



MEDICAL UNIVERSITY OF PLOVDIV
FACULTY OF PHARMACY

SYLLABUS

IN

PHARMACEUTICAL CHEMISTRY

Approved by the Department Council - Protocol № 01/09.01.2023.

Confirmed by the Faculty Council - Protocol № 01/25.01.2023.

**Pharmaceutical chemistry
Syllabus**

Discipline	Final exam/ semester	According to the Faculty of Pharmacy curriculum of MU-Plovdiv Academic hours				ECTS	Academic hours in semester			
		Aauditorium	Lectures	Practices	Non-auditorium		V semester		VI semester	
							L	P	L	P
Pharmaceutical chemistry	VI	210	45	60	105	7,0	3	4	3	4
			45	60	111					

Discipline:

Pharmaceutical chemistry

Type of discipline according to the Uniform State Requirements:

Obligatory

Level of qualification:

Master's degree /M/

Forms of training:

Lectures and practical classes.

Year of training:

III

Duration:

2 semesters.

Academic hours:

90 hours lectures, 120 hours exercises.

Teaching methods:

Lectures, presentations, discussions, seminars, laboratory work.

Forms of evaluation:

Ongoing evaluation, Tests.

Semester exam:

Yes /written, oral/

State exam:

Yes / written, oral /

Leading lecturer:

Habilitated lecturer with obtained:

- PhD degree in Pharmaceutical Chemistry
- Postgraduate degree in “Pharmaceutical drug analysis”.

Department:

Pharmacognosy and pharmaceutical chemistry

ANNOTATION

The course “Pharmaceutical chemistry” is essential for Pharmacy education and a state exam is taken on it. This special scientific field, characteristic only of education in the Faculties of Pharmacy, represents an intersection of several essential scientific disciplines. Objective of the course study are the pharmacological groups, international nonproprietary names, relationship between chemical structure, physical and chemical properties and pharmacological action, mechanism of action, therapeutic indications, metabolism, elimination, stability, and synthesis of pharmaceutical drugs.

BASIC AIMS OF THE DISCIPLINE

The objective of the course study is to prepare qualified, creative, and motivated master pharmacists, with thorough knowledge on drug classification, chemical structures, therapeutic indications, pharmacophores, mechanism of action, metabolism, and synthesis of pharmaceutical drugs.

EXPECTED RESULTS

After successfully completing the course, the students will gain knowledge about drug classification, chemical structures, therapeutic indications, pharmacophores, mechanism of action, metabolism, and synthesis of pharmaceutical drugs.

PROGRAMME OF THE LECTURE COURSE

III course, V semester

N	TOPIC	DURATION
1	Introduction to pharmaceutical chemistry. Drug absorption, distribution and metabolism.	3 hours
2	Barbiturates. Benzodiazepines, Z-drugs.	3 hours
3	Anesthetics.	3 hours
4	Anxiolytics.	3 hours
5	Antidepressants. Antipsychotics.	3 hours
6	Antiparkinson drugs.	3 hours
7	Antiepileptic drugs.	3 hours
8	Antiemetics and anti-nauseants. Laxatives and anti-diarrheals.	3 hours
9	Analgesics. Antimigraine preparations.	3 hours
10	Nonsteroidal anti-inflammatory drugs.	3 hours
11	Psychostimulants and nootropic drugs.	3 hours
12	Drugs, affecting autonomic nervous system.	3 hours
13	H1 blockers. Drugs for treatment of peptic ulcer and gastroesophageal reflux disease.	3 hours
14	Anticancer drugs.	3 hours
15	Beta-blockers.	3 hours

Total: 45 hours

PROGRAMME OF THE LECTURE COURSE

III course, VI semester

N	TOPIC	DURATION
1	Calcium channel blockers. Antiarrhythmic drugs.	3 hours
2	ACE inhibitors. Angiotensin II receptor blockers.	3 hours
3	Diuretics.	3 hours
4	Peripheral vasodilators. Organic nitrates.	3 hours
5	Lipid-modifying drugs.	3 hours
6	Antithrombotic and antihemorrhagic drugs.	3 hours
7	Antibiotics: beta-lactams, beta-lactamase inhibitors.	3 hours
8	Antibiotics: tetracyclines, macrolides, aminoglycosides.	3 hours
9	Antibacterial sulfonamides and quinolones.	3 hours
10	Antimycotic drugs. Drugs for treatment of tuberculosis.	3 hours
11	Antiviral drugs. Antiparasitic drugs.	3 hours
12	Cough suppressants and expectorans.	3 hours
13	Sex hormones and modulators of the genital system. Anabolic steroids. Systemic hormonal preparations, excluding sex hormones and insulins - corticosteroids.	3 hours
14	Blood glucose lowering drugs, excluding insulins. Systemic hormonal preparations, excluding sex hormones and insulins - thyroid and antithyroid drugs.	3 hours
15	Vitamins.	3 hours

Total: 45 hours

PROGRAM OF THE EXERCISES IN PHARMACUTICAL CHEMISTRY

III course, V semester

N	TOPIC	DURATION
1	Introduction to pharmaceutical chemistry. Chemical nomenclature.	4 hours
2	Absorption, distribution, and metabolism.	4 hours
3	Barbiturates. Benzodiazepines, Z-drugs.	4 hours
4	Anesthetics.	4 hours
5	Anxiolytics.	4 hours
6	Antidepressants. Antipsychotics.	4 hours
7	Antiparkinson drugs.	4 hours
8	Antiepileptic drugs.	4 hours
9	Antiemetics and antinauseants. Laxatives and antidiarrheals.	4 hours
10	Analgesics, antipyretics, antimigraine preparations.	4 hours
11	Nonsteroidal anti-inflammatory drugs.	4 hours
12	Psychostimulants and nootropic drugs.	4 hours
13	Drugs, affecting autonomic nervous system.	4 hours
14	H1 blockers. Drugs for treatment of peptic ulcer and gastroesophageal reflux disease.	4 hours
15	Anticancer drugs.	4 hours

Total: 60 hours

PROGRAM OF THE EXERCISES IN PHARMACUTICAL CHEMISTRY

III course, VI semester

N	TOPIC	DURATION
1	Beta-blockers.	4 hours
2	Calcium channel blockers. Antiarrhythmic drugs.	4 hours
3	ACE inhibitors. Angiotensin II receptor blockers.	4 hours
4	Diuretics.	4 hours
5	Peripheral vasodilators. Organic nitrates.	4 hours
6	Lipid-modifying drugs.	4 hours
7	Antithrombotic and antihemorrhagic drugs.	4 hours
8	Antibiotics: beta-lactams, beta-lactamase inhibitors.	4 hours
9	Antibiotics: tetracyclines, macrolides, aminoglycosides.	4 hours
10	Antibacterial sulfonamides and quinolones.	4 hours
11	Antimycotic drugs. Drugs for treatment of tuberculosis.	4 hours
12	Antiviral drugs. Antiparasitic drugs.	4 hours
13	Cough suppressants and expectorants.	4 hours
14	Sex hormones and modulators of the genital system. Anabolic steroids. Systemic hormonal preparations, excluding sex hormones and insulins - corticosteroids.	4 hours
15	Blood glucose lowering drugs, excluding insulins. Systemic hormonal preparations, excluding sex hormones and insulins - thyroid and antithyroid drugs.	4 hours

Total: 60 hours

PROGRAMME OF THE LECTURE COURSE

1. Introduction to pharmaceutical chemistry. Drug absorption, distribution and metabolism.

2. Barbiturates. Benzodiazepines, Z-drugs.

- Brief historical review.
- Classification.
- Mechanism of action.
- Structure-activity relationship.
- Examples, therapeutic indications, metabolism, synthesis, side effects.

3. Anesthetics.

- Brief historical review.
- Classification.
- Mechanism of action.
- Structure-activity relationship.
- Examples, therapeutic indications, metabolism, synthesis, side effects.

4. Anxiolytics.

- Brief historical review.
- Classification.
- Mechanism of action.
- Structure-activity relationship.
- Examples, therapeutic indications, metabolism, synthesis, side effects.

5. Antidepressants. Antipsychotics.

- Brief historical review.
- Classification.
- Mechanism of action.
- Structure-activity relationship.

- Examples, therapeutic indications, metabolism, synthesis, side effects.

6. Antiparkinson drugs.

- Brief historical review.
- Classification.
- Mechanism of action.
- Structure-activity relationship.
- Examples, therapeutic indications, metabolism, synthesis, side effects.

7. Antiepileptic drugs.

- Brief historical review.
- Classification.
- Mechanism of action.
- Structure-activity relationship.
- Examples, therapeutic indications, metabolism, synthesis, side effects.

8. Antiemetics and antinauseants. Laxatives and antidiarrheals.

- Brief historical review.
- Classification.
- Mechanism of action.
- Structure-activity relationship.
- Examples, therapeutic indications, metabolism, synthesis, side effects.

9. Analgesics. Antimigraine preparations.

- Brief historical review.
- Classification.
- Mechanism of action.
- Structure-activity relationship.
- Examples, therapeutic indications, metabolism, synthesis, side effects.

10. Nonsteroidal anti-inflammatory drugs.

- Brief historical review.
- Classification.
- Mechanism of action.
- Structure-activity relationship.
- Examples, therapeutic indications, metabolism, synthesis, side effects.

11. Psychostimulants and nootropic drugs.

- Brief historical review.
- Classification.
- Mechanism of action.
- Structure-activity relationship.
- Examples, therapeutic indications, metabolism, synthesis, side effects.

12. Drugs, affecting autonomic nervous system.

- Neurotransmitters.
- Classification.
- Mechanism of action.
- Structure-activity relationship.
- Examples, therapeutic indications, metabolism, synthesis, side effects.

13. H1 blockers. Drugs for treatment of peptic ulcer and gastroesophageal reflux disease.

- Brief historical review.
- Classification.
- Mechanism of action.
- Structure-activity relationship.
- Examples, therapeutic indications, metabolism, synthesis, side effects.

14. Anticancer drugs.

- Brief historical review.
- Classification.

- Mechanism of action.
- Structure-activity relationship.
- Examples, therapeutic indications, metabolism, synthesis, side effects.

15. Beta-blockers.

- Brief historical review.
- Classification.
- Mechanism of action.
- Structure-activity relationship.
- Examples, therapeutic indications, metabolism, synthesis, side effects.

16. Calcium channel blockers. Antiarrhythmic drugs (excluding beta-blockers).

- Brief historical review.
- Classification.
- Mechanism of action.
- Structure-activity relationship.
- Examples, therapeutic indications, metabolism, synthesis, side effects.

17. ACE inhibitors. Angiotensin II receptor blockers.

- Brief historical review.
- Classification.
- Mechanism of action.
- Structure-activity relationship.
- Examples, therapeutic indications, metabolism, synthesis, side effects.

18. Diuretics.

- Brief historical review.
- Classification.
- Mechanism of action.
- Structure-activity relationship.
- Examples, therapeutic indications, metabolism, synthesis, side effects.

19. Peripheral vasodilators. Organic nitrates.

- Brief historical review.
- Classification.
- Mechanism of action.
- Structure-activity relationship.
- Examples, therapeutic indications, metabolism, synthesis, side effects.

20. Lipid-modifying drugs.

- Brief historical review.
- Classification.
- Mechanism of action.
- Structure-activity relationship.
- Examples, therapeutic indications, metabolism, synthesis, side effects.

21. Antithrombotic and antihemorrhagic drugs.

- Brief historical review.
- Classification.
- Mechanism of action.
- Structure-activity relationship.
- Examples, therapeutic indications, metabolism, synthesis, side effects.

22. Antibiotics: beta-lactams, beta-lactamase inhibitors.

- Brief historical review.
- Classification.
- Mechanism of action.
- Structure-activity relationship.
- Examples, therapeutic indications, metabolism, synthesis, side effects.

23. Antibiotics: tetracyclines, macrolides, aminoglycosides.

- Brief historical review.

- Classification.
- Mechanism of action.
- Structure-activity relationship.
- Examples, therapeutic indications, metabolism, synthesis, side effects.

24. Antibacterial sulfonamides and quinolones.

- Brief historical review.
- Classification.
- Mechanism of action.
- Structure-activity relationship.
- Examples, therapeutic indications, metabolism, synthesis, side effects.

25. Antimycotic drugs. Drugs for treatment of tuberculosis.

- Brief historical review.
- Classification.
- Mechanism of action.
- Structure-activity relationship.
- Examples, therapeutic indications, metabolism, synthesis, side effects.

26. Antiviral drugs. Antiparasitic drugs.

- Brief historical review.
- Classification.
- Mechanism of action.
- Structure-activity relationship.
- Examples, therapeutic indications, metabolism, synthesis, side effects.

27. Cough suppressants and expectorants.

- Brief historical review.
- Classification.
- Mechanism of action.
- Structure-activity relationship.

- Examples, therapeutic indications, metabolism, synthesis, side effects.

28. Sex hormones and modulators of the genital system. Anabolic steroids. Systemic hormonal preparations, excluding sex hormones and insulins - corticosteroids.

- Brief historical review.
- Classification.
- Mechanism of action.
- Structure-activity relationship.
- Examples, therapeutic indications, metabolism, synthesis, side effects.

29. Blood glucose lowering drugs, excluding insulins. Systemic hormonal preparations, excluding sex hormones and insulins - thyroid and antithyroid drugs.

- Brief historical review.
- Classification.
- Mechanism of action.
- Structure-activity relationship.
- Examples, therapeutic indications, metabolism, synthesis, side effects.

30. Vitamins.

- Brief historical review.
- Classification.
- Mechanism of action.
- Structure-activity relationship.
- Examples, therapeutic indications, metabolism, synthesis, side effects.

PROGRAM OF THE EXERCISES IN PHARMACUTICAL CHEMISTRY

1. Introduction to pharmaceutical chemistry. Chemical nomenclature.

2. Absorption, distribution, and metabolism.

- Test.

- Seminar.
- Discussion.

3. Barbiturates. Benzodiazepines, Z-drugs.

- Test.
- Seminar.
- Discussion.

4. Anesthetics.

- Test.
- Seminar.
- Discussion.

5. Anxiolytics.

- Test.
- Seminar.
- Discussion.

6. Antidepressants. Antipsychotics.

- Test.
- Seminar.
- Discussion.

7. Antiparkinson drugs.

- Test.
- Seminar.
- Discussion.

8. Antiepileptic drugs.

- Test.
- Seminar.

- Discussion.

9. Antiemetics and antinauseants. Laxatives and antidiarrheals.

- Test.
- Seminar.
- Discussion.

10. Analgesics, antipyretics, antimigraine preparations.

- Test.
- Seminar.
- Discussion.

11. Nonsteroidal anti-inflammatory drugs.

- Test.
- Seminar.
- Discussion.

12. Psychostimulants and nootropic drugs.

- Test.
- Seminar.
- Discussion.

13. Drugs, affecting autonomic nervous system.

- Test.
- Seminar.
- Discussion.

14. H1 blockers. Drugs for treatment of peptic ulcer and gastroesophageal reflux disease.

- Test.
- Seminar.
- Discussion.

15. Anticancer drugs.

- Test.
- Seminar.
- Discussion.

16. Beta-blockers.

- Test.
- Seminar.
- Discussion.

17. Calcium channel blockers. Antiarrhythmic drugs.

- Test.
- Seminar.
- Discussion.

18. ACE inhibitors. Angiotensin II receptor blockers.

- Test.
- Seminar.
- Discussion.

19. Diuretics.

- Test.
- Seminar.
- Discussion.

20. Peripheral vasodilators. Organic nitrates.

- Test.
- Seminar.
- Discussion.

21. Lipid-modifying drugs.

- Test.
- Seminar.
- Discussion.

22. Antithrombotic and antihemorrhagic drugs.

- Test.
- Seminar.
- Discussion.

23. Antibiotics: beta-lactams, beta-lactamase inhibitors.

- Test.
- Seminar.
- Discussion.

24. Antibiotics: tetracyclines, macrolides, aminoglycosides.

- Test.
- Seminar.
- Discussion.

24. Antibacterial sulfonamides and quinolones.

- Test.
- Seminar.
- Discussion.

25. Antimycotic drugs. Drugs for treatment of tuberculosis.

- Test.
- Seminar.
- Discussion.

26. Antiviral drugs. Antiparasitic drugs.

- Test.
- Seminar.

- Discussion.

27. Cough suppressants and expectorants.

- Test.
- Seminar.
- Discussion.

28. Sex hormones and modulators of the genital system. Systemic hormonal preparations, excluding sex hormones and insulins - corticosteroids. Anabolic steroids.

- Test.
- Seminar.
- Discussion.

29. Blood glucose lowering drugs, excluding insulins. Systemic hormonal preparations, excluding sex hormones and insulins - thyroid and antithyroid drugs.

- Test.
- Seminar.
- Discussion.

BIBLIOGRAPHY

- Medicinal Chemistry, W. Foye, Th. Lemke, D. Williams, Williams&Wilkins, 1995.
- Medicinal Chemistry, G. Patrick, Oxford University Press, 2001.
- Textbook of Organic and Pharmaceutical Chemistry, J. Delgado, W. Remers, Lippincott-Raven, 1998.
- Pharmaceutical Chemistry, H. Roth, A. Kleeman, T. Beisswenger, John Wiley&Sons, 1988.
- Drug Actions, E. Mutschler, H. Derendorf, 1995.

CONSPECTUS

1. Drug absorption, distribution, and metabolism.
2. Barbiturates.
3. Benzodiazepines, Z-drugs.
4. General anesthetics.

5. Local anesthetics.
6. Anxiolytics.
7. Antidepressants.
8. Antipsychotics.
9. Anti-parkinson drugs.
10. Antiepileptic drugs.
11. Antiemetics and antinauseants.
12. Laxatives.
13. Antidiarrheals.
14. Opioid analgesics.
15. Non-opioid analgesics and antipyretics. Antimigraine preparations.
16. Nonsteroidal anti-inflammatory drugs.
17. Psychostimulants and nootropics.
18. Antihistamines - H1, H3-blockers.
19. Drugs for treatment of peptic ulcer and gastroesophageal reflux disease.
20. Antineoplastic drugs.
21. Antiarrhythmic drugs (excluding beta-blockers and calcium antagonists).
22. Calcium channel blockers.
23. ACE inhibitors.
24. Angiotensin II receptor blockers.
25. Diuretics.
26. Peripheral vasodilators.
27. Organic nitrates.
28. Lipid-modifying drugs.
29. Antithrombotic and antihemorrhagic drugs.
30. Penicillins.
31. Cephalosporins.
32. Monobactams and carbapenems.
33. Beta-lactamase inhibitors.
34. Tetracyclines.
35. Macrolides, aminoglycosides.
36. Antibacterial sulfonamides.

37. Antibacterial quinolones.
38. Antimycotic drugs.
39. Drugs for treatment of tuberculosis.
40. Antiviral drugs.
41. Antiparasitic drugs.
42. Cough preparations - expectorants.
43. Cough suppressants.
44. Blood glucose lowering drugs, excluding insulins.
45. Thyroid and antithyroid drugs.
46. Water-soluble vitamins.
47. Fat-soluble vitamins.
48. Sex hormones - progestogens, androgens, estrogens.
49. Oral contraceptives.
50. Anabolic steroids.
51. Glucocorticoids.
52. Mineralocorticoids.
53. Neurotransmitters in the sympathetic and parasympathetic nervous system.
54. Alpha-adrenoreceptor agonists.
55. Beta-adrenoreceptor agonists.
56. Alpha-adrenoreceptor antagonists.
57. Beta-adrenoreceptor antagonists.
58. Parasympathomimetics.
59. Parasympatholytics.