Thematic plan of seminars
in the discipline " Special pharmaceutical chemistry "
for students of the educational program
specialist degree
in the specialty of training 33.05.01 Pharmacy
direction (profile) Pharmacy,
form of study full-time (face to face)
for the 2023-2024 academic year

№	Thematic blocks	Hours (academic)
	7 term	
1	Safety rules in chemical laboratories. Check of residual knowledge (III course material).	1,5
	Synthetic pharmaceuticals - pyridine derivatives (part 1). Pyridine-3-carboxylic acid derivatives[1]. nicotinic acid, nicotinamide, nicotinic acid diethylamide, picamilon[2].	2,0
2	Synthetic pharmaceuticals - pyridine derivatives (part 2). Pyridine-4-carboxylic acid derivatives[2]. Antitubercular agents (isoniazid, fthivazide, prothionamide)[2].	2,0
	Antidepressants (nialamide). Dihydropyridine derivatives: nifedipine (phenigidine). Piperidine derivatives: cyclodol.[2].	1,5
3	Quinoline derivatives[1]. Characterisation of quinoline derivatives quinoline. General method of synthesis of heterocyclic quinoline system[2].	1,5
	Quinozolol, cinchofen, enteroseptol, nitroxoline, sovcain. Synthetic antimalarials - quinine analogues. Plasmocide, quinocide, quinamine[2].	2,0
4	Pyrimidine derivatives. The relationship between structure and action in a series of of pyrimidine derivatives. Uracil and its derivatives[1]. Methylthiouracil, methyluracil[2].	1,5
	Uracil derivatives - pentoxyl, fluorouracil, fluorafur, hexamidine. Synthetic drugs of nucleoside nature: cytarabine, azidothymidine, iodoxuridine, lamivudine[2].	2,0
5	Barbituric acid derivatives[1]. The relationship between chemical structure, narcotic and anticonvulsant action in a number of barbiturates. General methods of obtaining of barbiturates[2].	1,5
	Barbital, phenobarbital, ethomyl sodium, hexenal, thiopental sodium, benzonal[2].	2,0
6	Benzothiadiazine derivatives[1]. Diuretics: chlortiazide and dichlothiazide. Acyclic analogues (furosemide, oxodoline).	1.5
	Neuroleptic agents - phenothiazine derivatives[1]. Alkylamine derivatives - aminazine, propazine, triphthazine. Acyl derivatives-- ethocyzine, ethmosine. The relationship between structure and action depending on nature of substituents and nature of bonds[2].	2,0
7	Benzodiazepine derivatives as targeted drugs action[1]. General methods of obtaining[2].	1.5
	Chlordiazeproxide, diazepam, oxazepam, nitrazepam, phenazepam[2].	2,0
8	**Control of knowledge, abilities, skills in thematic blocks 1-7** Solving test problems with a choice of answers	1,5
	Test work	2,0

9	General classification of vitamins. Chemical classification. Vitamins of aliphatic series[1]. Ascorbic acid (vitamin C). Methods obtaining, causes of instability, redox and acid-base properties. Chemical basis for stabilisation of ascorbic acid in dosage forms[2].	1.5
	Pantothenic acid (calcium pantothenate), pangamic acid (calcium pangamate - vitamin B_{15})[2].	2,0
10	Vitamins of the alicyclic series[1]. Retinols (vitamins of group A). Retinol acetate.	1.5
	Calciferols (D vitamins) as products of sterol transformation. Mechanism of formation of ergocalciferol (vitamin D2) and cholecalciferol (vitamin D3). Oxydevitol, dioxydevitol[2].	2,0
11	Vitamins of the aromatic series - derivatives of naphthoquinones (vitamins of the K group)[1]. Vikasol.	1,5
	Antivitamins K[1]. Dicoumarin, neodicoumarin, fepromarone, phenylin[2].	2,0
12	Vitamins of the heterocyclic series. Chromic vitamins - tocopherols (E vitamins) as medicinal and prophylactic agents[1]. Tocopherol acetate.	1,5
	Phenylchroman vitamins - bioflavanoids (P vitamins)[1]. Rutin, quercetin[2].	2,0
13	Vitamins are derivatives of pyridine[1]. Nicotinic acid, nicotinamide. (vitamin B_5 or PP).	1,5
	Oxy-methylpyridine vitamins (B_6 vitamins). Pyridoxine hydrochloride, pyridoxal phosphate[2].	2,0
14	Pyrimidine-thiazole vitamins (B_1 vitamins)[1]. Thiamine chloride and bromide, cocarboxylase, phosphothiamine, benfotiamine[2].	1,5
	Biotransformation of B_1 vitamins, stability, quality requirements, methods of analysis[2].	2,0
15	Pterin vitamins (vitamins of the folic acid group)[1]. Folic acid and its analogues. Relationship between structure and biological action[2].	1,5
	Methotrexate, quality requirements, general physical and chemical methods of analysis[2].	2,0
16	Isoalloxazine derivatives (B_2 vitamins) as medicinal and prophylactic agents[1]. Riboflavin, riboflavin mononucleotide[2].	2,0
	Biotransformation, quality requirements, methods of analysis[2].	1,5
17	Pyrrole derivatives (B_{12} vitamins)[1]. Cyancobalamin, oxycobalamin, cobamide[2].	2,0
	Structure features, quality requirements, methods of analysis[2].	1,5
18	**Control of knowledge, abilities, skills in thematic blocks 9-17** Solving test problems with a choice of answers	1.5
	Test work.	2,0
8 term		
19	Safety rules in the chemical laboratory. Residual knowledge check. Alkaloids[1]. History of discovery and medical use of alkaloids.[2]	1,0
	Classification of alkaloids. General methods of isolation, purification and separation of alkaloids. Qualitative determination of alkaloids. General (group) reactions. Methods of quantitative determination of alkaloids.[2]	1,3
20	Pyridine and piperidine derivatives.[1] Lobeline hydrochloride, cytisine, pachycarpine[2]	1,0
	Tropane derivatives.[1] Classification. Atropine sulphate[2]	1,3

21	Synthetic analogues of atropine. [1] Homatropine hydrobromide, scopolamine hydrobromide, tropacin, aprofen, troventol. [2]	1,3
	Ecgonine derivatives. [1] Cocaine hydrochloride. Conditions of storage and handling at work.[2]	1,0
22	Quinoline derivatives. [1] Quinine, quinidine, isodibut.[2]	1,0
	Benzylisoquinoline derivatives.[1] Papaverine hydrochloride and Drotaverine hydrochloride (no-shpa). Quality requirements, general and specific methods of analysis. Analogues of papaverine in action: tifen, diprofen, aprofen.[2]	1,3
23	Phenanthrenoisoquinoline derivatives.[1] Morphine, codeine. Sources of morphine.[2]	1,0
	Semisynthetic morphine derivatives. [1] Apomorphine hydrochloride, ethylmorphine hydrochloride. The problem of creating analgesics of morphine type and its social significance. Promedol, fentanyl. Storage conditions and rules of release.[2]	1,3
24	Indole derivatives.[1] Reserpine.[2]	1,0
	Physostegmine salicylate and its semi-synthetic analogue proserine. Specific quality requirements and methods of analysis depending on redox properties and isomerism ability. Strychnine nitrate.[2]	1,3
25	Imidazole derivatives.[1] Pilocarpine hydrochloride.[2]	1,0
	Benzimidazole derivatives. [1] Dibazol, omeprozole.[2]	1,0
26	**Control of knowledge, abilities, skills on thematic blocks 19-25** Solving test problems with a choice of answers	1,0
	Test work.	1,0
27	Purine derivatives.[1] Caffeine, theophylline, theobromine. General methods of synthesis and analysis based on oxidation and hydrolytic cleavage reactions of pyrimidine and imidazole cycles.[2]	1,2
	Salts of purine derivatives.[1] Diprophyllin, xanthinol nicotinate, pentoxifylline.[2]	1,0
28	Synthetic drugs are purine derivatives.[1] Allopurinol, etomizole, fopurine, riboxin.[2]	1,0
	Guanine derivatives. [1] Acyclovir, ganciclovir.[2]	1,3
29	Alkaloids, derivatives of phenylalkylamines.[1] Ephedrine hydrochloride, dephedrine. [2]	1,0
	Guanidine derivatives. [1] Spherofisin benzoate.[2]	1,3
30	Hormones.[1] Definition, biological role and classification of hormones. [2]	1,0
	Iodinated derivatives of aromatic amino acids. [1] Thyroid hormones: thyroxine, triiodothyronine. Complex preparation - thyroidine. Antithyroid agents: diiodotyrosine.[2]	1,3
31	Hydroxyphenylalkylamines.[1] Adrenal medullary hormones. (dopamine, adrenaline, noradrenaline and their salts).[2]	1,0
	Synthetic analogues of catecholamines.[1] Isoprenaline hydrochloride (isadrine). Mesaton. [2]	1,1
32	Derivatives of substituted hydroxypropanolamines (beta-adrenoblockers).[1] Anapriline, atenolol.[2]	1,0
	Biochemical role of steroids in the body as a prerequisite for the preparation of drugs.1 Classification and nomenclature. Sources of derivation. Conditional names of cycles and substances. Peculiarities of structure, stereochemistry of steroidal compounds and biological	1,0

	activity. General physical and chemical properties. Methods of analysis of compounds of steroidal structure.[2]	
33	Cardenolides (cardiac glycosides).[1] Chemistry of cardenolides, their classification. Relation between structure and biological action, role of steric factors. Compounds of the digitoxigenin series: digitoxin, acetyl digitoxin, digoxin. Strophanthine.2	1,0
	Lily of the valley glycosides: corglycone.1 Biological and physicochemical methods for quantitative estimation of glycoside activity.[2]	1,0
34	**Control of knowledge, abilities, skills on thematic blocks 27-33** Solving test problems with a choice of answers	1,0
	Test work.	1,0
	9 term	
35	Safety rules in the conditions of chemical laboratories. Current state and development of corticosteroid chemistry as medicinal substances.[1] Biochemical prerequisites for obtaining medicinal substances of corticosteroid group. Relationship between structure and biological activity. Mineralcorticosteroids, glucocorticosteroids.[2]	1,5
	Deoxycorticosterone acetate, cortisone acetate, hydrocortisone and prednisolone, fluorosubstituted compounds: dexamethasone. Steroid esters.[2]	2,0
36	Androgens and anabolics.[1] Androgenic hormones as drugs: testosterone propionate, methyltestosterone. Relationship between structure and biological action.[2]	1,5
	Biological prerequisites for obtaining semi-synthetic drugs with anabolic action.[1] Methandrostenolone, methylandrostenediol, phenobolin. Quality requirements, methods of analysis.[2]	2,0
37	Gestagens and their synthetic analogues[1] Progesterone, pregnin.[2]	1,5
	Estrogens. Estrone and estradiol as drug substances. [2]	2,0
38	Estrogenic hormones.[1] Ethinylestradiol, mestranol, estradiol esters.[2]	1,5
	Synthetic non-steroidal estrogen analogues.[1] Synestrol, diethylstilbestrol. Synthetic anti-estrogenic agents - tamoxifen citrate (nolvadex).[2]	2,0
39	Antibiotics as medicinal products.[1] General concepts and terminology. Classification of antibiotics by focus and mechanism of action.[2]	1,5
	Chemical classification of antibiotics[1] Current state of antibiotic science. Requirements for the efficacy and safety of antibiotics. Rational antibiotic therapy. Standardisation of antibiotics.[2]	2,0
40	Penicillins.[1] General chemical structure, its peculiarities. Relation between structure and biological action. Benzylpenicillin, its salts (sodium, potassium, novocaine). Phenoxymethylpenicillin. Directed semi-synthesis based on 6-aminopenicillanic acid. [2]	1,5
	Semisynthetic penicillins.[1] oxacillin sodium salt, ampicillin. General physicochemical properties, comparative resistance to chemical reagents and enzymes. Products of chemical transformation as possible impurities, methods of their analysis. Semisynthetic penicillins: carbenicillin dynatrium salt, amoxicillin.[2]	2,0
41	Cephalosporins.[1] Studies on the chemical transformation of Benzylpenicillin and preparation of 7-dez-acetylcephalosporanic acid. Natural cephalosporin C as a source of cephalosporins.[2]	1,5

	Partial directed synthesis of cephalosporin antibiotics.1 Cephalexin, cephalothin. Chemical structure of cephalosporins, its peculiarities. Relationship between structure, biological action and stability. Quality requirements and methods of analysis.2	2,0
42	Aromatic antibiotics.[1] Nitrophenylalkylamines. Levomycetin (chloramphenicol). Chemical synthesis of levomycetin.[2]	1,5
	Antibiotics of the aromatic series.[1] Syntomycin and its esters - stearate and succinate. [2]	2,0
43	**Control of knowledge, abilities, skills on thematic blocks 35-42** Solving test problems with a choice of answers	1,2
	Test work.	1,7
44	Aminoglycosides.[1] Streptomycin sulphate, kanamycin sulphate, gentamicin sulphate.[2]	1,5
	Preparation of semi-synthetic aminoglycosides.[1] Amikacin. General Quality requirements and methods of analysis.[2]	2,0
45	Tetracyclines (partially hydrogenated naphthacene derivatives)[1]. General characterisation of chemical structure and properties. Relation between structure and biological action. Epimerisation of tetracyclines, epi- and anhydro derivatives of tetracycline, methods of control.[2]	1,5
	Tetracyclines.[1] Tetracycline, oxytetracycline and their semi-synthetic derivatives: metacycline and doxycycline. Quality requirements, methods of analysis.[2]	2,0
46	Antitumour antibiotics of different chemical groups.[1] Anthracycline antibiotics - rubomycin hydrochloride. Aurelic acid derivatives - olivomycin. [2]	1,5
	Quinoline-5,8-dione derivatives.[1] Bruneomycin, reumycin. Actinomycins: dactinomycin. [2]	2,0
47	Contraindications.[1] Side effects occurring with antibiotics.[2]	1,5
	Therapy.[1] Minimise the side effects of taking antibiotics.[2]	2,0
48	Legislative documents.[1] Regulatory and technical documentation for medicinal products.[2]	1,5
	Development of NTDs.[1] State-wide system of institutions and activities aimed at planning and development of normative and technical documentation for medicines. activities aimed at planning and developing regulatory and technical documentation for medicines. [2]	2,0
49	Standardisation of medicines.[1] Basic content of standardisation.[2]	1,5
	Standardisation of medicinal products.1 Regulatory and technical documentation. International and regional compilations of unified requirements and test methods for medicinal products.	2,0
50	Validation.[1] Regulatory framework for validation.[2]	1,5
	Validation Process.[1] The main stages of validation. Types of process validation process. Particular cases of validation. Validation parameters.[2]	2,0
51	Research to find new medicines.[1] Natural and synthetic sources.[2]	1,5
	Prospects for the development of research on the search for new drugs and improvement of methods for assessing their quality.[1] Evolution of the process of searching for biologically active substances. Main directions in computer modelling of biological activity of substances[2]	2,0

52	**Control of knowledge, abilities, skills on thematic blocks 37-52** Solving test problems with a choice of answers	1,5
	Test work.	1,6
	Total	161

[1] - Subject
[2] - Essential content (if necessary)

Considered at the meeting of the department of Pharmaceutical and Toxicological Chemistry "27" may 2023, protocol No9

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