

REQUIREMENTS

Semmelweis University, Faculty of General Medicine – single, long-cycle medical training programme

Name of the host institution (and any contributing institutions):

Name of the subject: Pharmacology I.

in English: Pharmacology I.

in German: Pharmakologie I.

Credit value: 4

Semester: 5th

(as defined in the curriculum)

Total number of classes per week: 4.5	lectures: 2	practical lessons: 2.5	seminars: -
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Type of subject: compulsory optional elective

(PLEASE UNDERLINE AS APPLICABLE)

Academic year: 2024/2025 1st semester

Language of instruction, for optional or elective subjects:

Course code: AOKFRM1108_1A

Course director (tutor): Dr. Ferdinandy, Péter

Contact details: Department of Pharmacology and Pharmacotherapy, 1089 Budapest, Nagyvárad tér 4. Tel: +36-1-2104416, e-mail: ferdinandy.peter@semmelweis.hu

Position: Head of Department, full professor

Date of habilitation and reference number: June 2 2001., 26/2001 Hab.

Objectives of the course and its place in the medical curriculum:

Pharmacology is a synthesizing subject, building on what has been learned in the past, especially physiology, biochemistry, pathology, and translational medicine, and is essential for the later acquisition of clinical knowledge. The subject includes general pharmacology, detailed pharmacology, toxicology and basics of prescription writing. General pharmacology (pharmacodynamics, pharmacokinetics) aims to acquire the basic concepts and knowledge needed for pharmacological thinking, while in detailed pharmacology the student learns the main principles of the mechanism of action, therapeutic effects, adverse effects, major interactions, and partly dosing of medicines. The basics of toxicology describe the mechanisms and targets of major intoxications and thus provide a theoretical background for toxicology education. All these competencies form the grounds to study clinical pharmacology and prepare students for the skill-level application of pharmacotherapeutic knowledge essential to clinical subjects.

Place of instruction (address of lecture hall or seminar room etc.):

Nagyvárad téri Elméleti Tömb, 1089 Budapest, Nagyvárad tér 4.

Competencies acquired through the completion of the course:

Students understand the pharmacological terminology, learn the mechanism of action, therapeutic effects, adverse effects, important interactions of drugs and the basics of dosing. They understand the mechanisms and targets of the most important poisonings, as well as the knowledge of the basic rules of prescription writing.

Prerequisites for course registration and completion:

Medical Microbiology I, Molecular Cell Biology II, Medical Physiology II

OR

Medical Microbiology I Medical Physiology II, (Medical Biochemistry III OR Medical Biochemistry, Molecular and Cell Biology III., OR Molecular Cell Biology II.)

Conditions for concurrent course registration and permission thereof in the case of a multi-semester subject:

Since it is a mandatory subject all the students in the third year of medical education must register.

Student headcount conditions for starting the course (minimum, maximum) and method of student selection:

Through NEPTUN system.

Detailed course description:

(Theoretical and practical instruction must be broken down into lessons (weeks), numbered separately. Please provide the names of lecturers in both types of lessons, indicating guest lecturers. This information is not to be attached separately. CVs of guest lecturers, however, must be attached.)

- 1st week
 - Lecture: Introduction to Pharmacology. (development, pharmacogenomics, basics of toxicology)
 - Practice: Pharmacodynamics I (drug receptors, receptor theories, drug-receptor interactions).
- 2nd week
 - Lecture: Pharmacokinetics I.
 - Practice: Pharmacodynamics II (quantal dose-response curves, therapeutic indices, tolerance, drug interactions).
- 3rd week
 - Lecture: Pharmacokinetics II
 - Practice: Pharmacology of the cholinergic transmission. Parasympathomimetics and parasympatholytics, centrally acting anticholinergic drugs
- 4th week
 - Lecture: Pharmacology of the skeletal muscles.
 - Practice: Pharmacology of the adrenergic transmission. Sympathomimetics and sympatholytics
- 5th week
 - Lecture: Non-steroidal anti-inflammatory drugs (NSAIDs). Minor analgesics.
 - Practice: Drugs affecting uric acid metabolism. Drugs for headache syndromes.
- 6th week
 - Lecture: Drugs acting on opioid receptors
 - Practice: 1st midterm. The Summary of Product Characteristics
- 7th week
 - Lecture: Local anesthetics
 - Practice: Basic principles of prescription writing
- 8th week
 - Lecture: Antipsychotics
 - Practice: Sedative-hypnotics, anxiolytics

- 9th week
 - Lecture: Drugs acting on the extrapyramidal motoric system. Nootropic agents
 - Practice: Antidepressants, drugs against mania, mood stabilizers
- 10th week
 - Lecture: General anesthetics
 - Practice: Anticonvulsants (antiepileptics)
- 11th week
 - Lecture: Antiviral drugs
 - Practice: Cell wall synthesis inhibitor antibiotics. 2nd midterm
- 12th week
 - Lecture: Antifungal drugs. Antimycobacterial drugs.
 - Practice: Protein synthesis inhibitor antibiotics
- 13th week
 - Lecture: Anthelmintic and antiprotozoal agents. Antiparasitic drugs.
 - Practice: Inhibitors of nucleic acid synthesis and antibiotics with other mechanisms of action. Disinfectants, antiseptics.
- 14th week
 - Lecture: Biological Drugs. Orphan Drugs. Advanced Therapy Medicines
 - Practice: Nutrients, traditional plant medicines, vitamins, anorectic drugs.

Related subjects due to interdisciplinary fields (both compulsory and elective) and potential overlaps between subjects:

Physiology, biochemistry, molecular biology, pathology, translational medicine, internal medicine, cardiology, pulmonology, neurology, psychiatry, clinical pharmacology

Attendance requirements; conditions under which students can make up for absences and the method of absence justification:

Maximum number of absences is 25 percent of the number of practices in the semester. In the case of absence, the student can attend another class the same week.

Form of assessment in the study period:

(including the number, topics and scheduling of oral and written tests, their share in the overall evaluation, make-up tests and improvement tests)

During the semester, we organise two compulsory midterm tests in weeks 6 and 11. Making up or improving the midterm (or both midterms) will be possible in week 13. The correction may only be a verbal demonstration.

The course material for the first midterm test (study material from week 1 to 4): General Pharmacology (Pharmacodynamics, Pharmacokinetics). Pharmacology of cholinergic and adrenergic transmission. Skeletal muscle relaxants.

Second midterm test (study material from week 5 to 10): NSAIDs, Drugs affecting uric acid metabolism, Drugs affecting headaches, Local anaesthetics, Opioids, Neuropsychopharmacology (Prescribing and the Summary of Product Characteristics are not included in the midterm test.)

The midterm tests will count towards the semester semifinal exam results:

1. 10% of the students in the top of the whole year will be awarded an excellent mark (5) and further 10% of the students in the second top 10% will be awarded a good mark, provided that they achieve at least 2x80% in the midterm tests. If the number of these students is less than 20% of the whole year, only they will be offered a mark, if more than 20%, the top 10% will be offered a mark. Only the results of the first attempts count towards the offered semifinal mark, not the improved midterms.
2. If the student scores better than 60% in both midterm tests, the drug recognition question will be waived and in case of a doubtful grade, the better one will be awarded. There is no exemption from the Core Concept topics.
3. If the student fails both midterm tests (even at the time of a retake), or fails to achieve 33% in either midterm test with a correction, the student will receive a grade penalty on the semifinal exam.

4. In the case of a repeated exam after a failure, the negative and, in the case of an improvement exam, both the positive and the negative modifications are cancelled.

Number and type of assignments for individual work and the deadline for submission:

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Requirements to obtain the teacher's signature:

The number of absences must not be more than 25 percent of the number of practices in the semester.

Type of assessment (*comprehensive examination, end-term examination, term-grade, term-grade on a three-grade rating scale, no examination*):

oral end-term semifinal examination

Examination requirements:

(*list of examination topics, subject areas of tests / examinations, lists of mandatory parameters, figures, concepts and calculations, practical skills*)

In the oral semifinal exam, at first 5 active substances selected from the compulsory list of active substances must be identified and their mechanism of action explained. If the student does not recognize at least 3 of the active substances, he/she will not be allowed to continue and will receive a fail mark. After successful completion of one core-concept question and two topics of two lists of topics (one from each), an acceptable level of knowledge of pharmacology must be demonstrated.

Core concept topic list

1. Stages of drug development in brief.
2. Types of clinical trials.
3. History of the Hungarian pharmaceutical industry.
4. Molecular targets of drugs
5. Receptor theory - agonist, partial agonist, antagonist, inverse agonist
6. Efficacy, potency
7. Dose-effect relationships at population level
8. Adverse drug reactions
9. Therapeutic index
10. Tolerance, tachyphylaxis, dependence
11. Absorption of drugs
12. Membrane transport mechanisms.
13. Distribution of drugs
14. Bioavailability
15. Volume of distribution
16. Phases of drug biotransformation
17. Excretion of drugs
18. Linear and non-linear pharmacokinetics
19. Clearance
20. Half-life
21. Saturating and maintenance dose
22. Drug accumulation and cumulation
23. Enzyme inducers
24. Enzyme inhibitors
25. Pharmacodynamic interactions - synergism
26. Pharmacodynamic interactions - antagonism
27. Pharmacokinetic drug interactions - at the level of absorption
28. Pharmacokinetic drug interactions - at the level of distribution
29. Pharmacokinetic drug interactions - at the level of metabolism
30. Pharmacokinetic drug interactions - at the level of elimination
31. Characterisation of biological medicinal products
32. Orphan drugs
33. Advanced therapy medicinal products
34. Nutritional supplements

35. Traditional herbal active substances
36. Medical device
37. Principles of antimicrobial treatment - selective toxicity
38. Principles of antimicrobial treatment - empirical, targeted and prophylactic therapy
39. Principles of antimicrobial treatment - principles of bactericidal, bacteriostatic antibiotic and antibiotic combinations
40. Principles of antimicrobial treatment - time-, concentration- and exposure-dependent antibiotics
41. Narrow and broad spectrum antibiotics
42. Antibiotic selection considerations - pregnancy, childhood
43. Antibiotic selection considerations - infections affecting specific compartments
44. Considerations for antibiotic choice - comorbidities
45. Classification of drugs according to chemical structure and complexity
46. The Summary of Product Characteristics

Topic list "A"

1. Cholinergic and adrenergic transmission and its presynaptic modification.
2. Cholinomimetics
3. Muscarinic receptor blocking drugs
4. Catecholamines
5. Indirect sympathomimetics. Selective α_1 agonists
6. α_2 -agonists and drugs acting on the imidazoline receptors
7. α -receptor antagonists
8. β -receptor antagonists
9. Centrally and peripherally acting skeletal muscle relaxants
10. Local anesthetics
11. Opioids
12. NSAIDs.
13. Drugs used for treatment of gout. Drugs for headache syndromes
14. Inhalational anesthetics
15. Intravenous anesthetics. Perioperative medication
16. Benzodiazepines
17. Non benzodiazepine anxiolytics and non-benzodiazepine hypnotics.
18. Antipsychotics
19. Monoamine reuptake inhibitors.
20. Non-reuptake-inhibitor antidepressants. Agents used for treatment of manic phase of bipolar disorders.
21. Antiepileptics. Adjuvant analgesics.
22. Drugs of neurodegenerative diseases. (Drugs acting in the extrapyramidal motoric system. Nootropic drugs)

Topic list "C"

1. Disinfectants and antiseptics
2. Antimycobacterial drugs
3. Antiprotozoal and antihelminthic drugs.
4. Antifungal agents
5. Agents to treat Herpes simplex (HSV), varicella-zoster (VZV) virus, cytomegalovirus (CMV). Anti-influenza agents Drugs against Corona- and other viruses
6. Antiretroviral agents.
7. Agents against hepatitis viruses
8. Penicillins
9. Cephalosporins
10. Carbapenems. Monobactams. Beta-lactamase inhibitors.
11. Chloramphenicol. Polymyxins. Antifolate drugs
12. Tetracyclines and glycyliclones
13. Aminoglycosides
14. Quinolones and fluoroquinolones

15. Macrolides. Pleuromutilins
16. Clindamycin. Streptogramins. Oxazolidinones. Fusidans.
17. Glycopeptides. Lipopeptides. Bacitracin. Mupirocin.
18. Metronidazole. Fidaxomicin. Rifaximin. Nitrofurantoin. Phosphomycin.

Method and type of grading:

(Share of theoretical and practical examinations in the overall evaluation. Inclusion of the results of the end-of-term assessment. Possibilities of and conditions for offered grades.)

The midterm tests will count towards the semester semifinal exam results:

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Detailed information on the compulsory and the full lists of active substances. If the candidate:

1. knows all the active substances to be studied in full detail, or knows all the active substances with some minor lacks and can mention names of active substances from the full drug list, – mark 5
2. knows all the active substances to be studied and the information to a varying degree and can mention the names of active substances from the full drug list to a varying degree - 2,3,4
3. knows all the active substances to be learned, but only the name and nothing else – unsatisfactory (failure)
4. does not know any active substance names – unsatisfactory (failure)
5. does not know all the active substances from the mandatory list, but knows the active substances from the full list of active substances in the given topic, then points 1,2 or 3 above are taken into consideration, the mark is awarded according to these points

Type of grade: five-mark scale (1=unsatisfactory, 2=satisfactory, 3=average, 4=good, 5=excellent)

List of course books, textbooks, study aids and literature facilitating the acquisition of knowledge to complete the course and included in the assessment, precisely indicating which requirement each item is related to (e.g., topic by topic) as well as a list of important technical and other applicable study aids:

Basic and Clinical Pharmacology (Ed. B. G. Katzung), 15th edition, McGraw-Hill Education, 2021. ISBN 978-1 260 45231 0

Materials discussed during lectures and seminars: Moodle (<https://itc.semmelweis.hu>)

Signature of habilitated instructor (course coordinator) announcing the course:



**Péter Ferdinandy, MD, DSc, MBA
Head of Department**



Signature of the director of the host institution:



**Péter Ferdinandy, MD, DSc, MBA
Head of Department**



Date of submission:

May 27, 2024