

MEDICAL BIOTECHNOLOGY MASTERS PROGRAMME

The Medical Biotechnology Masters Programme is based on the Bologna process, and the study requirements are listed below

Title of the Programme

Medical Biotechnology

Level of degree and description of the degree in the certificate

- Level of degree: master of science; (MSc)
- Degree: master of medical biotechnology
- Tracks: molecular biotechnology; cell- and tissue engineering

Field of study

biotechnology

Duration of the programme in semesters

4 semesters

Minimum credit requirements to obtain the masters degree

120 credits

- Foundation modul:25-45 credits;
- Specialized core material:20-40 credits;
- Specialized core material:30-50 credits;
- Diploma work: 20 credits;
- Elective courses:minimum 6 credits;
- Ratio of practices: minimum of 49%

Aims of the programme and expected level of professional competences

The goal of the programme to train medical biotechnologists with well founded knowledge in basic sciences, relevant areas of medical and biological sciences and information technologies that are all required to be successful in the field of biomedicine. The problem solving ability of all graduates are expected to be high therefore they can follow their studies in PhD programmes.

Completing the masters programme leads to well founded knowledge in

- Methodologies in biotechnology;
- analytical methods in biotechnology;
- molecular mechanisms of biological processes and modelling these processes;
- ethical issues in biotechnology;
- information technology necessary in biotechnology;
- intellectual property rights;
- management and organization of research and development
- communication necessary for collaborative and team work.

Graduates of the masters programme are capable of

- innovative research and development in medical biotechnology;
- making biotechnology applicable in clinical practice;
- directing, organizing and managing research and development work in the field of biotechnology;
- further development of the chosen specialty.

Cell and tissue engineering :

- description of molecular interactions that are suitable for application in systems biology, genetics, cell and tissue engineering;
- application of molecular biotechnology and pharmacogenetics in nanotechnology;
- molecular diagnostics (arrays and real-time analytical methods);
- molecular targeting (extra- and intracellular as well as intranuclear signalling);
- generation of transgenic animals and of complex vectors necessary in the process;
- drug development based on biotechnology for preclinical and clinical trials;
- tissue development for autologous tissue transplantation;
- generation and application potential of vectors suitable in gene therapy.

Molecular biotechnology:

- description of molecular interactions that are suitable for application in systems biology, genetics, cell and tissue engineering;
- development of toxicological and metabolical test methods based on molecular biotechnology and pharmacogenetics;
- drug development based on biotechnology for preclinical and clinical trials;
- development and application of molecular diagnostics;
- development of novel drugs and therapeutical methods for various diseases especially for oncotherapy based on molecular target recognition.

To be able to practice medical biotechnology successfully, the graduate needs

- creativity;
- logical way of thinking;
- ability for good communication and collaborative work;
- ability for teamwork;
- problem and conflict solving ability.

Main taught subjects

Foundation modul

25-45 credits

Basic sciences course: 20-30 credits

Biochemistry, biophysics, genetics, molecular and cell biology, human physiology, informatics

Basic economics and ethics courses: 5-15 credits

economics, marketing and management, business law, ethics in biotechnology.

Specialized core material

20-40 credits

proteins, protein networks, nucleic acids, cell and molecular biology, molecular pathology.

Specialty courses

Differenciált szakmai ismeretek: 30-50 credits

- Cell and tissue engineering:
Molecular development, transdifferentiation, biological therapies, tissue culture techniques, tissue transplantation, nanotechnology and nanobiotechnology.
- Molecular biotechnology:
Molecular and functional genetics and genomics, molecular toxicology, drug research and development, molecular targeting, pharmacological testing, nanotechnology and nanobiotechnology, molecular basis of pathogenesis, pharmacokinetics

Laboratory practice requirements

Visits to and laboratory practices in Hungarian and foreign clinical and research laboratories, biotechnology and pharmaceutical companies will aid to obtain high level of competences. Duration and requirements of professional laboratory practices are regulated by the University's course content.

Additional requirements

As the MSc degree taught in English, the entry requirement is minimum a medium level © language test or anything equivalent.

BASIC PRINCIPLE OF THE CREDIT SYSTEM

The minimum credit requirement in the Medical Biotechnology programme is **120** credits, and only 10% of the total credits can be collected on top of the minimum required credits with no extra charges if the students are financed by the Hungarian government..

120 credits obtained as (85. §. (4)) follows:

- 83% **core material**,
- 8% **facultative** material (10 credits),
- approx. 8% **elective material** (10 credits)
- 17% of diploma work (20 credits)

Most of the courses in the programme are heavily practice based and the practices are marked, they provide credit points, and are compulsory for completion of the programme and obtaining the absolutorium.

The curriculum is divided into modules: compulsory core material (1. semester), specialized core material (2. semester) and differential core material in specialty tracks (3. semester) and diploma work (4. semester) modules.

If the student completed a course and obtained credit points for that course, the course cannot be repeatedly signed on by the student.

The students can sign on for courses in specific period of enrolment, in any given semesters students can choose from the allowed list of courses for the semester, taking into consideration the previous study requirements and available places in the course. Marks and credit points can only be obtained if the student is signed in the ETR system for the given course.

The recommended curriculum for a semester aims the collection of 30 ± 3 credit points.

Courses in the foundation and differential core material modules are compulsory, the elective and facultative courses are in a separate modules.

STRUCTURE OF THE CURRICULUM

Core material: those courses belong to this category that are have to be completed by all students in the programme. (83% of the total credit points). Core material cannot be based on elective or facultative courses.

Elective courses: these are courses the students can freely choose from, but during their studies the students are required to complete a certain number of courses and obtain credits (at least 8% of total credit points). The Credit Committee controls the course content that has to be independent of the core material courses and has to provide additional information. This information, however, cannot be tested in core material exams.

Facultative courses: these are courses the students can freely choose from. Usually, 8% of the total credit points. Minimum credit point is 1 (14 hours of seminars or practices or lectures/semester).

Professional practices are part of the curriculum. **Types of professional practices:** laboratory practices and summer practices. Main rules for practices:

In the Medical Biotechnology MSc Programme the diploma work is completed in the 2. year second semester as a laboratory work that provides 17% of the whole programme. In the complete curriculum the ratio of practices is 49,4% that are either seminars or practices lead by an experienced instructor.

Summer practices: 2 – 4 weeks, in small groups or individually performed in pharmaceutical companies or biotechnology laboratories. The summer practice can be taken up by students following the second semester. Basic requirements are determined by the course coordinators and the Credit Committee and approved by the Faculty Committee. Development of the programme material for summer practices is the responsibility of the course coordinator. Distribution of students is performed by the HÖK (Student Association Committee) and the Faculty Office for Education. Completion of the practice is verified in the gradebook by the head the laboratory. For the summer professional practice no credit points are given. The diploma work and the summer professional practice apart from the University's departments are allowed to be completed in laboratories of pharmaceutical and biotechnology companies. Requirements: permission of the Vice Dean for Education, letter of acceptance from the laboratory where the practice will be performed. Permission can only be refused on sound professional or economical basis. The student has to provide a proof for completion from the head of the accepting laboratory and completion of the practice has to be confirmed in the student's grade book.

Laboratory practice requirements during the programme

- Nucleic acid, protein expression and manipulation (I. year)
- Development and application of vectors (I. year)
- Application of genomics and proteomics (I. year)
- Differential practical knowledge (II. year)
 - Drug development and testing or,
 - Cell and tissue engineering

Proficiency level required in languages

- As the programme is taught in English, as the students already have the necessary language requirements at the beginning of the programme, no additional proficiency level is required.

Requirements for physical education

MSc students are not required to take part in physical education.

Conditions of obtaining the absolutorium

The absolutorium proves that the student completed all the requirements of the curriculum and can take the final exam. The absolutorium can be obtained prior to completion of the diploma work and its viva.

Requirements for obtaining the absolutorium:

- Obtaining the required minimal credit points (120),
- Obtaining credits from all compulsory courses of the curriculum
- Obtaining minimal credits 10 points from elective courses, and additional 20 points for the diploma work.

The absolutorium in a student's grade book is filled in by the Office of Education, and signed by the Vice Dean for Education.

Main requirements for diploma work preparation

Prior to the final exam the student has to prepare a diploma work and defend it. The aim of the diploma work to provide evidence that the student is proficient in medical biotechnology and can analyze and summarize his data clearly.

The supervisor

The student completes the diploma work with the help of the supervisor. The supervisor must possess a PhD degree whether he works in departments of the University or in laboratories of pharmaceutical or biotechnology companies. It is advisable to start the work in the second semester. The student can choose a supervisor and a project based on the list provided by the University and pharmaceutical and biotechnology companies supporting the programme.

The supervisor has to agree in writing to supervise the student. Both the student and the supervisor have to sign the form. A copy of the form is filed at the Department or Laboratory, while one copy each is given to the supervisor and the student, respectively.

The student can change the supervisor or the project prior enrolment to the second year. If the student only wants to change the project, he only needs to discuss it with the supervisor. To change the supervisor, the student needs to notify both the supervisor and the head of the department in writing. The supervisor is responsible for the quality of the diploma work. If the student is not working to the level of expectations of the supervisor, the supervisor can terminate the project. The supervisor needs to notify the student about his decision in writing. The supervisor cannot terminate the supervision of the student after the student enrolled to the second year. The supervisor cannot accept students who have already enrolled to the fourth semester.

Scientific project work (TDK)

If the student is taking part in the scientific project competition assigned by The Dean of the Faculty and he finishes in the first three, the student doesn't have to complete a diploma work. The head of the department is notified by the Office of Education in writing.

To be allowed to enrol to the second year, the student has to prove that the work has begun with a supervisor, or at least the student has selected a supervisor who has agreed in writing to supervise the student or the student has already been a winner in the scientific project competition.

If the student presented his data on a conference, the presentation and defence of the work is not necessary.

Form of Diploma work

The student can use all the libraries of the University to complete the project.

The diploma work is prepared in English.

The length of the diploma work (including tables and references usually 20 - 40 A4 pages). The project needs to be bound. On the cover page the title of the project, name of the student, year when the work was prepared, name of the supervisor and his department have to be visible.

The final copy of the diploma work has to be completed in (minimum) two copies and handed over to the department of the supervisor by the deadline. If the supervisor is not working for the University, two copies of the diploma work have to be handed over the head of the laboratory where the project was completed.

The viva (defence)

The diploma work is presented using powerpoint presentation and defended. The head of the department has to assign an examiner (the supervisor cannot be the examiner). The final decision is made by a committee of three with the help of the Office of Education. The committee includes the head or vice head of the department, the examiner and the supervisor. The head of the department is responsible for the correct completion of the viva. The student can only take his final exam if the head of the department confirms his successful viva towards the Office of Education at the latest 1st of June.

The diploma work and the viva marked on five grade scale and the student has to be notified by the result following the viva. Only experimental work can be given mark five. The credit of the diploma work is regulated by the curriculum and is worth 20 credit points in the Medical Biotechnology MSc programme.

If the student fails (either his work or the viva), he can only take the final exam when he corrected this mark. The corrected diploma work can only be handed in two months following the viva at the earliest. The Office of Education is given a copy of the diploma work and the signed evaluation form. The student is handed back one copy of the diploma work at the oral final exam. The other copy is filed (for a minimum of 5 years) at the department where the viva was held.

Final exam

The MSc degree can be awarded only if the candidate passes the final exam. During the exam the student has to prove his proficiency in Medical Biotechnology.

Conditions to begin the final exam

- Completion of the absolutorium within two year prior to application for taking the final exam,
- Completion and viva of the diploma work

The final exam

- Written test (as Medical Biotechnology Programme only began at Pécs University, the test is prepared by the University),
- Oral exam.

In the final examination board has to be a chairman and 2 – 4 members. One of the board members has to come from outside the profession of medicine/biotechnology. Chairmen are selected by the KB and approved by the Faculty Committee for three years. The members of the board are assigned by the Dean.

The final exam begins with a written test. Questions in the final exam are based on core, specialized core and differential core material. The part exams are marked on five grade scale and cannot be combined. If the student fails any parts of the final exam, the exam can be continued and only the failed part has to be repeated. The final exam is only successful if all parts are completed at least at “passed” level. The final mark is based on the marks of the two separate parts of the final exam and the mark of the diploma work as follows:

- 4,51 – 5,00excellent
- 3,51 – 4,50good
- 2,51 – 3,50average
- 2,00 – 2,50 passed

Retake can only be completed in the next final exam period.

If the student doesn't complete his final exam until his student status is still valid, he can take his final exam any time later in final exam periods.

Conditions to award the masters degree

Degree can be awarded for those students who completed their final exams and diploma work successfully.

The certificate is signed by the Chancellor of the University, the Dean of the Faculty and the Chairman of the final examination board.

The grade of the certificate is calculated based on the weighted average of all the exam and practice results. To calculation of the grade of the certificate the credit of the diploma work is added the final exam mark.

The certificate is written in English and Hungarian.

On the certificate the quality of the Medical Biotechnology Masters degree is described as follows:

- First class honours (4.51 – 5.00)
- Second class honours ... (3.51 – 4.50)
- Ordinary (2.00 – 3.50)

There is a degree ceremony within one months of the final exam.