



# SOFIA UNIVERSITY "ST. KLIMENT OHRIDSKI"

## FACULTY OF CHEMISTRY AND PHARMACY

### C U R R I C U L U M

Signed by: .....

Approved by the Academic Council,  
Record of Proceedings № ..... / .....

Professional Field: **7.3. Pharmacy**

Educational and Qualification Degree: **Master of Science**

Subject Area:

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**(code, name)**

**Pharmacy**

**Form of Study: regular**

**Length of Study: 10 semesters**

Professional Qualification: **MASTER OF PHARMACY**

## Qualification Description

**Subject Area: Pharmacy**

**M. Sc. Program: Pharmacy**

### 1. Educational objectives

The main purpose of this M.Sc. program is to educate competent pharmacists who can pursue successful career in the field of Pharmacy – public and hospital pharmacies, pharmaceutical industry, specialized and control laboratories, or research institutions.

The education in Pharmacy is **in accordance with the national and EU legislation** regulating the M.Sc. degree of Pharmacy and the professional competencies and the types of educational activity, which should be covered by a University graduate to become Master of Pharmacy.

The M. Sc. program Pharmacy is a state-regulated graduate program with professional qualification 7.3. “Pharmacy”.

The education is full-time in 5 years (10 semesters): 9 semesters basic and specialized pharmaceutical training, two study internships: in Botany and in Pharmacognosy, one industrial internship in Technology of Drug Forms, and 6 months of professional training.

The students are **educated in the spirit of the good traditions** of university education. Professionals from different Faculties of the University of Sofia are involved in the teaching.

The program is completed by passing the following State exams:

1. Pharmaceutical Technology and Biopharmacy;
2. Pharmacognosy, Pharmacology, and Toxicology;
3. Pharmaceutical Chemistry and Pharmaceutical Analysis;
4. Social Pharmacy and Pharmaceutical Law.

The successfully graduated students are awarded a M. Sc. diploma for Master of Pharmacy.

### 2. Description

The professional qualification of the pharmacists is acquired by study of **core, elective and optional courses** containing lectures, seminars, practical classes and independent study and providing fundamental and specialized pharmaceutical knowledge. The students develop practical skills and competences in the following areas:

- knowledge of the basic principles of Chemistry, Biology and Physics as fundament for Pharmacy;
- design and synthesis of pharmaceuticals;
- pharmaceutical technologies;
- physical, chemical, biological and microbiological control of drugs;
- biotransformation and pharmacokinetics of pharmaceuticals;
- rational drug usage, drug applicability and impact on the human organism;
- toxic substances and their action;
- drug safety;

- assessment of the scientific information for drugs and ability to offer professional assistance based thereon;
- comprehension of the legislation and the scientific-regulatory requirements of the pharmaceutical practice.

The courses included in the curriculum of Pharmacy furnish the following **BASIC COMPETENCIES**:

**A. Fundamental biomedical, chemical and pharmaceutical knowledge in the field of:**

- properties and physiological activity of the main classes of inorganic and organic compounds;
- methods for synthesis, purification and analysis of drug components;
- human anatomy and physiology, pharmacology, drug toxicology, microbiology and virology, biopharmaceutics, which are related to the study of pathogenic processes and of the mechanism of action of drugs;
- pharmacognosy;
- cytology and histology;
- pathoanatomy and pathophysiology;
- pharmaceutical legislation and regulations, pharmacoeconomics, national drug policy;
- good pharmaceutical practices; management of pharmacies – Good Pharmacy Practice and its implementation and other legislative documents related to pharmaceutical practice.

**B. Specialized pharmaceutical background in:**

- bioactive compounds used for production of drugs;
- understanding and implementation of modern pharmaceutical techniques, technologies and methods;
- ensuring good quality of pharmaceutical preparations and techniques;
- drug metabolism and modes of action;
- rational drug use;
- drug-related information and promotion of drugs;

### **3. Professional Qualifications**

The graduated pharmacists gain **COMPETENCE, KNOWLEDGE AND SKILLS** in fundamental biomedical, clinical and in specialized pharmaceutical disciplines:

**A. Fundamental capabilities:**

- A1. Creative and innovative thinking, accumulation of new knowledge as a basis for life-long learning and professional development;
- A2. Compliance with the professional ethics of a pharmacist;
- A3. Ability for independent and team work and for decision making, capacity for collection and analysis of scientific and professional information;
- A4. Professional communication with patients and healthcare experts and ability to use contemporary information technologies in favour of patients;
- A5. Capacity for collection, processing, analysis and presentation of pharmacy-related data and its efficient communication to health-regulating authorities and organizations, health insurance funds and other branch organizations;

- A6. Comprehensible and convincing oral and written assistance and presentation of information related to drugs and drug constituents to other specialists, patients, health organizations, public and private health institutions, state representatives and organizations, non-government bodies, etc.;
- A7. Performance of marketing studies of the pharmaceuticals market, including participation in pharmacoeconomic research;
- A8. Work with Internet resources;
- A9. Sustainable management of own pharmaceutical establishment, preparation of business plans and specific reports;
- A10. Practical level of at least one EU language (apart from Bulgarian);
- A11. Ability to use Latin pharmaceutical terminology;
- A12. Comprehension of the essence of the “pharmacist” profession as being focused on the patient and of the role of the pharmacist when working in a pharmacy or in the industry.

#### **B. Specialized pharmaceutical capabilities:**

- B1. Application of the principles of the fundamental disciplines for solving specific pharmaceutical problems related to the search of new biologically active substances, to creation, production, quality control, storage, efficiency, and safety of pharmaceuticals;
- B2. Supply, storage, and sales of pharmaceuticals and sanitation materials in public and hospital pharmacies;
- B3. Preparation and prescription of pharmaceuticals in accord with the latest achievements of pharmaceutical science and practice, jurisdiction and codes of professional conduct;
- B4. Verification of single and daily dosages of prescribed medications;
- B5. Assessment of the compatibility of the drug substances, excipients and packaging materials in the preparation of compounded medications;
- B6. Providing adequate information to the patients/users and offering interchangeable medicines;
- B7. Experimental design and critical analysis of experimental data, seeking and accomplishment of solutions to pharmaceutical problems.

### **4. Professional Realization**

#### **The graduated Masters of Pharmacy are entitled to perform the following activities (EU directive 85/432/EEC):**

- 1. Preparation of pharmaceuticals;
- 2. Production and control of pharmaceuticals;
- 3. Drugs quality and safety assessment in specialized laboratories;
- 4. Storage and distribution of pharmaceuticals to pharmacies and hospitals;
- 5. Supply of information and assistance related to pharmaceuticals.

#### **Job opportunities**

After graduating, the students can become pharmacists with fully acknowledged qualification at national and EU level.

They can pursue career in the following directions:

- ♦ Production and import of pharmaceuticals and active drug forms of human, animal, plant, and chemical origin;
- ♦ Official approval of pharmaceuticals;
- ♦ Quality and safety assessment of pharmaceuticals and customs release of pharmaceuticals shipments and bioactive substances;
- ♦ Clinical tests of pharmaceuticals;

- ♦ Drugs safety;
- ♦ Pharmaceutical information, pharmaceuticals promotion and advertisement;
- ♦ Wholesale and retail of pharmaceuticals;
- ♦ National drugs policy;
- ♦ Health economics, pharmacoeconomics, health technologies;
- ♦ Drug applicability and rational drug usage at micro- and macro-level;
- ♦ State control of drug products.

The Masters of Pharmacy will be able to work in state organizations and institutions responsible for drug policy and state control of pharmaceuticals; in public and societal organizations; in state-funded and private research institutes, universities, and industrial companies; in various areas of industry and distribution of pharmaceuticals; in public and hospital pharmacies; in analytical laboratories; in pharmaceutical companies and sales representatives offices; in research laboratories, etc.

The diploma entitles its holders to pursue the next level of education – PhD, and to apply for obtaining other educational qualification in other University.

The compliance with the EU directives 85/432, 85/433, 2005/36 and 2006/100 ensures mobility of the graduates, who can practice their profession in the EU member states, in other countries, which are part of the EEA, and in Switzerland, as regulated by the national legislation of the respective country.

## **5. Admission requirements**

The candidates should have completed their high school education (certified by official Bulgarian translation of the diploma). They have to pass admission exams in Chemistry and Biology. Their high school diploma should contain grades in Chemistry and Biology.

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### M. Sc. Program "Pharmacy"

for the academic year beginning in 2013

№	Course code	Course Title	Type – C, E, O	Semester	ECTS credits	Number of hours- total				Number of hours per week	Type of grading* - e, ca, m, a
						Total	Lectures	Seminars	Practical classes / practice		
1	2	3	4	5	6	7	8	9	10	11	12

#### Core courses

1	C	0	1	7	Mathematics (Calculus)	C	1	7	175	30	0	45	2/0/3	e
2	C	0	2	5	Biology	C	1	5	125	30	0	30	2/0/2	e
3	C	0	3	6	General and Inorganic Chemistry 1	C	1	6	150	30	0	45	2/0/3	e
4	C	0	4	5	Latin	C	1	5	125	30	30	0	2/2/0	e
5	C	0	5	5	English	C	1	5	125	0	60	0	0/4/0	e
6	C	0	6	2	Sport	C	1	-	30	0	0	30	0/0/2	a
7	C	0	7	4	Human Anatomy	C	2	4	100	30	0	15	2/0/1	e
8	C	0	8	5	General and Inorganic Chemistry 2	C	2	5	125	30	0	30	2/0/2	e
9	C	0	9	7	Physics and Biophysics	C	2	7	175	45	0	45	3/0/3	e
10	C	1	0	5	Pathoanatomy	C	2	5	125	30	0	30	2/0/2	e
11	C	1	1	8	Microbiology and Virology	C	2	8	200	60	0	60	4/0/4	e
12	C	1	2	3	History of Pharmacy	C	2	3	75	30	0	0	2/0/0	ca
13	C	0	6	2	Sport	C	2	2	30	0	0	30	0/0/2	ca
14	C	1	4	6	Human Physiology	C	3	6	150	45	0	45	3/0/3	e
15	C	1	5	6	Analytical Chemistry 1	C	3	6	150	30	0	60	2/0/4	e
16	C	1	6	5	Physical Chemistry with Colloid Chemistry 1	C	3	5	125	30	0	30	2/0/2	e
17	C	1	7	6	Organic Chemistry 1	C	3	6	150	45	0	45	3/0/3	e
18	C	1	8	5	Information Technology and Statistics	C	3	5	125	30	0	30	2/0/2	e
19	C	0	6	2	Sport	C	3	-	30	0	0	30	0/0/2	a

Type of grading:  
e-exam, ca-current assesment,  
m-matriculation,  
a-advances to the next semester

The Faculty Council has decided that min. 50% of the total education load is independent study of the students

20	C	2	0	6	Analytical Chemistry 2	C	4	6	150	30	0	60	2/0/4	e
21	C	2	1	5	Physical Chemistry with Colloid Chemistry 2	C	4	5	125	30	0	30	2/0/2	e
22	C	2	2	6	Organic Chemistry 2	C	4	6	150	45	0	45	3/0/3	e
23	C	2	3	6	Pharmaceutical Botany	C	4	6	150	45	0	45	3/0/3	e
24	C	2	4	5	Pathophysiology	C	4	5	125	30	0	30	2/0/2	e
25	C	0	6	2	Sport	C	4	2	30	0	0	30	0/0/2	ca
26	C	2	6	0	Pharmacognosy 1	C	5	10	250	60	0	90	4/0/6	e
27	C	2	7	7	Pharmaceutical Chemistry 1	C	5	7	175	45	0	60	3/0/4	e
28	C	2	8	7	Biochemistry	C	5	7	175	45	30	30	3/2/2	e
29	C	2	9	5	Pharmacogenetics	C	5	5	125	30	0	30	2/0/2	e
30	C	3	0	4	Hygiene and Ecology	C	5	4	100	30	0	15	2/0/1	e
31	C	3	1	8	Pharmacognosy 2	C	6	8	200	45	0	75	3/0/5	e
32	C	3	2	7	Pharmaceutical Chemistry 2	C	6	7	175	45	0	60	3/0/4	e
33	C	3	3	0	Pharmaceutical Technology 1	C	6	10	250	60	0	90	4/0/6	e
34	C	3	4	6	Pharmacology 1	C	6	6	150	45	0	45	3/0/3	e
35	C	3	5	0	Pharmaceutical Technology 2	C	7	10	250	60	0	90	4/0/6	e
36	C	3	6	7	Pharmacology 2	C	7	7	175	45	0	60	3/0/4	e
37	C	3	7	7	Pharmaceutical Analysis 1	C	7	7	175	45	0	60	3/0/4	e
38	C	3	8	5	Clinical Chemistry	C	7	5	125	30	0	30	2/0/2	e
39	E	3	9	4	Elective course 1	E	7	4	100	30	0	30	2/0/2	e
40	C	4	0	8	Pharmaceutical Technology 3	C	8	8	200	45	0	75	3/0/5	e
41	C	4	1	8	Pharmaceutical Analysis 2	C	8	8	200	45	0	75	3/0/5	e
42	C	4	2	5	Social Pharmacy and Pharmaceutical Law 1	C	8	5	125	30	15	30	2/3/0	ca
43	C	4	3	6	Toxicology	C	8	6	150	45	0	45	3/0/3	e
44	C	4	4	5	Pharmacotherapy 1	C	8	5	125	45	0	30	3/0/2	e
45	C	4	5	7	Biopharmaceutics and Pharmacokinetics	C	9	7	175	45	0	60	3/0/4	e
46	C	4	6	6	Pharmacotherapy 2	C	9	6	150	45	0	30	3/0/2	e
47	C	4	7	5	Social Pharmacy and Pharmaceutical Law 2	C	9	5	125	30	15	30	2/2/0	e

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Type of grading:  
e-exam, ca-current assesment,  
m-matriculation,  
a-advances to the next semester

48	C	4	8	5	Pharmacoeconomics	C	9	5	125	30	30	0	2/2/0	e
49	C	4	9	5	Pharmaceutical Care	C	9	5	125	30	30	0	2/2/0	e
50	E	5	0	4	Elective course 2	E	9	4	100	30	0	30	2/0/2	e

**Elective courses** – courses with minimum of 8 ECTS (total) must be elected

1	E	0	1	4	Analytical Toxicology	E	7,9	4	100	30	0	30	2/0/2	e
2	E	0	2	4	Bioactive and Medico-pharmaceutical Polymers	E	7,9	4	100	30	0	30	2/0/2	e
3	E	0	3	4	Bioinorganic Chemistry	E	7,9	4	100	30	0	30	2/0/2	e
4	E	0	4	4	Bioorganic Chemistry	E	7,9	4	100	30	0	30	2/0/2	e
5	E	0	5	4	Biophysical Chemistry	E	7,9	4	100	30	0	30	2/0/2	e
6	E	0	6	4	Bromatology	E	7,9	4	100	30	0	30	2/0/2	e
7	E	0	7	4	Cosmetic Materials and Care	E	7,9	4	100	30	0	30	2/0/2	e
8	E	0	8	4	Coordination Compounds in Medicine	E	7,9	4	100	30	0	30	2/0/2	e
9	E	0	9	4	Molecular Modeling of Pharmacophores	E	7,9	4	100	30	0	30	2/0/2	e
10	E	1	0	4	Nanotechnologies in Pharmacy	E	7,9	4	100	30	0	30	2/0/2	e
11	E	1	1	4	Drugs, Health, and Education	E	7,9	4	100	30	0	30	2/0/2	e
12	E	1	2	4	Toxicochemistry	E	7,9	4	100	30	0	30	2/0/2	e
13	E	1	3	4	Quality Management in Pharmacy	E	7,9	4	100	30	0	30	2/0/2	e
14	E	1	4	4	Chemistry of Natural Products	E	7,9	4	100	30	0	30	2/0/2	e
15	E	1	5	4	QSAR and Drug Design	E	7,9	4	100	30	0	30	2/0/2	e

**Optional courses**

1	O	0	1	3	Introduction to University Chemistry	O	1	3	75	0	0	30	0/0/2	ca
2	O	0	2	3	Basic Mathematics	O	1	3	75	0	0	30	0/0/2	ca
3	O	0	3	3	Fundamentals of Pharmaceutics	O	2,3	3	75	30	15	0	2/1/0	ca
4	O	0	4	4	Optical and Electron Microscopy	O	3-9	4	100	30	0	30	2/0/2	e

*The Faculty Council has decided that min. 50% of the total education load is independent study of the students*

Type of grading:  
e-exam, ca-current assesment,  
m-matriculation,  
a-advances to the next semester



5	O	0	5	3	Molecular Mechanics	O	3,5,7,9	3	75	30	0	15	2/0/1	e
6	O	0	6	4	Molecular Dynamics and Monte Carlo Simulations	O	6,8	4	100	30	0	30	2/0/2	e
7	O	0	7	4	Ab initio MO Calculations	O	6,8	4	100	30	0	30	2/0/2	e
8	O	0	8	5	Colloids and Dispersions in Medicine and Pharmacy	O	3,5,7,9	5	125	45	0	30	3/0/2	e
9	O	0	9	5	Biomembranes in Norm and Pathology	O	4,6,8	5	125	45	0	30	3/0/2	e
10	O	1	0	4	Bioelectronics	O	4,6,8	4	100	30	0	30	2/0/2	e
11	O	1	1	4	Immunochemistry	O	3-9	4	100	30	0	30	2/0/2	e
15	O	1	5	4	Radioactive Isotopes in Nuclear Medicine	O	5,7,9	4	100	30	0	30	2/0/2	e
13	O	1	3	4	Organic Biolabels for Diagnostics	O	4,6,8	4	100	30	0	30	2/0/2	e
14	O	1	4	4	Green Chemistry	O	4,6,8	4	100	30	0	30	2/0/2	e

#### Study Internships

No	code	Internship	Type - C, E, O	Semester	ECTS credits	Days	Hours	Type of grading* - e, ca, m
1	I 0 1 2	Study Internship in Botany	C	4	2	6	48	ca
2	I 0 2 2	Study Internship in Pharmacognosy	C	6	2	6	48	ca
3	I 0 3 3	Study Internship in Technology of Drug Forms	C	9	2	7	60	ca
4	I 0 4 0	Professional Internship	C	10	28	168	720	ca

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Type of grading:  
e-exam, ca-current assesment,  
m-matriculation,  
a-advances to the next semester

**Degree completion**

Form of degree completion	ECTS credits	First state exam/ thesis defence session	Second state exam/ thesis defence session
State exam in Technology of Drug Forms and Biopharmacy	15	October-November	February-March
State exam in Pharmacognosy, Pharmacology, and Toxicology			
State exam in Pharmaceutical Chemistry and Pharmaceutical Analysis			
State exam in Social Pharmacy and Pharmaceutical Law			

**The curriculum has been approved by the Faculty Council, Record of Proceedings № 10 from 11. 03. 2014**

**DEAN:**.....

*The Faculty Council has decided that min. 50% of the total education load is independent study of the students*

Type of grading:  
e-exam, ca-current assesment,  
m-matriculation,  
a-advances to the next semester

Sofia University "St. Kliment Ohridski"

# Curriculum Reference Statement

M. Sc. Program "Pharmacy"

Form of study: full-time; Length of study: ten semesters

In-class course load, ECTS credits and courses completed per semester																								
Type of courses	I semester			II semester			III semester			IV semester			V semester			VI semester			VII semester			VIII semester		
	Course Load - number of hours	ECTS credits	Number of grades	Course Load - number of hours	ECTS credits	Number of grades	Course Load - number of hours	ECTS credits	Number of grades	Course Load - number of hours	ECTS credits	Number of grades	Course Load - number of hours	ECTS – кредити	Number of grades	Course Load - number of hours	ECTS credits	Number of grades	Course Load - number of hours	ECTS credits	Number of grades	Course Load - number of hours	ECTS credits	Number of grades
Compulsory courses	360	28	5	435	34	7	420	28	5	420	30	6	465	33	5	465	31	4	420	29	4	480	32	5
Min. of elective courses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	60	4	1	0	0	0
Study internships	0	0	0	0	0	0	0	0	0	48	2	1	0	0	0	48	2	1	0	0	0	0	0	0
Total:	360	28	5	435	34	7	420	28	5	468	32	7	465	33	5	513	33	5	480	33	5	480	32	5

Degree completion	ECTS credits	Number of hours for preparation	First state exam/ thesis defence session
State exam in Technology of Drug Forms and Biopharmacy State exam in Pharmacognosy, Pharmacology, and Toxicology State exam in Pharmaceutical Chemistry and Pharmaceutical Analysis State exam in Social Pharmacy and Pharmaceutical Law	15	300	October-November

**Professional Qualification: Master of Pharmacy**

**Record of Proceedings of the Faculty Council № 10 from 11. 03. 2014**

**Dean:**

IX semester			X semester			Total		
Course Load - number of hours	ECTS credits	Number of grades	Course Load - number of hours	ECTS credits	Number of grades	Course Load - number of hours	ECTS credits	Number of grades
375	28	5	0	0	0	3840	273	46
60	4	1	0	0	0	120	8	2
60	2	1	720	28	1	876	34	4
495	34	7	720	28	1	4836	315	52

Second state exam/ thesis defence session
February-March