

**MASTER**

# MEDICAL AND PHARMACEUTICAL BIOTECHNOLOGY

Looking for an internationally respected master programme that will open up exciting career opportunities in the pharmaceutical industry and research? Potential employers hold our Medical and Pharmaceutical Biotechnology programme in high regard thanks to its broad curriculum.

# MEDICAL AND PHARMACEUTICAL BIOTECHNOLOGY

Developing high-level expertise in identifying, characterising and manufacturing biopharmaceuticals is an essential aspect of this master programme. Manufacturing biopharmaceuticals also requires extensive knowledge of the applicable legal framework and the quality assurance procedures which play a vital part in an interdisciplinary setting. In order to prepare our students for the upcoming trends, we also offer complementary training in development, application and production methods for quality-assured tissue and organ replacements.

## AT A GLANCE



### Full-time

Courses usually take place from Monday to Friday.



### English

The language of instruction is English. This prepares you for a career in a multi-cultural environment.



### Four semesters

The degree programme lasts two years, with a total workload of 120 ECTS. Graduates receive the academic degree of Master of Science in Engineering (MSc).



### Admission

Undergraduate degree in a relevant natural sciences or engineering discipline (bachelor's degree or equivalent, minimum 180 ECTS). Amongst others, these disciplines are accepted: Biotechnology or Biomedical studies, Biochemistry, Molecular Biology or Pharmacology, Biomedical Analytics, Chemical Engineering, Nanotechnology, Bioinformatics, Biology, Chemistry, Physics



### Study fee

EU/EEA citizens pay a study fee of EUR 363.36 per semester, plus the student union fee.

# ELECTIVES

On the master programme, you enhance your methods-based and problem-solving competencies, putting you in a position to overcome the challenges associated with developing and producing innovative treatments for cancer, autoimmune conditions and neurodegenerative diseases. You use cutting-edge and interdisciplinary methods, such as culturing “mini tumours” to help predict the effects of cancer treatments.

## Bioprocess Engineering

If you take this elective, you will gain detailed insights into bioprocess engineering, process automation, and especially fermentation. This expertise will give you the skills required to take on positions at all types of biotech companies – large pharmaceutical businesses as well as small start-ups specialising in innovative products such as nutraceuticals. You’ll be able to contribute in a wide range of areas encompassing the development, testing and large-scale manufacturing of brand-new substances.

In the bioprocess engineering lectures and practicals, you’ll use cutting-edge analytical techniques, ranging from simple online methods – which you’ll also evaluate – through to liquid LC-MS for proteomics work.

## Advanced Therapeutics Development

Medical biotechnology has seen some major breakthroughs in recent years, such as immune checkpoint inhibitors (PD-1) for the treatment of advanced melanomas. Small interfering RNA (siRNA) molecules are currently being tested for use in potential treatments for cancers and viral diseases, which are expected to come on to the market in the next few years.

High-throughput technologies in areas such as next-generation sequencing (NGS), mass spectrometry and imaging are becoming increasingly important in the development of new treatments. This means there is going to be an ever greater focus on linking together large data sets, and integrating the clinical results of treatment.

## Tip

**Double Degree Option:** A particularly attractive option is the double degree we offer in conjunction with Linköping University in Sweden. Besides obtaining a Master of Science at IMC Krems, you will also be accredited with completing the “Experimental and Medical Biosciences” programme at our esteemed partner institution.

# CURRICULUM

Semester I	H	ECTS
Bioethics		
Bioethics	1	2
Bioprocess Technology		
Upstream Processing	2	3
Recombinant Protein Production, Theory	2	3
Recombinant Protein Production, Laboratory	4	8
Process Design		
Equipment and Production Design	2	4
Standardisation	1	2
Health, Disease and Therapeutical Strategies		
Immunology	2	2
The Molecular Mechanisms of Aging	1	2
The Hallmarks of Cancer	1	2
Developmental Biology	1	2

Semester II	H	ECTS
Integrative Methods in Biotechnology		
Biostatistics and Trend Analysis	1	2
Structural Bioinformatics and Drug Design	2	2
Systems Biology	1	2
Biomedical Regulations		
Legislation for Drugs and Medical Devices	2	3
Pharmaceutical Quality Management		
Quality Management Systems	1	2
GLP and GMP Regulations	1	2
Risk Assessment	1	2
Pharmaceutical Project Management		
Project and Portfolio Management	1	2
Clinical Studies and GCP	1	2
Analytical Methods in Life Sciences		
Bioanalytics, Laboratory	2	4
Personalised Medicine, Laboratory	2	4
Analytical Methods in Biomedicine	2	2
Research Semester Application and Preparation		
Research Semester Preparation	1	1

Semester III	H	ECTS
<b>Elective 1: Bioprocess Engineering*</b>		
<b>BIOPROCESS ENGINEERING</b>		
Scale-up – Scale-down Techniques	2	3
Current Issues in Bioprocess Engineering	1	2
Fermentation Technology		
Fermentation Technology, Laboratory	7	10
Fermentation of Complex Host Systems	1	2
Process Automation		
Process Control and Process Online Monitoring	2	3
Equipment Test and Process Validation	2	4
<b>Elective 2: Advanced Therapeutics Development*</b>		
<b>PRINCIPLES OF DRUG DISCOVERY</b>		
Pathophysiology and Molecular Therapies	2	4
Drug Discovery Systems	2	3
Strategies in Molecular Therapies		
Stem Cells, Gene Therapy and Regenerative Medicine	2	3
Immunology Base Therapies	1	2
Therapeutics Development		
Advanced Therapeutics Development, Laboratory	7	10
Current Issues in Advanced Therapeutics Development	1	2
Therapeutic Effects of Biopharmaceuticals		
Pharmacokinetics and Pharmacodynamics	2	3
Business		
Entrepreneurship in Life Sciences	2	3

Semester IV	H	ECTS
Research Semester		
Master Thesis	0	22
Coaching Seminar	1	3
Master Exam		
Master Exam	0	5

\* Students choose one elective.  
Subject to possible alterations (Version 01/2020)

## A VERY PERSONAL STORY: VARIETY OF OPPORTUNITIES

**Raphaela Wagner** is studying for a master degree programme in Medical and Pharmaceutical Biotechnology after completing her bachelor's degree at IMC Krems.

### Top job prospects

My keen interest in science and medical research as well as a stay in the US reassured me that the English-language study programme Medical and Pharmaceutical Biotechnology at IMC Krems was the perfect solution for me. The ideal conditions for my professional life also made the master's degree attractive.

### Unmatched team spirit

The enthusiasm of students and teachers are a real highlight for me. We even meet with professors during our free time to chat about the latest findings in cancer research. The programme also organises the annual Life Science Meeting, which brings together international research projects from academia and industry. The team spirit at IMC Krems is incomparable.

### Practical laboratory courses

I benefit most from the applied laboratory courses, which make it possible to apply the theory in practice. In small groups we learn, for example, how to genetically modify bacteria and yeast species, to breed human 3D tumours or to work with a mass spectrometer.

### Insights into processes

For me, the quality and quantity of the processes that are necessary to develop, produce and market a drug are surprising. Probably only few people know that it takes at least 13 years and costs around 2.5 billion euros to develop a possible innovative idea into a safe drug.

### Diverse future prospects

I would like to specialise in the development of drugs in the field of neurodegenerative diseases. No matter if you study for a doctorate or a career in a pharmaceutical company – I know I'm in good hands with my education.





Terrific landscape and safe environment



A very personal atmosphere



State-of-the-art facilities on IMC Campus Krems

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