PHARMACODYNAMICS

1. Information about the program

1.1.	**UNIVERSITY: "GRIGORE T. POPA" UNIVERSITY OF MEDICINE AND PHARMACY OF IAŞI**
1.2.	**FACULTY: PHARMACY SCHOOL / DEPARTMENT: PHARMACEUTICAL SCIENCES II**
1.3.	**SUBJECT: PHARMACODYNAMICS AND CLINICAL PHARMACY**
1.4.	**STUDY FIELD: HEALTH**
1.5.	**STUDY CYCLE: UNDERGRADUATE**
1.6.	**STUDY PROGRAMME: PHARMACY**

2. Subject data

2.1.	**SUBJECT:** PHARMACODYNAMICS						
2.2.	**Module leader:** Prof. Veronica Bild, PhD; Lecturer Delia Bulea, PhD;						
2.3.	**Seminar leader** Prof. Veronica Bild, PhD; Lecturer Delia Bulea, PhD; Assist. Monica Neamțu, PhD; Assist. Oana Arcan, PhD; Assist. Alexandru Vasincu, PhD; Assist. Daniela Carmen Ababei, PhD; Assist. Rusu Răzvan, PhD student						
2.4. Year of study	IV	**2.5. Semester in which is taught**	I/II	**2.6. Evaluation type**	E1/E2	**2.7. Subject status**	Compulsory

3. Duration of the course (hours per semester)

3.1. Number of hours / week	6 (1st sem) 6 (2nd sem)	**3.2. Number of hours / week**	3 (1st sem) 3 (2nd sem)	**3.3.Seminar / lab**	3 (1st sem) 3 (2nd sem)
3.4.Total number of learning hours	84 (1st sem) 84 (2nd sem)	**3.5.Total number of learning hours**	42 (1st sem) 42 (2nd sem)	**3.6. seminar / lab**	42 (1st sem) 42 (2nd sem)

3.7.Distribution of activities in the course (1st sem /2nd sem)		**hours**
Study based on the manual, printed course, bibliography and notes		73/45
Additional research in the library, on specialized e-platforms and field study		8/5
Preparation for seminars, practical courses, portfolios and essays		33/14
Tutoring		2/2
Assessment		-
Other activities		-
3.8. Number of hours of individual study		116/66
3.9. Number of hours per semester		200/150
3.10. Number of ECTS		8/6

4. Previous Knowledge (if applicable)

4.1. course related	Physiology, Pathophysiology, Medical semiology, Medical pathology, Microbiology.
4.2. skill related	Theoretical knowledge of physiology, pathophysiology of organs and systems, concepts of medical semiology, pathology and microbiology, laboratory skills, techniques of harvesting and management of biological samples in laboratory animals and humans, pharmaceutical calculations.

5. Requirements (if applicable)

5.1. course conditions	Audio-video equipment.
5.2. seminar / laboratory conditions	Audio-video equipment, special room arranged to carry out experiments on laboratory animals, experimental animals, laboratory glassware, specific laboratory instruments.

6. Specific Skills Acquired

Professional skills displayed by knowledge and skills	• Storage, preservation and distribution of medicines, food supplements, cosmetics and other health care products • Dispense prescribed medicines, food supplements, cosmetics, other health care products and pharmaceutical care • Consultancy and expertise in the field of medicines, food supplements, cosmetics and other health care products • Identification of the types of side effects that occur after drug administration; preparing the sheet with side reactions; demonstrate the actions and clinical relevance of substances: general anesthetics, hypnotics, tranquilizers, neuroleptics, opioid analgesics (thermal stimulus, mechanical stimulus), antipyretic analgesics, NSAIDs, CNS stimulant, some substances acting on the autonomic nervous system (parasympathomimetics, parasympatholytics) • Evaluation of drug substances according to the degree of toxicity • Demonstrate the actions and clinical relevance of drugs clases: substances acting on the autonomic nervous system (sympathomimetics, sympatholytics), lymph node and curare-like compounds, local anesthetics, antihistamines H_1, miotics mydriatic, anti-ulcer, laxative, purgative, coagulants and anticoagulants, diuretics • Acquiring data about pharmaceutical products from these groups, existing in Product Nomenclature
Transversal skills (role skills, professional and personal skills)	• Autonomy and responsibility - the execution of some complex educational tasks under conditions of autonomy. • Social interaction and teamwork - assuming the roles / functions of leadership of working or research teams, learning group work. • Written and oral expression skills. • Respect and development of professional values and

	ethics. • Problem solving and decision making. • Recognize and respect for diversity and multiculturalism.

7. Course Objectives (confirmed by the grid of specific skills acquired)

7.1. General Objective	Learning the basics notions regarding the third chapter of the general pharmacology: general pharmacotoxicology; Learning the basics notions regarding the special part of pharmacodynamics: drugs acting on the CNS and peripheral, drugs acting on ANS and neuromuscular unit (parasympathomimetics; parasympatholytics) Continue to assimilate the basic notions regarding the special part of pharmacology: drugs acting on ANS and neuro-motor unit (sympathomimetic, sympatholytic, ganglionar and curare-like compounds), drugs acting at different apparatus level (respiratory, cardiovascular, excretory, digestive etc), chemotherapic drugs.
7.2. Specific Objectives	Identification of the side effects types, of mechanisms of action of drugs groups, identification of the interactions types.

8. Contents

8.1. Course	**Teaching methods**	**Observations**
1. General pharmacotoxicology: 1.1. Types of side-effects (adverse reactions) 1.2. Pharmacoepidemiology; pharmacovigilence	Lecture, open discussion, correlation with notions acquired at curriculum preconditions	3 hours
2. Drugs acting on the central and on the peripheral nervous system: 2.1. General anesthetics; sedative-hypnotic drugs 2.2. Anxiolytic drugs, neuroleptics (antipsychotics) 2.3. Antiseizure drugs (drugs for epilepsy), drugs for Parkinson's disease; central skeletal muscle relaxants (spasmolytic drugs) 2.4. Opioid analgesics 2.5. Antipyretic analgesics (nonopioid analgesics) 2.6. Nonsteroidal anti-inflammatory drugs (NSAID's) 2.7. Central nervous system stimulants 2.8. Antidepressant agents 2.9. Local anesthetics		27 hours
3. Drugs acting on the autonomic nervous system and on the neuromuscular junction: 3.1. Parasympathomymetics 3.2. Parasympatholytics		12 hours
4. Drugs acting on the autonomic nervous system and on the neuromuscular junction (continuation): 4.1. Sympathomimetic drugs		9 hours

(adrenoceptor-activating drugs) 4.2. Sympatholitic drugs (adrenolytic, neurosympatholytic, alfa-2 and I-1 presinaptic agonists) (adrenoceptor antagonist drugs) 4.3. Ganglionic drugs (nicotinomymetics, ganglion-blocking agents) 4.4. Neuromuscular blocking drugs (curare derivatives) 5. Autacoids and their antagonists: histamine and antihistaminic drugs; serotonin, serotonin agonists and antagonists; angiotensin and inhibitors of angiotensin; prostaglandins 6. Drugs used in respiratory disorders: against cough agents, drugs used in asthma, expectorants 7. Drugs used in diseases of the blood: agents used in anemias; drugs used in bleeding disorders (haemostatic); antithrombotic (anticoagulant and thrombolytic drugs)	Lecture, open discussion, correlation with notions acquired at curriculum preconditions	3 hours 3 hours 1.5 hours
8. Cardiovascular system drugs: 8.1. Cardiac glycosides and drugs used in cardiac arrhythmias 8.2. Drugs used in angina pectoris; antihypertensive agents, cerebral and peripheral vasodilators (anti-ischaemic vasodilators); vasoconstrictors; drugs acting on veins and capillaries 9. Drugs acting on the excretory system: diuretic agents, anti-diuretic agents, drugs used in kidney stones disease 10. Drugs acting on digestive apparatus: 10.1. Stimulants and substitute of gastric acid secretion; drugs used in peptic ulcer disease; emetic and antiemetic agents; prokinetic drugs 10.2. Antidiarrheal and intestinal anti-inflammatory agents; laxatives and purgatives; antiflatulent drugs, antispastic agents 11. Drugs acting on uterine motility: oxytocin-like drugs, tocolytic agents, uterine antispastic and spasmolytic agents 12. Drug therapy for hypercholesterolemia and dyslipidemia: lipid-lowering drugs, anorexigenic agents, drugs used in gout 13. Drugs acting on the endocrine system 14. Antibiotics: ß-lactams (penicillins, cephalosporins, carbapenems,	Lecture, open discussion, correlation with notions acquired at curriculum preconditions	4.5 hours 3 hours 5 hours 1 hour 1 hour 5 hours 2 hours

monobactams), aminoglycosides, macrolides, lincosamides, glycopeptides, large-spectrum antibiotic, rifampicins, polipeptidic antibiotics 15. Synthetic chemotherapeutic drugs: quinolones and fluoroquinolones, antimicrobial sulfamides, di-aminopyrymidines (trimethoprim); nitrofuran derivatives 16. Chemotherapeutic drugs: antituberculous, antiparasitic, antiviral drugs and cancer chemotherapeutic drugs	Lecture, open discussion, correlation with notions acquired at curriculum preconditions	2 hours 2 hours

Bibliography

1. *British National Formulary, The authority on the selection and use of medicines. Volume 67*. Glasgow: BMJ Group and the Royal Pharmaceutical Society of Great Britain, 2014.
2. Cristea AN. *Farmacologie generală*. Bucureşti: Editura Didactică şi Pedagogică, 1998-2010.
3. Cristea AN (coautori: Pavelescu M, Hriscu A). *Tratat de farmacologie*. Bucureşti: Editura Medicală, 2005.
4. Goodman & Gilman's. *The Pharmacological Basis of Therapeutics*. New York: McGraw-Hill, Med Div, 2001.
5. Katzung BG. *Basic and Clinical Pharmacology, Eleventh Edition*. New York: McGraw-Hill, Med Div, 2009.
6. Rang HP, Dale MM, Ritter JM, Flower RJ. *Rang and Dale's Pharmacology*. Sixth Edition. London: Churchill Livingstone Elsevier, 2008.

8.2. Seminar / Practical lessons	**Teaching Methods**	**Observations**
1. Gradual effects and quantal effects. Quantitative evaluation of drug efficacy and toxicity (ED_{50}, LD_{50}); therapeutic index	Lecture, open discussion, practical applications of concepts	3 hours
2. General pharmacotoxicology. (Adverse) Side effects (I)	Lecture, open discussion, practical applications of concepts	3 hours
3. General pharmacotoxicology. Side effects (II). Pharmacoepidemiology; pharmacovigilance	Lecture, open discussion, practical applications of concepts	3 hours
4. General anesthetics; sedative-hypnotic drugs	Description of the experimental protocol, the explanation of the techniques used, interpreting the data and their experimental and clinical significance	3 hours
5. Tranquilizers	Description of the experimental protocol, the explanation of the techniques used, interpreting the data and their experimental and clinical significance	3 hours
6. Neuroleptics	Description of the experimental protocol, the explanation of the techniques	3 hours

	used, interpreting the data and their experimental and clinical significance	
7. Anticonvulsivant (antiepileptic), antiparkinsonians, myorelaxants with central action	Description of the experimental protocol, the explanation of the techniques used, interpreting the data and their experimental and clinical significance	3 hours
8. Opioid analgesics	Description of the experimental protocol, the explanation of the techniques used, interpreting the data and their experimental and clinical significance	3 hours
9. Antipyretic analgesics	Description of the experimental protocol, the explanation of the techniques used, interpreting the data and their experimental and clinical significance	3 hours
10. Nonsteroidal anti-inflammatory drugs	Description of the experimental protocol, the explanation of the techniques used, interpreting the data and their experimental and clinical significance	3 hours
11. CNS stimulants; Antidepressants	Description of the experimental protocol, the explanation of the techniques used, interpreting the data and their experimental and clinical significance	3 hours
12. Local anesthetics	Description of the experimental protocol, the explanation of the techniques used, interpreting the data and their experimental and clinical significance	3 hours
13. Drugs acting on the autonomic nervous system and on the neuromuscular junction: 13.1. Parasympathomymetics 13.2. Parasympatholytics	Description of the experimental protocol, the explanation of the techniques used, interpreting the data and their experimental and clinical significance	3 hours
14. Drugs acting on the autonomic nervous system and on the neuromuscular junction	Description of the experimental protocol, the	3 hours

(continuation): 14.1. Sympathomymetic 14.2. Sympatholytics 14.3. Ganglionar and curare-like drugs	explanation of the techniques used, interpreting the data and their experimental and clinical significance	
15. Autacoids and their antagonists	Description of the experimental protocol, the explanation of the techniques used, data interpretation and their experimental and clinical significance	3 hours
16. Drugs used in eye diseases (miotic and mydriatic drugs)	Description of the experimental protocol, the explanation of the techniques used, data interpretation and their experimental and clinical significance	3 hours
17. Drugs used in respiratory diseases	Presentation of aerosolisation device types and practical applications regarding on how to use them properly to avoid losses of active substance	3 hours
18. Drugs used to treat diseases of the blood: drugs for bleeding disorders (haemostatics) and antithrombotics (anticoagulant and thrombolytic drugs)	Description of the experimental protocol, the explanation of the techniques used, data interpretation and their experimental and clinical significance	3 hours
19. Cardiovascular system medication – drugs acting predominantly on the heart (cardiac glycosides and drugs used in cardiac arrhythmias)	Presentation of routine assessments to determine the presence and etiology of heart failure - the significance of effort tests for the diagnosis of heart failure	3 hours
20. Cardiovascular system medication – drugs acting predominantly on the blood vessels (drugs used in angina pectoris, antihypertensives, vasodilators, vasoconstrictors, drugs acting on veins and capillary)	Description of the experimental protocol, the explanation of the techniques used, data interpretation and their experimental and clinical significance	3 hours
21. Drugs action on renal system (diuretic agents)	Description of the experimental protocol, the explanation of the techniques used, data interpretation and their experimental and clinical significance	3 hours
22. Drugs used in gastrointestinal disorders: drugs for peptic ulcer disease	Description of the experimental protocol, the explanation of the techniques	3 hours

23. Drugs used in gastrointestinal disorders: laxatives and purgatives	used, data interpretation and their experimental and clinical significance Description of the experimental protocol, the explanation of the techniques used, data interpretation and their experimental and clinical significance	3 hours
24. Drugs acting on uterine motility; drugs acting on the endocrine system	Lecture, open discussion, practical applications of concepts	3 hours
25. Chemotherapeutic drugs (antimicrobial, antiparasitic and cancer chemotherapeutic drugs)	Description of the experimental protocol, the explanation of the techniques used, data interpretation and their experimental and clinical significance	3 hours

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1. *British National Formulary, The authority on the selection and use of medicines. Volume 67*. Glasgow: BMJ Group and the Royal Pharmaceutical Society of Great Britain, 2014.
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3. Cristea AN (coautori: Pavelescu M, Hriscu A). *Tratat de farmacologie*. Bucureşti: Editura Medicală, 2005.
4. Goodman & Gilman's. *The Pharmacological Basis of Therapeutics*. New York: McGraw-Hill, Med Div, 2001.
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6. Pavelescu M, Hriscu A. *Lucrări practice de farmacodinamie*. Iaşi: Litografia IMF, 1983.
7. Rang HP, Dale MM, Ritter JM, Flower RJ. *Rang and Dale's Pharmacology.* Sixth Edition. London: Churchill Livingstone Elsevier, 2008.

9. The agreement between the course contents and the expectations of the representatives of the epistemic communities, professional associations and employers in the field related to the program

The study program of the discipline is developed and revised periodically to meet the market dynamics of academic and professional qualifications, so as to ensure the formation of graduates who are capable of integrating into the labor market in health systems. Also, the study program contributes to the development of professional skills needed in the labor market.

10. Assessment

Activity	10.1. Assessment criteria	10.2. Assessment methods	10.3. Percentage of the final grade
10.4. Course	Answers to exam / colloquium (final examination).	Descriptive written paper	50%
10.5. Seminar / Practical lessons	Final answers to practical laboratory work.	Descriptive written paper	35%

	Continuous testing during the semester (periodic testing by control works, essays, seminar activity)	Oral and practical examination, descriptive written paper, MCQ testing	15%
Minimal standard of proficiency: Promotion with minimum grade 5.			
• Mechanisms of action of drugs groups. • Types of drug interactions. • Acquiring pharmaceutical products in groups of drugs studied. • Preparing the sheet of side effects.			