SUBJECT OUTLINE

1. Programme of study description

1.1.	**THE "CAROL DAVILA" UNIVERSITY OF MEDICINE AND PHARMACY**
1.2.	**THE FACULTY OF MEDICINE / THE PRECLINICAL DEPARTMENT 1**
1.3.	**DISCIPLINE: PHARMACOLOGY AND PHARMACOTHERAPY**
1.4.	**DOMAIN OF STUDY: Healthcare – regulated sector within the EU**
1.5.	**CYCLE OF STUDIES: BACHELOR'S DEGREE**
1.6.	**PROGRAMME OF STUDY: MEDICINE**

2. Subject description

2.1.	**Name of the subject/compulsory subject/elective subject within the discipline: PHARMACOLOGY AND PHARMACOTHERAPY**
2.2.	**Location of the discipline: BDUL. EROILOR SANITARI NR. 8 BUCUREȘTI**
2.3.	**Course tenured coordinator:** **1. ASSOC.PROFAURELIAN ZUGRAVU, MD, PhD** **2. LECTURER. SMARANDA STOLERU, MD, PhD**
2.4.	**Practicals/clinical rotations tenured coordinator:** **1. ASSOC.PROFAURELIAN ZUGRAVU, MD, PhD** **2. LECTURER. SMARANDA STOLERU, MD, PhD**

2.5. Year of study	III	**2.6. Semester**	I II	**2.7. Type of assessment**	Paper test MCQ Practical/oral examination	**2.8. Subject classification**	Compulsory subject

3. Total estimated time (hours/semester of didactic activity) – teaching module

Number of hours per week	4	**Out of which: course**	2	**Practical meeting**	2
Total number of hours from curriculum	112	**Out of which: course**	**56**	**Practical meeting**	56
Distribution of allotted time					**Hours**
Study from textbooks, courses, bibliography, and student notes					2
Additional library study, study on specialized online platforms and field study					2
Preparing seminars / laboratories, assignments, reports, portfolios and essays					2
Tutoring					2
Examinations					8
Other activities					2
Total hours of individual study					
Number of credit points	8				

4. Prerequisites (where applicable)

4.1. of curriculum	Basic knowledge of physiology, biochemistry, semiology, pathophysiology
4.2. of competencies	

5. Requirements (where applicable)

5.1. for delivering the course	Computer, Projector
5.2. for practical session unfolding	Department´s Laboratory, Computer, Projector

6. Acquired specific competencies

Professional competencies (expressed through knowledge and skills)	At the end of the 56 lecture hours, the student must - Acquire the basis of medicine use for prevention, diagnosis and treatment of disease - Evaluate the benefits and risks of medicine use, both as unique medication as well as in medicine combinations - Be familiar with pharmacodynamic and pharmacokinetic properties of drugs for different types of patients At the end of the 56 practical session hours, the student must - be familiar with the methods by which medicine are discovered and evaluated from experimental point of view - prescribe medicine acting on different organ systems action in a rational manner
Transversal competencies (of role, of professional and personal development)	- To acquire the ability to work in teams - To acquire communication skills - To express empathy and professional medical ethics

7. Subject learning objectives (based on the scale of acquired specific competencies)

7.1. General learning objective	Development, in the context of the Pharmacology discipline, of knowlege, abilities, attitudes and behaviors necessary for the optimal progress in the medical field
7.2. Specific learning objectives	The objectives of the lecture are: • Comprehension and knowledge of the drug's effects on the body as a whole, of the way they influence bodily functions and usage of these abilities in medical practice. • Acquisition of necessary basic knowledge of drug use in prevention, diagnosis and treatment of disease. • Evaluation of benefits and risks of drug use, whether alone or in different therapeutic combinations. • Acquisition of necessary knowledge for the proper individualization of treatment, regarding the patient´s particular needs • Acknowledging cellular and molecular mechanisms of actions of the main classes of drugs. • Acquiring fundamental knowledge of pharmacokinetic parameters and their use in deciding dosing, administration intervals and treatment individualization for different patient categories • Treatment monitoring from the points of view of efficacy, adverse reactions and drug interactions • Acknowledging pharmacodynamic and pharmacokinetic particularities of drugs for different catergories of patients

	(elders, childern, pregnant women/which breastfeed, patients suffering from renal or hepatic failure) • Acknowledging basic notions regarding drug abuse and addiction and methods of prevention and treatment of acute or chronic drug intoxication. The objectives of practical sessions are: • Acquisition of knowledge regarding the methods by which medicine are discovered and evaluated from experimental point of view. • Critical analysis of scientific literature regarding drugs. • Rational use of scientific electronic data bases in the field of the drug • Rational analysis of experimental data predictability for the efficacy and clinical safety of drugs. • The possibility of writing a complete, correct and rigorous prescription, inclusively for drugs that require special prescription conditions. • Rational prescription of drugs acting on different organ systems of the human body.

8. Content

8.1. Course	**Teaching methods**	**Observations**
Lecture 1 – Introduction: Definition of the drug. Definition of Pharmacology. Non-clinical Pharmacology. Clinical Pharmacology. Methods of drug discovery and development.	Lecture	2 hours
Lecture 2 – General Pharmacology: General Pharmacodynamics. Demonstrating drug actions and mechanisms of action. Pharmacologic receptors. Molecular, cellular, organ, organ systems and body drug actions.	Lecture	2 hours
Lecture 3 – General Pharmacokinetics: Fundamental processes of pharmacokinetics. Drug movement across biological membranes. Drug absorption. Drug distribution. Drug elimination. Pharmacokinetic parameters.	Lecture	2 hours
Lecture 4 – General Pharmacotoxicology: Defining adverse reactions. Factors influencing the occurence of adverse reactions. Types of adverse reactions. Evaluation of adverse reactions. Monitoring adverse reactions.	Lecture	2 hours

- Drugs during pregnancy and breast feeding - Drugs and the elderly		
Lecture 5 – Drugs Affecting the Autonomic Nervous System - Drug effects on the nervous system - Cholinergic system Parasympathomimetics Parasympatholytics	Lecture	2 hours
Lecture 6 – Nicotinic substances. Ganglioplegic drugs. Curarizing drugs. Anticholinesterazic drugs.	Lecture	2 hours
Lecture 7 – The Adrenergic System Sympathomimetics. Sympatholitics	Lecture	2 hours
Lecture 8 – Drugs Affecting the Central Nervous System - The nervous system's global modulation: General Anaesthetics. General Inhalation Anaesthetics. General Intravenous Anaesthetics. - Local Anaesthetics	Lecture	2 hours
Lecture 10 – Sedative and Hypnotic Drugs : Benzodiazepines. Barbiturates. Other sedatives. Other hypnotics - Psychomotor Stimulants.	Lecture	2 hours
Lecture 10 – Drugs Affecting Cognitive Functions - Antipsychotic drugs. - Alzheimer's disease drugs. - Noothrops.	Lecture	2 hours
Lecture 11 – Drugs Affecting Affective Functions - Antidepressants. - Antimaniacal drugs. - Mood Stabilizers. - Anxiolytic drugs.	Lecture	2 hours
Lecture 12 – Particular Central Nervous System Drugs Antiparkinsonian drugs. Anticonvulsant drugs. Central Nervous Muscle Relaxing drugs	Lecture	2 hours
Lecture 13 – Opioid Analgetics and antagonists: Opioid receptors agonists. Antagonists-agonists of the opioid receptors. Opioid receptors antagonists. Other opioids. Toxicomania and dependency.	Lecture	2 hours

Lecture 14 – Drugs Affecting the Autacoid System - Drugs affecting the eicosanoid system - Histamine and antihistaminic drugs - Drugs affecting other autacoid systems: serotonin, kinins, angiotensin, nitric oxide, endothelin **Drugs affecting hormonal function** - Glucocorticoids and mineralcorticoids	Lecture	2 hours
Lecture 15 – Drugs Affecting the Cardiovascular System - Digitalis and other ionotropic positive drugs: Digitalis Glycosides. Sympathomimetics. Phosphodiestherase inhibitors. - Vasodilators in cardiac failure treatment	Lecture	2 hours
Lecture 16 – Antiarrythmic Drugs Sodium channel blocker antiarrythmics (class I). β adrenergic blocker antiarrythmics (class II). Action potential prolonging antiarrythmics (class III). Calcium channel blocker antiarrythmics (class IV).	Lecture	2 hours
Lecture 17 – Antianginal Drugs: Organic Nitrates. Beta adrenergic blockers. Calcium channel blockers. Vasoactive medication: Vasodilators. Vasoconstrictors.	Lecture	2 hours
Lecture 18: Antihypertensives: Sympatholytics. Direct vasodilators. Calcium channel blockers. Renin-Angiotensin system inhibitors. Diuretics as antihypertensives.	Lecture	2 hours
Lecture 19 - Diuretics and antidiuretics - Diuretics. - Antidiuretics.	Lecture	2 hours
Lecture 20 – **Drugs Affecting the Respiratory System** - Antiasthmatic drugs. - Antitussive drugs, expectorant drugs and surfactant.	Lecture	2 hours
Lecture 21 – **Drugs Affecting the Digestive System** - Antiulcer Drugs - Substituens and stimulants of the digestive secretion. - Prokinetic drugs.	Lecture	2 hours

- Antispastic drugs. -Antiemetic drugs -Antidiarrheal drugs. - Laxatives and purgatives. - Glucocorticoids. Imunodepressant and imunomodulating agents. Antimicrobial agents.		
Lecture 22 - Drugs Affecting the Blood - Antianemic drugs: Iron. Vitamin B_{12} and folic acid. Hematopoietic growth factors.	Lecture	2 hours
Lecture 23 – Antithrombotic Drugs: Antiplatelet drugs. Anticoagulan ts. Fibrinolytics. Hemostatic drugs Hypolipidemic drugs.	Lecture	2 hours
Lecture 24 - Chemotherapeutic Drugs Antibacterial Chemotherapeutic Drugs. Molecular action of antibacterial chemotherapeutic drugs. Bacterial resistance to chemotherapeutic drugs. Antibacterial chemotherapeutic drugs pharmacokinetics. Pharmacotoxicologic particularities of antibacterial chemotherapeutic drugs.	Lecture	2 hours
Lecture 25 – Penicilins. Cephalosporins. Carbapenems. Monobactams. Tribactams.	Lecture	2 hours
Lecture 26 – Aminoglycosides. Tetracyclines. Chloramphenicol. Antibacterial Macrolides. Lincosamidic antibiotics. Glycopeptide antibiotics. Polypeptide antibiotics. Chemotherapeutic drugs used in tuberculosis. Chemotherapeutic drugs used in leprosy. Antibacterial sulfonamides and trimethoprim. Antibacterial quinolones. Urinary antiseptic drugs.	Lecture	2 hours
Lecture 27 – Anticancer Chemotherapeutic Drugs and Immunosuppressants Particularities of anticancer chemotherapeutic drugs and immunosuppressants.	Lecture	2 hours
Lecture 28 **Antiviral chemotherapeutic drugs.** Particularities of antiviral chemotherapeutic drugs. **Antifungal chemotherapeutic drugs:**	Lecture	2 hours

Particularities of antifungal chemotherapeutic drugs **Antiparasitic chemotherapeutic drugs:** Chemotherapeutic drugs used in malaria.Chemotherapeutic drugs active in amebiasis, trichomoniasis, giardosis. Antihelmintic chemotherapeutic drugs.		

8.2. Practical Sessions (LP)	**Teaching methods**	**Observations**
LP1 – **General aspects** - Legal elements and drug authorization	Practical Sessions	2 hours
LP2 – Pharmaceutical forms solid, semi solid, volatile	Practical Sessions	2 hours
LP3- The presctription – general and prescription examples for the main pharmaceutical forms	Practical Sessions	2 hours
LP4 – Discovery and development of drugs 1. *drug discovery phase* 2. *non-clinical drug evaluation* *- pharmacodynamic evaluation* *- pharmacokinetic evaluation* *- non-clinical toxicologic evaluation*	Practical Sessions	2 hours
LP5 – Experimental models - experimental design - protocol **- Statistical workup of results and their interpretation** **- Legal and ethical aspects of laboratory animal testing and exprimenting**	Practical Sessions	2 hours
LP6 – Experimental assessment of drug pharmacokinetics: primary pharmacokinetic parameters; primary pharmacokinetic parameters calculation; drug absorption evaluation; drug distribution evaluation; drug metabolization evaluation; drug excretion evaluation; enzymatic induction problems.	Practical Sessions	2 hours
LP7- Experimental assessment of drugs affecting the cholinergic system and their pharmacodynamics	Practical Sessions	2 hours

LP8 – Experimental assessment of drugs affecting the adrenergic system. Mammal blood pressure monitoring method.	Practical Sessions	2 hours
LP9 – Non-clinical experimental assessment of pharmacodynamic properties of drugs affecting the Central Nervous System: ***- general anaesthetics evaluation*** ***- sedative-hypnotic drugs evaluation*** ***- neuroleptic drugs evaluation*** ***- pain medication evaluation***	Practical Sessions	2 hours
LP10 – Rational drug prescription – the rational drug and therapeutic model election in clinical conditions **• Rational prescription of drugs affecting the Autonomic Nervous System**	Practical Sessions	2 hours
LP11 – Rational prescription of drugs affecting the Central Nervous System: the sedative-hypnotic medication; anxiolytic medication; psychomotor stimulating medication; antipsychotic medication; antidepressive medication; antiparkinsonian medication; muscle relaxing medication; anticonvulsant drugs	Practical Sessions	2 ore
LP12 – Control Test	Evaluation	2 hours
LP13- Rational prescription of analgesic drugs: opioid analgesics, non-opioid analgesics, non steroidal antiinflammatory drugs (NSAID)	Practical Sessions	2 hours
LP14 – Rational prescription of glucocorticoids. Rational prescription of antihistaminic drugs.	Practical Sessions	2 hours
LP15- Rational prescription of drugs – General aspects.	Practical Sessions	2 hours
LP16 – Rational prescription of drugs affecting different organ systems and effecetor structures: ***- drugs affecting the cardiovascular system*** ***- tonicardiac medication***	Practical Sessions	2 hours
LP17 – ***Drugs affecting the cardiovacular system:*** **Antiarrythmic drugs**	Practical Sessions	2 hours
LP18 – ***Drugs affecting the cardiovascular system:*** **Antianginal drugs:** organic nitrites, beta-blockers and calcium channel blockers	Practical Sessions	2 hours

used as antianginal medication		
LP19 – *Drugs affecting the cardiovascular system:* Antihypertensive drugs: antihypertensie drug classes, diuretics used as antihypertensives	Practical Sessions	2 hours
LP20 – *Drugs affecting the digestive system:* antiacid drugs, hydrochloric acid secretion inhibitors, antispastic, antidiarrheal and antiemetic drugs	Practical Sessions	2 hours
LP21- *Drugs affecting the respiratory system:* antiasthmatic drugs, expectorants, antitussive medication.	Practical Sessions	2 hours
LP22- Control Test	Evaluation	2 hours
LP23 – *Drugs affecting the blood:* antianemic medicine	Practical Sessions	2 hours
LP24- *Drugs affecting the Blood:* Antiplatelet drugs, anticoagulants, fibrinolyrics, antihaemorragic drugs^{o}	Practical Session	2 hours
LP25- Rational prescription of chemotherapeutic antibacterial drugs: Beta-lactamines: penicilins, cephalosporins, carbapenems	Practical Sessions	2 hours
LP26- Rational prescription of chemotherapeutic antibacterial drugs: Aminoglycosides, tetracyclines, macrolides, chloramphenicol, quinolones	Practical Sessions	2 hours
LP27- Rational prescription of antifungal and antiprotozoal chemotherapeutic drugs	Practical Sessions	2 hours
LP28- Practical Examination	Evaluation	2 hours

Bibliography for course and practical meeting

- Goodman and Gilman's, The Pharmacological Basis of Therapeutics, 14th edition, Mc Graw Hill, 2017
- Katzung Bertram: Basic and Clinical Pharmacology, 13th edition, Mc Graw Hill, 2016
- Lippincott's Illustrated Reviews: Pharmacology, Sixth Edition, 2014

9. Corroboration of the subject content with the expectations of the representatives of the epistemic community, professional associations, and major employers in the field of the programme of study

Acquiring the pharmacological notions that allow the proper training of future medical personnel and conferring the prerequisites for admission to residency and the carrying out of a successful medical activity

10. Assessment

Type of activity	Assessment criteria	Assessment methods	Assessment weighting within the final grade
Course	Acknowledging the theoretical aspects of the subject	Theoretical (written) exam – Multiple choice tests	70%
Practical activity	Acknowledging the pharmacographic and fundamental pharmacologic notions applied in organ systems medication	Oral practical examination performed in front of the assistant professor	30%

Minimum performance standard

Theoretical (written) Exam:

- The student must give a correct answer to at least 50% of the questions.

Practical Exam

- The practical exam is eliminatory
- The minimal passing grade is 5

The student must prove the knowledge of the necessary practical skills in order for his or her medical practice not to be dangerous

Date of filing	**Signature of the course tenured coordinator**	**Signature of the seminar tenured coordinator**
19.03.2022		

Date of approval in the Council of the Department: **Signature of the Head of the Department**

24.03.2022