ed.Tehnopress, Iasi, 2010.</p> <p>9. Pinto R. Conseils en homeopathie, Ed. Pro-officina, Paris, 2009.</p> <p>10. Clarke A.G. 120 de remedii în simptome cheie, Ed.Pan Europe, Iasi, 2008.</p> <p>11. Knerr C.B. Relații între remedii, Ed.Pan Europe, Iasi, 2008.</p> <p>12. Moldovan M. Compendiu de homeopatie, Editura Medicală Universitară „Iuliu Hațieganu”, Cluj-Napoca, 2007.</p> <p>13. Roux F. Conseil homéopathique à l’officine, Ed. Lavoisier Tec &amp; Doc, Paris, 2006.</p> <p>14. S. Kayne. Homoeopathic Pharmacy, Ed. Churchill Livingstone, 1997.</p> <p>15. Boiron M., Payre-Ficot A. Homéopathie. Le conseil au quotidien, Ed. Boiron, France, 1996.</p> <p>16. Phatak S.R. Materia medica a remediilor homeopate, Ed.Pan Europe, Iasi, 2006.</p> <p>17. G. Suci. Forme farmaceutice de uz veterinar, Ed. Dacia, Cluj-Napoca, 1990.</p> <p>18. Nueleanu V.I., Mărculescu A., Cernea M.S. Tehnică farmaceutică și receptură veterinară, Ed. Risoprint, Cluj-Napoca, 2005.</p> <p>19. Plumb D.C. Veterinary Drug Handbook, Ed. Blackwell, Ed. a 5-a, Wisconsin, 2005.</p> <p>20. Desachy F. Conseil vétérinaire à l’officine pour les animaux de compagnie, 2ème édition, Ed. PRO-OFFICINA, 2007.</p> <p>21. Petit S &amp; colab. Guide thérapeutique vétérinaire. Animaux de compagnie, Ed. Point veterinaire, Rueil Malmaison, 2008.</p> <p>22. ***German Homeopathic Pharmacopeia, 2003, Medpharm GmbH Scientific Publishers, Stuttgart, Germany</p> <p>23. ***Farmacopeea Română ed. a X-a, Supliment 2006, Ed. Medicală, București, 2006.</p> <p>24. ***Farmacopeea Europeană ed. a 9-a, disponibilă la <a href="http://online6.edqm.eu/ep902/">http://online6.edqm.eu/ep902/</a>.</p> <p>25. Roux F, Popowski P, Boiron M. Homeopatie: Dosarele expertului - Pediatrie. Editura Viața Medicală Romanească, București, 2016.</p> <p>26. C. Bogdan, M. Moldovan. Medicamente homeopate și medicamente veterinare, 2019-2020, Note de curs, <a href="http://www.farma.umfcluj.ro">www.farma.umfcluj.ro</a>.</p>	
<b>7.2 Laboratory activities (hours)</b>	<b>Remarks</b>
<b>1. Preparation of homeopathic mother tinctures.</b> Preparation of mother tinctures from vegetal raw materials. Methods of preparation.	<b>3 h</b>
<b>2. Preparation of homeopathic mother tinctures. Control of mother tinctures.</b> Preparation of mother tinctures from mineral raw materials. Control of mother tinctures obtained from vegetal raw materials.	<b>3 h</b>
<b>3. Preparation of homeopathic dilutions.</b> Preparation of homeopathic dilutions from soluble raw materials.	<b>3 h</b>
<b>4. Preparation of homeopathic dilutions from insoluble raw materials. Impregnation of dilutions..</b>	<b>3 h</b>
<b>5. Study of pathogenetic actions of homeopathic drugs. Examples.</b>	<b>2 h</b>
<b>Bibliography</b>	
<p>1. Hahnemann S. Organon al medicinei,Ed.Tehnopress, Iasi, 2012.</p> <p>2. Moldovan M. Bogdan C. Medicamente homeopate și medicamente veterinare, suport de curs 2019-2020, <a href="http://www.farma.umfcluj.ro">www.farma.umfcluj.ro</a>.</p> <p>3. Moldovan M. Medicamente homeopate. Note de curs. Ghid pentru lucrări practice. Ed. Medicală “Iuliu Hațieganu”, Cluj-Napoca, 2010.</p>	

4. Demarque D., Jouanny J., Poitevin B., Saint-Jean Y. Pharmacologie et Matière médicale homéopathique, Ed. CEDH, Paris, 2007.
5. Nash E.B. Materia Medica completă, Ed. Tehnopress, Iasi, 2012.
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13. Roux F. Conseil homéopathique à l’officine, Ed. Lavoisier Tec & Doc, Paris, 2006.
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17. \*\*\*German homeopathic Pharmacopeia, Ed. Medpharm Scientific Publischer, Stuttgart, 2001
18. \*\*\*Farmacopeea Română ed. a X-a, Supliment 2006, Ed. Medicală, București, 2006.
19. \*\*\*Farmacopeea Europeană ed. a 7-a, disponibilă la <http://online.pheur.org/EN/entry.htm>.

## 8. Evaluation

Activity type	8.1. Evaluation criteria	8.2. Evaluation methods	8.3. Percent of final grade
<b>8.4. Lectures</b>	<p>Knowledge of the specialized terminology pertaining to homeopathy and the issues discussed.</p> <p>Ability to appropriately use the specialized terminology (consistency, logic, fluent rendering).</p> <p>Ability to identify problems.</p> <p>Ability to support the solutions proposed.</p>	Written exam (multiple choice questions and written test )	<b>70%</b>
<b>8.5. Laboratory</b>	<p>Evaluation of theoretical knowledge and practical skills.</p> <p>Ability to correctly explain the name of unitary homeopathic drugs.</p> <p>Ability to identify the methods for the preparation of homeopathic drugs according to the type and the raw material properties.</p> <p>Ability to prepare homeopathic dilutions in liquid and solid phase from source material.</p> <p>Ability to justify the choice of methods.</p> <p>Knowing the components of proving and their importance in homeopathy.</p>	Practical exam	<b>30%</b>
<b>8.6. Minimal performance standard</b>			
<p>Learning the main concepts in homeopathy and veterinary pharmacy field.</p> <ul style="list-style-type: none"> <li>• Definition of homeopathy and veterinary pharmacy</li> <li>• Legal framework of the activity involving homeopathic drugs and veterinary drugs.</li> <li>• Preparation methods of homeopathic drugs (obtaining mother tinctures, obtaining dilutions,</li> </ul>			

impregnating liquid dilutions).

- Homeopathic pharmaceutical forms and pharmaceutical forms used in veterinary medicine.
- Use of OTC homeopathic drugs.
- The information for the patients undergoing homeopathic treatment.
- Knowing the criteria for determining the doses in animals.
- Knowing the drugs used to treat some common diseases of animals.

## FIRST AID

### 1. Information about the course

<b>1.1. Discipline</b>		<b>First Aid</b>					
<b>1.2. Course instructor</b>		<b>Lecturer Petrișor Cristina, PhD, MD Dirzu D., PhD, MD</b>					
<b>1.3. Laboratory instructor</b>		<b>Stefanescu Elena, PhD, MD Dr. Cocis Mihaela, PhD, MD Antal Oana, PhD, MD Dirzu Dan, PhD, MD</b>					
<b>1.4. Year</b>	<b>5</b>	<b>1.5. Semester</b>	<b>2</b>	<b>1.6. Evaluation type</b>	<b>Written exam</b>	<b>1.7. Course type</b>	<b>Specialty discipline Compulsory discipline</b>

### 2. Total estimated time (hours/semester for teaching activity)

<b>2.1. Total hours/week</b>	<b>1</b>	<b>2.2. Course</b>	<b>0,57</b>	<b>2.3. Laboratories</b>	<b>0,43</b>
<b>2.4. Total hours in the curriculum</b>	<b>14</b>	<b>2.5. Course</b>	<b>8</b>	<b>2.6. Laboratories</b>	<b>6</b>
<b>2.4. Distribution of time needed (1<sup>st</sup> sem. / 2<sup>nd</sup> sem.)</b>					<b>Hours</b>
a. Study using text books, lecture notes, bibliography					25
b. Individual study within libraries, on-line platforms, field research					12
c. Preparing seminars/laboratories, homework, projects, portfolios and essays					2
d. Tutoring					2
e. Evaluation/ semester					3
f. Other activities					2
<b>2.7. Total hours for individual study (a+b+c+d)</b>				<b>41 (2<sup>nd</sup> sem.)</b>	
<b>2.8. Total hours per semester</b>				<b>60 (2<sup>nd</sup> sem.)</b>	
<b>2.9. Number of credits</b>				<b>2 (2<sup>nd</sup> sem.)</b>	

### 3. Prerequisites

<b>3.1. Curriculum</b>	-
<b>3.2. Competences</b>	-

### 4. Requisites

<b>4.1. For lectures</b>	Amphitheatres with projection systems Students without mobile phones during courses/practical activities
<b>4.2. For laboratories sessions</b>	UMF laboratory ; Emil Isac street, n0 13. Simulation- resuscitation mannequin, injection techniques

## 5. Specific competences acquired

<b>Professional competences</b>	<ul style="list-style-type: none"> <li>Abilities to recognize a patient with cardio-pulmonary arrest and practice basic life support according to international guidelines</li> <li>Perform hemostasis</li> <li>Perform intramuscular and subcutaneous injections</li> </ul>
<b>Transversal competences</b>	<ul style="list-style-type: none"> <li>Obtain the ability of proper communication with the patient</li> <li>Properly ask help from emergency services</li> </ul>

## 6. Course objectives

<b>6.1. General objectives</b>	<ul style="list-style-type: none"> <li>General information about saviour safety, first aid during natural disasters, trauma or intoxication</li> </ul>
<b>6.2. Specific objectives</b>	<ul style="list-style-type: none"> <li>Cardio-pulmonary resuscitation – chain of survival understanding, cardio-pulmonary arrest diagnosis, basic life support teaching, airway deobstruction manoeuvres, informations about saviour safety</li> <li>First aid in environmental emergencies: sunstroke and hyperthermia, hypothermia and frostbites, drowning, avalanches, lightning: recognition and first aid, viper bites, insect stings, animal bites: first aid.</li> <li>Acute intoxication- drugs, mushrooms, plants, alcohol, carbon monoxide- diagnosis and first aid</li> <li>Trauma: evaluation, hemostasis- simple methods, immobilization, transport</li> </ul>

## 7. Content

<b>7.1. Course</b>	<b>Teaching methods</b>
<ol style="list-style-type: none"> <li>1. First Aid information- Surviving chain, Saviour safety. Cardio-pulmonary arrest . Cardio-pulmonary resuscitation</li> <li>2. First aid in environmental emergencies: sunstroke and hyperthermia, hypothermia and frostbites, drowning, avalanches, lightning: recognition and first aid, viper bites, insect stings, animal bites</li> <li>3. Trauma: evaluation, osteo-articular trauma and soft tissue trauma , burns, crushing, hemostasis methods and immobilization</li> <li>4. acute intoxication- drugs, mushrooms, plants, alcohol, carbon monoxide</li> </ol>	Power point presentation according to material planning, multimedia presentation, brainstorming.
<b>Bibliography:</b> <ol style="list-style-type: none"> <li>1. European Resuscitation Council Guideline 2015.</li> <li>2. Natalia Hagău (editor), Constantin Bodolea, Dan Dîrzu, Cristina Indrei, Sebastian Trancă. Prim ajutor medical. Curs pentru studenți din anul I medicină generală și medicină dentară. Editura Medicală Universitară „Iuliu Hațieganu” Cluj-Napoca 2016</li> <li>3. Reading CJ. Incidence, pathology and treatment of adder (Vipera berus) bites in man. Journal Accidents Emergency Medicine 1996; 13: 346-351.</li> <li>4. Trancă S, Hagău N. Mușcătura de viperă. Terapia pacientului critic cu reacție toxică severă la veninul de viperă. J Rom Anest Terap Int 2009; 16: 134-139.</li> <li>5. www.emedicine.com/emerg/index.shtml</li> </ol>	
<b>7.2. Laboratoires/seminars</b>	<b>Teaching and learning methods</b>
<ol style="list-style-type: none"> <li>1. Cardio-pulmonary resuscitation, cardio-pulmonary arrest diagnosis, basic life support, airway deobstruction</li> </ol>	Practical meetings using manequins for cardio-

2. First aid kit, fracture immobilization, hemostasis 3. Subcutaneous and intramuscular injection techniques	pulmonary resuscitation, use of the first aid kit, techniques of subcutaneous and intramuscular injections using manequins
<b>Bibliography:</b>	
1. European Resuscitation Council Guideline 2015. 2. Natalia Hagău (editor), Constantin Bodolea, Dan Dîrzu, Cristina Indrei, Sebastian Trancă. Prim ajutor medical. Curs pentru studenți din anul I medicină generală și medicină dentară. Editura Medicală Universitară „Iuliu Hațieganu” Cluj-Napoca 2016	

### 8. Evaluation

Activity type	8.1.Evaluation criteria	8.2. Evaluation methods	8.3. Percent of final grade
<b>8.4. Lectures</b>	According to educational objectives	Written exam- MCQ and written topics	<b>50%</b>
<b>8.5. Laboratory</b>	According to educational objectives	Practical manoeuvres	<b>50%</b>
<b>8.6. Minimal performance standard</b>			
Key message at the end of each course			

## IN SERVICE TRAINING 5<sup>th</sup> YEAR

### 1. Information about the course

<b>1.1. Discipline</b>		<b>Medical devices. Pharmaceutical practice</b>					
<b>1.2. Course instructor</b>		<b>Senior lecturer, PhD Simona Mirel</b>					
<b>1.3. Laboratory instructor</b>		<b>Senior lecturer, PhD Simona Mirel Lecturer, PhD Liora Colobatiu Teaching assistant, PhD student Alexandru Găvan</b>					
<b>1.4. Year</b>	5	<b>1.5. Semester</b>	2	<b>1.6. Evaluation type</b>	<b>Practical exam</b>	<b>1.7. Course type</b>	<b>Speciality discipline, Compulsory discipline</b>

### 2. Total estimated time (hours/semester for teaching activity)

<b>2.1. Total hours/week</b>	<b>30 (26 weeks, 2<sup>nd</sup> sem.)</b>	<b>2.2. Course</b>	-	<b>2.3. Laboratories</b>	<b>30</b>
<b>2.4. Total hours in the curriculum</b>	<b>780</b>	<b>2.5. Course</b>	-	<b>2.6. Laboratories</b>	<b>780</b>
<b>2.4. Distribution of time needed (1<sup>st</sup> sem. / 2<sup>nd</sup> sem.)</b>					Hours
a. Study using text books, lecture notes, bibliography					30
b. Individual study within libraries, on-line platforms, field research					50
c. Preparing seminars/laboratories, homework, projects, portfolios and essays					30
d. Tutoring					5
e. Evaluation/ semester					5
f. Other activities					-
<b>2.7. Total hours for individual study (a+b+c+d)</b>				<b>115 (2<sup>nd</sup> sem.)</b>	
<b>2.8. Total hours per semester</b>				<b>900 (2<sup>nd</sup> sem.)</b>	
<b>2.9. Number of credits</b>				<b>18 (2<sup>nd</sup> sem.)</b>	

### 3. Pre-requisites:

<b>3.1. Curriculum</b>	Knowledge regarding all the subjects from the curriculum of the Faculty of Pharmacy
<b>3.2. Competences</b>	Acquired during the previous practical internships in pharmacies

### 4. Requisites:

<b>4.1. For lectures</b>	-
<b>4.2. For laboratories sessions</b>	Authorized pharmacies. Pharmacies in which there are available pharmacists who can act as coordinators of the professional internship (appointed based on their abilities, professional experience and according to the regulations of the Pharmacists' College from Romania – Cluj and of the Faculty of Pharmacy).

### 5. *Specific competences acquired*

<b>Professional competences</b>	<ul style="list-style-type: none"> <li>• Knowing and getting involved in the organisational activities performed in a pharmacy</li> <li>• Respect towards the ethical obligations specific for the profession of pharmacist</li> <li>• The capacity to understand and exercise the role, responsibilities and obligations of the profession of pharmacist</li> <li>• The storage, preservation, distribution of medicines, alimentary supplements and other health products             <ul style="list-style-type: none"> <li>○ The identification and the assessment of the optimal preservation conditions and the application of specific quality insurance procedures regarding the storage of medicines</li> </ul> </li> <li>• The preparation of medicines</li> <li>• The release of medicines, alimentary supplements, cosmetics and of other health products             <ul style="list-style-type: none"> <li>○ The capacity to follow the recommended steps in order to properly release medicines (prescription and OTC)                 <ul style="list-style-type: none"> <li>▪ The capacity to verify prescriptions</li> <li>▪ The capacity to identify possible errors in the prescriptions</li> </ul> </li> <li>○ The capacity to respect the regulations and the deontological code</li> </ul> </li> <li>• The attunement of communication abilities required in the profession             <ul style="list-style-type: none"> <li>○ Speaking clarity</li> <li>○ The capacity to adapt the conversation according to the patient's needs</li> <li>○ The familiarization with the necessary information that must be provided to the patient during counseling</li> </ul> </li> <li>• The capacity to respect and apply the standards specific for the activities that involve medicines and other health products</li> </ul>
<b>Transversal competences</b>	<ul style="list-style-type: none"> <li>• The attunement of an active attitude regarding the role of the professional internship in the professional development of the future pharmacist</li> <li>• The identification of the pharmacist's responsibilities</li> <li>• The application of specific communication techniques</li> <li>• Individual professional development</li> </ul>

### 6. *Course objectives*

<b>6.1. General objectives</b>	<ul style="list-style-type: none"> <li>• Engagement in all the activities specific for the profession of pharmacist, under the coordination, surveillance and evaluation of a pharmacist-coordinator of the professional internship</li> <li>• To use of the previously acquired theoretical notions into the pharmaceutical activity, under the coordination, surveillance and evaluation of a pharmacist-coordinator of the professional internship</li> </ul>
<b>6.2. Specific objectives</b>	<ul style="list-style-type: none"> <li>• To know and exercise the role, responsibilities and obligations of the pharmacist's profession</li> <li>• To know the activities performed in a pharmacy (community and hospital pharmacy)</li> <li>• To identify and know pharmaceutical forms (the industrial medicine; the officinal/magistral medicines)</li> </ul>



	<ul style="list-style-type: none"> <li>• To be familiar with the products frequently released from a pharmacy</li> <li>• To identify and know aspects related to medicines containing antibiotics, antiseptics, antivirals and antimycotics</li> <li>• To identify and know the phytopharmaceutical products and also the naturally derived products which can be found in pharmacies (composition, mechanism of action, indications) and to be able to evaluate their quality</li> <li>• To be capable of releasing medicines to the patients</li> <li>• To document and synthesize information in order to complete the required applications (from the Practice Guide)</li> </ul>
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## 7. Content

**Teaching methods for course:** -

**Teaching methods for laboratory activity:** explanation, conversation, questioning, analysis. The analysis of the way to solve professional problems encountered.

<b>7.1 Course (hours)</b>	<b>Remarks</b>
-	-
<b>7.2. Laboratory activities (hours)</b>	<b>Remarks</b>
<b>1. Reception of medicines</b> – qualitative, quantitative reception – document elaboration (reception notes, register for products with special release) – the assurance of preservation conditions	
<b>2. The analysis of medicinal substances</b>	
<b>3. The preparation of officinal and magistral formulations</b> -the preparation of the medicine -wrapping, labelling, preservation -the elaboration of specific documents : register for magistral prescriptions and prepared medicines	
<b>4. The release of medicines</b> -the release of prescription medicines -the elaboration of documents for the Health Insurance Company -the processing of the prescription in the informatic system -the release of OTC medicines -the release of homeopathic medicines -the release of phytotherapeutic medicines -the release of biological medicines -patients' counseling	
<b>5. The release of other products available in pharmacies</b> -the release of alimentary supplements -the release of cosmetic products -the release of medical devices	
<b>6. The elaboration of specific documents</b> -cash books, inventory reports, inventory lists	
<b>Bibliography</b>	
1. Popa A. (coordonator), Ghid de practică pentru studenții anului V, Editura Medicală Universitară	

“Iuliu Hațieganu” Cluj-Napoca, reeditare în ediție revizuită 2013

2. Farmacopeea română, Ed. X, Editura Medicală, București, 1993
3. Legea nr. 266/2008 a farmaciei, republicată, Monitorul Oficial al României, partea I, nr. 448/2009, cu modificările și completările ulterioare;
4. Ordinul ministrului sănătății nr. 962/2009 pentru aprobarea Normelor privind înființarea, organizarea și funcționarea farmaciilor și drogheriilor, Monitorul Oficial al României, partea I, nr. 538/2009, cu modificările și completările ulterioare;
5. Ordinul ministrului sănătății nr. 75/2010 pentru aprobarea Regulilor de bună practică farmaceutică, Monitorul Oficial al României, partea I, nr. 91/2010;
6. Codul deontologic al farmacistului, Monitorul Oficial al României, partea I, nr. 490/2009;
7. Agenția Națională a Medicamentului și a Dispozitivelor Medicale, Nomenclatorul medicamentelor de uz uman, disponibil la [http://www.anm.ro/app/nom1/anm\\_list.asp](http://www.anm.ro/app/nom1/anm_list.asp)
8. Agenda medicală, Editura Medicală, București, 2013
9. Memomed, Editura Universitara, București, 2013
10. Legislație și modele de proceduri pentru aplicarea în farmacie a Regulilor de buna practică farmaceutică, Ed . Risoprint, Cluj, 2011

Specific bibliography: recommended during the faculty

## 8. Evaluation

Activity type	8.1.Evaluation criteria	8.2. Evaluation methods	8.3.Percent of final grade
<b>8.4. Course</b>	-	-	-
<b>8.5. Laboratory</b>	<p>Criteria regarding the attitude and motivation of the students -the characterization of the student’s activity</p> <p>The way in which the applications proposed are solved (Professional internship guide) The capacity to understand and respond to problems The capacity to discuss and talk adequately</p>	<p>The evaluation performed by the coordinator pharmacist</p> <p>The evaluation performed by the supervisor (teacher from the faculty)</p> <p>The way in which the applications from the guide are solved</p> <p>Oral exam (interview) -the examination commission is composed of pharmacists (teachers from the faculty) and of practitioner pharmacists</p>	<p><b>20%</b></p> <p><b>10%</b></p> <p><b>30%</b></p> <p><b>40%</b></p>
<b>8.6. Minimal performance standard</b>			
<p>The acquirement of basic knowledge regarding:</p> <ul style="list-style-type: none"> <li>• The founding, organisation and functioning of a pharmacy</li> <li>• The reception and storage of medicines and other health care products</li> <li>• The release of medicines and of other health products</li> <li>• Communication with the patient</li> </ul>			

## 8.5.2. OPTIONAL COURSES

### PHARMACY AS BUSINESS

#### 1. Information about the course

<b>1.1. Discipline</b>		<b>Pharmaceutical legislation</b>					
<b>1.2. Course instructor</b>				<b>Lecturer Anamaria Boboia, PhD</b>			
<b>1.3. Laboratory instructor</b>				<b>Not necessary.</b>			
<b>1.4. Year</b>	<b>V</b>	<b>1.5. Semester</b>	<b>I</b>	<b>1.6. Evaluation type</b>	<b>Complex evaluation</b>	<b>1.7. Course type</b>	<b>Specialized discipline Optional discipline</b>

#### 2. Total estimated time (hours / semester for teaching activity)

<b>2.1. Total hours / week</b>	<b>1</b>	<b>2.2. course</b>	<b>1</b>	<b>2.3. laboratories</b>	<b>0</b>
<b>2.4. Total hours in the curriculum</b>	<b>14</b>	<b>2.5. course</b>	<b>14</b>	<b>2.6. laboratories</b>	<b>0</b>
<b>Distribution of time needed</b>					<b>Hours</b>
a. Study using text books, lecture notes, bibliography					16
b. Individual study within libraries, on-line platforms, field research					8
c. Preparing seminars/laboratories, homework, projects, portfolios and essays					8
d. Tutoring					2
e. Evaluation/semester					2
f. Other activities					-
<b>2.7. Total hours for individual study</b>					<b>36 (2<sup>nd</sup> sem.)</b>
<b>2.8. Total hours per semester</b>					<b>50 (2<sup>nd</sup> sem.)</b>
<b>2.9. Number of credits</b>					<b>2 (2<sup>nd</sup> sem.)</b>

#### 3. Prerequisites

<b>3.1. Curriculum</b>	<ul style="list-style-type: none"> <li>- Management and Marketing</li> <li>- Pharmaceutical legislation</li> <li>- Methodology of scientific research</li> </ul>
<b>3.2. Competences</b>	<p>The students need to be able to:</p> <ul style="list-style-type: none"> <li>- understand the principles of management and marketing, in order to use and apply them in the pharmaceutical field;</li> <li>- understand the importance of complying with the legislation in the pharmaceutical field;</li> <li>- understand the importance of complying with the scientific research methodology, including in the business sector.</li> </ul>

#### 4. Requisites

<b>4.1. For lectures</b>	Compliance with the Charter and University regulations.
<b>4.2. For laboratories sessions</b>	Not needed.

### 5. Specific competences acquired

<b>Professional competences</b>	<p>The students are able to:</p> <ul style="list-style-type: none"> <li>- understand the role of the pharmacist in the pharmacy business management;</li> <li>- understand the principles of market economy and their impact on the pharmacy;</li> <li>- understand the factors that influence the evolution of graduates of Pharmacy;</li> <li>- acquire a conscious and responsible reporting at the functions performed by the pharmacist: owner, manager, employee, in order to understand their role in pharmacy activities: conception, formulation, preparation/manufacture, conditioning, analysis and quality control, storage, preservation, dispensing of medicinal products, food supplements, cosmetics and other health products; management, marketing, administration in health field; provision of information and advice on medicinal products, food supplements, cosmetics and other health products;</li> <li>- acquire a conscious and responsible reporting in the relation pharmacist – patient, in the business development by adapting to the needs of the patient: dispensing and advising on the use of medicines, food supplements, cosmetics and other health products; pharmaceutical care during treatment; determination of biological parameters (body mass index, blood pressure, blood sugar etc.); help to interpreting the analyses carried out in laboratories of biochemistry, toxicology; advice concerning the environmental and food hygiene;</li> <li>- acquire an active attitude to develop the pharmacy business by complementing basic activities with legal, additional activities (creation and implementation of health programs, determining the biological parameters, administering vaccines, veterinary medicines release etc.);</li> <li>- develop the ability of right use of digital information sources (websites, specialised software, data bases, online courses etc.) in the business field;</li> <li>- develop the ability to organize and manage a pilot company;</li> <li>- develop the capacity of guideline for selecting the suitable career;</li> <li>- develop the capacity to achieve and apply successful business plans in the pharmaceutical field.</li> </ul>
<b>Transversal competences</b>	<ul style="list-style-type: none"> <li>- develop the ability to actively participate, as European citizens, to the community, society and humanity issues;</li> <li>- develop the ability to relate and to communicate at interpersonal, intercultural, social and civic level;</li> <li>- develop their personal autonomy, the responsibility and the capacity of lifelong learning;</li> <li>- develop their ability of optimum and creative capitalizing of their potential in the scientific activities;</li> <li>- develop their preoccupation for quality assurance in the activities carried out;</li> <li>- develop the ability to communicate on business topics.</li> </ul>

### 6. Course objectives

<b>6.1. General objective</b>	<ul style="list-style-type: none"> <li>- To familiarize the students with the main aspects of pharmacy business management and factors affecting professional development of graduates.</li> </ul>
<b>6.2. Specific objectives</b>	<ul style="list-style-type: none"> <li>- To develop students' ability to use and apply business concepts in</li> </ul>

	<p>the field of medicament, for the profitability of the activity in the pharmaceutical units, identifying and satisfying the needs of patients by providing quality products and services;</p> <ul style="list-style-type: none"> <li>- To develop students' skills to reflect correctly to the specific of business in the pharmaceutical field;</li> <li>- To develop students' skills of analysis and interpretation of the principles of business, for the correct application in practice;</li> <li>- To develop the abilities of professional communication;</li> <li>- To correctly reflect at the business issues of pharmaceutical units, so that students be able to create their own business after graduation;</li> <li>- To develop students' skills to organize and manage a company-pilot;</li> <li>- To develop students' ability to achieve business plans;</li> <li>- To develop students' ability to orient themselves in the professional career.</li> </ul>
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## 7. Content

**Teaching methods for course:** academic lecture with ppt support, test, essays, exercise, case studies, discussions and expressing opinions students, conversation, problematisation, business models, group activity - role playing, working in teams.

**Teaching methods for laboratory activity:** not needed.

7.1. Course (hours)	Remarks
1. Pharmacy in the market economy. (2)	2 lectures
2. Organizing and managing a company pilot. Presentation of the projects "Start! Business", "The company. Your business pilot" (Junior Achievement Romania). (2)	2 lectures
3. The pharmacist - owner, manager, employee. Relations between functions. (2)	2 lectures
4. Developing a business plan. The business - efficiency, development, profit. The role of the pharmacist. The managerial philosophy. (2)	2 lectures
5. Planning and analysing business activity. The work of the team to develop the business plan. (2)	2 lectures
6. The role of relationship pharmacist - patient in functioning and business development: communication, sales and marketing. (2)	2 lectures
7. Choice of career. Factors that influence the professional development of graduates. Perspectives on jobs and employees. Stages - key to obtain the desired jobs. (2)	2 lectures
<b>Bibliography:</b>	
<ol style="list-style-type: none"> <li>1. Boboia A., Crişan O., Polinicencu C., Activitatea din farmacie – Ghid pentru lucrări practice de legislație farmaceutică, Editura Medicală Universitară „Iuliu Hațieganu”, Cluj-Napoca, 2012;</li> <li>2. Boboia A., Cercetări privind aplicarea unor metode moderne de management în domeniul farmaceutic, Teză de doctorat, UMF „Iuliu Hațieganu” Cluj-Napoca, 2009;</li> <li>3. Burta C.M., Automedicația în mediul urban din România. Aspecte socio-economice și legislative, Teză de doctorat, UMF “Iuliu Hațieganu” Cluj-Napoca, 2006;</li> <li>4. Clark M.E., Pharmaceutical Law: Regulation of Research, Development, and Marketing, Bloomberg BNA, Arlington, 2007, with 2011 Cumulative Supplement;</li> <li>5. Freyer G., Sciences humaines et sociales en médecine et pharmacie, Ellipses Ed. Marketing, 2009;</li> <li>6. Kawasaki G., The Art of the Start, Ed. Bizzkit, Bucureşti, 2011;</li> </ol>	

7. Kelly W., Pharmacy. What it is and how it Works, CRC Press Pharmacy Education Series, 2002;	
8. Jenner S., Ghidul carierei pentru absolvenții universitari, Curtea Veche Publishing, București, 2010;	
9. Junior Achievement România, Compania. Afacerea mea pilot, 2011;	
10. Junior Achievement România, Esențialul: o introducere în cele mai durabile idei despre management de la Harvard Business Review, Ed. Bizzkit, București, 2011;	
11. Junior Achievement România, GlaxoSmithKline, Farmacia – mod de administrare, Manualul trainerului, Junior Achievement România, București;	
12. Junior Achievement România, GlaxoSmithKline, Farmacia – mod de administrare, Manualul studentului, Junior Achievement România, București;	
13. Mariotti S., Glackin C., Antreprenoriat: lansarea și administrarea unei afaceri, Ed. Bizzkit, București, 2012;	
14. Mărculescu E., Strategia managementului la o societate comercială farmaceutică în etapa de trecere la economia de piață, Teză de doctorat, UMF „Iuliu Hațieganu” Cluj-Napoca, 2006;	
15. Peterson A.M., Managing Pharmacy Practice: Principles, Strategies and Systems, CRC Press Pharmacy Education Series, 2004;	
16. Popa A. (coordonator), Ghid de practică în farmacie pentru studenții anului V, Editura Medicală Universitară “Iuliu Hațieganu” Cluj-Napoca, edițiile anuale 2005-2016;	
17. *** Marché, création et gestion d’une pharmacie, Arcane Institut, 2002.	
<b>7.2. Laboratory activities (hours)</b>	<b>Remarks</b>
Not needed.	
<b>Bibliography:</b> Not needed.	

## 8. Evaluation

Activity type	8.1. Evaluation criteria	8.2. Evaluation methods	8.3. Percent of final grade
<b>8.4. Course</b>	<ul style="list-style-type: none"> <li>- Ability to analyze and interpret the business principles, to ensure correct application in practice.</li> <li>- Ability to achieve business plans.</li> <li>- Knowledge and application of the main rules of professional communication.</li> <li>- Capacity to correctly understand the business issues of pharmaceutical units.</li> <li>- The ability to use and apply business concepts in the field of medicine, for make profitable the pharmaceutical units.</li> <li>- Ability to organize and manage a company pilot.</li> <li>- Capacity to choose a adequate professional career.</li> </ul>	<ul style="list-style-type: none"> <li>- Projects within working groups</li> <li>- Tests and essays</li> <li>- Active involvement at the course</li> <li>- Attendance to the course</li> </ul>	<p><b>40%</b></p> <p><b>30%</b></p> <p><b>20%</b></p> <p><b>10%</b></p>

	<ul style="list-style-type: none"> <li>- Logical coherence, fluency, force of argument.</li> <li>- Attitudinal and motivational aspects of student activity.</li> <li>- Understanding the essence and importance in the pharmaceutical field business and in society.</li> </ul>		
<b>8.5. Laboratory</b>	Not needed.		
<b>8.6. Minimal performance standards</b>			
<ul style="list-style-type: none"> <li>- Understanding of the essence and importance of business, in general and in the pharmaceutical field.</li> <li>- Capacity to achieve a business plan in pharmacy field.</li> <li>- Understanding the importance of choosing a suitable job and the career development, in general and as a pharmacist.</li> </ul>			

## GERIATRIC PHARMACOTHERAPY

### 1. Information about the course

<b>1.1. Discipline</b>			<b>Clinical pharmacy</b>				
<b>1.2. Course instructor</b>			<b>Lecturer Daniela Primejdie</b>				
<b>1.3. Laboratory instructor</b>			<b>The course does not have laboratory activities.</b>				
<b>1.4. Year</b>	5	<b>1.5. Semester</b>	1	<b>1.6. Evaluation type</b>	<b>Theoretical exam</b>	<b>1.7. Course type</b>	<b>Specialty discipline Optional discipline</b>

### 2. Total estimated time (hours/semester for teaching activity)

<b>2.1. Total hours/week</b>	<b>1 (1<sup>st</sup> sem.) 0 (2<sup>nd</sup> sem.)</b>	<b>2.2. Course</b>	<b>1 0</b>	<b>2.3. Laboratories</b>	<b>0 0</b>
<b>2.4. Total hours in the curriculum</b>	<b>14 (1<sup>st</sup> sem.) 0 (2<sup>nd</sup> sem.)</b>	<b>2.5. Course</b>	<b>14 0</b>	<b>2.6. Laboratories</b>	<b>0 0</b>
<b>2.4. Distribution of time needed (1<sup>st</sup> sem. / 2<sup>nd</sup> sem.)</b>					<b>Hours</b>
a. Study using text books, lecture notes, bibliography					10/0
b. Individual study within libraries, on-line platforms, field research					10/0
c. Preparing seminars/laboratories, homework, projects, portfolios and essays					10/0
d. Tutoring					3/0
e. Evaluation/ semester					3/0
f. Other activities					-
<b>2.7. Total hours for individual study (a+b+c+d)</b>				<b>33 (1<sup>st</sup> sem.)</b>	
<b>2.8. Total hours per semester</b>				<b>50 (1<sup>st</sup> sem.)</b>	
<b>2.9. Number of credits</b>				<b>2 (1<sup>st</sup> sem.)</b>	

### 3. Pre-requisites:

<b>3.1. Curriculum</b>	clinical pharmacy, pharmacology, pathophysiology, biopharmacy and pharmacokinetics, biochemistry and clinical laboratory, medicinal chemistry, medical devices
<b>3.2. Competences</b>	specific, acquired through these courses

### 4. Requisites:

<b>4.1. For lectures</b>	-
<b>4.2. For laboratories sessions</b>	-

### 5. Specific competences acquired

<b>Professional competences</b>	<ul style="list-style-type: none"> <li>• to identify drug related problems specific for the geriatric population: potentially misused/ underused/ overused medications</li> <li>• to identify the therapeutic approach used for prevalent pathologies</li> <li>• to identify medications causing or increasing the risk for specific geriatric</li> </ul>
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	<p>conditions</p> <ul style="list-style-type: none"> <li>• to identify the therapeutic goals according to the elderly clinical context</li> <li>• to identify the parameters necessary for appropriate therapy and patients' adherence monitoring</li> <li>• to search and justify pertinent solutions for the identified drug related problems</li> <li>• to offer appropriate counseling to the caregiver in charge with the frail and dependent elderly</li> <li>• to suggest pharmaceutical care plans specific to the elderly population</li> <li>• to develop strategies for increasing the pharmacist's role in the optimization of the elderly pharmacotherapy</li> </ul>
<b>Transversal competences</b>	<ul style="list-style-type: none"> <li>• to prove a professional and empathetic attitude towards the elderly patients</li> <li>• to prove independent reasoning capacity during the search for the patients drug related problems, either real or potential.</li> <li>• to acquire a critical appraisal capacity referring to drug related information</li> </ul>

## 6. Course objectifs

<b>6.1. General objectives</b>	<ul style="list-style-type: none"> <li>• to know the particular therapeutic approach and the specific pharmaceutical care needs of the elderly patients</li> </ul>
<b>6.2. Specific objectives</b>	<ul style="list-style-type: none"> <li>• to know the potentially inappropriate medications for the elderly population</li> <li>• to know the physiologic changes associated to the aging process and their impact on the drug therapy choice and monitoring</li> <li>• to know the specific pharmacotherapeutic approach for several common pathologies and geriatric syndromes</li> <li>• to identify the elderly at risk for drug related problems</li> <li>• to identify the pertinent available information regarding the safety and efficacy of the drug therapy used by the elderly patient</li> <li>• to elaborate a therapeutic plan aiming for solving the elderly drug related problems.</li> </ul>

## 7. Content

**Teaching methods for course: Lecture, PowerPoint presentation, discussion upon examples, case studies**

**Teaching methods for laboratory activity: The course does not have laboratory activities.**

<b>7.1 Course (hours)</b>	<b>Remarks</b>
1. General principles of the geriatric pharmacotherapy	<b>1 h</b>
2. The pharmacist's potential contribution to therapy optimisation	<b>1 h</b>
3. Dementia and associated non- cognitive symptoms - therapeutic approach	<b>3 h</b>
4. Antibacterial use in the elderly	<b>1 h</b>
5. Pain management in the elderly patient	<b>1 h</b>
6. Cardiovascular diseases and diabetes mellitus – geriatric considerations	<b>2 h</b>
7. Urinary incontinence and constipation -therapeutic approach	<b>2 h</b>
8. Depressive disorder, insomnia and senile pruritus – therapeutic considerations	<b>3 h</b>

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Various prescriptions and case scenarios, real or identified through the medical literature will be presented and discussed.

### 7.2. Laboratory activities (hours)

### Remarks

**The course does not have laboratory activities.**

## Bibliography

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## 8. Evaluation

Activity type	8.1. Evaluation criteria	8.2. Evaluation methods	8.3. Percent of final grade
<b>8.4. Course</b>	The use of the information presented for the choice and monitoring of the elderly pharmacotherapy. Knowledge of the drugs potentially inappropriate in the geriatric population, depending on the clinical context. Knowledge of the pharmacists' role and his possibility of intervention for the optimization of the elderly pharmacotherapy.	Short analysis of the therapy delivered to an elderly ambulatory patient with the identification and resolution of drug related problems.	<b>60%</b>
		Solutions to the exercises presented during the lectures	<b>40%</b>
<b>8.5. Laboratory</b>	-		
<b>8.6. Minimal performance standard</b>			
<p>To know of the main principles of the geriatric pharmacotherapy:</p> <ul style="list-style-type: none"> <li>• the most prevalent drugs associated with a potentially inappropriate use in the elderly</li> <li>• the specific approach of the most frequent geriatric diseases</li> <li>• the main activities through which the pharmacist can increase the safety and the efficacy of the elderly pharmacotherapy</li> </ul>			

## GEMMOTHERAPIC PRODUCTS

### 1. Information about the course

<b>1.1. Discipline</b>		<b>Dermatopharmacy and cosmetics</b>					
<b>1.2. Course instructor</b>		<b>Lecturer Cătălina Bogdan, PhD</b>					
<b>1.3. Laboratory instructor</b>		<b>No laboratory activities</b>					
<b>1.4. Year</b>	<b>5</b>	<b>1.5. Semester</b>	<b>1</b>	<b>1.6. Evaluation type</b>	<b>Written exam</b>	<b>1.7. Course type</b>	<b>Optional, specialty course</b>

### 2. Total estimated time (hours/semester for teaching activity)

<b>2.1. Total hours/week</b>	<b>2/7 weeks</b>	<b>2.2. Course</b>	<b>2/7 weeks</b>	<b>2.3. Laboratories</b>	<b>0</b>
<b>2.4. Total hours in the curriculum</b>	<b>14</b>	<b>2.5. Course</b>	<b>14</b>	<b>2.6. Laboratories</b>	<b>0</b>
<b>2.4. Distribution of time needed</b>					<b>Hours</b>
a. Study using text books, lecture notes, bibliography					14
b. Individual study within libraries, on-line platforms, field research					4
c. Preparing seminars/laboratories, homework, projects, portfolios and essays					2
d. Tutoring					2
e. Evaluation/ semester					2
f. Other activities					-
<b>2.7. Total hours for individual study (a+b+c+d)</b>				<b>24 (1<sup>st</sup> sem)</b>	
<b>2.8. Total hours per semester</b>				<b>38 (1<sup>st</sup> sem)</b>	
<b>2.9. Number of credits</b>				<b>2 (1<sup>st</sup> sem)</b>	

### 3. Prerequisites

<b>3.1. Curriculum</b>	- To acquire botany, pharmacognosy, physiology and pathology knowledge applied to the pharmaceutical field
<b>3.2. Competences</b>	- Acquired specific competencies of botany, cell biology, anatomy, general physiology and physiopathology, pharmacognosy

### 4. Requisites

<b>4.1. For lectures</b>	<ul style="list-style-type: none"> <li>• Classroom equipped with computer and projector</li> <li>• Being aware of, and complying with the Regulation governing the functioning and organization of the teaching activity in undergraduate study programs</li> </ul>
<b>4.2. For laboratories sessions</b>	-

### 5. Specific competences acquired

<b>Professional competences</b>	<ul style="list-style-type: none"> <li>• Ability to properly use the specialized terminology.</li> <li>• Ability to understand and use the principles and specific concepts of gemmotherapy.</li> </ul>
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	<ul style="list-style-type: none"> <li>• Ability to identify the methods for the preparation of gemmotherapy products.</li> <li>• Ability to understand and explain the elements forming the name of gemmotherapy products.</li> <li>• Ability to express recommendations for use of gemmotherapy products.</li> <li>• Ability to explain to the patients the general recommendations to be followed during the gemmotherapeutic treatment.</li> </ul>
<b>Transversal competences</b>	<ul style="list-style-type: none"> <li>• Ability to use domain-specific concepts in new contexts.</li> <li>• Ability to apply theoretical knowledge to cope with actual situations.</li> <li>• Ability to efficiently use the information resources for own professional development.</li> <li>• Ability to optimally and creatively use the potential in conducting scientific activities.</li> <li>• Developing communication skills.</li> </ul>

## 6. Course objectives

<b>6.1.General objectives</b>	<ul style="list-style-type: none"> <li>• Acquiring general knowledge relating to the principles and the concepts of gemmotherapeutic therapy approach.</li> <li>• Acquiring the necessary knowledge for the use gemmotherapy as alternative or complementary treatment method.</li> </ul>
<b>6.2.Specific objectives</b>	<ul style="list-style-type: none"> <li>• Getting the students familiar with the specific terminology used in the field.</li> <li>• Knowing the principles and the concepts of gemmotherapy</li> <li>• Knowing the raw materials used for the gemmotherapy products preparation.</li> <li>• Knowing the methods for the preparation of gemmotherapy products.</li> <li>• Knowing the main gemmotherapy products.</li> <li>• Knowing the principles of use of gemmotherapy products.</li> </ul>

## 7. Content

**Teaching methods course:** Oral presentation with PowerPoint presentation, systematic presentation, discussion, questioning

<b>7.1.Lectures (hours)</b>	<b>Remarks</b>
1. Introduction to gemmotherapy. Defining the gemmotherapy, the gemmotherapy products, defining other specific terms used. Brief history.	<b>1 h</b>
2. Preparation of gemmotherapy products. Raw materials. Gemmotherapy products types.	<b>1 h</b>
3. Active principles in gemmotherapy products.	<b>1 h</b>
4. Preparation of gemmotherapy products. Preparation methods. Good manufacturing practice guidelines for the preparation of gemmotherapy products. Oral presentation, systematic presentation, discussion, questioning	<b>1 h</b>
5. Scientific research in the field of gemmotherapy.	<b>1 h</b>
6. Recommendations for use of gemmotherapy products. Patient counseling.	<b>1 h</b>
7. Recommendations for use of gemmotherapy products for the respiratory system.	<b>2 h</b>

8. Recommendations for use of gemmotherapy products for the cardiovascular system.	<b>2 h</b>
9. Recommendations for use of gemmotherapy products for the urinary tract.	<b>1 h</b>
10. Recommendations for use of gemmotherapy products for the endocrine system.	<b>1 h</b>
11. Recommendations for use of gemmotherapy products in dermatology.	<b>1 h</b>
12. Recommendations for use of gemmotherapy products for the immune system.	<b>1 h</b>
<b>Bibliography</b>	
<ol style="list-style-type: none"> <li>Soescu S, Nițu S, Ponoran C, Olah N. Gemoterapia de la A la Z, Ed Eikon, Cluj-Napoca, 2009.</li> <li>Pitera F. Compendiu de gemoterapie clinică, ediția a treia. Ed. Fundația creștină de homeopatie Simile, Constanța, 2000.</li> <li>Moldovan M. Medicamente homeopate. Note de curs. Ghid pentru lucrări practice. Ed. Medicală „Iuliu Hațieganu”, Cluj-Napoca, 2010.</li> <li>Moldovan M. Compendiu de homeopatie, Editura Medicală Universitară „Iuliu Hațieganu”, Cluj-Napoca, 2007</li> <li>Andrienne Ph, Leunis JC. Les bases de la prescription en gemmotherapie: parametres biologiques seriques et phytosociologie Phytotherapie, 2008; 6:301–305.</li> <li>Goetz P. Quelques éléments pratiques de gemmothérapie. Phytothérapie, 2006; 4(2): 83-86.</li> <li>Andrienne Ph. La gemmotherapie: passé, present et avenir. Phytotherapie, 2008; 6: 29–32.</li> <li>*** Farmacopeea Europeană ed. a 9-a, disponibilă la: <a href="https://www.edqm.eu/en/european-pharmacopoeia-ph-eur-9th-edition">https://www.edqm.eu/en/european-pharmacopoeia-ph-eur-9th-edition</a></li> <li>C. Bogdan. Preparate gemoderivate, 2018-2019, Note de curs, <a href="http://www.farma.umfcluj.ro">www.farma.umfcluj.ro</a></li> </ol>	
<b>7.2.Laboratory activities (hours)</b>	<b>Remarks</b>
<b>No laboratory activities</b>	

## 8. Evaluation

Activity type	8.1.Evaluation criteria	8.2. Evaluation methods	8.3. Percent of final grade
<b>8.4. Lectures</b>	Knowledge of the specialized terminology and the issues discussed. Ability to appropriately use the specialized terminology (consistency, logic, fluent rendering). Ability to identify problems. Ability to support the solutions proposed.	Written exam	<b>100%</b>
<b>8.5. Laboratory</b>	-		
<b>8.6. Minimal performance standard</b>			
Learning the main concepts in gemmotherapy field. <ul style="list-style-type: none"> <li>• Definition of gemmotherapy.</li> <li>• Preparation methods of gemmotherapy products.</li> <li>• Knowing the main types of gemmotherapy products used in pharmaceutical practice.</li> <li>• Knowing the information for the patients using gemmotherapy products.</li> </ul>			

## GENETIC VARIABILITY IN PHARMACOLOGY

### 1. Information about the course

<b>1.1. Discipline</b>		<b>Pharmacology, physiology, physiopathology</b>					
<b>1.2. Course instructor</b>		<b>Lecturer Cristina Pop, PhD</b>					
<b>1.3. Laboratory instructor</b>		<b>-</b>					
<b>1.4. Year</b>	<b>5</b>	<b>1.5. Semester</b>	<b>1</b>	<b>1.6. Evaluation type</b>	<b>Written exam – multiple answer questions Project</b>	<b>1.7. Course type</b>	<b>Optional discipline</b>

### 2. Total estimated time (hours/semester for teaching activity)

<b>2.1. Total hours/week</b>	<b>1 (1<sup>st</sup> sem.)</b>	<b>2.2. Course</b>	<b>1</b>	<b>2.3. Laboratories</b>	<b>0</b>
<b>2.4. Total hours in the curriculum</b>	<b>14 (1<sup>st</sup> sem.)</b>	<b>2.5. Course</b>	<b>14</b>	<b>2.6. Laboratories</b>	<b>0</b>
<b>2.4. Distribution of time needed (1<sup>st</sup> sem. / 2<sup>nd</sup> sem.)</b>					<b>Hours</b>
a. Study using text books, lecture notes, bibliography					14
b. Individual study within libraries, on-line platforms, field research					7
c. Preparing seminars/laboratories, homework, projects, portfolios and essays					14
d. Tutoring					3
e. Evaluation/ semester					1
f. Other activities					-
<b>2.7. Total hours for individual study (a+b+c+d)</b>				<b>39 (1<sup>st</sup> sem.)</b>	
<b>2.8. Total hours per semester</b>				<b>53 (1<sup>st</sup> sem.)</b>	
<b>2.9. Number of credits</b>				<b>2 (1<sup>st</sup> sem.)</b>	

### 3. Pre-requisites:

<b>3.1. Curriculum</b>	Genetics, Pharmacology
<b>3.2. Competences</b>	-

### 4. Requisites:

<b>4.1. For lectures</b>	• Lecture classroom (amphitheater) with required facilities
<b>4.2. For laboratories sessions</b>	-

### 5. Specific competences acquired

<b>Professional competences</b>	<ul style="list-style-type: none"> <li>• The ability to name the main drug classes and the main drugs for which genetic variability can modify their efficacy and safety profiles</li> <li>• The ability to explain the mechanisms through which genetic variability may influence drugs pharmacology (mainly efficacy and safety)</li> <li>• The ability to interpret the effect of drugs (mainly efficacy and safety) taking into account genetic variability issues</li> </ul>
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<b>Transversal competences</b>	<ul style="list-style-type: none"> <li>• Students will be able to make connections between two already studied disciplines: Genetics and General Pharmacology</li> <li>• Students will be aware of the principles of personalized therapy, and their applications for pharmacists</li> <li>• As healthcare professionals, future pharmacists will be able to use genetic information to optimize drug therapy for patients</li> </ul> <p>Students will be aware of the ethical, social and economic importance of the genetic variability in pharmacology</p>
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## 6. Course objectifs

<b>6.1. General objectives</b>	<ul style="list-style-type: none"> <li>• The familiarization of students to a new field that studies the influence of genetic variability in pharmacology</li> </ul>
<b>6.2. Specific objectives</b>	<ul style="list-style-type: none"> <li>• To deepen the knowledge about genetic variability, genetic polymorphism, allele, etc.</li> <li>• To present the importance of understanding genetic information for pharmacists</li> <li>• To present the importance of genetic variability for the efficacy and safety of drugs</li> <li>• To present, in a systematic structured way, the main drugs influenced by genetic variability</li> <li>• To explain the molecular mechanisms by which genetic variability can influence drugs' pharmacology</li> <li>• To present the role of the pharmacist in the implementation of personalized therapy</li> </ul>

## 7. Content

**Teaching methods for course:** Lecture, interactive methods. Exemplifications, connections with other studied disciplines or known facts, questions.

**Teaching methods for laboratory activity:** -

<b>7.1 Course (hours)</b>	<b>Remarks</b>
• Course 1 - Introduction: the pharmacist's role in personalized therapy.	<b>1 h</b>
• Course 2 - Genetic variability, definition and clarification.	<b>1 h</b>
• Course 3 - Influence of genetic variability on drug metabolism (Phase I - CYP450 enzymes).	<b>1 h</b>
• Course 4 - Influence of genetic variability on drug metabolism (Phase II enzymes).	<b>1 h</b>
• Course 5 - Influence of genetic variability on drug transporters.	<b>1 h</b>
• Course 6 - Genetic variability and immune system (hypersensitivity reactions, transplantation medication and vaccines).	<b>1 h</b>
• Course 7 - Genetic variability and cardiovascular system medication I (anticoagulated, platelet antiaggregants, hypolipemiant).	<b>1 h</b>
• Course 8 - Genetic variability and cardiovascular system medication II (beta blockers, renin-angiotensin-aldosterone system blockers, calcium channel blockers).	<b>1 h</b>
• Course 9 - Genetic variability and antineoplastic medication I.	<b>1 h</b>



<ul style="list-style-type: none"> <li>• Course 10 - Genetic variability and antineoplastic medication II.</li> <li>• Course 11 - Genetic variability and antipsychotic and antidepressant medication.</li> <li>• Course 12 - Genetic variability and medication for neurodegenerative diseases - Alzheimer's disease, Parkinson's disease.</li> <li>• Course 13 - Genetic variability and antiviral medication.</li> <li>• Course 14 - Genetic variability and ethical, social and economic implications.</li> </ul>	<b>1 h</b> <b>1 h</b> <b>1 h</b> <b>1 h</b> <b>1 h</b>
<b>Bibliography</b> <ol style="list-style-type: none"> <li>1. Katzung BG et al. Basic &amp; Clinical Pharmacology. 13<sup>th</sup> Edition, 2015 McGraw-Hill</li> <li>2. Bertino JS Jr, DeVane LC, Fuhr U, Kashuba A, Ma JD. Pharmacogenomics: An Introduction and Clinical Perspective. 2013 McGraw-Hill Education</li> <li>3. Webber WW. Pharmacogenetics. Second Edition, 2002 Oxford University Press</li> <li>4. McNamarra D. Pharmacogenetics in heart failure. How it will shape the future. 2010 Elsevier</li> <li>5. Atkinson AJ, editors et al. Principles of Clinical Pharmacology. Third Edition, 2012 Elsevier</li> <li>6. Brunton LL, Chabner BA, Knollmann BC, editors: Goodman &amp; Gilman's The Pharmacological Basis of Therapeutics. 12<sup>th</sup> Edition, 2011 McGraw-Hill</li> <li>7. McCullough KB. Assessment of the pharmacogenomics educational needs of pharmacists. Am J Pharm Educ. 2011;75(3):51</li> <li>8. Moen et al. Assessment of healthcare students' views on pharmacogenomics at the University of Minnesota. Pharmacogenomics. 2012 Oct;13(13):1537-45</li> <li>9. Murphy et al. Pharmacogenomics in the curricula of colleges and schools of pharmacy in the United States. Am J Pharm Educ. 2010 Feb 10;74(1):7</li> <li>10. O'Brien et al. Development of an undergraduate pharmacogenomics curriculum. Pharmacogenomics. 2009 Dec;10(12):1979-86</li> <li>11. Brothers KB, Rothstein MA. Ethical, legal and social implications of incorporating personalized medicine into healthcare. Personalized Medicine 2015;12(1):43-51</li> <li>12. Swen JJ et al. Pharmacogenetics: From bench to byte—An update of guidelines. Clin Pharmacol Ther 2009;89:662</li> <li>13. Lee KC, Ma JD, Kuo GM. Pharmacogenomics: bridging the gap between science and practice. J Am Pharm Assoc. 2010;50(1):e1–e14</li> <li>14. Issa AM, Tufaila W, Hutchinson J, Tenorioc J, Poonam Baligaa M. Assessing patient readiness for the clinical adoption of personalized medicine. Public Health Genomics. 2009;12:163–169</li> <li>15. Daly AK. Using genome-wide association studies to identify genes important in serious adverse drug reactions. Annu Rev Pharmacol Toxicol. 2012;52:21–35</li> <li>16. Roederer MW, Sanchez-Giron F, Kalideen K, et al. Pharmacogenetics for Every Nation Initiative. Pharmacogenetics and rational drug use around the world. Pharmacogenomics. 2011;12(6):897–905</li> <li>17. McNamara D. Pharmacogenetics: which of these medicines do I really need? Heart Fail Clin. 2010 Jan;6(1):15-16</li> </ol>	

## 8. Evaluation

Activity type	8.1. Evaluation criteria	8.2. Evaluation methods	8.3. Percent of final grade
8.4. Course	Capacity to understand and integrate scientific information.	Written exam – multiple answer questions	<b>50%</b>
		Project	<b>50%</b>

<b>8.5. Laboratory</b>	-	-	-
<b>8.6. Minimal performance standard</b>			
<ul style="list-style-type: none"> <li>• Knowledge of the influence of genetic variability on the efficacy and safety of drugs</li> <li>• Knowledge of drugs whose pharmacology can be modified by genetic variability</li> <li>• Knowledge of the molecular mechanisms by which the pharmacology of drugs can be influenced by genetic variability</li> <li>• Knowledge of the pharmacist's role in personalized therapy</li> </ul>			

# INTELLECTUAL PROPERTY PROTECTION BY MEANS OF PATENTS

## 1. Information about the course

<b>1.1. Course</b>		<b>Intellectual property protection by means of patents</b>					
<b>1.2. Course instructor</b>		<b>Prof. dr. Ioan TOMUȚĂ Asist. univ. dr. Dana HALES</b>					
<b>1.3. Laboratory instructor</b>		-					
<b>1.4. Year</b>	<b>V</b>	<b>1.5. Semester</b>	<b>I</b>	<b>1.6. Evaluation type</b>	<b>Written exam</b>	<b>1.7. Course type</b>	<b>Complementary discipline Optional discipline</b>

## 2. Total estimated time (hours/semester for teaching activity)

<b>2.1. Total hours/week</b>	<b>1 (1<sup>st</sup> sem.)</b>	<b>2.2. Course</b>	<b>1</b>	<b>2.3. Laboratories</b>	<b>-</b>
<b>2.4. Total hours in the curriculum</b>	<b>14 (1<sup>st</sup> sem.)</b>	<b>2.5. Course</b>	<b>14</b>	<b>2.6. Laboratories</b>	<b>-</b>
<b>2.4. Distribution of time needed (1<sup>st</sup> sem. / 2<sup>nd</sup> sem.)</b>					<b>Hours</b>
a. Study using text books, lecture notes, bibliography					28
b. Individual study within libraries, on-line platforms, field research					10
c. Preparing seminars/laboratories, homework, projects, portfolios and essays					-
d. Tutoring					2
e. Evaluation/ semester					1
f. Other activities					-
<b>2.7. Total hours for individual study (a+b+c+d)</b>					<b>40 (1<sup>st</sup> sem.)</b>
<b>2.8. Total hours per semester</b>					<b>54 (1<sup>st</sup> sem.)</b>
<b>2.9. Number of credits</b>					<b>2 (1<sup>st</sup> sem.)</b>

## 3. Pre-requisites :

<b>3.1. Curriculum</b>	Good knowledge of pharmaceutical technology, pharmacology, pharmaceutical chemistry, therapeutic chemistry.
<b>3.2. Competences</b>	-

## 4. Requisites :

<b>4.1. For lectures</b>	• Classroom with laptop and video projector.
<b>4.2. For laboratories sessions</b>	-

## 5. Specific competences acquired

<b>Professional competences</b>	<ul style="list-style-type: none"> <li>• Acquiring knowledge on intellectual property rights in the pharmaceutical field.</li> <li>• Acquiring skills regarding database search of patents.</li> <li>• Acquiring skills regarding reading and interpretation of a patent.</li> </ul>
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<b>Transversal competences</b>	<ul style="list-style-type: none"> <li>• Developing a conscious and responsible perception regarding the role of each pharmacist in intellectual property protection in the pharmaceutical field.</li> <li>• Formation of proficiency for reading and interpreting a patent.</li> </ul>
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## 6. Course objectifs

<b>6.1. General objectives</b>	<ul style="list-style-type: none"> <li>• Presentation of underlying principles of intellectual property protection in the pharmaceutical field through patents.</li> </ul>
<b>6.2. Specific objectives</b>	<ul style="list-style-type: none"> <li>• Acquiring the principles of intellectual property protection in the pharmaceutical field.</li> <li>• Providing knowledge/information on patent search in specific databases.</li> <li>• Providing knowledge/information on reading and interpretation of patents.</li> <li>• Providing knowledge on the legal framework, specific to intellectual property.</li> </ul>

## 7. Content

**Teaching methods for course: oral lectures supported by Power-Point slides, interactive communication.**

**Teaching methods for laboratory activity: -**

<b>7.1 Course (hours)</b>	<b>Remarks</b>
<b>1. Intellectual property – introduction, brief history.</b> Types of intellectual property - copyright, industrial property rights (patent, trademark). National and international organizations - World Intellectual Property Organization (WIPO), The World Trade Organization (WTO), European Patent Office (EPO), European Union Intellectual Property Office (EUIPO), European Union Copyright Office, United States Patent and Trademarks Office (USPTO), State Office for Inventions and Trademarks (OSIM), Romanian Copyright Office (ORDA), Fundamental legislative principles. Paris Convention for the Protection of Industrial Property.	<b>2 h</b>
<b>2. Pharmaceutical inventions protection.</b> Directions of protection. Product life cycle management. Conditions for patentability: technical character, novelty.	<b>2 h</b>
<b>3. Conditions for patentability: inventiveness.</b> Identifying inventions and determining their scope.	<b>2 h</b>
<b>4. Searching patents in patent literature.</b> Freedom to operate. Patent infringement. Generating keywords for patent searches. Patent classification systems. Databases used for patent search.	<b>2 h</b>
<b>5. How to read and interpret a patent.</b> How to write a patent. Patent structure and content. Patent language. Patent claims.	<b>2 h</b>
<b>6. The patent process. Inventorship (patenting and publication).</b> Patent review procedure (search report, examination report). Obtaining international protection. Types of patents - product or process patents (patents of new products, patents of new uses, formulation patents etc.), design patents.	<b>2 h</b>
<b>7. Patent application rejection (refusal).</b> Reasons for rejection (refusal). Patent rights. How long does patent protection last? Transmission and defense of patent rights.	<b>2 h</b>
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14. Cremer K, Schellhaas K. Essential Patent Workshop ”How to draft, analyse and circumvent a formulation patent”. Berlin, 11-12 November 2019.	
<b>7.2. Laboratory activities (hours)</b>	-
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## 8. Evaluation

Activity type	8.1.Evaluation criteria	8.2. Evaluation methods	8.3. Percent of final grade
<b>8.4. Course</b>	<ul style="list-style-type: none"> <li>Acquiring the notions and concepts taught in class.</li> <li>Correct understanding and assimilation of basic notions on intellectual property and legal provisions relating to intellectual property.</li> </ul>	Written exam.	<b>100%</b>
<b>8.5. Laboratory</b>	-	-	-
<b>8.6. Minimal performance standard</b>			
<ul style="list-style-type: none"> <li>Knowledge, understanding and using of basic concepts underlying intellectual property in the pharmaceutical field.</li> <li>Ability to search for a patent in national and international databases.</li> <li>Ability to read and interpret a patent in the pharmaceutical field.</li> </ul>			