

**INFORMATION PACKAGE**

**UNIVERSITY OF ZAGREB  
FACULTY OF PHARMACY AND BIOCHEMISTRY**

**for the 133th academic year  
2014/2015**

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## INFORMATION ON THE INSTITUTION AND ADMISSION REQUIREMENTS

### FACULTY OF PHARMACY AND BIOCHEMISTRY

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**Dean:** Professor Jerka Dumić, PhD  
**Vice Dean for Education:**  
Associate Professor Lidija Bach-Rojecky, PhD  
**Vice Dean for Science:** Professor Sanda Vladimir-Knežević, PhD  
**Registrar:** Marija Dora Katulić, LLB

### GENERAL INFORMATION

The Faculty of Pharmacy and Biochemistry is the only faculty in Croatia dedicated entirely to teaching and research in pharmacy and medical biochemistry. Pharmacy studies were started at the University of Zagreb in 1882. The name Faculty of Pharmacy and Biochemistry was adopted in 1963, and since 1986 the Faculty organizes two study programmes, one in pharmacy and the other in medical biochemistry.

Today, the Faculty offers graduate programme in Pharmacy and in Medical biochemistry, postgraduate (PhD) programme in "Pharmaceutical-Biochemical Sciences" and postgraduate specialist programmes. In addition, The Faculty offers continuing education for masters of pharmacy and medical biochemistry.

The goals and objectives of **Master of Pharmacy programme** are to educate students for competent participation in the design, development and delivery of medications for safe and efficient therapy. The five-year Master of Pharmacy programme (10 semesters, 300 ECTS points) is divided in three areas of academic focus: basic sciences, biomedical sciences and pharmaceutical sciences. Programme emphasizes problem solving, critical thinking, and latest scientific findings related to medicines and modern medical treatments. Students learn to practice as patient-oriented healthcare professionals who will work as team with

other health care providers. In our modern educational, research and practice settings, student are prepared to excel in a variety of pharmaceutical careers such as working in community and hospital pharmacies, pharmaceutical industry (research, development, production, control and marketing of drugs), Agency for Medicinal Products and Medical Devices, educational institutions for pharmacists, research institutes, drug distribution enterprises (wholesalers).

The goals and objectives of **Master of Medical Biochemistry programme** are to train students to examine human life in health and disease from the chemical, biochemical and molecular-biological aspects.

The five-year Master of Medical Biochemistry programme (10 semesters, 300 ECTS points) is divided in three areas of academic focus: basic sciences, biomedical sciences and medical biochemistry sciences. Programme emphasizes problem solving, critical thinking, and latest scientific findings related to the molecular mechanisms underlying a multitude of diseases as well as novel diagnostic methods. The aim of this programme is to educate professionals who will be able to help physicians to diagnose the disease and follow up the therapy by choosing appropriate procedures and interpreting the obtained results.

Medical biochemistry students study molecular processes in human body and molecular changes specific to disease, as well as the essence, selection and quality control of laboratory diagnostic procedures. Interpretation of laboratory findings, measuring instruments, insulation and preparation of biological substances, production of reagents and biochemicals are also among their tasks. The extensive practical programme and research projects develop teamwork skills and introduce students to the practical aspects of modern medical biochemistry.

Masters of medical biochemistry get mainly employed in the health care system (medical-biochemistry laboratories in primary health care, polyclinics, general and specialized hospitals and clinical hospital centres).

Graduate programmes constitute the basis for postgraduate extension of knowledge and acquisition of special skills and competences. Therefore **PhD programme in pharmaceutical-biochemical sciences** has an important role in the educational system of

the Faculty of Pharmacy and Biochemistry. The goal of PhD programme is to prepare independent, creative scientists to excel in academia, the pharmaceutical industry and other research institutions.

Faculty of Pharmacy and Biochemistry is situated on four locations, at a total area of ca 8500 square meters, with research and student laboratories, demonstration rooms, a student pharmacy, computer classroom, central library, several departmental libraries and botanical garden of medicinal, poisonous, aromatic and food plants.

### PROGRAMMES

Graduate programmes:

- Master of Pharmacy
- Master of Medical Biochemistry

Postgraduate (PhD) programme in "Pharmaceutical-Biochemical Sciences" organized in 2 modules:

- Pharmaceutical Sciences
- Medical-Biochemical Sciences

Postgraduate specialist programmes: Drug Development, Dermatopharmacy and Cosmetology, Phitopharmacy with Dietotherapy, Clinical Pharmacy, Medical Biochemistry and Laboratory Medicine, Molecular Diagnostics, Pharmacogenomics: a New Approach to Optimizing Therapy and Toxicology (two modules). The credit system applied in all programmes complies with the European system (European Credit Transfer System, ECTS).

### ADMISSION/REGISTRATION PROCEDURE

#### Graduate studies

Faculty of Pharmacy and Biochemistry enrolls in the first study years:

- Full-time students, financed by the Ministry of Science, Education and Sports
- Full-time students -participating in tuition fees (linear participation)
- Full-time students -participating in tuition fees (maximal participation)
- Full-time students - foreign nationals paying full tuition fees.

#### General enrolment conditions

All persons who have completed four-year secondary education and passed the state baccalaureate exam.

### Application

Applications are submitted to the Central Admission Office according to the instructions of the said office.

### Invitation for admission applications

Invitation to apply for first year enrolment is announced in the daily press and on the University of Zagreb web pages. The invitation comprises details of admission.

### Admission criteria for graduate programmes

#### - Pharmacy and Medical Biochemistry

- a) Based on secondary-school achievement  
to 250 points
- b) Based on state baccalaureate exams passed  
- Croatian language  
to 50 points
- Mathematics (higher)  
to 200 points
- Foreign (or classical) language  
to 50 points
- Chemistry  
to 200 points
- Biology\*  
to 200 points

\*Not a condition for admission, but brings points if passed at the state baccalaureate.

#### c) Based on checking special skills

- If applicants did not attend and pass a two-year course of the Latin language during secondary education, they must do it before enrolment into the 2nd study year

#### d) Student's additional achievements

- one of the first three places won at state competitions in the Republic of Croatia or international competitions in *Chemistry* or *Biology* or *Mathematics* (one competition 30 points, two or more competitions 50 points) maximum 50 points

### Postgraduate doctoral studies

"Pharmaceutical-Biochemical Sciences"

#### General conditions

Enrolment requirements for students regularly enrolling in the first year:

- University degree (Faculty of Pharmacy and Biochemistry)
- Graduate studies achievement (grade point average 4.0, or references from two teachers)
- English language competence and computer literacy

Enrolment requirements for students enrolling after having completed organized one-year instruction within specialist training in health services or the 1st year of some other scientific or specialist postgraduate course of studies:

- Completed 1st year and exams passed, grade point average 4.5
- Taking up and passing differential courses in agreement with the leader of the postgraduate doctoral course
- English language competence and computer literacy

Candidates who have not graduated from the Faculty of Pharmacy and Biochemistry but from one of the related faculties (related faculties are *e.g.*: Faculty of Science, Faculty of Food Technology and Biotechnology, Faculty of Medicine) may enrol into the PhD programme under the following conditions:

- Graduate studies achievement (grade point average 4.0, or references from two teachers)
- Recommendation and statement of reasons from the leader of the PhD programme
- Taking exams in differential courses of graduate studies (an appointed three-member board decides on the differential courses that the candidate has to pass)
- English language competence and computer literacy

#### **Criteria and procedures of student selection**

Candidates are selected based on the graduate studies grade point average 4.0, scientific activities (*e.g.* papers published in journals indexed in Current Contents, in other indexed journals, congress abstracts), and recommendations of the possible doctoral thesis supervisor.

#### **PRINCIPAL RULES AND REGULATIONS OF THE INSTITUTION**

##### **Transfer admission procedures - graduate programmes**

Students may transfer to this Faculty from other pharmacy and medical biochemistry faculties or related faculties in the Republic of Croatia provided their curricula leading to the award of the degrees of master of pharmacy or master of medical biochemistry are concordant. Transfer conditions are provided in Articles 25-29 of the **Faculty of Pharmacy and Biochemistry Graduate Studies Rulebook** (December 2008).

Possibilities and conditions of student transfer from pharmacy and medical biochemistry faculties outside the Republic of Croatia are evaluated by the Teaching Commission in terms of the degree of concordance and quality of curriculum execution, openness of the European academic scene and the legal framework of the Republic of Croatia.

Transfer is allowable only from the second to the fourth study years; transfer is not possible during the academic year in which the student enrolled for the first time.

Total number of students allowed to transfer from other faculties is determined for each academic year by the Faculty Council at the proposal of the Dean's Board, taking account of the Faculty space and staff capacities.

Besides curriculum concordance, general conditions for student transfer from other pharmacy and medical biochemistry and related faculties are:

- candidate must have passed the exams and met the other requirements for regular enrolment in a higher study year at the parent faculty;
- candidate should not have repeated any study year;
- Croatian language competence (for foreign nationals, proven by relevant documents).

The Teaching Commission decides whether the listed requirements are met and whether the request is justified. ECTS coordinator of the Faculty offers the opinion on the ECTS points recognition.

If a larger number of candidates than that stipulated by the decision of the Faculty Council satisfy the general conditions, advantage is given to candidates with better general achievement at the faculty from which they are transferring.

The grade point average is calculated by taking into account grades of all exams passed at the faculty from which the candidate wishes to transfer, evaluated pursuant to the ECTS system.

Foreign nationals acquire the right to transfer to the Faculty under the same conditions as Croatian citizens, on the basis of a special quota and priority list, with recognition of the previous study period.

Requests for student transfer are submitted at the latest seven days before the ending of the regular registration period for the following academic year to the Faculty Enrolment Office in Zagreb.

Enclosures to the argued request for transfer:

- Student book (*Index lectionum*);
- Certificate of exams passed and total grade achieved in the course of the study so far (Official Transcripts);
- certificate issued by the faculty from which the student is transferring that he/she has fulfilled all the requirements to enrol in the higher study year;
- curriculum of the faculty from which the student is transferring;
- Certificate of citizenship; for foreign nationals: photocopies of the passport and certificate of temporary residence.

Students transferring from faculties abroad have to submit, along with original documents, certified translations of original documents, as well as a certified translation of the parent faculty curriculum (*Curriculum studiorum*) and the decision on recognition of the previous study period issued by a competent agency.

#### **Transfer admission procedures - PhD programme**

Individuals who have completed a specialist course of studies in biomedicine and health or a related field with the grade point average of at least 4.5 and with the required number of ECTS points can enrol in the relevant semester of PhD programme.

Individuals who have met all the requirements of a specialist course of studies or postgraduate MSc studies in pharmaceutical or medical-biochemical sciences, but have not written and defended the final thesis, with the grade point average of at least 4.5 and with the required number of ECTS points can enrol in the relevant semester of PhD programme.

Fulfilment of the listed requirements is controlled by the Postgraduate Studies Commission.

Enrolment to PhD programme can be approved to applicants who have spent some time at organized research training abroad or at other biomedical faculties in Croatia, providing they meet the admission

requirements prescribed by the study programme.

The Postgraduate Studies Commission passes the decision on recognizing the equivalence of a completed study programme with the postgraduate studies curriculum.

Pursuant to the provisions of paragraph 2, Article 14 of the **Postgraduate Studies Rulebook**, the Postgraduate Studies Commission approves enrolment to the relevant postgraduate course of studies and defines the conditions that the candidate has to meet before registering the theme of his/her PhD thesis.

#### **INSTITUTIONAL ECTS COORDINATOR**

Associate Professor Marijana Zovko Končić,  
PhD

## TEACHING STAFF MEMBERS AND ASSOCIATES

### 1. Full Professors

#### a) Full-time

Barišić, PhD Karmela  
Dumić, PhD Jerka  
Filipović-Grčić, PhD Jelena  
Kronja, PhD Olga  
Lauc, PhD Gordana  
Luterotti, PhD Svjetlana  
Maleš, PhD Željko  
Nigović, PhD Biljana  
Petrik, PhD Jozsef  
Rumora, PhD Lada  
Vladimir Knežević, PhD Sanda  
Vrčec, PhD Valerije  
Zorc, PhD Branka  
Žanić Grubišić, PhD Tihana

#### b) Cumulative Employment

Romić, PhD Željko  
Sučić, PhD Mirna  
Zadro, PhD Renata

#### c) Others

Cetina-Čižmek, PhD Biserka  
Čvorišćec, PhD Dubravka  
Matulić, PhD Tonči  
Sertić, PhD Jadranka  
Šiftar, PhD Juraj

### 2. Associate Professors

#### a) Full-time

Bach-Rojecky, PhD Lidija  
Dabelić, PhD Sanja  
Domijan, PhD Ana-Marija  
Gabričević, PhD Mario  
Hafner, PhD Anita  
Hazler Pilepić, PhD Kroata  
Jadrijević-Mladar Takač, PhD Milena  
Jug, PhD Mario  
Juričić, PhD Živka  
Jurišić Grubešić, PhD Renata  
Kosalec, PhD Ivan  
Maravić Vlahoviček, PhD Gordana  
Mornar Turk, PhD Ana  
Petlevski, PhD Roberta  
Šanković, PhD Krešimir  
Šegvić Klarić, PhD Maja  
Vuković Rodriguez, PhD Jadranka  
Zovko Končić, PhD Marijana  
Žuntar, PhD Irena

#### b) Cumulative Employment

Bačić-Vrca, PhD Vesna  
Rogić, PhD Dunja  
Vrkić, PhD Nada

#### c) Others

Dodig, PhD Slavica  
Galešić Ljubanović, PhD Danica  
Flegar-Meštrić, PhD Zlata  
Kujundžić, PhD Milan  
Poropart, PhD Mirjana  
Šimundić, PhD Ana-Maria

### 3. Assistant Professors

#### a) Full-time

Barbarić, PhD Monika  
Bešić, PhD Erim  
Blažeković, PhD Biljana  
Budimir, PhD Ana  
Denegri, PhD Bernard  
Gornik, PhD Olga  
Jurić, PhD Sandra  
Lovrić, PhD Jasmina  
Pepić, PhD Ivan  
Pilepić, PhD Viktor  
Rajić Džolić, PhD Zrinka  
Šupraha Goreta, PhD Sandra  
Vanić, PhD Željka  
Vitali Čepo, PhD Dubravka

#### b) Cumulative Employment

Fumić, PhD Ksenija

#### c) Others

Bulimbašić, PhD Stela  
Debeljak, PhD Željko  
Grgurević, PhD Ivica  
Marušić, PhD Srećko  
Tadić, PhD Mario

### 4. Senior Lecturers

#### a) Others

Vujević, PhD Drago

### 5. Senior Assistants

#### a) Full-time

Inić, PhD Suzana  
Jablan, PhD Jasna  
Turčić, PhD Petra  
Vujić, PhD Lovorka

#### b) Others

Horvatić, PhD Ivica  
Mitrović, PhD Srećko

### 6. Assistants

#### a) Full-time

Bival Štefan, Maja  
Crkvenčić, Maja  
Hulina, Andrea  
Karković Marković, Ana  
Rimac, Hrvoje

*b) Others*

Bokun, Tomislav

**7. Staff Associates**

*a) Full-time*

Čulić, PhD Ognjen

Kremer, PhD Dario

**8. Junior Researchers**

Bojić, PhD Mirza

Drinovac, Višnja

Fabijanić, PhD Ivana

Grdić Rajković, PhD Marija

Jakobušić Brala, PhD Cvijeta

Jakšić Despot, Daniela

Keser, Toma

Kindl, Marija

Marijan, Marijan

Matić, PhD Mirela

Mucalo, PhD Iva

Ortner Hadžiabdić, mr. sc. Maja

Palac, Zora

Perković, PhD Ivana

Sertić, PhD Miranda

Somborac Bačura, PhD Anita

Šakić, Davor



## 133<sup>rd</sup> ACADEMIC YEAR CALENDAR (2014/2015)

OCTOBER 2014						
Mon	Tue	Wed	Thu	Fri	Sat	Sun
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

1 BEGINNING OF THE WINTER TERM  
4 FACULTY DAY  
8 INDEPENDENCE DAY

NOVEMBER 2014						
Mon	Tue	Wed	Thu	Fri	Sat	Sun
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30

1 ALL SAINTS DAY  
13 - 15 UNIVERSITY OF ZAGREB FAIR

DECEMBER 2014						
Mon	Tue	Wed	Thu	Fri	Sat	Sun
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

25 CHRISTMAS  
26 National holiday: ST STEPHEN'S DAY  
24 - 31 CHRISTMAS HOLIDAYS

JANUARY 2015						
Mon	Tue	Wed	Thu	Fri	Sat	Sun
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	

1 National holiday: NEW YEAR'S DAY  
2 - 6 CHRISTMAS HOLIDAYS  
6 National holiday: EPIPHANY  
23 END OF THE WINTER TERM  
26 BEGINNING OF THE WINTER EXAMINATION PERIOD

FEBRUARY 2015						
Mon	Tue	Wed	Thu	Fri	Sat	Sun
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	

27 END OF THE WINTER EXAMINATION PERIOD  
23 - 27 SUMMER TERM ENROLMENT PERIOD

MARCH 2015						
Mon	Tue	Wed	Thu	Fri	Sat	Sun
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30	31					

2 BEGINNING OF THE SUMMER TERM  
2 - 4 SUMMER TERM ENROLMENT PERIOD

APRIL 2015						
Mon	Tue	Wed	Thu	Fri	Sat	Sun
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30			

5 EASTER  
6 EASTER MONDAY  
7 - 10 EXAMINATION PERIOD (no lectures)

MAY 2015						
Mon	Tue	Wed	Thu	Fri	Sat	Sun
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

1 LABOUR DAY

JUNE 2015						
Mon	Tue	Wed	Thu	Fri	Sat	Sun
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30					

19 END OF THE SUMMER TERM  
23 BEGINNING OF THE SUMMER EXAMINATION PERIOD  
4 CORPUS CHRISTI DAY  
22 ANTI-FASCIST STRUGGLE DAY  
25 STATEHOOD DAY

JULY 2015						
Mon	Tue	Wed	Thu	Fri	Sat	Sun
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

17 END OF THE SUMMER EXAMINATION PERIOD

AUGUST 2015						
Mon	Tue	Wed	Thu	Fri	Sat	Sun
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31						

5 VICTORY AND HOMELAND GRATITUDE DAY  
15 ASSUMPTION OF MARY  
24 BEGINNING OF THE FINAL EXAMINATION PERIOD

SEPTEMBER 2015						
Mon	Tue	Wed	Thu	Fri	Sat	Sun
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30				

18 END OF THE FINAL EXAMINATION PERIOD  
14 - 23 SUMMER TERM ENROLMENT PERIOD

### LEGENDA:

WINTER TERM LECTURES (1 September 2014 - 23 January 2015)

SUMMER TERM LECTURES (2 March 2015 - 19 June 2015)

WINTER EXAMINATION PERIOD (26 Jan - 27 Feb 2015)

SUMMER EXAMINATION PERIOD (23 June 2015 - 17 July 2015)

FINAL EXAMINATION PERIOD (24 August 2015 - 18 September 2015)

Summer term enrolment (23 February - 4 March 2015)

Winter term enrolment (14 - 23 September 2015)

## **GENERAL STUDENT INFORMATION**

Schrottova Street is the only specialized garden of the kind in this part of Europe.

### **STUDENT ASSOCIATIONS AND ACTIVITIES**

A branch of the Students' Union is active at the Faculty, as well as an association of students of pharmacy and medical biochemistry - CPSA (Croatian Pharmacy and Medical Biochemistry Students' Association). Students' Union is made up of directly elected student representatives. Student representatives are members of the Faculty Council and participate in various faculty committees.

CPSA has the status of a full member of EPSA (European Pharmaceutical Students' Association) and IPSF (International Pharmaceutical Students' Federation). CPSA is the only association representing pharmacy and medical biochemistry students in Croatia. CPSA organizes charity events at the Faculty (e.g., pancake party), voluntary blood donation in collaboration with HZTM, project Patient Consulting Event. CPSA members participate in public health campaigns (e.g., smoking, HIV/AIDS, diabetes rational antibiotic use etc.), they organize international student's exchange within the Student Exchange Programm, short-time student's exchange during academic year (TWIN Project), student's party and other projects.

The FPB branch of the eSTUDENT association has been active since October 2011. Two teams were active in our branch: the team for lectures and workshops and the team for work experience and internships.

### **FACILITIES AND EQUIPMENT**

Faculty of Pharmacy and Biochemistry works on four locations. The Faculty building at No. 1 Ante Kovačića Street houses a lecture hall with 200 seats, two seminar rooms, central library, student computer room and student common room in the yard.

Students can study and use the Internet in the central library and students' computer room.

The Faculty location at No. 2 Domagojeva Street houses a lecture hall with 80 seats and a seminar room, and that at No. 39

Schrottova Street has a lecture hall with 80 seats. All lecture halls and seminar rooms are supplied with modern audiovisual and multimedial equipment. At each department there is one or more student laboratories, and at the Department of Pharmaceutics there is also a students' pharmacy. Faculty's botanical garden of medicinal, poisonous, aromatic and food plants "Fran Kušan" in

## INFORMATION ON DEGREE PROGRAMMES

### MASTER OF PHARMACY PROGRAMME

#### Qualification awarded

Upon completion of the **Master of Pharmacy programme**, students acquire the degree of **Master of Pharmacy (MPharm)**.

#### Educational and professional goals

The Faculty of Pharmacy and Biochemistry, University of Zagreb, is the only faculty and the leading scientific-research institution in Croatia dedicated entirely to teaching and research in pharmacy and pharmaceutical sciences. Known for its excellence in pharmacy education at graduate and postgraduate levels, as well as for its contribution to science, the Faculty of Pharmacy and Biochemistry is an expert source of pharmaceutical knowledge. The Faculty has always been ready to face the challenges of rapid technological advancement of modern pharmacy, and to transfer and apply the acquired knowledge to the benefit of individuals and the community as a whole.

The goals and objectives of Master of Pharmacy programme are to educate students for competent participation in the design, development and delivery of medications for safe and efficient therapy.

Pharmacy studies at the Faculty of Pharmacy and Biochemistry of the University of Zagreb are structured as an integral ten-semester undergraduate and graduate course of studies (5 years, 300 ECTS points) leading to the degree of Master of Pharmacy. Programme emphasizes problem solving, critical thinking, and latest scientific findings related to medicines and modern medical treatments. Students learn to practice as patient-oriented healthcare professionals who will work as team with other health care providers.

In the 5th study year, students are trained for work in the health care system where, as drug experts, they promote correct and rational use of medicines. Theoretical lectures on pharmacotherapy with clinical pharmacy, pharmaceutical care, health legislature, communication skills and pharmaceutical ethics and deontology, are followed by 6-month practical training in community and hospital pharmacies. Studies are completed by taking the diploma exam and the final

exam. The Faculty issues the Diploma, which represents the ground for issuing the licence to work independently in the health care system at jobs foreseen for pharmacy profession (community and hospital pharmacies).

Pharmacy studies are multidisciplinary; they include the basic (mathematics, chemistry, physics, statistics, biochemistry, biology, molecular biology), biomedical (anatomy, physiology, pathophysiology, microbiology and parasitology, pharmacology, toxicology and haematology) and pharmaceutical courses (pharmaceutical botany, pharmacognosy, pharmaceutical chemistry, biochemistry of drugs, pharmaceuticals, drug design, drug analytics, clinical pharmacy, pharmacotherapy, cosmetology, etc.), through which students acquire specific knowledge and skills in the field of pharmacy. Pharmacy students learn the strategies of organic drug synthesis, natural sources of medicinal substances and biotechnological methods of the production of drugs and diagnostic agents. They study the physical, chemical, biological and pharmaceutical-technological characteristics of drugs and use traditional and modern methods to prove and determine medicinal substances. Pharmacy students also get conversant with the structure and functions of tissues, organs and the organism as a whole in health and disease. They acquire knowledge of different molecular mechanisms of drug action, possible adverse and harmful effects as well as interactions of drugs. They master the technology of preparing traditional and modern formulations and address the issues of storage, quality control and supervision in drug production and marketing. They develop skills of drug dispensing and communicating with patients (counselling about the choice of appropriate drug and formulation, patient compliance, monitoring side effects, correct drug information, describing potential drug and food interactions). They acquire knowledge required for research and development of new drugs and drug delivery systems.

Masters of pharmacy, after completing the one-year internship and passing the state exam, get the licence to work independently on the foreseen jobs and assignments (community and hospital pharmacies) in the health care system. Masters of pharmacy are qualified for jobs in the pharmaceutical industry (research, development, production, control and marketing of drugs), Agency for Medicinal Products and Medical Devices and

other public health institutions, academic environment, etc.

### Student practice

Student practice is organized by the Centre for Applied Pharmacy. Persons responsible for the organization and execution of student practice are Associate Professor Milena Jadrijević-Mladar Takač, PhD; Associate Professor Sanda Vladimir-Knežević, PhD; Assistant Professor Željka Vanić, PhD; and Assistant Professor Renata Jurišić Grubešić, PhD.

Practical work is mandatory in the third and fourth study years. It is organized as follows:  
**3rd year:** In the 30 hours with a mentor-pharmacist, students get familiar with: mandatory technical literature and official books at pharmacies (European and Croatian Pharmacopoeias), storage of medicines and medical substances, ordering and receiving medicines and other products sold at pharmacies, checking expiry dates, monitoring supplies, weighing monocomponent teas and sorting out preparations.

**4th year:** In the 60 hours with a mentor-pharmacist, students get familiar with food supplements (herbal preparations, vitamins and minerals, dietary products, etc.), participate in the production of extemporaneous and galenic preparations (dosage control, compounding, labelling, keeping records), learn how to apply pharmacopeial and related regulations at the pharmacy, get familiar with non-prescription medicines and their purpose, dosage, side effects, use limitations, potential interactions with other medicines and food supplements, and compare similar and/or related preparations from different manufacturers.

**5th study year:** In the course Professional Training for Pharmacists (720 hours in community and hospital pharmacies) students master: application of user pharmacy programs and procedures of keeping mandatory turnover and business records, dispensing prescription medicines and medicines from special drug groups (psychotherapeutic substances and narcotics), procedures of preparation, dispensing, distribution and monitoring turnover of medicines at hospital pharmacies. Students also acquire the knowledge and skills of correct monitoring and reporting of side effects, and are informed about the group of products "Cosmetics" and "Special Purpose Cosmetics", and master the ways of providing pharmaceutical care.

### Possible access to further education

Upon completion of **pharmacy studies**, students may continue scientific and research oriented education at postgraduate PhD studies, professional training at postgraduate specialist studies, professional training within pharmacy specialization in the health system and continuing education via relevant courses.

### Degree Thesis and Diploma Exam

The Study is completed by passing all the exams and completing the other study obligations, by making the thesis and taking the diploma exam as well as the final exam after the professional training in accordance with the study programme having been done.

Pursuant to the Ordinance on Integrated Undergraduate and Graduate Study Programmes of the University of Zagreb Faculty of Pharmacy and Biochemistry (July 2014), Article 63 and 64:

1. Degree thesis is a paper prepared by the student under the supervision of a mentor at the Faculty or some other institution enabling scientific and research work according to the Instructions for degree thesis preparation.
2. Preparation of degree thesis is organized by the Degree Thesis Commission.
3. Degree thesis is a paper written by the student under supervision of his/her mentor at the Faculty or some other institution with scientific and research work potentials according to the Guidelines for Degree Thesis Preparation.
4. At the degree examination, the student proves his/her competence to apply the knowledge and skills acquired in the course of studies as well as his/her ability to solve the problems and tasks of his/her profession.
5. Degree examination is an oral exam and consists of Degree Thesis defence and of testing the candidate's knowledge of the field covered by the Degree Thesis.
6. Degree examination is a public exam, taken before the Examining Board appointed by the Dean at the suggestion of the Degree Thesis Commission.

7. Degree Thesis Commission sets the dates of degree examinations, and informs about these dates the Commission members, the students, and the Faculty Enrolment Office.

Graduate studies end by taking the final exam before the Examining Board appointed by the Dean.

Professional exam can be taken after all the student obligations have been fulfilled, including six-month professional training for pharmacists.

The student who meets the following requirements can access the final examination:

- a. he or she studied at the Faculty for at least two years,
- b. he or she met all the requirements of compulsory and elective forms of teaching, stipulated by the executive teaching plan,
- c. he or she passed all the prescribed examinations and earned a minimum of 300 ECTS credits,
- d. he or she passed the graduation examination.

#### Examinations and other learning controls

Ordinance on Integrated Undergraduate and Graduate Study Programmes of the University of Zagreb Faculty of Pharmacy and Biochemistry (July 2014), Article 41:

1. Students' knowledge and skills can be checked at subject examinations and/or evaluated during the course (midterms, practical assignments, seminar papers, project assignments, etc.). The study programme may postulate that ECTS points for particular types of instruction may be also gained without marking students' performance or by its descriptive evaluation.
2. Examinations may be theoretical or practical and are taken only as written, or only as oral, or as written and oral exams, or by demonstration/presentation of a practical assignment.
3. Exams may be theoretical or practical, and are taken only in written form, only orally, or in written form and orally, or through presentation of a practical assignment.
4. Practical part of the examination can be taken separately from the

theoretical part. Overall examination must be completed in not more than five working days, except for special legitimate cases.

5. Examining a student at an oral examination must not take more than 30 minutes. Written examinations can last up to 120 minutes.
6. Written part of the examination can be eliminatory, except when the examination is taken before the examining board.
7. Students are entitled to access to marked written examination papers.
8. Examinations are free of charge.
9. Students cannot sit more than four times for an exam in the same course. The fourth time, the exam is taken before the examining board. Students who fail in the fourth attempt to pass the exam in the same course must take up that course again in the following academic year. Should the student fail the exam in the fourth attempt in the following academic year, he will be disallowed to continue the same programme.

#### Exam before the examining board

Article 49:

1. Dean, or in his absence the Vice Dean for Academic Affairs, appoints the examining board.
2. The examining board is made up of the course leader and two other members of the faculty teaching staff. One board member has to be from a different course.
3. The course leader cannot act as the board chairperson.
4. A student is entitled to take an exam before the examining board irrespective of his/her achievement in the written exam.
5. The decision of the examining board is made by majority vote; the examination application slip is signed by all members of the examining board.
6. Course leader enters the grade into the student's book and signs it.
7. The board chairperson is making the records of the exam before examining board.

The grade awarded by the examining board cannot be appealed.



### Course structure diagram - PHARMACY

COURSE STATUS	COURSE TITLE	TOTAL HOURS				ECTS
		L	S	E	F	
1 <sup>st</sup> semester						
Compulsory	Introduction to Pharmacy	15	0	0	0	1.5
	Mathematics with Statistical Analysis	45	30	0	0	7.5
	Cell Biology with Genetics	30	15	30	0	7.5
	Physics	30	15	30	0	7.5
	General Chemistry with Stoichiometry	60	45	30	0	11
	Total compulsory courses:	<b>180</b>	<b>105</b>	<b>90</b>	<b>0</b>	<b>35</b>
	Total elective courses:					

Physical training - the student enrolls for 30 hours

COURSE STATUS	COURSE TITLE	TOTAL HOURS				ECTS
		L	S	E	F	
2 <sup>nd</sup> semester						
Compulsory	Pharmaceutical Botany	30	15	30	0	7.5
	Sociology and HealthCare	15	15	0	0	2.5
	Analytical Chemistry 1	30	15	30	0	7.5
	Physical Chemistry 1	30	15	30	0	7.5
	Total compulsory courses:	<b>105</b>	<b>60</b>	<b>90</b>	<b>0</b>	<b>25</b>
Total elective courses:						

Physical training - the student enrolls for 30 hours

COURSE STATUS	COURSE TITLE	TOTAL HOURS				ECTS	
		L	S	E	F		
3 <sup>rd</sup> semester							
Compulsory	Analytical Chemistry 2	30	0	30	0	6	
	Physical Chemistry 2	30	15	15	0	6	
	Organic Chemistry	60	30	45	0	11.5	
	Biological Chemistry	30	0	15	0	3.5	
	Total compulsory courses:		<b>150</b>	<b>45</b>	<b>105</b>	<b>0</b>	<b>27</b>
	Total elective courses:						

Physical Training - the student enrolls for 30 hours

COURSE STATUS	COURSE TITLE	TOTAL HOURS				ECTS
		L	S	E	F	
4 <sup>th</sup> semester						
Compulsory	Physiology with Human Anatomy	60	45	0	0	9
	Microbiology with Parasitology	60	0	30	0	8
	Biochemistry	60	10	30	0	8.5
	Pharmacognosy 1	30	15	45	0	7.5
Total compulsory courses:		<b>210</b>	<b>70</b>	<b>105</b>	<b>0</b>	<b>33</b>
Total elective courses:						



	Total elective courses:					
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Physical Training – the student enrolls for 30 hours

COURSE STATUS	COURSE TITLE	TOTAL HOURS				ECTS
		L	S	E	F	
5 <sup>th</sup> semester						
Compulsory	Pharmacognosy 2	30	15	30	0	6
	Pathophysiology with Pathology	60	30	0	0	7.5
	Medicinal Chemistry 1	45	7	60	0	9
	Pharmaceutics	30	15	0	0	3.5
	Total compulsory courses:	<b>165</b>	<b>60</b>	<b>90</b>	<b>0</b>	<b>26</b>
Elective	Pharmacy Informatics	15	15	0	0	2.5
	Physical Chemistry Methods in Biomedical Research	15	0	15	0	2.5
	Health Ecology	15	0	0	0	1.5
	Applied Psychology - selected Topics	20	10	0	0	2.5
	Modern Biochemical Techniques	15	15	0	0	2.5
	Total elective courses:	<b>80</b>	<b>40</b>	<b>15</b>	<b>0</b>	<b>11.5</b>

COURSE STATUS	COURSE TITLE	TOTAL HOURS				ECTS
		L	S	E	F	
6 <sup>th</sup> semester						
	Biopharmacy with Pharmacokinetics	15	15	30	0	5
	Molecular Biology with Genetic Engineering	30	15	30	0	6

Compulsory	Clinical Biochemistry with Haematology	35	10	30	0	6
	Nutritional Biochemistry	30	0	30	0	5
	Medicinal Chemistry 2	45	8	0	0	5
	Professional Practice 1	0	0	0	30	2
	Total compulsory courses:	<b>155</b>	<b>48</b>	<b>120</b>	<b>30</b>	<b>29</b>
Elective	Spectroscopic Identification of Organic Compounds	10	10	10	0	2.5
	History of Pharmacy	15	0	0	0	1.5
	Metalloproteins - Structure and Mechanism	5	10	5	0	2
	Selected Methods of Instrumental Analysis	10	0	20	0	2.5
	Total elective courses:	<b>40</b>	<b>35</b>	<b>35</b>	<b>0</b>	<b>8.5</b>

COURSE STATUS	COURSE TITLE	TOTAL HOURS				ECTS
		L	S	E	F	
7 <sup>th</sup> semester						
Compulsory	Pharmacology	75	40	20	0	10.5
	Drug Formulation	60	0	45	0	9
	Pharmaceutical Analysis	60	15	60	0	10,5
	Total compulsory courses:	<b>195</b>	<b>55</b>	<b>125</b>	<b>0</b>	<b>30</b>
Elective	Pharmacoeconomics	30	0	0	0	2.5
	Medicinal Chemistry – Selected Topics	15	15	0	0	2.5
	Molecular Basis of Diseases and Therapy	15	15	0	0	2.5
	Applied Microbiology	20	10	0	0	2.5
	Total elective courses:	<b>80</b>	<b>40</b>	<b>0</b>	<b>0</b>	<b>10</b>

COURSE STATUS	COURSE TITLE	TOTAL HOURS				ECTS
		L	S	E	F	
8 <sup>th</sup> semester						
Compulsory	Immunology	30	0	0	0	2.5
	Drug Metabolism	45	15	30	0	8
	Magistral Formulation	0	5	40	0	3.5
	Analytical Toxicology	30	15	15	0	5
	Clinical Pharmacy and Pharmacotherapy	45	15	15	0	6
	Professional Practice 2	0	0	0	60	3
	Total compulsory courses:		<b>150</b>	<b>50</b>	<b>100</b>	<b>60</b>
Eelective	Isolation of Bioactive Natural Products	15	5	10	0	2.5
	Phytotherapy	15	15	0	0	2.5
	Experimental Pharmacology	15	0	15	0	2.5
	Analysis in Pharmaceutical Products Development	15	0	15	0	2.5
	Quality Assurance and Drug Registration	15	5	0	0	2
	Inovative Drug Delivery Systems	15	15	0	0	2.5
	Total elective courses:		<b>90</b>	<b>40</b>	<b>40</b>	<b>0</b>

COURSE STATUS	COURSE TITLE	TOTAL HOURS				ECTS
		L	S	E	F	
9 <sup>th</sup> semester						
Compulsory	Cosmetology	30	0	30	0	5
	Pharmaceutical Ethics and Deontology	15	0	0	0	1.5
	Pharmaceutical Care*	30	30	0	0	5
	Healthcare Legislation*	15	0	0	0	1.5

	Communication Skills*	0	15	0	0	1.5
	Thesis	0	0	100	0	10
	Total compulsory courses:	<b>90</b>	<b>45</b>	<b>130</b>	<b>0</b>	<b>24.5</b>
Elective	Biochemical Basis of Toxicity of Endobiotics and Xenobiotics	15	15	0	0	2.5
	Drugs Design	30	15	0	0	3.5
	Industrial Pharmacy	15	15	0	0	2.5
	Pharmacogenetics	10	15	5	0	2.5
	Personalized Healthcare	15	5	0	0	2
	Nutrition Therapy	15	15	0	0	2.5
	Sociology in Pharmacy	15	0	0	0	1.5
	Biostatistics	15	15	0	0	2.5
	Total elective courses:	<b>140</b>	<b>105</b>	<b>5</b>	<b>0</b>	<b>19.5</b>

\* Theoretical part of Professional Training for Pharmacists

COURSE STATUS	COURSE TITLE	TOTAL HOURS				ECTS
		L	S	E	F	
10 <sup>th</sup> semester						
Compulsory	Professional Training for Pharmacists	0	0	0	720	30

*L – lectures; S – seminars; E – experimental work; F – field classes*

## **MASTER OF MEDICAL BIOCHEMISTRY PROGRAMME**

### **Qualification awarded**

Upon completion of the **Master of Medical Biochemistry programme**, students acquire the degree of **Master of Medical Biochemistry and Laboratory Medicine (MMedBiochem)**.

### **Educational and professional goals**

The Faculty of Pharmacy and Biochemistry, University of Zagreb, is the only faculty and the leading scientific-research institution in Croatia dedicated entirely to teaching and research in medical biochemistry. Renowned for its excellence in medical-biochemical education, both undergraduate and graduate, and its contribution to science, the Faculty constitutes an expert source of extensive medical-biochemical knowledge. The Faculty has always been ready to face challenges ensuing from the rapid technological progress of contemporary medical biochemistry, and to extend, disseminate and apply the acquired knowledge and skills to the benefit of individuals and the community as a whole. The goals and objectives of Master of Medical biochemistry programme are to train students to examine human life in health and disease from the chemical, biochemical and molecular-biological aspects. Medical biochemistry is an interdisciplinary scientific field, the scientific findings of which are applied in the health system with the aim of efficient diagnosing, disease and therapy monitoring, and prevention of pathological conditions. Modern medicine, closely connected with the development of science and technology, is today inconceivable without medical-biochemical diagnostics. Applying biochemical, hematological, molecular-biological and chemical procedures, techniques and technologies of testing biological materials, masters in medical biochemistry and laboratory medicine contribute to determination of causes of disease, health maintenance, disease prevention, monitoring treatment outcomes and to new scientific findings. Medical biochemistry integrates the findings of modern general and analytical biochemistry and cellular and molecular biology with physiological and pathophysiological processes, making it possible to understand pathological processes at the molecular level and to identify novel

diagnostic and prognostic indicators of diseases.

Medical biochemistry studies are structured as an integral ten-semester undergraduate and graduate course of studies (5 years, 300 ECTS points) leading to the award of the degree of Master of Medical Biochemistry and Laboratory Medicine.

Medical biochemistry studies are multidisciplinary; they include the basic (mathematics, chemistry, physics, statistics, biochemistry, biology, molecular biology, genetics), biomedical (anatomy, physiology, pathophysiology, histology and cytology, immunology, microbiology and parasitology, pharmacology, toxicology and haematology) and medical biochemistry courses (general clinical biochemistry, transfusiology with immuno-haematology, coagulation, integrated course of laboratory diagnostics, molecular diagnostics, etc.) through which students acquire specific knowledge and skills in the field of medical biochemistry. The extensive practical programme and research projects develop teamwork skills and introduce students to the practical aspects of modern medical biochemistry.

The curriculum trains masters of medical biochemistry and laboratory medicine to expertly interpret patients' biochemical and haematological findings, thereby making them important members of the medical team involved in patient treatment.

As part of the course in medical biochemistry, students will acquire knowledge and skills of communication sciences, laboratory management, electronic data processing, and laboratory system computerization.

In the 5th study year, students are trained for work in the health care system. Theoretical instruction in professional courses is followed by 6-month professional training in medical-biochemical laboratories. The course is completed by taking the diploma exam and the final exam. The Faculty issues the Diploma, which represents the basis for issuing the licence to work independently in the profession.

Masters in medical biochemistry and laboratory medicine can work in medical-biochemical laboratories of primary health care institutions, polyclinics, general and special hospitals, clinics, teaching hospitals and private health institutions, in research, analytical, biotechnological laboratories, marketing of biomedical diagnostic products, public health institutions, and academic institutions.

## Professional practice

Persons responsible for the organization and execution of student practice for medical biochemistry students is Marija Grdić Rajković, PhD.

Student practice is an obligatory subject during the third and fourth study years and is organized in the following way:

**3rd year:** In the 30 hours with a mentor-master in medical biochemistry, students take part in less demanding operations in the medical-biochemical laboratory: they get familiar with the recommended methods and appertaining reference intervals in general medical biochemistry for the following laboratory tests: metabolites and substrates; enzymes; electrolytes; trace elements; proteins; lipids; and qualitative urine analysis.

**4th year:** In the 60 hours with a mentor-master in medical biochemistry, students take part in less demanding operations in the cytological, microbiological and molecular diagnostics laboratories. They learn and independently apply simple methods of the parasitology laboratory and molecular diagnostics and cytology laboratories.

**5th year:** In the course Professional Training, students acquire the knowledge and skills for independent work in the medical-biochemical laboratory. The program comprises two professional units: medical biochemistry (500 hours) and hematology with coagulation (250 hours). Students acquire the knowledge and skills for taking, identification and delivery of samples, sample preparation for analysis, treatment of samples in biochemical, hematological and coagulation analyzers.

### Possible access to further education

Upon completion of **medical biochemistry studies**, students may continue scientific and research oriented education at postgraduate PhD studies, professional training at postgraduate specialist studies and within medical biochemistry specialization in the health system and continuing education via relevant courses.

### Degree Thesis and Diploma Exam

The Study is completed by passing all the exams and completing the other study obligations, by making the thesis and taking the public graduation examination as well as the final exam after the professional training in accordance with the study programme having been done.

Pursuant to the Ordinance on Integrated Undergraduate and Graduate Study Programmes of the University of Zagreb Faculty of Pharmacy and Biochemistry (July 2014), Article 63 and 64:

8. Degree thesis is a paper prepared by the student under the supervision of a mentor at the Faculty or some other institution enabling scientific and research work according to the Instructions for degree thesis preparation.
9. Preparation of degree thesis is organized by the Degree Thesis Commission.
10. Degree thesis is a paper written by the student under supervision of his/her mentor at the Faculty or some other institution with scientific and research work potentials according to the Guidelines for Degree Thesis Preparation.
11. At the degree examination, the student proves his/her competence to apply the knowledge and skills acquired in the course of studies as well as his/her ability to solve the problems and tasks of his/her profession.
12. Degree examination is an oral exam and consists of Degree Thesis defence and of testing the candidate's knowledge of the field covered by the Degree Thesis.
13. Degree examination is a public exam, taken before the Examining Board appointed by the Dean at the suggestion of the Degree Thesis Commission.
14. Degree Thesis Commission sets the dates of degree examinations, and informs about these dates the Commission members, the students, and the Faculty Enrolment Office.

Graduate studies end by taking the final exam before the Examining Board appointed by the Dean.

final exam can be taken after all the student obligations have been fulfilled, including six-month professional training for pharmacists. The student who meets the following requirements can access the final examination:

- he or she studied at the Faculty for at least two years,
- he or she met all the requirements of compulsory and elective forms of

teaching, stipulated by the executive teaching plan,

- he or she passed all the prescribed examinations and earned a minimum of 300 ECTS credits,
- he or she passed the graduation examination.

### Examinations and other learning controls

Ordinance on Integrated Undergraduate and Graduate Study Programmes of the University of Zagreb Faculty of Pharmacy and Biochemistry (July 2014), Article 41:

1. Students' knowledge and skills can be checked at subject examinations and/or evaluated during the course (midterms, practical assignments, seminar papers, project assignments, etc.). The study programme may postulate that ECTS points for particular types of instruction may be also gained without marking students' performance or by its descriptive evaluation.
2. Examinations may be theoretical or practical and are taken only as written, or only as oral, or as written and oral exams, or by demonstration/presentation of a practical assignment.
3. Exams may be theoretical or practical, and are taken only in written form, only orally, or in written form and orally, or through presentation of a practical assignment.
4. Practical part of the examination can be taken separately from the theoretical part. Overall examination must be completed in not more than five working days, except for special legitimate cases.
5. Examining a student at an oral examination must not take more than 30 minutes. Written examinations can last up to 120 minutes.
6. Written part of the examination can be eliminatory, except when the examination is taken before the examining board.
7. Students are entitled to access to marked written examination papers.
8. Examinations are free of charge.
9. Students cannot sit more than four times for an exam in the same course. The fourth time, the exam is taken before the examining board. Students who fail in the fourth attempt to pass

the exam in the same course must take up that course again in the following academic year. Should the student fail the exam in the fourth attempt in the following academic year, he will be disallowed to continue the same programme.

### Exam before the examining board

Article 49:

1. Dean, or in his absence the Vice Dean for Academic Affairs, appoints the examining board.
2. The examining board is made up of the course leader and two other members of the faculty teaching staff. One board member has to be from a different course.
3. The course leader cannot act as the board chairperson.
4. A student is entitled to take an exam before the examining board irrespective of his/her achievement in the written exam.
5. The decision of the examining board is made by majority vote; the examination application slip is signed by all members of the examining board.
6. Course leader enters the grade into the student's book and signs it.
7. The board chairperson is making the records of the exam before examining board.

The grade awarded by the examining board cannot be appealed.

### Course structure diagram - MEDICINAL BIOCHEMISTRY

COURSE STATUS	COURSE TITLE	TOTAL HOURS				ECTS
		L	S	E	F	
1 <sup>th</sup> semester						
Compulsory	Introduction to Medical Biochemistry	15	0	0	0	1,5
	Mathematics with Statistical Analysis	45	30	0	0	7,5
	Cell Biology with Genetics	30	15	30	0	7,5
	Physics	30	15	30	0	7,5
	General Chemistry with Stoichiometry	60	45	30	0	11
	Total compulsory courses:	<b>180</b>	<b>105</b>	<b>90</b>	<b>0</b>	<b>35</b>
	Total elective courses:					

Physical Training – the student enrolls for 30 sati

COURSE STATUS	COURSE TITLE	TOTAL HOURS				ECTS
		L	S	E	F	
2 <sup>th</sup> semester						
Compulsory	Cytology and histology	30	15	10	0	5,5
	Sociology and Healthcare	15	15	0	0	2,5
	Analytical Chemistry 1	30	15	30	0	7,5
	Physical Chemistry 1	30	15	30	0	7,5
	Bioethics	15	5	0	0	2
	Total compulsory courses:	<b>120</b>	<b>65</b>	<b>70</b>	<b>0</b>	<b>25</b>
	Total elective courses:					

Physical Training – the student enrolls for 30 sati



COURSE STATUS	COURSE TITLE	TOTAL HOURS				ECTS
		L	S	E	F	
3 <sup>th</sup> semester						
Compulsory	Analytical Chemistry 2	30	0	30	0	6
	Physical Chemistry 2	30	15	15	0	6
	Organic Chemistry	60	30	45	0	11
	Biological Chemistry	30	15	15	0	6
	Total compulsory courses:	<b>150</b>	<b>60</b>	<b>105</b>	<b>0</b>	<b>29</b>
	Total elective courses:					

Physical Training – the student enrolls for 30 sati

COURSE STATUS	COURSE TITLE	TOTAL HOURS				ECTS
		L	S	E	F	
4 <sup>th</sup> semester						
Compulsory	Physiology with Human Anatomy	60	45	0	0	9
	Microbiology with Parasitology	60	0	30	0	8
	Biochemistry	60	15	45	0	10,5
	Medicinal Chemistry	30	0	0	0	3,5
	Total compulsory courses:	<b>210</b>	<b>60</b>	<b>75</b>	<b>0</b>	<b>31</b>
	Total elective courses:					

Physical Training – the student enrolls for 30 sati

COURSE STATUS	COURSE TITLE	TOTAL HOURS				ECTS
		L	S	E	F	
5 <sup>th</sup> semester						
Compulsory	Pathophysiology and Pathology	60	30	0	0	7,5
	General Clinical Biochemistry	60	30	90	0	13,5
	Hematology 1	30	5	25	0	5
	Physical Biochemistry	30	20	10	0	5
	Total compulsory courses:	<b>180</b>	<b>85</b>	<b>125</b>	<b>0</b>	<b>31</b>
Elective	Biological Membranes and Cell Signalling	15	15	0	0	2,5
	Physical Chemistry Methods in Biomedical Research	15	0	15	0	2,5
	Environmental Health	15	0	0	0	1,5
	Modern Biochemical Techniques	15	15	0	0	2,5
	Total elective courses:	<b>60</b>	<b>30</b>	<b>15</b>	<b>0</b>	<b>9</b>

COURSE STATUS	COURSE TITLE	TOTAL HOURS				ECTS
		L	S	E	F	
6 <sup>th</sup> semester						
Compulsory	Clinical Biochemistry of Organs and Organ Systems 1	30	15	0	0	4
	Analytical Biochemistry	30	0	30	0	5
	Hematology 2	25	15	20	0	5
	Immunology	30	15	0	0	4
	Molecular Biology with Genetic Engineering	30	15	30	0	6
	Professional Practice 1	0	0	0	30	2
	Total compulsory courses:	<b>145</b>	<b>45</b>	<b>80</b>	<b>30</b>	<b>26</b>

Elective	Spectroscopic Identification of Organic Compounds	10	10	10	0	2,5
	Metalloproteins - Structure and Mechanism	5	10	5	0	2
	Selected Methods of Instrumental Analysis	10	0	20	0	2,5
	Membrane Transport of Substances and Information	15	15	0	0	2,5
	Total elective courses:	<b>40</b>	<b>35</b>	<b>35</b>	<b>0</b>	<b>9,5</b>

COURSE STATUS	COURSE TITLE	TOTAL HOURS				ECTS
		L	S	E	F	
7 <sup>th</sup> semester						
Compulsory	Humane and Population Genetics	15	5	10	0	2,5
	Molecular Diagnostics	30	15	15	0	5
	Coagulation	15	15	15	0	4
	Clinical Biochemistry of Organ and Organ Systems 2	30	15	30	0	6
	Pharmacology	75	10	20	0	8,5
	Immunochemistry	14	8	8	0	2,5
	Neurochemistry	8	4	3	0	1,5
Total compulsory courses:		<b>187</b>	<b>72</b>	<b>101</b>	<b>0</b>	<b>30</b>
Elective	NutritionTherapy	15	15	0	0	2,5
	Selected Topics from Applied Psychology	15	15	0	0	2,5
	Communication Skills	0	15	0	0	1,5
	Total elective courses:	<b>30</b>	<b>45</b>	<b>0</b>	<b>0</b>	<b>6,5</b>

COURSE STATUS	COURSE TITLE	TOTAL HOURS				ECTS
		L	S	E	F	
8 <sup>th</sup> semester						
Compulsory	Nutritional Biochemistry	30	0	30	0	5
	Special Topics in Clinical Biochemistry	15	15	30	0	5
	Drug Metabolism	30	0	30	0	5
	Transfusiology and Immunohaematology	15	0	15	0	2,5
	Analytical Toxicology	30	15	15	0	5
	Professional Practice 2	0	0	0	60	3
	Total compulsory courses:	<b>120</b>	<b>45</b>	<b>120</b>	<b>60</b>	<b>25,5</b>
Elective	Culturing of Cells and Cell Lines	10	10	10	0	2,5
	Bioanorganic Chemistry	10	0	5	0	1,5
	Free Radicals and Antioxidants in Health and Disease	15	8	7	0	2,5
	Total elective courses:	<b>35</b>	<b>18</b>	<b>22</b>	<b>0</b>	<b>6,5</b>

COURSE STATUS	COURSE TITLE	TOTAL HOURS				ECTS
		L	S	E	F	
9 <sup>th</sup> semester						
Compulsory	Biostatistics	15	15	0	0	2,5
	Integrated Laboratory Diagnostics Course	0	30	0	0	2,5
	Instruments, Procedures and Reagents Evaluation	15	15	0	0	2,5
	Organization and Management of Medical Biochemistry Laboratory*	30	15	0	0	3,5
	Healthcare Legislation in Laboratory Medicine*	15	0	0	0	1,5
	Diploma Thesis	0	0	100	0	10
	Total compulsory courses:	<b>75</b>	<b>75</b>	<b>100</b>	<b>0</b>	<b>22,5</b>

Elective	Laboratory Endocrinology	15	10	5	0	2,5
	Epidemiology Basics and Microbial Diagnostics	15	0	15	0	2,5
	Point of Care Testing	6	3	6	0	1,5
	Complex Genetics	15	15	0	0	2,5
	Emergency Laboratory Diagnostics	15	10	5	0	2,5
	Rational Laboratory Diagnostics	10	5	0	0	1,5
	Radionuclides Application in Diagnostics	15	0	0	0	1,5
	Total elective courses:	<b>91</b>	<b>43</b>	<b>31</b>	<b>0</b>	<b>14,5</b>

\* Theoretical part of Professional Training for Pharmacists

COURSE STATUS	COURSE TITLE	TOTAL HOURS				ECTS
		L	S	E	F	
10 <sup>th</sup> semester						
Compulsory	Professional Training	0	0	0	750	30
	Total compulsory courses:				<b>750</b>	<b>30</b>
	Total elective courses:					

*L – lectures; S – seminars; E – experimental work; F – field classes*

## PHD PROGRAMME IN "PHARMACEUTICAL-BIOCHEMICAL SCIENCES"

### Qualification awarded

Upon completion of the PhD programme in "Pharmaceutical-Biochemical Sciences" and defence of the PhD thesis, students acquire the academic degree of **Doctor of Science (Doctor of Philosophy, PhD)**, scientific field **Biomedicine and Health**.

### Educational and professional goals

The goal of PhD programme is to prepare independent, creative scientists to excel in academia, the pharmaceutical industry and other research institutions.

PhD studies in "Pharmaceutical-Biochemical Sciences" of the Faculty of Pharmacy and Biochemistry, University of Zagreb, are organized in two modules: Pharmaceutical Sciences and Medical-Biochemical Sciences. PhD studies are structured and run as full-time or part-time study courses.

The programme is intended for pharmacists, medical biochemists and other professionals in the field of Biomedicine and Health and the field of Natural Sciences.

Doctoral studies last 3-4 years for full-time and 6-8 years for part-time students, during which time a minimum of 180 ECTS credits have to be earned.

The studies comprise A) organized lectures (basic, modular, methodological and elective courses) and B) active engagement in research. PhD studies end by taking an exam, favourable assessment of research activities, award of a passing grade and defence of the PhD thesis.

Courses are divided in 4 ECTS credit point groups:

Credit point groups of courses	ECTS
1. Basic courses	4
2. Modular courses	10
3. Methodological courses	4
4. Elective courses	18

The remaining required ECTS points (144 ECTS points) can be acquired through different forms of compulsory and elective scientific activities.

### Possible access to further education

Upon completion of **postgraduate studies in "Pharmaceutical-Biochemical Sciences"**, students may continue education within postdoctoral training at different universities and scientific institutions in Croatia and abroad.

### Tuition and fees

The tuition fee, extra costs of postgraduate studies as well as the conditions and method of payment are determined by the Faculty.

### Doctoral thesis

Postgraduate PhD studies end with the preparation and defence of the PhD thesis.

The PhD is the product of intensive research at the doctoral level, distinguished by its deeper, more comprehensive, professional and scholarly treatment of the subject. The PhD thesis is expected to represent independent and original research in the field of the candidate's postgraduate study. It must add to understanding in the candidate's field. The project must be of sufficient difficulty and depth to test the candidate's ability to carry out research independently, and it should show a mastery of the skills needed for such research.

## **POSTGRADUATE SPECIALIST STUDIES**

### **Educational and professional goals**

Postgraduate specialist studies at the Faculty of Pharmacy and Biochemistry, University of Zagreb, are structured and run as separate studies of one (2 semesters) or two (4 semesters) years duration or as a mandatory part of a health specialization.

The studies are a form of continuing education, or life-long learning, for pharmacists, medical biochemists and related professions.

Programmes of postgraduate specialist studies are harmonized with the European system of point transfer, in which the total point value of course contents taken amounts to 60-120 ECTS.

**Starting from academic year 2010./2011. the following postgraduate specialist study courses are offered at the Faculty of Pharmacy and Biochemistry:**

**Dermatopharmacy and Cosmetology, Drug Development, Phytopharmacy with Dietotherapy, Clinical Pharmacy, Toxicology, Molecular Diagnostics, Medical Biochemistry and Laboratory Medicine, and Pharmacogenomics: a novel approach to therapy optimization.**

### **Tuition fees**

Tuition fees are paid by students themselves or with support of a government institution, legal or physical entity that has referred them to the Faculty.

The amount of the fee, tuition fee for foreign students, extra costs of postgraduate specialist studies, the manner and terms of payment are determined by the Faculty.

### **Specialist degree thesis**

Postgraduate specialist studies end by students' writing and defending a specialist degree thesis, an independent paper proving that the candidate has acquired specialized professional knowledge required for highly professional jobs.

### **Qualification awarded**

Upon completion of studies, the Faculty issues a diploma and awards the academic degree of master of a profession or part of profession corresponding to the study program.