

## POSTGRADUATE STUDY BIOMEDICAL TECHNOLOGY

### 1 Introduction

In the last decades medical science has experienced stunning advancement, visible in many fields medicine is being intertwined with. Unavoidable intertwining of medicine and other natural and humanistic science branches has resulted in technological advancement, which could be mastered only by the professionals with interdisciplinary knowledge. Important part of the particularly fast advancement in the field of interdisciplinary knowledge linked with medicine is happening in the field of technical knowledge. Usage of new materials, up-to date information technology, development of electronics, robotics, opto-electronics – are all fields which are accompanying modern medicine. Biomedical technology in Slovenia is a new postgraduate program, which interdisciplinary connect natural-technical science with medicine. There was no this kind of postgraduate study program in Slovenia before. Program, presented in this brochure, tries to link interdisciplinary technical science with medical knowledge on postgraduate level.

University of Maribor formed and advertised postgraduate study program »Biomedical Technology« after positive references of the Council for High Education of the Republic of Slovenia (Decision No 4, Session on 15th April 2005) and all other necessary procedures. In the academic year 2005/2006, first students were enrolled.

Rapid development of biomedical and engineering sciences urged establishment of a new postgraduate study program that had not existed in Slovenia before. Biomedical technology combines knowledge about clinical medicine, biochemistry, chemistry and chemical engineering, physics, mathematics, computing and informatics, electrical engineering and other related sciences. Postgraduate study program Biomedical Technology at the University of Maribor is organized and carried out by the following departments:

- Faculty of Medicine
- Faculty of Electrical Engineering and Computer Science
- Faculty of Chemistry and Chemical Engineering
- Faculty of Mechanical Engineering
- Josef Stefan Institute (Ljubljana, Slovenia)

Parts of the program are carried out in collaborations with the researchers from the institutions with which we have signed agreements.

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## **2 Basic goals of the postgraduate - doctoral study of Biomedical Technology**

Doctoral study goals:

- to educate professionals who will be able to use and develop research methodology independently in the chosen interdisciplinary field;
- to enable highly educated professionals to perform interdisciplinary research and development in the different modern medicine and technical fields;
- education of professionals who will be able to raise their pedagogical knowledge to the more advanced – university level.

Goal of Biomedical Technology doctoral study program is to deepen researching knowledge about new biomaterials, usage of the up-to-date information technologies, electronics, robotics, etc, as well as development of the modern technology accompanying fields. Apart from theoretical themes, lectures, seminars and laboratory work, syllabus also demands fundamental, applicative and developmental researching project tasks.

After accomplishing doctoral study, candidates will be competent to carry out independent research and acquire new scientific recognitions, to develop new diagnostic and treatment methods in depth, and will be qualified for faster application of diagnostic and treatment methods from abroad. Candidates will also be able to conduct research clinical work, as well as applicative and fundamental research work in depth.

Throughout Biomedical Technology program we will strive to:

- educate students in the field of biomedical technology
- to enable basic and applicative research and clinical study within wide range of biomedical technology, for example in health care, virtual medicine, telemedicine, public health and measurement procedures, analysis of bioelectrical signals, gerontotechnology, robotics, computing, modelling and analysis of the images, biomaterials in medicine, etc.

## **3 Curriculum, carriers and program credit evaluation**

Biomedical Technology lasts 6 semesters (3 years). Study obligations of the whole programme are entirely in conformity with the Law and Measures of the Council of the Republic of Slovenia for Higher Education (ZViS, 36. in 37. Article). Study program is evaluated by ECTS – European Credit Transfer System. Thus the program can be directly included in the international student exchange programme with the countries also applying ECTS.

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**1st year:**

Obligatory subjects:

Biomedical Informatics	9 ECTS credits
Scientific Research Methods	3 ECTS credits
Individual Research Work 1 – IRW 1	15 ECTS credits
Individual Research Work 2 with Seminar Work – IRW 2	12 ECTS credits
	= 33 ECTS credits

Six basic subjects, of which students can choose three, and gain  $3 \times 9 = 27$  ECTS credits

1 semester			2 semester		
Subject	Kind of subject	ECTS	Subject	Kind of subject	ECTS
Biomedical Informatics	Obligatory	9	IRW 2 with seminar	Obligatory	12 [2*]
Scientific Research Methods	Obligatory	3	2nd Basic subject	Basic	9
1st Basic subject	Basic	9	3rd Basic subject	Basic	9
IRW 1	Obligatory	9			
<b>Total</b>		<b>30</b>			<b>30</b>
<b>Contact hours*</b>		<b>21</b>			<b>20</b>
<b>IRW</b>		<b>9</b>			<b>10</b>
<b>Total of contact hours 41 ECTS</b>					
<b>Total of IRW 19 ECTS</b>					

**2nd year:**

Obligatory subjects: Transferable Knowledge – 3 ECTS, IRW 3 – 21 ECTS, IRW 4 – 24 ECTS = 48 ECTS.  
Candidate gains 12 ECTS credits (2 x 6) for two Optional subjects.

3 semester			4 semester		
Subject	Kind of subject	ECTS	Subject	Kind of subject	ECTS
Transferable Knowledge	Obligatory	3	2nd Optional subject	Optional	6
1st Optional subject	Optional	6	IRW 4	Obligatory	24
IRW 3	Obligatory	21			
<b>Total</b>		<b>30</b>			<b>30</b>
<b>Contact hours*</b>		<b>9</b>			<b>6</b>
<b>IRW</b>		<b>21</b>			<b>24</b>
<b>Total of contact hours 15 ECTS</b>					
<b>Total of IRW 45 ECTS</b>					

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### 3rd year:

Candidate gains 30 ECTS credits with IRW 5 and 30 ECTS credits with IRW 6. required for doctoral dissertation.

5 semester			6 semester		
Subject	Kind of subject	ECTS	Subject	Kind of subject	ECTS
IRW 5 - Presentation of doctoral dissertation topic	Obligatory	30 [2*]	Preparation and defence of the doctoral dissertation	Obligatory	30 [2*]
<b>Total</b>		<b>30</b>			<b>30</b>
<b>Contact hours*</b>		<b>2</b>			<b>2</b>
<b>IRW</b>		<b>28</b>			<b>28</b>
<b>Total of contact hours 4 ECTS</b>					
<b>Total of IRW 56 ECTS</b>					

### 1<sup>st</sup> year

#### OBLIGATORY SUBJECTS

	Obligatory Subjects	Lecturer	ECTS
1.	Biomedical Informatics	Full prof. Dejan DINEVSKI Assoc. prof. Miljenko KRIŽMARIČ	9
2.	Scientific Research Methods	Assist. prof. Petra POVALEJ BRŽAN	3
3.	<i>IRW 1</i>	/	9
4.	<i>IRW 2 WITH SEMINAR</i>	/	12

#### BASIC SUBJECTS

	Basic Subjects	Lecturer	ECTS
1.	Biophysics	Full prof. Marko MARHL	9
2.	Biochemistry	Full prof. Uroš POTOČNIK	9
3.	Molecular Biology	Full prof. Uroš POTOČNIK	9
4.	Genetics	Full prof. Nadja KOKALJ-VOKAČ Full prof. Peter DOVČ Full prof. Damjan GLAVAČ	9
5.	Pharmaceutical Biotechnology	Assist. prof. Uroš MAVER Full prof. Uroš POTOČNIK	9
6.	Research in Clinical Practice	Full prof. Ivan KRAJNC	9

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2<sup>nd</sup> year

### OBLIGATORY SUBJECTS

	Obligatory Subjects	Lecturer	ECTS
1.	Transferable Knowledge		3
2.	IRW 3		21
3.	IRW 4		24

### OPTIONAL SUBJECTS

	Optional Subjects	Lecturer	ECTS
1.	Bio-ceramics	Full prof. Tomaž KOSMAČ Full prof. Miha DROFENIK	6
2.	Nanoparticles in Biomedicine	Full prof. Darko MAKOVEC	6
3.	Nutraceuticals and New Trends in Nutrition	Full prof. Dušanka MIČETIĆ TURK	6
4.	Synthesis, Structure and Characteristics of Polymers	Full prof. Peter KRAJNC Full prof. Simona STRNAD	6
5.	Bioactive Oriented Polymers	Full prof. Karin STANA-KLEINSCHEK Full prof. Simona STRNAD	6
6.	Synthetic Biopolymers	Full prof. Peter KRAJNC	6
7.	Membrane Mass Transport Phenomena	Full prof. Željko KNEZ	6
8.	Polymeric Membranes in Medicine	Full prof. Peter KRAJNC	6
9.	Selected Topics in Cell Biology	Assoc. prof. Saša LIPOVŠEK	6
10.	Microbial Pathogenesis	Full prof. Maja RUPNIK	6
11.	Microbiological Typing Methods	Full prof. Maja RUPNIK	6
12.	Cell Physiology	Full prof. Marjan SLAK RUPNIK Assist. prof. Andraž STOŽER	6
13.	Methods in Cell Physiology	Full prof. Marjan SLAK RUPNIK Assist. prof. Andraž STOŽER	6
14.	Mathematical Physiology	Full prof. Marjan SLAK RUPNIK Full prof. Milan BRUMEN Assist. prof. Andraž STOŽER	6
15.	Clinical Biochemistry and Laboratory Medicine	Full prof. Uroš POTOČNIK	6
16.	Clinical Pharmacology	Assoc. prof. Sebastjan BEVC	6
17.	Clinical Pharmacokinetics	Assist. prof. Uroš MAVER Assoc. prof. Sebastjan BEVC	6
18.	Toxicology of the Pharmaceutical Treatment	Assist. prof. Uroš MAVER Assoc. prof. Sebastjan BEVC	6
19.	Pharmacoepidemiology and Pharmacoconomics	Assist. prof. Uroš MAVER Assist. prof. Eva TURK	6

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20.	System Theory	Full prof. Rajko SVEČKO	6
21.	Telematics	Full prof. Žarko ČUČEJ	6
22.	Biomedical Signal Processing	Full prof. Aleš HOLOBAR	6
23.	Artificial Intelligence Methods	Assoc. prof. Damjan STRNAD	6
24.	NMR in Biomedicine	Full prof. Igor SERŠA	6
25.	Biomedical Electronics and Photonics	Full prof. Denis ĐONLAGIČ	6
26.	Research Methods in Pathology	Full prof. Rastko GOLOUH	6
27.	Endoscopy and Ultrasound in Gastroenterology	Assoc. prof. Marjan SKALICKY	6
28.	Neurosurgery	Full prof. Tadej STROJNIK	6
29.	Biomechanics, Osteology, Osteosynthesis	Assoc. prof. Andrej ČRETNIK	6
30.	Therapeutic Methods in Anaesthesiology	Full prof. Mirt KAMENIK	6
31.	Gynecologic Oncology	Full prof. Iztok TAKAČ	6
32.	Three-Dimensional Ultrasonography in Neurology	Assoc. prof. Erih TETIČKOVIČ	6
33.	Nephrology	Full prof. Radovan HOJS Full prof. Breda PEČOVNIK BALON	6
34.	Tissue Oxygenation, Metabolism and Microcirculation	Assoc. prof. Matej PODBREGAR	6
35.	Cardiology	Full prof. Andreja SINKOVIČ, Full prof. Matej PODBREGAR	6
36.	Clinical Immunology	Full prof. Ivan KRAJNC	6
37.	Infectious Diseases	Assist. prof. Nina GORIŠEK MIKSIČ	6
38.	Chosen Chapters on Paediatrics	Assoc. prof. Nataša MARČUN VARDAR	6
39.	Chosen Chapters from Ophthalmology	Full prof. Dušica PAHOR	6
40.	Selected Topics from Psychiatry	Assist. prof. Hojka GREGORIČ KUMPERŠČAK	6
41.	Care of Elderly People in a Field of Gerontology Technology	Full prof. Zmago TURK	6
42.	Biomechanics Load of Low Back	Full prof. Zmago TURK	6
43.	Molecular and Cellular Endocrinology	Full prof. Marjan SLAK RUPNIK Assist. prof. Andraž STOŽER	6
44.	Ethics of Bio-Medical Research	Full prof. Matjaž ZWITTER	6
45.	Carcinogenesis and Tumor Biology	Full prof. Matjaž ZWITTER	6
46.	Molecular Biophysics	Full prof. Janez ŠTRANCAR	6
47.	Materials for Controlled Drug Delivery	Full prof. Peter KRAJNC	6
48.	Pharmacogenomics	Full prof. Uroš POTOČNIK	6
49.	Vascular Implants	Assist. prof. Nina KOBILICA	6

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50.	Assessment of Cardiac and Circulatory function	Assoc. prof. Gorazd VOGA	6
51.	New Technologies in Family Medicine	Assoc. prof. Zalika KLEMENC KETIŠ	6
52.	Nutraceuticals and Technology	Full prof. Mojca ŠKERGET	6
53.	Functional Cell Models	Full prof. Uroš POTOČNIK	6
54.	Breast Oncology	Full prof. Iztok TAKAČ	6
55.	Urogynecology and Reconstructive Surgery	Full prof. Igor BUT	6
56.	Maxillofacial Surgery Introduction to Stomatology	Assist. prof. Bogdan ČIZMAREVIČ	6
57.	Tuboperitoneal Infertility	Assoc. prof. Milan RELJIČ	6
58.	Mechanisms and Biomechanics of Injury in Trauma	Assoc. prof. Andrej ČRETNIK	6
59.	Clinical Pathophysiology of Emergencies	Assoc. prof. Dušan MEKIŠ	6
60.	Intelligent Data Analysis in Medicine	Full prof. Milan ZORMAN	6
61.	Applied Biostatistics in Clinical Research	Full prof. Peter KOKOL	6
62.	Applications of Molecular Immunology in Clinical Practice	Full prof. Ivan KRAJNC Full prof. Uroš POTOČNIK	6
63.	Modern Surgical Techniques and Applied Surgical Anatomy	Full prof. Vojko FLIS	6
64.	Experimental Surgery	Full prof. Vojko FLIS	6
65.	Dermatovenerology	Assoc. prof. Jovan MILJKOVIČ	6
66.	Chosen Chapters on Dermatooncology	Assoc. prof. Jovan MILJKOVIČ	6
67.	Comprehensive Approach Towards Health Problems	Assoc. prof. Zalika KLEMENC KETIŠ	6
68.	Corporate Governance in Health Care	Full prof. Borut BRATINA Full prof. Žan Jan OPLONIK	6
69.	Urology – Selected Topics	Assist. prof. Tine HAJDINJAK	6
70.	Telemedicine	Full prof. Dejan DINEVSKI	6
71.	Molecular Allergology	Assoc. prof. Peter KOROŠEC	6
72.	Female and Male Infertility	Full prof. Veljko VLAISAVLJEVIČ	6
73.	Reproductive Biology and Embryology	Assoc. prof. Borut KOVAČIČ Full prof. Veljko VLAISAVLJEVIČ	6
74.	Advanced Multidisciplinary Analytics in Biomedicine	Assist. prof. Uroš MAVER Assist. prof. Matjaž FINŠGAR	6
75.	Chosen Chapters from Emergency Medicine	Assist. prof. Matej STRNAD	6
76.	Selected Chapters from Gastroenterology and Hepatology	Full prof. Pavel SKOK	6

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**3rd year:**

**OBLIGATORY SUBJECTS**

	Obligatory Subjects	Lecturer	ECTS
1.	IRW 5 – Presentation of doctoral dissertation topic		30
2.	Preparation and defence of the doctoral dissertation		30

**4 Kind of the subject units regarding its percentage in the structure of the programme**

**First year:**

SUBJECT	KIND OF SUBJECT	ECTS	PERCENTAGE (%)
Biomedical informatics	Obligatory	9	15
Scientific Research Methods	Obligatory	3	5
IRW 1	Obligatory	9	15
IRW 2 WITH SEMINAR	Obligatory	12	20
1st Basic Subject	Basic	9	15
2nd Basic Subject	Basic	9	15
3rd Basic Subject	Basic	9	15

**Second year:**

Study syllabus will be carried out if **at least five** candidates have applied, otherwise it will be carried out **individually**.

SUBJECT	KIND OF SUBJECT	ECTS	PERCENTAGE (%)
1st Optional subject	Optional	6	10
2nd Optional subject	Optional	6	10
Transferable Knowledge	Obligatory	3	5
IRW 3	Obligatory	21	35
IRW 4	Obligatory	24	40

**Third year:**

SUBJECT	KIND OF SUBJECT	ECTS	PERCENTAGE (%)
IRW 5 – Presentation of doctoral dissertation topic	Obligatory	30	50
Preparation and defence of the doctoral dissertation	Obligatory	30	50



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## 5 Number and percentage of lectures, seminars and practical work

Year	Hours total	Lectures	%	Seminar	%	Lab. work	%	Others	%	IRW	%
1	1800	95	5,28	175	9,73	60	3,33	60	3,33	1410	78,33
2	1800	30	1,67	40	2,22	20	1,11	90	5	1620	90
3	1800	-	-	-	-	-	-	120	6,67	1680	93,33
<b>total</b>	<b>5400</b>	<b>125</b>	<b>2,32</b>	<b>215</b>	<b>3,98</b>	<b>80</b>	<b>1,48</b>	<b>270</b>	<b>5</b>	<b>4710</b>	<b>87,22</b>

Third year: 60 ECTS credits gains a candidate for individual research work (IRW), which is meant to be a doctoral thesis.

## 6 Biomedicine Technology postgraduate study subjects are linked horizontally and vertically

Horizontal link of the subjects is assured, so students are able to choose logically linked subjects giving them theoretical basis for their doctoral dissertation.

Vertically, subjects are upgrading, so that the first-year-subjects are upgraded in the second year, offering theoretical basis for doctoral work.

There is a possibility of subject exchange with the comparable programs of the same quality carried out at other universities. This possibility has to be approved by the Senate of the Medical Faculty University of Maribor. International exchanges are carried out on the basis of international mutual contracts and agreements about mutual recognition of obligations. ECTS evaluation of the subjects stimulates international exchange.

## 7 Credit evaluation of the program

Complete study program is evaluated according to ECTS. Study year is valid 60 ECTS credits, i.e. semester is valid 30 ECTS credits. There are four obligatory subjects valid 9, 3 and 12 ECTS credits. Each obligatory subject, with hours and ECTS credits, is shown in the Table 1.

There are six basic subjects, of which students chose three. Basic subjects, shown in the Table 2, are valid 9 ECTS credits.

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In the 2<sup>nd</sup> year there are three obligatory subjects valid 3, 21 and 24 ECTS credits. At the moment, there are 76 optional subjects, of which students choose two. Each subject is valid six ECTS credits. Syllabus will be implemented if there are **at least five applied students**, otherwise it will be carried out **individually**. Optional subjects are shown in the Table 4.

Individual research work in the first study year is valid 9 and 12 ECTS credits, in the second year 21 and 24, and in the third year 2 x 30 ECTS credits.

Postgraduate student is able to choose subjects from the other home or foreign universities if their program has been evaluated according to ECTS. Students are allowed to collect up to 20 ECTS credits outside the primary study program.

**Table 1: Obligatory subject (hours and ECTS credits) – 1<sup>st</sup> year**

Obligatory subjects	ECTS credits	Contact hours	IRW (hour)
Biomedical Informatics	9	75	195
Scientific Research Methods	3	30	60
IRW 1	9	-	270
IRW 2 WITH SEMINAR	12	60	300

**Table 2: Basic subjects (hours and ECTS credits) – 1<sup>st</sup> year**

Basic subjects	ECTS credits	Contact hours	IRW (hour)
Biophysics	9	75	195
Biochemistry	9	75	195
Molecular Biology	9	75	195
Genetics	9	75	195
Pharmaceutical Biotechnology	9	75	195
Research in Clinical Practice	9	75	195

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**Table 3: Obligatory subject (hours and ECTS credits) – 2<sup>nd</sup> year**

Obligatory subjects	ECTS credits	Contact hours	IRW (hour)
Transferable Knowledge	3	90	
IRW 3	21	-	630
IRW 4	24	-	720

**Table 4: Optional subjects (hours and ECTS) – 2<sup>nd</sup> year**

	Optional Subjects	ECTS credits	Contact hours	IRW (hour)
1.	Bio-ceramics	6	45	135
2.	Nanoparticles in Biomedicine	6	45	135
3.	Nutraceuticals and New Trends in Nutrition	6	45	135
4.	Synthesis, Structure and Characteristics of Polymers	6	45	135
5.	Bioactive Oriented Polymers	6	45	135
6.	Synthetic Biopolymers	6	45	135
7.	Membrane Mass Transport Phenomena	6	45	135
8.	Polymeric Membranes in Medicine	6	45	135
9.	Selected Topics in Cell Biology	6	45	135
10.	Microbial Pathogenesis	6	45	135
11.	Microbiological Typing Methods	6	45	135
12.	Cell Physiology	6	45	135
13.	Methods in Cell Physiology	6	45	135
14.	Mathematical Physiology	6	45	135
15.	Clinical Biochemistry and Laboratory Medicine	6	45	135
16.	Clinical Pharmacology	6	45	135
17.	Clinical Pharmacokinetics	6	45	135
18.	Toxicology of the Pharmaceutical Treatment	6	45	135
19.	Pharmacoepidemiology and Pharmacoconomics	6	45	135
20.	System Theory	6	45	135
21.	Telematics	6	45	135
22.	Biomedical Signal Processing	6	45	135

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23.	Artificial Intelligence Methods	6	45	135
24.	NMR in Biomedicine	6	45	135
25.	Biomedical Electronics and Photonics	6	45	135
26.	Research Methods in Pathology	6	45	135
27.	Endoscopy and Ultrasound in Gastroenterology	6	45	135
28.	Neurosurgery	6	45	135
29.	Biomechanics, Osteology, Osteosynthesis	6	45	135
30.	Therapeutic Methods in Anaesthesiology	6	45	135
31.	Gynecologic Oncology	6	45	135
32.	Three-Dimensional Ultrasonography in Neurology	6	45	135
33.	Nephrology	6	45	135
34.	Tissue Oxygenation, Metabolism and Microcirculation	6	45	135
35.	Cardiology	6	45	135
36.	Clinical Immunology	6	45	135
37.	Infectious Diseases	6	45	135
38.	Chosen Chapters on Paediatry	6	45	135
39.	Chosen Chapters from Ophthalmology	6	45	135
40.	Selected Topics from Psychiatry	6	45	135
41.	Care of Elderly People in a Field of Gerontology Technology	6	45	135
42.	Biomechanics Load of Low Back	6	45	135
43.	Molecular and Cellular Endocrinology	6	45	135
44.	Ethics of Bio-Medical Research	6	45	135
45.	Carcinogenesis and Tumor Biology	6	45	135
46.	Molecular Biophysics	6	45	135
47.	Materials for Controlled Drug Delivery	6	45	135
48.	Pharmacogenomics	6	45	135
49.	Vascular Implants	6	45	135
50.	Assessment of Cardiac and Circulatory function	6	45	135
51.	New Technologies in Family Medicine	6	45	135
52.	Nutraceuticals and Technology	6	45	135
53.	Functional Cell Models	6	45	135
54.	Breast Oncology	6	45	135
55.	Urogynecology and Reconstructive Surgery	6	45	135
56.	Maxillofacial Surgery Introduction to Stomatology	6	45	135

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57.	Tuboperitoneal Infertility	6	45	135
58.	Mechanisms and Biomechanics of Injury in Trauma	6	45	135
59.	Clinical Pathophysiology of Emergencies	6	45	135
60.	Intelligent Data Analysis in Medicine	6	45	135
61.	Applied Biostatistics in Clinical Research	6	45	135
62.	Applications of Molecular Immunology in Clinical Practice	6	45	135
63.	Modern Surgical Techniques and Applied Surgical Anatomy	6	45	135
64.	Experimental Surgery	6	45	135
65.	Dermatovenerology	6	45	135
66.	Chosen Chapters on Dermatooncology	6	45	135
67.	Comprehensive Approach Towards Health Problems	6	45	135
68.	Corporate Governance in Health Care	6	45	135
69.	Urology – Selected Topics	6	45	135
70.	Telemedicine	6	45	135
71.	Molecular Allergology	6	45	135
72.	Female and Male Infertility	6	45	135
73.	Reproductive Biology and Embryology	6	50	130
74.	Advanced Multidisciplinary Analytics in Biomedicine	6	45	135
75.	Chosen Chapters from Emergency Medicine	6	45	135
76.	Selected Chapters from Gastroenterology and Hepatology	6	45	135

**Third year:** 60 ECTS credits for Individual research work–IRW 5 – Presentation of doctoral dissertation topic and Preparation and defence of the doctoral dissertation.

## 8 Admission requirements

Admission requirements are accordant to the valid Law of High Education Act.

Candidates who completed the following may apply for the 3rd-cycle (doctoral) study programme in Biomedical Technology:

- A 2nd-cycle (master's) study programme in the field of medicine (medicine and dental medicine), pharmacy, or veterinary. Other graduates shall pass an entrance examination in the following courses: Biochemistry, Molecular Biology, Pharmacology, and Biophysics.
- An undergraduate academic study programme adopted prior to 11 June 2004 in the field of medicine (medicine and dental medicine), pharmacy, or veterinary. Other graduates shall

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pass an entrance examination in the following courses: Biochemistry, Molecular Biology, Pharmacology, and Biophysics.

- A specialisation following an undergraduate professional study programme adopted prior to 11 June 2004 in the field of medicine (medicine and dental medicine), pharmacy, or veterinary. Other graduates shall pass an entrance examination in the following courses: Biochemistry, Molecular Biology, Pharmacology, and Biophysics. Prior to enrolment, candidates shall fulfil study obligations corresponding to 60 ECTS credits.
- A study programme educating students for professions regulated by EU directives and corresponding to 300 ECTS credits (e.g. medicine, dental medicine, veterinary science, as well as the five-year study programme in Pharmacy). Other graduates shall pass an entrance examination in the following courses: Biochemistry, Molecular Biology, Pharmacology, and Biophysics, corresponding to 300 ECTS credits.
- Graduates of other Slovene and foreign universities in the field of medicine (medicine and dental medicine), pharmacy, or veterinary. Other graduates shall pass an entrance examination in the Biochemistry, Molecular Biology, Pharmacology, and Biophysics courses in accordance with the criteria applying to students of the Republic of Slovenia. The equivalency of foreign academic qualifications is determined under the procedure for the recognition of academic qualifications according to the Statute of the University of Maribor.

If the number of applications exceeds the number of available positions, candidates shall be ranked according to:

- grade point average (15%),
- grade awarded for the thesis (5%), and
- grade awarded for the elective exam (80%) focused on the fields of medicine, natural sciences, and engineering. Candidates may replace up to 40% of the elective exam with scientific research and professional work.

Criteria for the evaluation of scientific research:

- scientific monographs,
- an independent scientific paper or chapter in a monograph, and
- an original scientific paper or review article in journals with impact factor (JCR) or journals indexed in SCI, SSCI, or A&HCI databases.

Criteria for the evaluation of professional work:

- a professional monograph or review,
- an independent professional paper or chapter in a monograph,
- published papers in conference proceedings,
- professional papers and/or review of these papers,
- participation in editorial boards of monographs or journals, and
- other documented forms of professional work.

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## 9 Study programme promotion prerequisites

Assessments of the students' performance are given for their exams, seminars and practical work. Assessment methods are described for each syllabus.

## 10 Conditions for promotion under the program

Conditions for promotion into 2<sup>nd</sup> year are met when **ALL** study obligations from 1<sup>st</sup> year in the value of at least **51 ECTS** credits are collected, and following first year obligatory syllabus accomplished:

- Biomedical Informatics,
- Scientific Research Methods,
- Individual research work– IRW 1,
- Individual research work with Seminar – IRW 2.

Condition for promotion into 3<sup>rd</sup> year is met when ALL study obligations from 1<sup>st</sup> and 2<sup>nd</sup> year, valid **120 ECTS** credits, are fulfilled. Enrolment into the third study year is also a dead line for students to submit application for evaluation of the chosen theme for doctoral work, as well as mentor's approval.

Last study year is reserved for Individual Research Work – IRW, oriented to preparation of doctoral thesis (**60 ECTS** credits).

## 11 Transfer between programmes

In accordance with the transfer criteria, candidates who completed the following may be admitted to the second year of study of the 3<sup>rd</sup>-cycle (doctoral) study programme in Biomedical Technology:

1. A master of science study programme in the field of biomedicine or an affiliated field adopted prior to 11 June 2004. Candidates are awarded 60 ECTS credits.
2. A specialisation following an undergraduate academic study programme adopted prior to 11 June 2004 in the field of biomedicine or an affiliated field. Candidates are awarded 60 ECTS credits.

In accordance with the transfer criteria, candidates may transfer to the doctoral (3<sup>rd</sup>-cycle) programme "Biomedical Technology" from programmes in the field of biomedicine and affiliated fields. The following criteria apply:

- fulfilled admission requirements,
- the number of positions available.

Under the recognition process, satisfied obligations that may be recognized are identified. Candidates must submit a programme outline, a certificate of the exams passed, and an official print-out of the programme. The Faculty's Academic Affairs Committee decides on the applications and determines new study obligations required for completion of the doctoral (3<sup>rd</sup>-cycle) programme.

March, 2019

## **12 Conditions for completing**

Written doctoral work and its defending are prerequisites for finalisation of the study, as well as accomplishment of all the other obligations, collecting at least 180 ECTS credits. An article from the field of the doctorate, published in the SCI indexed review, or SSCI with the IF quotation, has to be submitted (Rules of Doctoral Studies at UM No.: 012/2018/1). An article which results from the doctoral thesis must be published after the enrolment to postgraduate study Biomedical Technology. Doctoral thesis has to be defended in front of the commission and has to be published by candidate as a first author.

## **10 Obtaining of the scientific title**

After doctoral postgraduate study programme has been successfully accomplished, a candidate is given the title **Doctor of Science in Biomedical Technology**.