



Faculty of  
Medicine

Department of  
Biological  
Applications &  
Technology

ΒΕΤ



Τμήμα Χημείας



**FORTH**  
BIOMEDICAL RESEARCH INSTITUTE

Interinstitutional Interdepartmental Program of Postgraduate Studies  
**Molecular and Cellular Biology and Biotechnology**

**GUIDE FOR STUDIES**  
**Academic Year 2022-2023**

Ioannina 2022

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## Outline of the Program

### History and brief description

The Interinstitutional Interdepartmental Program of Postgraduate Studies (I.I.P.P.S.) in **Molecular and Cellular Biology and Biotechnology** (<http://msc-mcbb.ac.uoi.gr>) was launched initially in academic year 1998-99 (FEK 942/B'/2-9-1998), as Interdepartmental Program of Postgraduate Studies in Biotechnology (co-organized by the Department of Medicine (which supports the program administratively) and the Department of Chemistry of the University of Ioannina, and, after 2014 (FEK 2731/B'/13-10-2014), by the Department of Medicine (which supports the program administratively), the Department of Chemistry and the Department of Biological Applications and Technology of the University of Ioannina) and then, after re-establishment in 2018 (FEK 1808/B'/21-05-2018), operates as Interinstitutional Interdepartmental Program of Postgraduate Studies in Molecular and Cellular Biology and Biotechnology (co-organized by the Department of Medicine (which supports the program administratively) and the Department of Biological Applications and Technology of the School of Health Sciences, and the Department of Chemistry of the School of Sciences, University of Ioannina, and the Biomedical Research Institute of the Foundation for Research and Technology-Hellas (FORTH). The program focuses on the research education of the students in the area of biological/biomedical and biotechnological research. It covers 3 semesters (90 ECTS), of which the first semester includes attendance of five courses introducing the student to the subjects of the program and the projects of the participating research teams (Topics in Molecular and Cellular Biology (10 ECTS), Biology of Stem Cells and Applications in Regenerative Medicine (5 ECTS), Cell Growth, Differentiation and Cancer (5 ECTS), Functional Analysis of Genes: from the Design to the Living System (5 ECTS), Biotechnological Products and Applications (5 ECTS)), whereas the second and the third semesters are linked with the laboratory education and training of the students for the preparation, development and defense of their Master's Thesis. Starting from the second semester, each student sets an affiliation with a particular research lab (**Research Host Lab**) in which they work for their master's Thesis. The second semester is devoted to the preparation of the Thesis (Experimental Research (15 ECTS) and Literature Research (15 ECTS), including learning of experimental techniques to be used for the Thesis and research seminars in the relevant areas delivered by established and renowned professors and researchers from Greece and abroad) and the third semester is devoted to the development, writing, presentation and public defense of the Master's Thesis (30 ECTS). The Program awards a **Master's Degree** in Molecular and Cellular Biology and Biotechnology.

### Aims and objectives.

- The I.I.P.P.S. in Molecular and Cellular Biology and Biotechnology offers high-level postgraduate education in the area of Molecular and Cellular Biology and Biotechnology. The knowledge offered is focused on basic and more specific studies in molecular and cellular biology in conjunction with research methodologies which are needed for implementation of modern biotechnological applications, with an emphasis on biomedical research and health biotechnology.
- The program aims at preparing well-educated scientists for careers in biological/biomedical and biotechnological research, education, public services or the private sector. In parallel, the program aims at promoting knowledge and research development and contributes to the fulfillment of the educational, research, social, cultural and developmental needs of the country.
- Specifically, the program aims at offering high-quality postgraduate education in Molecular and Cellular Biology and Biotechnology, in fields related mostly to biomedical research and medical/health biotechnology, emphasis given on providing rigorous theoretical and experimental research education in a research lab environment, interdisciplinarity, extroversion, interaction with other research teams from other Educational and Research Foundations in Greece and abroad. In this context, a principal component of the program is the development of a laboratory research master's thesis in one of the specific research areas in which the participating research teams specialize either in the Department of Medicine, Chemistry, or Biological Applications and Technology of the University of Ioannina or in the Biomedical Research Institute of FORTH or/and in collaborating research teams from other Educational and Research Centers in Greece or abroad.
- Successful attendance of the program leads to the acquisition of research experience and scientific

knowledge in an interdisciplinary research environment and allows potential continuation in a third cycle of studies (doctoral studies) in a competent and largely autonomous manner, in the area of molecular and cellular biology and biotechnology/health biotechnology.

## Learning Outcomes

In their course of studies, students of the I.I.P.P.S. in Molecular and Cellular Biology and Biotechnology are expected to obtain specific knowledge, competences and skills, as follows:

### Knowledge:

- **(Semester A)** Familiarization with (a) the interconnection of basic principles of biology with current research developments and approaches in molecular and cellular biology, (b) understanding basic principles of current biology through the study of stem cells and understanding of one of the most modern therapeutic approaches in the field of health biotechnology, (c) important aspects of carcinogenesis and cancer development and related modern diagnostic and therapeutic strategies, (d) basic principles of modern research strategies through paradigms of development of molecular tools, model study systems and integrated analysis of important reference proteins, computational methods and wet-lab experimental designs, (e) different directions and approaches in Biotechnology and interconnections of applied biotechnology with basic research in molecular and cellular biology.
- **(Semester B)** Familiarization with research literature related to a particular research project assigned to the student in the Research Host Lab and with the evaluation and analysis of relevant literature on current themes of molecular and cellular biological research, and development of state-of-the-art knowledge in the specific research themes studied in the Research Host Lab.
- **(Semester C)** Specialization in a particular research field through the development and completion of an original research work which is presented by the student both as a written scientific text and in an open-audience defense procedure.

### Competences:

- **(Semester A)** Ability to (a) search for, analyze and combine/synthesize data and information from the bibliography and electronic databases, with the use of the necessary technology, (b) work both independently and together with other persons in a team, (c) work efficiently in an interdisciplinary environment, (d) respect the difference and multiculturalism, (e) exercise criticism and self-criticism, (f) promote free, creative and inductive thinking in the context of their tasks/assignments.
- **(Semester B)** Ability to adapt to new situations (in the context of the hosting research team), to expose themselves and work in an international environment (due to involvement in the program of researches and research teams from countries outside Greece), to design, develop and deliver original lectures requiring combination of knowledge and insight on current topics from the literature or the thorough analysis of a new research project with respect to the objectives, background, state-of-the-art, aims, rationale and methodological approach followed (in the context of the open-audience presentation of the research project assigned to the student in the hosting research lab), and communicate related scientific knowledge with clarity, scientific coherence, and comprehensiveness.
- **(Semester C)** Ability to contribute to the production of new research ideas, to develop, complete and present an original research project in the context of collaboration with the research host team, to communicate new scientific knowledge derived from an original research project as well as the rationale, experimental results and scientific reasoning behind the relevant conclusions and discussion (in the context of presentation and public defense of the postgraduate research diploma thesis).

### Skills:

- **(Semester A)** To be able to fluently use technologies required for the search, analysis and synthesis of data from the literature and electronic databases. To familiarize with application of computational methods and designing of wet-lab experimental approaches (mostly in the context of the course *Functional analysis of genes: from the design to the living system*).
- **(Semester B)**. To fluently apply basic techniques of molecular and cellular biology and bioinformatics tools required in a modern research lab, and be familiarized with most specific techniques related to the project assigned to the student in the Research Host Lab.

- **(Semester C)** To acquire integrated lab experience in a specific research field and develop learning skills that allow potential continuation in third-cycle (doctoral) studies in a competent and largely autonomous manner, in the research area of molecular and cellular biology and biotechnology/health biotechnology.

## Orientation

- The I.I.P.S. in Molecular and Cellular Biology and Biotechnology has operated for many years and has already educated and trained a large number of students with a first-degree background in the fields of health sciences and/or natural sciences. The program is oriented toward introducing and educating the students in current laboratory research through their affiliation with research teams participating in the program, led by either a researcher/tutor from the University of Ioannina and/or BRI-FORTH or a researcher/tutor from a collaborating team in other educational/research centers in Greece or abroad. Overall, the program supports internationality and extroversion, emphasizing exposure of the students in a collaborative and interdisciplinary environment and modern research directions.

## Feasibility of the postgraduate program

- In a broader perspective, the program aims at promoting knowledge and research development and, thereby, at contributing to the fulfillment of important educational, research, social, cultural and developmental needs of the country. The I.I.P.S. in Molecular and Cellular Biology and Biotechnology puts emphasis on laboratory research education of the postgraduate students in areas related to biomedical research and health biotechnology. These areas are relevant to the understanding and utilization of biological processes studied in research labs for the development of products and applications that contribute to improvement of the quality of human life.
- Biotechnology is a broad discipline that relates to the development of corresponding methodologies and applications in several directions, ranging from health sciences (drug development and disease treatment) to industrial applications (large-scale generation of products from biological processes and product improvement by implementation of biological processes in an industrial scale), to applications in agriculture, agrifood, or environmental management (sustainable development with improvement of products through reinforcement of biological processes in concert with minimalization of adverse environmental effects, but also direct bioremediation applications such as through biodegradation of environmental pollutants).
- The current development of several new aspects of biotechnology in a variety of directions (including nanobiotechnology, regenerative medicine, immunotherapy, bioimaging, biocomputational analysis, systems biology, new methods of molecular targeting and molecular therapy, and other fields, as they are characteristically referenced in the Aims & Scope section of the top-quality journal in this field, namely *Nature Biotechnology* (<https://www.nature.com/nbt/aims>)) necessitates a specific delineation of the study subject offered by a relevant postgraduate program, based on the curriculum and the specialties of researchers/tutors participating in the program. The knowledge offered in the context of the I.I.P.S. in Molecular and Cellular Biology and Biotechnology focuses on postgraduate studies on molecular and cellular biology in conjunction with the study of research methodologies implemented in modern biotechnological applications relevant with biomedical research and health biotechnology. Operation of such a postgraduate program is important and essentially useful in the Greek University academic environment for the following reasons:
  - (a)** the program refers to one of the most timely and competitive research fields universally, extending to potential key applications related to human health, quality of human life and social well-being.
  - (b)** other postgraduate programs in Greece related with biotechnology focus on different aspects or more specified applications (such as microbial biotechnology, protein biotechnology, plant molecular biology and biotechnology, agroindustry of plants and microorganisms of agricultural importance, biotechnology: quality of nutrition and environment) and not on the areas of biomedical research and health biotechnology.

## Relatedness to the Undergraduate Program of Studies at Dept. of Medicine

- The scope of the postgraduate program focuses on molecular and cellular biology in conjunction with the study of research methodologies required for the implementation of modern biotechnological applications with an emphasis on the fields of biomedical research and health biotechnology. The program is structured on the basis of the specialties of the participating tutors/researchers who derive from the Departments of Medicine (approximately 60%), Biological Applications and Technology (20%) and Chemistry (10%) of the University of Ioannina, and the Biomedical Research Institute (BRI-FORTH) (10%), as well as from researchers/professors from other educational and research centers in Greece or abroad with leading research expertise who participate as invited speakers/tutors in the courses of the first semester or in the open-audience seminars organized in the second and third semesters.
- The themes taught largely deepen or elaborate on knowledge obtained in the context of pre-graduate studies in the Department of Medicine (courses on Biochemistry, Biology, Pathological Anatomy, etc.) and also on specialized knowledge that has been introduced in pre-graduate elective courses (on stem cell biology, genetics, from genome to evolution, bioinformatics) or in a range of courses of the core curriculum (including biology of cancer, vascular endothelial cell biology, pharmacology, microbiology, evolutionary biology, etc.). Two of the first-semester courses (Biology of stem cells and applications to regenerative medicine, Cell growth, differentiation and cancer) and several sections of the other three courses (such as the study of molecular and cellular mechanisms underlying human diseases in the course *Topics of Molecular and Cellular Biology*, or the analysis of the use of modern research tools for understanding human health and disease in the course *Functional analysis of genes: from the design to the living system*) are of direct biomedical importance. The master's thesis projects assigned to the students for the second and third semesters are also in areas related to current biomedical research.

## Teaching and Research Personnel

- Teaching research personnel and principal researchers from the Department of Medicine, Department of Biological Applications and Technology, and Department of Chemistry of the University of Ioannina and the Biomedical Research Institute of FORTH participate in the program as tutors/supervisors and researchers of Research Host Labs according to the guidelines of the Cooperation Protocol of the four co-organizing departments/institutes. In addition, well-established professors and researchers from other Universities or Research Centers in Greece or abroad participate in the program as external teaching personnel for lessons of the first semester courses and invited speakers for lectures delivered in the seminar cycles of the second and third semesters. Participating research groups and teaching personnel from the University of Ioannina and the BRI-FORTH are listed on the website of the program (<http://msc-mcbb.ac.uoi.gr>), with links to corresponding webpages of their research labs which serve as potential Research Host Labs for the master's research theses of the students.

## Infrastructure

- Students of the I.I.P.P.S. in Molecular and Cellular Biology and Biotechnology are educated and trained in experimental techniques used in the development of their master's research thesis having access to the infrastructure and scientific instrumentation available at the corresponding research labs at the Department of Medicine, Department of Biological Applications and Technology, or Department of Chemistry of the University of Ioannina, and the Biomedical Research Institute of FORTH (BRI-FORTH). This infrastructure includes:
- **(a)** lecture rooms at the compound of the Department of Medicine as well as of the Department of Biological Applications and Technology and the Department of Chemistry, seminar rooms of the Biological Chemistry Lab and the Biology Lab at the Department of Medicine, University of Ioannina, Computer Room available at the University of Ioannina, **(b)** research laboratory equipment at the Labs of Biology, Biological Chemistry and other Labs of the Department of Medicine, including Clinical Chemistry, Pharmacology, Pathological Anatomy-Cytology, as well as at the Biochemistry Lab of the Department of Chemistry, the Labs of Molecular Biology, Biochemistry, Genetics, Neuroimmunology, Cellular and Developmental Biology, Biotechnology, and Bioinformatics of the Department of Biological Applications and Technology, University of Ioannina, **(c)** research laboratory equipment at the Biomedical Research Institute of FORTH, situated at Ioannina, **(d)** intra- and internet connections,

access to electronic scientific research journals and specialized e-databases and data processing units available through the University of Ioannina and the BRI-FORTH, **(e)** Library and Information Center of the University of Ioannina.

- The existing research laboratory equipment used in the postgraduate program includes: infrastructure for standard protein/DNA/RNA analyses employed in biological research, optical microscopy systems including fluorescence and confocal microscopes as well as a super-resolution microscopy unit at BRI-FORTH, cell culture units, cell sorting analysis unit, computational tools for bioinformatics analyses, etc. An important part of this infrastructure (related to microscopy and associated instrumentation) has been included in the Integrated joint Microscopy Unit of the University of Ioannina and FORTH (FEK 1762/τ. Β'/08-05-2020).
- All the above infrastructure and equipment are available to the students for their research training in the context of the postgraduate program, in accordance with the Cooperation Protocol between the participating departments/institutes of University of Ioannina and FORTH. Improvement, maintenance and upgrading of the infrastructure are pursued on a regular basis for retaining a competitive level of research facilities.

## Organization of the I.I.P.P.S.: Co-organizing Departments/Institutes

### Expediting Department

#### University of Ioannina: Department of Medicine

- The Department of Medicine of School of Health Sciences of the University of Ioannina was founded in 1977 and is now established as one of the top-level departments of Medicine in Greece (ranked first of all Departments of Medicine in Greece according to the Leiden 2019 list; <https://med.uoi.gr>).
- The Department of Medicine operated as a single Department of the Medical School of Ioannina until 2013 and, then, it operated together with the Department of Biological Applications and Technology as one of the Departments of the School of Health Sciences, which now includes four Departments, since the incorporation of the Department of Nursing and the Department of Speech and Language Therapy following the merging of several former Technological Education Institutes of Epirus with the University of Ioannina in 2018.
- The Department of Medicine is the largest of all Departments of the University of Ioannina in terms of Teaching and Research Personnel and in the number of enrolled students. It is arranged in 7 Sectors, of which members of the Sector of Clinical and Basic Functional Sciences (with expertise in Biochemistry, Biology, Molecular and Cellular Biology, Genetics, Pharmacology, Clinical Chemistry), the Sector of Morphological and Clinical Laboratory Sciences (with expertise in Anatomic Pathology), and the Sector of Internal Medicine (with expertise in Oncology, Hematology) participate as tutors in the I.I.P.P.S. Molecular and Cellular Biology and Biotechnology (<http://msc-mcbb.ac.uoi.gr>).
- The Department of Medicine of the University of Ioannina has been evaluated by External Evaluation Committees in the context of the Department accreditation and pre-graduate program accreditation by the Hellenic Quality Assurance Agency for Higher Education (currently, Hellenic Authority for Higher Education) and has received excellent comments in the relevant evaluation reports (External Evaluation Report, 2013; Accreditation Report for the Undergraduate Study Program, 2019) (available in the field *Quality Assurance*, in the website <https://med.uoi.gr>).
- Diachronic strategic plans for the Department of Medicine of the University of Ioannina include aims for (a) reinforcing education quality; (b) accomplishing research excellence; (c) producing novel high-standard clinical services; (d) promoting extroversion and mobility of academic teachers and students. More detailed or specific information can be reached at the website <https://med.uoi.gr>.
- Concerning participation in postgraduate programs of studies, the Department of Medicine exerts administrative support for three postgraduate study programs: an interinstitutional interdepartmental program between the University of Ioannina (Departments of Medicine, BAT and Chemistry) and the Foundation for Research and Technology (Biomedical Research Institute BRI-FORTH) (in Molecular and Cellular Biology and Biotechnology), a mono-departmental program (in Basic Biomedical Sciences) and an interdepartmental program between the Departments of Medicine and Nursing of the University of Ioannina (in Pathology Nursing / Adult Nursing); it also cooperates in two programs that are organized by the Department of Chemistry of the University of Ioannina (in Medical Chemistry) and the Department of Medicine of the National and Kapodistrian University of Athens (in Medical Physics- Radiation Physics), respectively.
- The Department of Medicine of the University of Ioannina provides significant research facilities and infrastructure, including several instruments organized in networks of related facilities such as a set of optical microscopy units that have been included in the Integrated joint Microscopy Unit of the University of Ioannina and FORTH (FEK 1762/B'/08-05-2020). The Department also has an organized third cycle program of studies and a significant number of postdoctoral researchers. The research activity of many teaching research members at the Department of Medicine of the University of Ioannina is pronounced and well recognized internationally. In particular, regarding research teams from the Department of Medicine that participate in the I.I.P.P.S. Molecular and Cellular Biology and Biotechnology, several teams (from the Labs of Biological Chemistry, Biology, Clinical Chemistry, and Pharmacology) are affiliated with the Institute of Biosciences of the University of Research Center of Ioannina (<https://urci.unit.uoi.gr/ibs/gr/members/members.html>) and/or the Biomedical Research Institute of the Foundation for Research and Technology (<https://www.bri.forth.gr/en/research-en>).



## Collaborating Departments/Institutes

### University of Ioannina: Department of Biological Applications and Technology (B.A.T.)

- The Department of Biological Applications and Technology (BAT) of the School of Health Sciences of the University of Ioannina was founded in 1999 and has accepted students as a University Department since academic year 2000-2001. The Department of BAT offers undergraduate education in the field of Biology with an emphasis on applications and technologies associated with biology and has a program of *five years of studies* leading to a 5-year Integrated Master's Degree in Biological Applications and Technology (FEK 3900/B'/07.09.2018) (<http://bat.uoi.gr>).
- The Department of BAT aims at promoting the science of Biology and supporting academic education in life sciences through the provision of scientific knowledge and the cultivation of basic, applied and technological research, along two axes: (a) pursuit of academic knowledge in all life sciences with an emphasis on technology and related applications; (b) production of new knowledge and technology for the development and protection of natural sources and habitats at the local and national level. The Department aims to be at the cutting edge of basic and applied research and to provide students with modern high-quality education in all areas of Biology.
- The Department of BAT has received a highly positive evaluation by an External Evaluation Committee of the Hellenic Quality Assurance Agency for Higher Education (currently, Hellenic Authority for Higher Education) (June 2011) (<http://bat.uoi.gr/department>). Starting from academic year 2016-2017, the Department has settled in a new building to serve its contemporary educational and research needs. The Department of BAT participates in the organization of 4 postgraduate programs; in two of these programs (Molecular and Cellular Biology and Biotechnology, coordinated by the Department of Medicine, and Medical Chemistry, coordinated by the Department of Chemistry), it cooperates with both the Department of Medicine and the Department of Chemistry of the University of Ioannina.
- The participation of the Department in the I.I.P.P.S. Molecular and Cellular Biology and Biotechnology dates from 2005-2006, initially through the participation of individual teaching research members, and later, starting from academic year 2014-2015, as a co-organizing Department (FEK 2731/τ. B'/13-10-2014). Teaching research members of the Department of BAT who participate in the postgraduate program as tutors/instructors (<http://msc-mcbb.ac.uoi.gr>) have expertise in Biochemistry, Molecular Biology, Molecular and Microbial Genetics, Immunology, Developmental Biology, Neurophysiology of the Central Nervous System, Enzyme Biotechnology and Biochemical Mechanics. The Department has very significant research facilities, part of which have been included in the Integrated joint Microscopy Unit of the University of Ioannina and FORTH (FEK 1762/B'/08-05-2020).
- Regarding the research teams of the Department of BAT who participate in the I.I.P.P.S. Molecular and Cellular Biology and Biotechnology, all members are affiliated also with either the University Research Center of Ioannina (URCI) (<https://www.uoi.gr/ereyna/panepistimiako-ereynitiko-kentro/>) (Institute of Biosciences (4 members) and Institute of Environmental and Sustainable Development (1 member)) or the Biomedical Research Institute of FORTH (4 members) (<https://www.bri.forth.gr/en/research-en>).
- Despite offering a 5-year Integrated Master's Degree as of 2018, the Department of BAT continues to provide an important source of postgraduate students for the I.I.P.P.S. Molecular and Cellular Biology and Biotechnology. A large number of students from the Department of BAT opt to develop their undergraduate diploma thesis in one of the research labs at the Department of Medicine or at BRI-FORTH and/or apply to attend the I.I.P.P.S. Molecular and Cellular Biology and Biotechnology after graduation or even continue for third-cycle (doctoral) studies in research labs of the Department of Medicine or the BRI-FORTH or outside Ioannina in Greece or abroad. Most of these students pursue a biomedical research direction through the I.I.P.P.S. Molecular and Cellular Biology and Biotechnology.

### University of Ioannina: Department of Chemistry

- The Department of Chemistry of the School of Sciences of the University of Ioannina was founded in 1976 and has accepted students as a University Department since academic year 1977-1978. Together with the Department of Physics and the Department of Mathematics, they constitute the School of Sciences of the University of Ioannina (<https://chem.uoi.gr>). The Department of Chemistry is organized in 4 Sectors. Teaching research members of the Department of Chemistry who participate in the I.I.P.P.S. Molecular and Cellular Biology and Biotechnology (<http://msc-mcbb.ac.uoi.gr>) derive from the Sector of Organic Chemistry and Biochemistry and specialize in Biochemistry or Chemical kinetics.

The Department of Chemistry has received a highly positive evaluation by an External Evaluation Committee in the context of the accreditation process of the Hellenic Quality Assurance Agency for Higher Education (currently, Hellenic Authority for Higher Education) (September 2011).

- Concerning postgraduate programs of studies, the Department of Chemistry provides an organized departmental postgraduate program (Master's Program of the Department of Chemistry) and also supports three interdepartmental postgraduate programs as an Expediting Department: Environment and Agri-food, Inorganic Biological Chemistry, Medical Chemistry. The postgraduate program Medical Chemistry, in particular, is organized by the Department of Chemistry together with the Department of Medicine and the Department of BAT of the University of Ioannina. The Department of Chemistry is also a participating partner in two postgraduate programs, supported by the Department of Materials Science (I.P.P.S. Chemistry and Materials Technology) or the Department of Medicine of the University of Ioannina (I.I.P.P.S. Molecular and Cellular Biology and Biotechnology).
- The Department of Chemistry provides significant research facilities and infrastructure, part of which are included in integrated units of related instrumentation at the University of Ioannina (Network of Research Supporting Laboratories). The Department also has an organized third cycle program of studies and a significant number of postdoctoral researchers.
- The research activity of many teaching research members of the Department of Chemistry of the University of Ioannina is pronounced and well recognized internationally, with the bibliometric indices of some members classifying in the upper 2% of the corresponding discipline as per the number of hetero-citations to their work appearing in the Scopus database (see the relevant recent paper from Stanford Univ.: <https://doi.org/10.1371/journal.pbio.3000918>). Many teaching research members of the Department of Chemistry are also affiliated with Institutes of the University Research Center of Ioannina (<https://www.uoi.gr/ereyna/panepistimiako-ereynitiko-kentro/>), mainly with the Institute of Materials Science and Computing or the Institute of Environmental and Sustainable Development, whereas one teaching research member of the Department, specializing in Biochemistry, is affiliated with the Institute of Biosciences of the University Research Center of Ioannina, and is also a member of the I.I.P.P.S. Molecular and Cellular Biology and Biotechnology.

#### **Foundation for Research and Technology (FORTH): Biomedical Research Institute (B.R.I.)**

- The Biomedical Research Institute (BRI) of the Foundation for Research and Technology (BRI-FORTH), <https://www.bri.forth.gr/en/>, was first established in 1998 as an independent institute (*Biomedical Research Institute of Ioannina*) under the auspices of General Secretariat for Research and Innovation (Presidential Decree 20/1998). In 2001, it joined the Foundation for Research and Technology (FORTH) (432/1987) and became the seventh institute of FORTH (*Biomedical Research Institute*) situated at Ioannina (Presidential Decree 311/2001, FEK 210/A/24-9-01). In 2012, it merged with the Institute of Molecular Biology and Biotechnology (IMBB) of Crete as a Biomedical Research Department (IMBB-BR of FORTH), situated at Ioannina (4051/29.2.2012). As of 2.12.2021, the Biomedical Research Institute was re-founded as an autonomous, ninth institute of FORTH situated at Ioannina (FEK 237/2.12.2021).
- The BRI-FORTH constitutes 18 research teams led by 4 principal researchers and 14 collaborating affiliated teaching research members of the University of Ioannina and one Distinguished member of FORTH. Currently, a total of 123 research team members and supporting personnel are occupied at BRI-FORTH (postdoctoral researchers, PhD students, undergraduate diploma students and master's students, technicians, administrative personnel). The research interests of BRI-FORTH members cover a range of biomedical research themes, including endothelial cell biology, angiogenetic mechanisms, nuclear organization, chromatin structure and function, stem cell biology and regenerative medicine, biology of cancer, inflammation and ageing, neurobiology and neurophysiology of neural development and neurodegenerative diseases, biomedical technology, as well as their applications, with emphasis in regenerative medicine and tissue mechanics. The BRI-FORTH currently hosts more than 40 relevant research programs, either at national or at European/international level, and has already served as a host Institute for a large number of PhD theses, master's theses, undergraduate diploma theses and practical training, in collaboration with Departments of the University of Ioannina.
- The BRI-FORTH provides a top-level microscopy facility that is unique in Greek research community, including Confocal STED microscopy (Leica), TIRF microscopy, and Incucyte zoom/Essex Bioscience. The facility of BRI-FORTH along with complementary high-technology microscopes from the University

of Ioannina (SPIM, AFM, electron and confocal microscopy) have been included in the Integrated joint Microscopy Unit of the University of Ioannina and FORTH (FEK 1762/B'/08-05-2020) which offers open-access and support in microscopy facilities which are unique for the Greek scientific community.

## Synergy between the departments/institutes of the I.I.P.P.S.

- Educational and research cooperation between the Departments of Medicine, Biological Applications and Technology (BAT) and Chemistry of the University of Ioannina and the Biomedical Research Institute of the Foundation for Research and Technology-Hellas (BRI-FORTH) exists in multiple levels. There is constant collaboration between teaching research members and researchers of the University of Ioannina and the researchers of the BRI-FORTH participating in the I.I.P.P.S. Molecular and Cellular Biology and Biotechnology, concerning research collaborations, supervision of PhD or Master's theses, organization of joint seminar cycles or meetings, undergraduate and graduate/postgraduate teaching. This synergy largely stems from the similarity, relevance and interconnection of gnostic subjects and research interests of the relevant teaching research members of the University of Ioannina and the researchers of the BRI-FORTH. Some of the synergistic actions are described below in more detail:
- [Cooperation Protocol for the I.I.P.P.S. Molecular and Cellular Biology and Biotechnology](#). For the re-establishment of the I.I.P.P.S. Molecular and Cellular Biology and Biotechnology in its current form, the three Departments (Medicine, BAT, and Chemistry) of the University of Ioannina and the BRI-FORTH have prepared and signed a Cooperation Protocol describing the specific terms and guidelines of the cooperation between the four departments/institutes in the postgraduate program (participating disciplines per Department/Institute, objectives-responsibilities, involvement in curriculum setup and curriculum preparation, roles in the administrative and managerial support of the program), which are valid throughout the duration of the program.
- [Affiliations of teaching research members of the Departments of Medicine and BAT with BRI-FORTH](#). Several teaching research members of the Departments of Medicine (Biochemistry, Biology, Clinical Chemistry) and BAT (Biochemistry, Molecular Biology, Molecular Genetics, Developmental Biology) who participate in the I.I.P.P.S. Molecular and Cellular Biology and Biotechnology as tutors/instructors are also affiliated for research work with the Biomedical Research Institute (BRI-FORTH). In addition, the majority (12 members) of teaching research members of the Departments of Medicine, BAT, and Chemistry who are affiliated with the Institute of Biosciences of the University Research Center of Ioannina (URCI) participate in the I.I.P.P.S. Molecular and Cellular Biology and Biotechnology, and 6 of them are also affiliated with the Biomedical Research Institute (BRI-FORTH).
- [Joint research program in the context of the Action «Regional excellence» \(BIOMED-20\)](#). An extensive research collaboration between members of the three Departments of the University of Ioannina participating in the I.I.P.P.S. program has been recently established as a joint research project for support of the development of new infrastructure at the University of Ioannina which is currently funded by the Region of Epirus in the framework of Action «Regional excellence» with the project title «Development of new infrastructure to build competence in biomedical research (BIOMED-20)» (MIS 5047236). In total, the project has drawn participation of 16 research teams led by teaching research personnel (DEP) members who act as Principal Investigators (PI). Of the 16 DEP members, 13 participate also as tutors/instructors in the I.I.P.P.S. Molecular and Cellular Biology and Biotechnology, 8 of them being also affiliated with the BRI-FORTH; practically all members of the managerial team of BIOMED-20 are also participants of the I.I.P.P.S. Molecular and Cellular Biology and Biotechnology.
- [Joint seminar cycles](#). Apart from co-teaching between members of the four departments/institutes both for postgraduate program courses of the first semester and for undergraduate elective courses of the Departments of Medicine, BAT or Chemistry, all members of the four departments/institutes take regular participation as speakers or hosts of invited speakers in a Joint Research Seminar Series co-organized by the I.I.P.P.S. Molecular and Cellular Biology and Biotechnology, the Biomedical Research Institute (BRI-FORTH) and the Institute of Biosciences of URCI (see <https://urci.unit.uoi.gr/ibs/gr/seminars.html>), entitled [Joint Seminars in Biotechnology, Biosciences, and Biomedical Research](#). These research seminars are given on a weekly basis by researchers of participating departments/institutes or collaborating researchers from other Institutes in Greece or abroad and constitute a key component for the education of the postgraduate students of the I.I.P.P.S. Molecular and Cellular Biology and Biotechnology.

- [Integrated research infrastructure](#)

Numerous research facilities are used in common by the BRI-FORTH and the Biological Chemistry and Biology Labs of the Department of Medicine (of which most members are affiliated with BRI-FORTH) but also by other members of the Departments of Medicine, BAT and Chemistry who are active in the biomedical research related fields. These facilities are accessible and used systematically for master's research theses in the context of the I.I.P.P.S. Molecular and Cellular Biology and Biotechnology. A substantial part of these facilities concerning advanced optical microscopy and related infrastructure have been included in the Integrated joint Microscopy Unit of the University of Ioannina and FORTH (FEK 1762/B'/08-05-2020) with the aim to provide optimized and effective support of the relevant research in University of Ioannina, BRI-FORTH, and access to other research teams nationwide, based on a relevant Memorandum of Understanding between the University of Ioannina and the Foundation for Research and Technology-Hellas (FORTH) (University of Ioannina Decree 7479, 07.01.2020).

## Teaching and research interconnections

- The I.I.P.P.S. Molecular and Cellular Biology and Biotechnology is linked with the introduction of the postgraduate students to the research arena in the fields of molecular cellular biology, biotechnology and biomedical research. Postgraduate teaching is offered by tutors/instructors who are also active in research on themes connected with the postgraduate program objectives and as potential supervisors of the students' master's research theses. In parallel, postgraduate students are exposed to a research education environment which fosters the values of inclusion of a new trainee researcher in an active research team, cooperative and compensatory work in the research team context, interdisciplinarity, scientific collaborations, and extroversion as important components of modern-day research.
- A main objective of the program is to offer high-quality postgraduate education in Molecular and Cellular Biology and Biotechnology, in fields mostly related to biomedical research and medical/health biotechnology, with an emphasis on research education and training of the students in a research lab environment, interdisciplinarity, extroversion, and interaction with other research teams from other Educational and Research Foundations in Greece and abroad. More specifically, in this direction:
- The postgraduate program includes one semester of intense education training in five courses with which the students are introduced in the program themes but also in the research objectives of the participating research teams and, subsequently, two semesters during which the students affiliate with particular host research labs for preparation, development, writing, presentation and defense of their master's theses. The thesis text can be written in either Greek or English. The basic educational material of the program is available in both Greek and English (see <http://msc-mcbb.ac.uoi.gr>, and the corresponding linked pages of the University of Ioannina e-course, <https://ecourse.uoi.gr>).
- Teaching during the first semester is offered in Greek and also in English, since (a) supportive material and bibliography (mostly, scientific research articles from peer-reviewed journals) for study is given in English, (b) English-speaking researchers and professors participate as tutors/instructors (including several Principal Researchers of BRI-FORTH and invited speakers from Universities or Research Centers outside Greece), (c) sufficient familiarization of the students with reading and comprehension of basic English texts in molecular cellular biology is required for admission to the program and is employed as one of the main criteria for evaluation and selection of candidates by the Evaluation Committee, (d) the students are called to present articles from the international scientific literature as part of their education training and evaluation process.
- All research literature studied by the postgraduate students in the context of their preparation and development of the master's thesis, during the second and the third semesters, is in English. Master's theses are developed in host teams which are led by English-speaking researchers and/or include English-speaking members or collaborators from abroad or are situated entirely outside Greece.
- During the second and third semesters, postgraduate students attend a series of research seminars ([Joint Seminars in Biotechnology, Biosciences, and Biomedical Research](#)), co-organized by the I.I.P.P.S. Molecular and Cellular Biology and Biotechnology, the Biomedical Research Institute (BRI-FORTH) and the Institute of Biosciences of the University Research Center of Ioannina. This series includes weekly lectures by established researchers from the host labs participating in the postgraduate program and collaborating research teams in Greece or abroad, and constitutes a key component for the education of the postgraduate students of the program.

- Apart from members of the University of Ioannina and the BRI-FORTH, professors/researchers from other academic/research institutions in Greece and abroad also contribute to the program as invited speakers for specific lectures in the first semester courses and/or research seminars in the second and third semesters.
- The program has an interdisciplinary orientation and employs participation of tutors/instructors from Departments of Medicine, Biology, Chemistry, Physics, Mathematics, Informatics and other disciplines, in the context of the master's thesis collaborative research work and/or in the first semester courses.
- In the course of development of the students' master's theses, the program encourages interactions and collaborative mobility between members of research teams from Greece and abroad. Specifically, during the last two or three years, the postgraduate program at Ioannina has launched development of a more specific collaboration with the University of Montpellier, the 6th largest university in France and one of the oldest in Europe (established in 1220) with many recent distinctions in international evaluation lists, which also includes close cooperation with the Research Center of Cellular Biology of Montpellier (CRBM, <https://www.crbm.cnrs.fr>). The CRBM is internationally acclaimed for research in cellular biology and in the field of cell cycle in particular. CRBM has served as host research center for several master's theses of the I.I.P.P.S. postgraduate program of Ioannina and a main affiliation of one of the teaching/research members of the I.I.P.P.S. Molecular and Cellular Biology and Biotechnology.

## Students – applications, evaluation and enrollment

- The I.I.P.P.S. accepts applications from graduates of Greek Universities or authorized Universities abroad with a degree in Medicine, Biology, Genetics, Biochemistry, Biotechnology, Molecular Biology, Cell Biology, Veterinary Medicine, Pharmacy, Agriculture, Chemistry, Informatics, Physics, Mathematics, Statistics, or other related disciplines, as well as from graduates of Technological Educational Institutes with a degree in a relevant discipline. Degrees of non-Greek University graduates need to have been recognized officially for academic equivalence prior to application.
- The program typically starts in the first week of October (winter semester). The precise starting date is defined by the Steering Committee upon decision of the final list and order of successful candidates for the corresponding academic year. In cases entailing special circumstances, the Steering Committee of the Program may opt to decide transfer of the program starting date to February (spring semester).
- A Call for applications of candidate postgraduate students is announced annually in June/July (when the program starts in October, i.e. the winter semester) or in October/November (when the program starts in February, i.e. spring semester). The Announcement of the Call for applications is uploaded in the website of the program (<http://msc-mcbb.ac.uoi.gr>), the websites of the cooperating departments including the Departments of Medicine (<https://med.uoi.gr/>), BAT (<http://bat.uoi.gr/>), and Chemistry (<https://chem.uoi.gr/>) of the University of Ioannina and the BRI-FORTH (<https://www.bri.forth.gr/>), as well as other appropriate websites (<https://masters.minedu.gov.gr/>; <https://www.eduguide.gr/grad/>; <https://www.eebmb.gr/>; other Departments of Greek Universities, etc.). The Call for applications includes all necessary information on the application pre-requirements and deadlines, the preparation of the submission folder, the evaluation process and the selection criteria, as well as the schedule for the enrollment period and the starting dates of the program. Application deadlines are typically set in September (when the program starts in October, i.e. in the winter semester) or December (when the program starts in February, i.e. in the spring semester).
- Selection of candidates is based on evaluation of the submission folder and an interview process. Interviews, selection and finalization of the list and order of successful candidates are completed in the month preceding the first month of the program schedule [within September, when the program starts in October (winter semester) or within January, when the program starts in February (spring semester)]. Selection is based on **the following criteria: *interview*** (evaluation of the candidate's personality, motivation, background of knowledge, rational thinking etc.), ***first degree grade, specific elements of candidate's Curriculum Vitae*** (any previous research experience, recommendations etc.), ***English knowledge*** (apart from Certificates, candidates are asked to explicitly read and translate a short text including basic molecular cellular biology terms and concepts to be given to them during the interview process). The relative importance of these criteria is as follows: **Interview (40%), First degree grade (20%), Specific elements of the Curriculum Vitae (20%), English knowledge (20%)**.
- All selected candidates obtain a postgraduate student status upon enrollment in the I.I.P.P.S. program. All postgraduate students of the program are full-time students and should enroll in the Program not later than the end of October (or the end of February, when the program starts in spring semester) of the corresponding academic year. Upon enrollment, each student accepts all directions and rules of the Postgraduate Study Program Regulations, recognizes that the Steering Committee of the Program has the right to decide their potential elimination from the program in case of conclusive failure, and conforms to all obligations defined by the coordinators/tutors/instructors and master's research thesis supervisors participating in the program for the relevant learning and evaluation processes.

## Study Regulations

### *Structure of the program*

- The I.I.P.P.S. Molecular and Cellular Biology and Biotechnology operates as a postgraduate study recurrent cycle with a duration of three semesters (three academic semesters, 90 ECTS); the first semester is devoted to the attendance of postgraduate courses and acquaintance with the participating research labs and the potential research projects available for developing a master's thesis; the second and third semesters are devoted to the preparation, development, writing and defense of a research diploma thesis (**Master's Diploma Thesis**). Emphasis is put on the research education and training of the students. Development of the Master's Diploma Thesis requires a minimum of 12 months of continuous research lab occupation.

### *Duration of studies*

- The duration of studies leading to the Master's Degree is **three (3) semesters**, from the date of enrollment to the date of graduation, and cannot exceed a maximum of **six (6) semesters**. Upon completion of the sixth semester, the student abolishes all rights pertaining to their student status and the Steering Committee examines their elimination from the program. An extension of the maximum time limit for completion of the program can be granted in special cases entailing serious health problems or other family or societal reasons, following a well-justified application of the student in agreement with their supervisor and assent by the Steering Committee of the Program.

### *Teaching – courses in the first semester*

- An academic year begins on September 1st and ends on August 31st. The program of the I.I.P.P.S. typically starts in the first week of October (winter semester). The precise starting date is defined by the Steering Committee upon decision of the final list and order of successful candidates for the corresponding academic year. In cases entailing special circumstances, the Steering Committee of the Program may opt to decide transfer of the program starting date to February (spring semester).
- The program is offered in Greek and in English.
- The duration of the academic semesters of the I.I.P.P.S. is set at 17 working weeks: 14 weeks for lessons or lectures (including article presentations by the students, usually in the last 1-2 weeks) and 3 weeks for exams. The minimum number of working weeks required for a valid academic semester is 10 weeks.
- Completion of a course requires realization of 100% of the scheduled hours of teaching. When a particular teaching date conflicts with an official holiday, any unforeseen engagement of the tutor or other hindrance, the corresponding lessons are transferred to another date (permissive with the program schedule) upon agreement between the tutor/coordinator and the students.
- Participation of postgraduate students in the lessons is mandatory. Attendance of less than 80% of the teaching hours by a student abolishes their right to sit for an exam on the corresponding course in the relevant academic period and necessitates repetition of course attendance in the next academic year. Any problems related to insufficient attendance of courses are dealt with by the tutor/coordinator and, in second degree, by the Steering Committee of the Program.

### *Master's Diploma Thesis*

- In parallel to their attendance of courses in the first semester, the postgraduate students receive information and update on the research activities and interests of research teams participating in the I.I.P.P.S. which would potentially act as host teams in Research Host Labs for their Master's theses in the second and third semesters. After exam success in at least 3 of the 5 first-semester courses, a student is eligible to affiliate with one of the participating **Research Host Labs** and start preparation for their Master's Diploma Thesis in the Research Host Lab selected.
- The specialized research required for the preparation and development of the Master's Diploma

Thesis in the second and third semesters is realized in a Research Host Lab of either one of the members of the postgraduate program at Ioannina or a collaborating researcher from other institutes in Greece or abroad. In either case, a member of the Program (from one of the four co-organizing departments/institutes at Ioannina) should act as supervisor of the Master's Thesis.

- During the **second semester**, the postgraduate students are actively engaged in research study in a Research Host Lab for preparation of their master's thesis and acquire systematic laboratory education and training in basic molecular and cellular biological techniques relevant to their research project (**Experimental Research**); they also participate in research team meetings (group meetings) and relevant bibliography seminars, and attend Joint Seminars held by members of all collaborating departments/institutes of University of Ioannina and BRI-FORTH involving lectures by researchers from University of Ioannina, BRI-FORTH, or other Universities or Research Centres in Greece and abroad, in current themes of Biotechnology, Biosciences, and Biomedical Research (*Joint Seminars in Biotechnology, Biosciences and Biomedical Research*) (**Literature Research**).
- During the **third semester**, the students actively engage in research work in the Host Lab for the preparation, development, completion, writing, and defense of their Master's project thesis. The work involves research interactions with other members of the team and collaborating members from other labs, study of the relevant research literature, experimental research work under the supervision of senior members of the team, preparation, writing and, finally, defense of the MSc thesis in an open-audience presentation.
- The written text of the **Master's Diploma Thesis** can be either in Greek or in English (and should include an abstract/summary in both English and Greek, in either case).

### **Exams – evaluation of performance**

- The exams of the first-semester courses take place at the end of the first semester. The dates of re-examination for students who fail or skip the initial exam are set by the course coordinator in communication with the students and should have been completed by the end of the second (first re-examination) or the third semester (second re-examination). Students who fail a course exam in two successive re-examinations are reviewed by the Coordinating Committee who may propose their potential elimination from the program to the Steering Committee of the Program. After exam success in at least 3 of the 5 first-semester courses, a student is eligible to affiliate with one of the participating **Research Host Labs** and start preparation for their Master's Diploma Thesis in the Research Host Lab selected. Affiliation with the Host Lab starts at the beginning of the second semester and the preparation, development, writing, and defense of the master's thesis take place in the second and third semesters. Students need to have passed all courses of the first and the second semesters prior to presentation of their Master's Thesis.
- The performance of the student in their Master's Diploma Thesis is graded by a five-membered evaluation committee in an open-audience defense procedure, following the development, writing and presentation of the research work by the student. The **five-membered evaluation committee** includes the **Supervisor** (host team leader and principal researcher for the relevant master's project), two additional teaching staff members who act together with the supervisor as **three-membered advisory committee**, and two members of the Steering Committee of the Program; the same two members of the Steering Committee participate in all master's theses evaluation committees for students of the same enrollment year.
- Student grades are based on a decimal scale, with 5/10 being the minimum passing grade.
- For the first- and second-semester courses, grades are given **with accuracy of  $\pm 0,5$**  (grades from +0.25 and above or +0.75 and above are approximated by +0.5 or +1.0, respectively; grades below +0.25 or +0.75 are approximated by +0.0 or +0.5 respectively). In the final evaluation of the master's thesis performance (third semester), each examiner's grade is given with accuracy of  $\pm 0.5$  and the final grade average is given with an approximation to three (3) decimal digits.
- The grade of the Master's Diploma Thesis (third semester) is the average of the grades given by each examiner/member of the five-membered evaluation committee.



- The **grade of the Master's Degree** is calculated as the sum of the products of the grade from each course times the equivalent ECTS, divided by the total number of ECTS of the program (90 ECTS). A course can be either a set of classes on a particular subject as in the first-semester courses, or a research educational activity as in the second and third semesters, leading to attribution of an equivalent number of ECTS. The final Master's Degree grade is given with an approximation to three (3) decimal digits.

### **Graduation**

- For graduation, a student needs to have passed all the assigned courses including the Master's Diploma Thesis as well as all the first- and second-semester courses, amounting to 90 ECTS, as detailed above.
- For the Master's Diploma award, it is pre-required that the student have submitted their Master's Diploma Thesis to the University Library and Information Center of the University of Ioannina and presented a relevant certification to the Secretariat of the Department of Medicine of the University of Ioannina. Apart from the above, the student needs to submit two printed copies as well as a pdf file of their Master's Diploma Thesis to the Director or the Coordinating Committee of the program for the Postgraduate Program archives.
- The Steering Committee of the Program is responsible to ascertain the successful completion of a studentship and validate graduation. The Master's Degree is awarded by the Department of Medicine of the University of Ioannina after fulfilment of all requirements of the program. The text in the certificate of the Master's Degree in Molecular and Cellular Biology and Biotechnology references all participating departments/institutes of the program, i.e. Department of Medicine, Department of Biological Applications and Technology, and Department of Chemistry of the University of Ioannina, and Biomedical Research Institute of the Foundation for Research and Technology (FORTH). The awarded Master's Degree is in compliance with the format defined by the University of Ioannina.

### **European Credit Transfer and Accumulation System (ECTS)**

- The program employs the European Credit Transfer and Accumulation System (ECTS). Successful completion of the program requires a total of **90 ECTS**. Postgraduate students need to collect **(a)** 30 ECTS from the five obligatory courses of the first semester; **(b)** 30 ECTS from the experimental and literature research in the context of their preparation for the Master's Thesis in the second semester; and **(c)** 30 ECTS from the development, writing, presentation and defense of their Master's Diploma Thesis in the third semester.
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### **Diploma Supplement**

- Diploma Supplement of the Master's Degree in Molecular and Cellular Biology and Biotechnology is issued since academic year 2021-2022.

## Program of studies 2022-2023

The analytical contents, teaching and evaluation methods and learning outcomes of each course can be found in the Course Outlines which are given in the program website (<http://msc-mcbb.ac.uoi.gr>).

The program offers 90 ECTS (3 academic semesters), distributed to 30 ECTS per semester. The general arrangement of the program and the titles of the courses offered are shown in the table below. A more detailed reference to the themes taught per course and the tutors who participate in teaching for academic year 2022-2023 are given in the pages that follow. At the end of the Guide of Studies, we provide a comprehensive list of the teaching/research personnel who participate in the program.

### Semester A

Courses:	ECTS
<b>MKBB101.</b> Topics in Molecular and Cellular Biology	10
<b>MKBB102.</b> Biology of Stem Cells and Applications in Regenerative Medicine	5
<b>MKBB103.</b> Cell Growth, Differentiation and Cancer	5
<b>MKBB104.</b> Functional Analysis of Genes: from the Design to the Living System	5
<b>MKBB105.</b> Biotechnological Products and Applications	5
<b>European Credit Transfer and Accumulation System</b>	<b>30</b>

### Semester B

Preparation for Master's Thesis:	ECTS
<b>MKBB201.</b> Experimental Research	15
<b>MKBB202.</b> Literature Research	15
<b>European Credit Transfer and Accumulation System</b>	<b>30</b>

### Semester C

Master's Thesis:	ECTS
<b>MKBB301.</b> Development, writing and defense of the Master's Thesis	30
<b>European Credit Transfer and Accumulation System</b>	<b>30</b>

#### Notes:

- Successful completion of the program requires a total of 90 ECTS. Postgraduate students need to collect (a) 30 ECTS from the five obligatory courses of the first semester; (b) 30 ECTS from the experimental and literature research in the context of their preparation for the Master's Thesis in the second semester; and (c) 30 ECTS from the development, writing, presentation and defense of their Master's Diploma Thesis in the third semester.
- The titles and curriculum of the courses are updated and adapted according to current needs and scientific developments based on relevant decisions or endorsements by the Steering Committee of the Program. The specialized research required for the preparation and development of the Master's Diploma Thesis in the second and third semesters is realized in a Research Host Lab of either one of the members of the postgraduate program at Ioannina or a collaborating researcher from other institutes in Greece or abroad.
- The program is offered in Greek and in English. The written text of the Master's Diploma Thesis can be either in Greek or in English.

## **MKBB101 (semester A)**

### **Topics in Molecular and Cellular Biology**

**10 ECTS, 5 weekly teaching hours, workload: 70 hours**

Coordinator: Stathis Frillingos, Professor, Department of Medicine

Vice-Coordinator: Dimitrios Liakopoulos, Assist. Professor, Department of Medicine

Webpage: <http://ecourse.uoi.gr/enrol/index.php?id=1812>

#### Objectives:

Interconnection of basic principles of biology with current research developments and approaches in molecular and cellular biology.

#### Sections:

[1] Cellular organization and function.

[2] Genomes and gene regulation.

#### Syllabus:

##### **a) Cellular organization and function**

Organismal evolution, Molecular evolution, Chromatin, nuclear envelope and nucleo-cytoplasmic traffic, Biosynthetic secretory pathway, Protein folding *in vivo*, Unfolded protein response stress, Mechanisms of vesicle-mediated exocytosis, Extracellular vesicles, Endocytosis: mechanisms and role in regulation of cellular function, Transmembrane transport, Ion channels and neurological disorders, Mitochondrial transporters in human physiology and pathology, The role of cytoskeleton in cellular functions, Mitotic spindle organization.

##### **b) Genomes and gene regulation**

Genome organization and evolution, Bioinformatic genome analysis, Transposable elements and diseases, Mechanisms of gene expression regulation in bacteria, RNA-dependent regulation of transcription and translation, The role of translational control in nervous system function, Cell cycle regulation, Cell cycle in oocytes and in egg cells, Cell signaling: The PI3K/PTEN pathway, The Wnt pathway, The role of NO in regulation of metabolism.

<b>Themes taught</b>	<b>Tutors</b>	<b>Title of Tutor</b>
Organismal evolution	Spyridon Georgatos	Professor of Biology, Dept. of Medicine, Uoi
Molecular evolution	Stathis Frillingos	Professor of Biological Chemistry, Dept. of Medicine, Uoi
Chromatin, nuclear envelope and nucleo-cytoplasmic traffic	Spyridon Georgatos	Professor of Biology, Dept. of Medicine, Uoi
Biosynthetic secretory pathway	Savvas Christoforidis	Professor of Biological Chemistry, Dept. of Medicine, Uoi
Protein folding <i>in vivo</i> , Unfolded protein response stress	Theodore Fotsis	Emeritus Professor of Biological Chemistry, Dept. of Medicine, Uoi
Mechanisms of vesicle-mediated exocytosis, Extracellular vesicles	Savvas Christoforidis	Professor of Biological Chemistry, Dept. of Medicine, Uoi
Endocytosis: mechanisms and role in regulation of cellular function	Savvas Christoforidis	Professor of Biological Chemistry, Dept. of Medicine, Uoi
Transmembrane transport	Stathis Frillingos	Professor of Biological Chemistry, Dept. of Medicine, Uoi
Ion channels and neurological disorders	Charalampos Labrakakis	Assist. Professor of Neurophysiology of the Central Nervous System, Dept. of BAT
Mitochondrial transporters in human physiology and pathology	Sotiria Tavoulari	Investigator Scientist, MRC Mitochondrial Biology Unit, University of Cambridge, UK
The role of cytoskeleton in	Panagiotis Kouklis	Assist. Professor of Biology, Dept. of

cellular functions		Medicine, UoI
Mitotic spindle organization	Dimitrios Liakopoulos	Assist. Professor of Biology, Dept. of Medicine, UoI
Genome organization and evolution	Stathis Frilingos	Professor of Biological Chemistry, Dept. of Medicine, UoI
Bioinformatic genome analysis	Grigorios Amoutzias	Assoc. Professor of Bioinformatics with an emphasis on Microbiology, Dept. of Biochemistry and Biotechnology, Univ. of Thessaly
Transposable elements and diseases	Theodore Tzavaras	Emeritus Professor of Biology, Dept. of Medicine, UoI
Mechanisms of gene expression regulation in bacteria	Stathis Frilingos	Professor of Biological Chemistry, Dept. of Medicine, UoI
RNA-dependent regulation of transcription and translation	Constantinos Stathopoulos	Professor of Biochemistry, Dept. of Medicine, Univ. of Patras
The role of translational control in nervous system function	Christos Gkogkas	Researcher B (neurobiology), BRI-FORTH
Cell cycle regulation	Evangelos Kolettas	Assoc. Professor of Molecular and Cellular Biology, Dept. of Medicine, UoI
Cell cycle in oocytes and in egg cells	Petros Marangos	Assoc. Professor of Developmental Biology, Dept. of BAT
Cell signaling: The PI3K/PTEN pathway	Georgios Leondaritis	Assist. Professor of Pharmacology, Dept. of Medicine, UoI
Cell signaling: The Wnt pathway	Theologos Michaelidis	Assoc. Professor of Molecular Genetics, Dept. of BAT
The role of NO in regulation of metabolism	Paschalis-Thomas Doulias	Assist. Professor of Biochemistry, Dept. of Chemistry, UoI

## MKBB102 (semester A)

### The biology of stem cells and applications in regenerative medicine

**5 ECTS, 3 weekly teaching hours, workload: 45 hours**

Coordinator: Spyridon Georgatos, Professor, Department of Medicine

Vice-Coordinator: Carol Murphy, Researcher B, Biomedical Research Institute, FORTH

Webpage: <https://ecourse.uoi.gr/course/view.php?id=1813>

#### Objectives:

Deeper understanding of principles of current biology through the study of stem cells and understanding of one of the most modern therapeutic approaches in the field of health biotechnology.

#### Sections:

[1] Types and properties of stem cells.

[2] Laboratory use and applications of stem cells. 2A: Directed stem cell differentiation *in vitro* 2B: Applications in regenerative medicine.

#### Syllabus:

##### **a) Types and properties of stem cells**

Fertilization and pre-implantation embryo development / totipotency, Post-implantation development-organogenesis, Blastocyst cells/pluripotency, Isolation and culture of embryonic stem cells, Assays for pluripotency, Primary spermatocytes, Self-renewal/cell cycle, Methods for maintaining self-renewal/pluripotency *in vitro*, The gene regulation network of embryonic stem cells, The epigenetic landscape of embryonic stem cells, The signaling pathways of embryonic stem cells, The shift from pluripotency to multipotency, Somatic cell reprogramming / induced pluripotent stem cells, «Plasticity» / transdifferentiation, Adult stem cells / Niche, Cancer “stem cells”

##### **b) Laboratory use and applications of stem cells**

**Directed stem cell differentiation *in vitro*:** Differentiation of embryonic stem cells to various directions/transient states, Differentiation of adult stem cells / precursors, Signaling pathways and tissue-specific differentiation, *In vitro* differentiation and malignant transformation

**Applications in regenerative medicine:** Inherent self-renewal capacity of tissues, Production of tissues *ex vivo*, organoids, Scaffolds / tissue mechanics, Autologous transplants, Cell replacement therapy, Cell therapy of malignancies

<b>Themes taught</b>	<b>Tutors</b>	<b>Title of Tutor</b>
Types and properties of stem cells	Spyridon Georgatos	Professor of Biology, Dept. of Medicine, Uoi
Directed stem cell differentiation <i>in vitro</i>	Carol Murphy	Researcher B (endothelial biology), BRI-FORTH
Applications in Regenerative Medicine	Theodore Fotsis	Emeritus Professor, Biological Chemistry, Dept. of Medicine, Uoi

## MKBB103 (semester A)

### Cell growth, differentiation and cancer

**5 ECTS, 4 weekly teaching hours, workload: 60 hours**

Coordinator: Angeliki Magklara, Assoc. Professor, Department of Medicine

Vice-Coordinator: Evangelos Kolettas, Assoc. Professor, Department of Medicine

Webpage: <http://ecourse.uoi.gr/course/view.php?id=1814>

#### Objectives:

Understanding of key aspects of carcinogenesis and cancer development (genetics, epigenetics, immunity and cancer, neoplastic angiogenesis) with emphasis on subjects that are within the research expertise of members of the program's teaching team and on related diagnostic and therapeutic strategies

#### Sections:

[1] Molecular basis and aberrations in cancer. 1A. Molecular basis. 1B. Molecular aberrations.

[2] The tumor microenvironment. 2A. Angiogenesis, endocytosis, extracellular vesicles. 2B. Immunity and cancer.

[3] Cancer markers, treatment, experimental models and techniques. 3A. Cancer markers and treatment. 3B. Analysis techniques and cancer experimental models.

#### Syllabus:

##### **a) Molecular basis and aberrations in cancer**

**Molecular basis:** Genetic and epigenetic alterations in cancer, DNA damage and repair mechanisms, Basic principles of carcinogenesis - hallmarks of cancer, the cancer stem cell model

**Molecular aberrations:** Principles of pathology approach to neoplasms, Molecular aberrations of sarcomas, Molecular aberrations of lymphomas, Molecular aberrations of melanomas, Molecular aberrations of carcinomas, Acute leukemias (diagnosis, types, prognosis, treatment) and cell therapy

##### **b) The tumor microenvironment**

**Angiogenesis, endocytosis, extracellular vesicles:** Angiogenesis and cancer: Molecular mechanisms of neoplastic angiogenesis, The role of endocytosis in angiogenesis and in cancer, Tumor microenvironment and extracellular vesicles in cancer

**Immunity and cancer:** Mechanisms of immune tolerance and their importance in homeostasis and cancer, Immunity and cancer

##### **c) Cancer markers, treatment, experimental models and techniques**

**Cancer markers and treatment:** Genetic and epigenetic markers, Liquid biopsy markers and clinical applications, Anticancer therapies, Drug discovery in cancer

**Analysis techniques and cancer experimental models:** Flow cytometry in hematologic malignancies, Techniques for identification of Liquid Biopsy Markers, Next Generation Sequencing applications in cancer, Bioinformatics in cancer, Transgenic mice as cancer models

Themes taught	Tutors	Title of Tutor
Genetic and epigenetic alterations in cancer	Evangelos Kolettas	Assoc. Professor of Molecular Cellular Biology, Dept. of Medicine, UoI
DNA damage and repair mechanisms	Papagiotis Karakaidos	Postdoctoral researcher, Biomedical Research Foundation of the Academy of Athens (BRFAA)
Basic principles of carcinogenesis - hallmarks of cancer	Evangelos Kolettas	Assoc. Professor of Molecular and Cellular Biology, Dept. of Medicine, UoI
The cancer stem cell model	Angeliki Magklara	Assoc. Professor of Clinical Chemistry, Dept. of Medicine, UoI
Principles of pathology approach to neoplasms	Anna Goussia	Professor of Pathological Anatomy, Dept. of Medicine, UoI
Molecular aberrations of sarcomas	Anna Batistatou	Professor of Pathological Anatomy, Dept. of Medicine, UoI

Molecular aberrations of melanomas	Evangelia Lampri	Assist. Professor of Pathological Anatomy, Dept. of Medicine, UoI
Molecular aberrations of lymphomas	Alexandra Papoudou-Bai	Assist. Professor of Pathological Anatomy, Dept. of Medicine, UoI
Molecular aberrations of carcinomas	Anna Goussia	Professor of Pathological Anatomy, Dept. of Medicine, UoI
Acute leukemias (diagnosis, types, prognosis, treatment) and cell therapy	Eleftheria Hatzimichael	Assist. Professor of Hematology, Dept. of Medicine, UoI
Angiogenesis and cancer: Molecular mechanisms of neoplastic angiogenesis	Theodore Fotsis	Emeritus Professor, Biological Chemistry, Dept. of Medicine, UoI
The role of endocytosis in angiogenesis and in cancer	Savvas Christoforidis	Professor of Biological Chemistry, Dept. of Medicine, UoI
Tumor microenvironment and extracellular vesicles in cancer	Georgios Giamas	Professor of Cancer Cell Signaling, Univ. of Sussex, Brighton, UK
Mechanisms of immune tolerance and importance in homeostasis and cancer, Immunity and cancer	Panagiotis Verginis	Assoc. Professor of Biochemistry, Dept. of Medicine, Univ. of Crete
Immunity and cancer	George Thyfronitis	Emeritus Professor, Cellular and Molecular Immunology, Dept. of BAT, UoI
Genetic and epigenetic markers	Marika Syrrou	Professor of Biology-Medical Genetics, Dept. of Medicine, UoI
Liquid biopsy markers and clinical applications	George Zarkavelis	Postdoctoral researcher, University General Hospital of Ioannina, Dept. Medical Oncology
Anticancer therapies	Davide Mauri	Assist. Professor, Oncology, Dept. of Medicine, UoI
Drug discovery in cancer	Maria Georgiadou	Researcher C (cancer biology and metabolism), BRI-FORTH
Flow cytometry in hematologic malignancies	Leukothea Dova	Postdoctoral researcher, University General Hospital of Ioannina, Hematology Lab
Techniques for identification of Liquid Biopsy Markers	Angeliki Magklara	Assoc. Professor of Clinical Chemistry, Dept. of Medicine, UoI
Next Generation Sequencing applications in cancer	Charilaos Kostoulas	Postdoctoral researcher, University of Ioannina Medical Genetics Laboratory
Bioinformatics in cancer	Spyridon Foutadakis	Postdoctoral researcher, Biomedical Research Foundation of the Academy of Athens (BRFAA)
Transgenic mice as cancer models	Apostolos Klinakis	Researcher A, Biomedical Research Foundation of the Academy of Athens (BRFAA)

## **MKBB104 (semester A)**

### **Functional analysis of genes: from the design to the living system**

**5 ECTS, 4 weekly teaching hours, workload: 60 hours**

Coordinator: Thomais Papamarcaki, Professor, Department of Medicine

Vice-Coordinator: Paschalis-Thomas Doulias, Assist. Professor, Department of Chemistry

Webpage: <http://ecourse.uoi.gr/course/view.php?id=1815>

#### Objectives:

Understanding of modern research strategies through paradigms of development of molecular tools, model study systems and integrated analysis of important reference proteins, and familiarization with computational methods and wet-lab experimental designs.

#### Sections:

- [1] Gene delineation, manipulation, and expression
- [2] Protein function and interactions
- [3] Model organisms
- [4] Familiarization with computational methods

#### Syllabus:

##### **a) Gene delineation, manipulation, and expression**

Genetic and genomic engineering, Mutagenesis designs, Genome editing by CRISPR-Cas9 technology, CRISPR-Cas9 experimental design, Mutagenesis experimental design, Global approaches in Genomics-Next Generation Sequencing (NGS), Next Generation Sequencing experimental design.

##### **b) Protein function and interactions**

Functional analysis of proteins: Identification and qualitative characterization of protein interactions, Quantitative analysis of protein interactions, Structure-function analysis of proteins and protein complexes, Experimental design of protein interactions study, Holistic approaches to protein analysis-Proteomics, Principles of microscopy – applications to biological research, Structure, dynamics and molecular basis of protein function: applications to rational drug design.

##### **c) Model organisms**

Model organisms: Zebrafish in biological research, The yeast genetic model, The *Drosophila* genetic model, The mouse as a model in biomedical research.

##### **d) Familiarization with computational methods**

Bioinformatic analysis of biological data, Statistical analysis of experimental data.

<b>Themes taught</b>	<b>Tutors</b>	<b>Title of Tutor</b>
Genetic and genomic engineering	Stathis Frillingos	Professor of Biological Chemistry, Dept. of Medicine, UoI
Mutagenesis designs	Stathis Frillingos	Professor of Biological Chemistry, Dept. of Medicine, UoI
Genome editing by CRISPR-Cas9 technology	Vassilios Douris	Assist. Professor of Molecular Biology, Dept. of BAT, UoI
CRISPR-Cas9 experimental design	Vassilios Douris	Assist. Professor of Molecular Biology, Dept. of BAT, UoI
Mutagenesis experimental design	Stathis Frillingos	Professor of Biological Chemistry, Dept. of Medicine, UoI
Global approaches in Genomics-Next Generation Sequencing (NGS)	Emmanouil Athanasiadis	Assist. Professor, Dept. Biomedical Engineering, University of West Attica
Bioinformatic analysis of biological data	Katerina Soupsana	Postdoctoral researcher, Biological Chemistry, Dept. of Medicine, UoI
Next Generation Sequencing experimental design	Katerina Soupsana	Postdoctoral researcher, Biological Chemistry, Dept. of Medicine, UoI



Identification and qualitative characterization of protein interactions	Thomais Papamarcaki	Professor of Biological Chemistry, Dept. of Medicine, UoI
Quantitative analysis of protein interactions	Anastasia Politou	Assoc. Professor of Biological Chemistry, Dept. of Medicine, UoI
Structure-function analysis of proteins and protein complexes	Anastasia Politou	Assoc. Professor of Biological Chemistry, Dept. of Medicine, UoI
Experimental design of protein interactions study	Thomais Papamarcaki; Anastasia Politou	Professor of Biological Chemistry, Dept. of Medicine, UoI; Assoc. Professor of Biological Chemistry, Dept. of Medicine, UoI
Holistic approaches to protein analysis-Proteomics	Michaela Filiou	Assist. Professor of Biochemistry, Dept. of BAT, UoI
Principles of microscopy – applications to biological research	Frank Fackelmayer	Researcher A (epigenetics), BRI-FORTH
Structure, dynamics and molecular basis of protein function: applications to rational drug design	Zoe Cournia	Researcher B, Biomedical Research Foundation of the Academy of Athens (BRFAA)
Model organisms: Zebrafish in biological research	Dimitrios Beis	Researcher B, Biomedical Research Foundation of the Academy of Athens (BRFAA)
The yeast genetic model	Dimitrios Liakopoulos	Assist. Professor of Biology, Dept. of Medicine, UoI
The <i>Drosophila</i> genetic model	Vassilios Douris	Assist. Professor of Molecular Biology, Dept. of BAT, UoI
The mouse as a model in biomedical research	Paschalis-Thomas Doulias	Assist. Professor of Biochemistry, Dept. of Chemistry, UoI
Statistical analysis of experimental data	Apostolos Batsidis	Assist. Professor Statistics, Dept. Mathematics, UoI

## MKBB105 (semester A)

### **Biotechnological products and applications**

**5 ECTS, 3 weekly teaching hours, workload: 45 hours**

Coordinator: Amalia-Sofia Afendra, Assist. Professor, Department of BAT

Vice-Coordinator: Anna-Irini Koukkou, Assoc. Professor, Department of Chemistry

Webpage: <https://ecourse.uoi.gr/course/view.php?id=1816>

#### Objectives:

Familiarization with different directions and approaches in the field of Biotechnology and understanding of the interconnections of applied biotechnology with basic research in molecular and cellular biology.

#### Sections:

[1] Microbial Biotechnology.

[2] Enzyme Biotechnology.

#### Syllabus:

##### **a) Microbial Biotechnology**

Horizontal gene transfer, leakage of genetic material to the environment: risks, safeguards, legislature, Genetically modified bacteria, Microbial production of primary metabolites, Microbial production of secondary metabolites, Environmental Biotechnology: Biodegradation, Green Biotechnology: Plant-microbe interactions

##### **b) Enzyme Biotechnology**

Enzyme kinetics – proteins as biotechnological products, White Biotechnology: enzymes as tools for industrial production of high-value products, Nanobiotechnology: enzymes and nanobiocatalytic systems for bioactive therapeutic products, Design and development of bioprocesses: Bioreactors

<b>Themes taught</b>	<b>Tutors</b>	<b>Title of Tutor</b>
Horizontal gene transfer, leakage of genetic material to the environment: risks, safeguards, legislature	Amalia-Sofia Afendra	Assist. Professor of Microbial Genetics, Dept. of BAT, UoI
Genetically modified bacteria	Amalia-Sofia Afendra	Assist. Professor of Microbial Genetics, Dept. of BAT, UoI
Microbial production of primary metabolites, Microbial production of secondary metabolites	Anna-Irini Koukkou	Assoc. Professor of Biochemistry, Dept. of Chemistry, UoI
Environmental Biotechnology: Biodegradation	Anna-Irini Koukkou	Assoc. Professor of Biochemistry, Dept. of Chemistry, UoI
Green Biotechnology: Plant-microbe interactions	Emmanouil Flemetakis	Assoc. Professor, Dept. Biotechnology, Agricultural University of Athens (AUA)
Enzyme kinetics – proteins as biotechnological products	Emmanouil Papamichael	Emeritus Professor, Enzymology, Dept. of Chemistry, UoI
White Biotechnology: enzymes as tools for industrial production of high-value products	Haralambos Stamatis	Professor of Enzyme Biotechnology, Dept. of BAT, UoI
Nanobiotechnology: enzymes & nanobiocatalytic systems for bioactive therapeutic products	Haralambos Stamatis	Professor of Enzyme Biotechnology, Dept. of BAT, UoI
Design and development of bioprocesses: Bioreactors	Petros Katapodis	Assist. Professor of Biochemical Mechanics, Dept. of BAT, UoI

## **MKBB201 (semester B)**

### **Experimental Research**

**15 ECTS, 12 weekly teaching hours, workload: 160 hours**

Coordinator: Stathis Frilingos, Professor, Department of Medicine, Director of the I.I.P.P.S.

Vice-Coordinators: All members of the I.I.P.P.S. who are active as Teaching and Research Personnel of the Department of Medicine or the Department of Biological Applications and Technology or the Department of Chemistry of the University of Ioannina or Researchers of the Biomedical Research Institute of FORTH.

Webpage: <http://msc-mcbb.ac.uoi.gr/Courses.Semester B>

#### **Objectives:**

Development of research knowledge and experience on theoretical understanding and experimental practice of basic molecular and cellular biological techniques related to an original MSc research project, familiarization with the relevant research literature, and development of the ability to communicate related scientific knowledge to the research community with clarity, scientific coherence, and comprehensiveness.

#### **Syllabus:**

Students are actively engaged in research study in a Research Host Lab for preparation of their MSc research work and acquire systematic laboratory education and training in basic molecular and cellular biological techniques relevant to their research project.

## MKBB202 (semester B)

### Literature Research

**15 ECTS, 12 weekly teaching hours, workload: 160 hours**

Coordinator: Stathis Frillingos, Professor, Department of Medicine, Director of the I.I.P.P.S.

Vice-Coordinators: All members of the I.I.P.P.S. who are active as Teaching and Research Personnel of the Department of Medicine or the Department of Biological Applications and Technology or the Department of Chemistry of the University of Ioannina or Researchers of the Biomedical Research Institute of FORTH.

Webpage: <http://msc-mcbb.ac.uoi.gr/Courses.Semester B2>

#### Objectives:

Acquisition of state-of-the-art knowledge in research themes of the Research Host Lab and familiarization with evaluation and analysis of research literature in molecular and cellular biology.

#### Syllabus:

Students are actively engaged in research study in a Research Host Lab, participate in research team meetings and relevant bibliography seminars, and in Joint Seminars held by members of all collaborating departments/institutes of the University of Ioannina and BRI-FORTH involving lectures by researchers from the University of Ioannina, BRI-FORTH, or other Universities or Research Centres from Greece and abroad, in current themes of Biotechnology, Biosciences, and Biomedical Research.

## **MKBB301 (semester C)**

### **Development, writing and defense of the Master's Thesis**

**30 ECTS, 30 weekly teaching hours, workload: 300 hours**

Coordinator: Stathis Frilingos, Professor, Department of Medicine, Director of the I.I.P.P.S.

Vice-Coordinators: All members of the I.I.P.P.S. who are active as Teaching and Research Personnel of the Department of Medicine or the Department of Biological Applications and Technology or the Department of Chemistry of the University of Ioannina or Researchers of the Biomedical Research Institute of FORTH.

Webage: <http://msc-mcbb.ac.uoi.gr/Courses.Semester C-start> <http://msc-mcbb.ac.uoi.gr/Courses.Semester C-end>

#### Objectives:

Students actively engage in research work in a Research Host Lab for the preparation, development, completion, writing, and defense of their MSc research project thesis. The work involves research interactions with other members of the team and collaborating members from other labs, study of relevant research literature, experimental research work under the supervision of senior members of the team, preparation, writing and, finally, defense of the MSc thesis in an open-audience presentation.

#### Syllabus:

Awarding of Postgraduate Degree in Molecular Cellular Biology and Biotechnology, combined with development of research experience and knowledge in the context of research team work in an interdisciplinary environment. Development of competencies that allow potential continuation in third-cycle (doctoral) studies in a competent and largely autonomous manner, in the research area of molecular and cellular biology and biotechnology/health biotechnology.

**Teaching/research personnel of the postgraduate program from Uoi and BRI-FORTH who act as potential Supervisors of students in Research Host Labs for Master's Diploma Theses (see MKBB201, MKBB202 and MKBB301)**

1. [Stathis Frillingos](#), Professor, Department of Medicine, Uoi
2. [Savvas Christoforidis](#), Professor, Department of Medicine, Uoi
3. [Spyridon Georgatos](#), Professor, Department of Medicine, Uoi
4. [Katerina Antoniou](#), Professor, Department of Medicine, Uoi
5. Marika Syrrou, Professor, Department of Medicine, Uoi
6. [Anna Batistatou](#), Professor, Department of Medicine, Uoi
7. [Anna Goussia](#), Professor, Department of Medicine, Uoi
8. [Thomais Papamarcaki](#), Professor, Department of Medicine, Uoi
9. [Anastasia Politou](#), Assoc. Professor, Department of Medicine, Uoi
10. [Angeliki Magklara](#), Assoc. Professor, Department of Medicine, Uoi
11. [Evangelos Kolettas](#), Assoc. Professor, Department of Medicine, Uoi
12. [Panagiotis Kouklis](#), Assist. Professor, Department of Medicine, Uoi
13. [Dimitrios Liakopoulos](#), Assist. Professor, Department of Medicine, Uoi
14. [George Leondaritis](#), Assist. Professor, Department of Medicine, Uoi
15. Davide Mauri, Assist. Professor, Department of Medicine, Uoi
16. [Eleftheria Hatzimichael](#), Assist. Professor, Department of Medicine, Uoi
17. [Alexandra Papoudou-Bai](#), Assist. Professor, Department of Medicine, Uoi
18. [Evangeli Lampri](#), Assist. Professor, Department of Medicine, Uoi
19. [Haralambos Stamatis](#), Professor, Department of BAT, Uoi
20. [Theologos Michaelidis](#), Assoc. Professor, Department of BAT, Uoi
21. [Petros Marangos](#), Assoc. Professor, Department of BAT, Uoi
22. [Vassilios Douris](#), Assist. Professor, Department of BAT, Uoi
23. [Amalia-Sofia Afendra](#), Assist. Professor, Department of BAT, Uoi
24. [Michaela Fiiou](#), Assist. Professor, Department of BAT, Uoi
25. [Petros Katapodis](#), Assist. Professor, Department of BAT, Uoi
26. [Charalampos Labrakakis](#), Assist. Professor, Department of BAT, Uoi
27. [Anna-Irini Koukkou](#), Assoc. Professor, Department of Chemistry, Uoi
28. [Paschalis-Thomas Doulias](#), Assist. Professor, Department of Chemistry, Uoi
29. [Frank Fackelmayer](#), Researcher A, Biomedical Research Institute, FORTH
30. [Carol Murphy](#), Researcher B, Biomedical Research Institute, FORTH
31. [Christos Gkogkas](#), Researcher B, Biomedical Research Institute, FORTH
32. [Maria Georgiadou](#), Researcher C, Biomedical Research Institute, FORTH

(links in the names of the above teaching/research members refer to corresponding lab webpages for information regarding potential Research Host Labs participating in the postgraduate program)

## Teaching personnel of the I.I.P.S. Molecular and Cellular Biology and Biotechnology for academic year 2022-2023

### (a) Department of Medicine, University of Ioannina

#### PROFESSORS

1. Stathis Frillingos, Professor of Biological Chemistry
2. Savvas Christoforidis, Professor of Biological Chemistry
3. Spyros Georgatos, Professor of Biology
4. Anna Batistatou, Professor of Pathological Anatomy
5. Anna Goussia, Professor of Pathological Anatomy
6. Thomais Papamarcaki, Professor of Biological Chemistry
7. Maria Syrrou, Professor of Biology-Medical Genetics
8. Katerina Antoniou, Professor of Pharmacology

#### ASSOCIATE PROFESSORS

9. Evangelos Kolettas, Assoc. Professor of Molecular Cellular Biology
10. Angeliki Magklara, Assoc. Professor of Clinical Chemistry
11. Anastasia Politou, Assoc. Professor of Biological Chemistry

#### ASSISTANT PROFESSORS

12. Panagiotis Kouklis, Assist. Professor of Biology
13. Alexandra Papoudou-Bai, Assist. Professor of Pathological Anatomy
14. Evangelia Lampri, Assist. Professor of Pathological Anatomy
15. George Leondaritis, Assist. Professor of Pharmacology
16. Dimitris Liakopoulos, Assist. Professor of Biology
17. Davide Mauri, Assist. Professor of Oncology
18. Eleftheria Hatzimichael, Assist. Professor of Hematology

#### POSTDOCTORAL RESEARCHERS

19. Katerina Soupsana, Postdoctoral researcher (Laboratory of Biological Chemistry)

#### EMERITUS PROFESSORS

20. Theodore Tzavaras, former Professor of Biological Chemistry, Emeritus Professor
21. Theodore Fotsis, former Professor of Biology, Emeritus Professor

### (b) Department of Biological Applications and Technology, University of Ioannina

#### PROFESSORS

22. Haralambos Stamatis, Professor of Enzyme Biotechnology

#### ASSOCIATE PROFESSORS

23. Petros Marangos, Assoc. Professor of Developmental Biology
24. Theologos Michaelidis, Assoc. Professor of Molecular Genetics

#### ASSISTANT PROFESSORS

25. Amalia Sofia Afendra, Assist. Professor of Microbial Genetics
26. Vassilis Douris, Assist. Professor of Molecular Biology
27. Charalampos Labrakakis, Assist. Professor of Neurophysiology of the Central Nervous System
28. Petros Katapodis, Assist. Professor of Biochemical Mechanics
29. Michaela Filiou, Assist. Professor of Biochemistry

#### **EMERITUS PROFESSORS**

30. George Thyphronitis, former Professor of Cellular and Molecular Immunology, Emeritus Professor

#### **(c) Department of Chemistry, University of Ioannina**

#### **ASSOCIATE PROFESSORS**

31. Anna Irini Koukkou, Assoc. Professor of Biochemistry

#### **ASSISTANT PROFESSORS**

32. Paschalis-Thomas Doulias, Assist. Professor of Biochemistry

#### **EMERITUS PROFESSORS**

33. Emmanuel Papamichael, former Professor of Enzymology, Emeritus Professor

#### **(d) Biomedical Research Institute, Foundation for Research and Technology (BRI-FORTH)**

#### **RESEARCHERS A**

34. Frank Fackelmayer, Senior Researcher A, epigenetics

#### **RESEARCHERS B**

35. Carol Murphy, Senior Researcher B, endothelial biology and stem cells
36. Christos Gkogkas, Senior Researcher B, neurobiology

#### **RESEARCHERS C**

37. Maria Georgiadou, Senior Researcher C, cancer biology and metabolism

#### **(e) Teaching members (DEP) from other Departments of the University of Ioannina**

#### **DEPARTMENT OF MATHEMATICS OF THE UNIVERSITY OF IOANNINA**

38. Apostolos Batsidis, Assist. Professor of Statistics

#### **(f) External teaching members – invited for lectures on specific subjects**

#### **PROFESSORS, TEACHING AND RESEARCH PERSONNEL, SENIOR RESEARCHERS**

39. Georgios Giamas, Professor of Cancer Cell Signaling, Department of Biochemistry and Biomedicine, University of Sussex, Brighton, UK
40. Constantinos Stathopoulos, Professor of Biochemistry, Dept. of Medicine, University of Patras
41. Grigorios Amoutzias, Assoc. Professor of Bioinformatics with emphasis on Microbiology, Dept. of Biochemistry and Biotechnology, University of Thessaly
42. Panayotis Verginis, Assoc. Professor of Biochemistry, Dept. of Medicine, University of Crete
43. Emmanouil Flemetakis, Assoc. Professor of Biochemistry of Plants and Microorganisms, Dept. of Biotechnology, Agricultural University of Athens (AUA)



44. Emmanouil Athanasiadis, Assist. Professor, Dept. of Biomedical Engineering, University of West Attica
45. Apostolos Klinakis, Researcher A, Biomedical Research Foundation of the Academy of Athens (BRFAA)
46. Zoe Cournia, Researcher B, Biomedical Research Foundation of the Academy of Athens (BRFAA)
47. Dimitris Beis, Researcher B, Biomedical Research Foundation of the Academy of Athens (BRFAA)
48. Sotiria Tavoulari, Senior Research Associate/Program Leader, MRC Mitochondrial Biology Unit, University of Cambridge, Cambridge, UK

#### **POSTDOCTORAL RESEARCHERS**

49. Papagiotis Karakaidos, postdoctoral researcher, Biomedical Research Foundation of the Academy of Athens (BRFAA)
50. Spyros Foutadakis, postdoctoral researcher, Biomedical Research Foundation of the Academy of Athens (BRFAA)
51. Charilaos Kostoulas, postdoctoral researcher, University Ioannina, Laboratory of Medical Genetics
52. Georgios Zarkavelis, postdoctoral researcher, pathologist-oncologist, University General Hospital of Ioannina, Dept. of Medical Oncology
53. Leukothea Dova, postdoctoral researcher, University General Hospital of Ioannina, Dept. of Medical Oncology, Hematology Lab (Molecular Biology and Translational Flow Cytometry Unit)

## Interinstitutional Interdepartmental Program of Postgraduate Studies

### Molecular and Cellular Biology and Biotechnology

#### Contact Us:

#### Information

Department of Medicine (Secretariat)  
University of Ioannina  
Panepistimioupolis Dourouti  
45110 Ioannina  
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#### Director of the I.I.P.P.S.

Prof. Stathis Frillingos  
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45110 Ioannina  
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#### Steering Committee for the Program of Studies

1. Stathis Frillingos, Professor, Department of Medicine, University of Ioannina, President
2. Savvas Christoforidis, Professor, Department of Medicine, University of Ioannina
3. Dimitrios Liakopoulos, Assist. Professor, Department of Medicine, University of Ioannina
4. Theologos Michaelidis, Assoc. Professor, Department of BAT, University of Ioannina
5. Vassilios Douris, Assist. Professor, Department of BAT, University of Ioannina
6. Paschalis-Thomas Doulias, Assist. Professor, Dept. of Chemistry, University of Ioannina
7. Christos Gkogkas, Researcher B, Biomedical Research Institute, FORTH

#### Coordinating Committee

1. Stathis Frillingos, Professor, Department of Medicine, University of Ioannina, President
2. Savvas Christoforidis, Professor, Department of Medicine, University of Ioannina
3. Dimitrios Liakopoulos, Assist. Professor, Department of Medicine, University of Ioannina
4. Vassilios Douris, Assist. Professor, Department of BAT, University of Ioannina
5. Paschalis-Thomas Doulias, Assist. Professor, Dept. of Chemistry, University of Ioannina

Website <http://msc-mcbb.ac.uoi.gr>

## Διδρυματικό Διατμηματικό Πρόγραμμα Μεταπτυχιακών Σπουδών

### Μοριακή-Κυτταρική Βιολογία και Βιοτεχνολογία

#### Στοιχεία επικοινωνίας:

#### Πληροφορίες

Γραμματεία Τμήματος Ιατρικής (επισπεύδον τμήμα)

Πανεπιστημίου Ιωαννίνων

Πανεπιστημιούπολη Δουρούτης

45110 Ιωάννινα

Τηλ. 26510 07521 (κα. Αικατερίνη Λαγού)

[klagou@uoi.gr](mailto:klagou@uoi.gr)

#### Διεύθυνση του Δ.Δ.Π.Μ.Σ.

Ευστάθιος Φριλίγγος

Καθηγητής Βιολογικής Χημείας

Τμήματος Ιατρικής

Πανεπιστήμιο Ιωαννίνων

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Τηλ. 26510 07715

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#### Επιτροπή Προγράμματος Σπουδών

1. Ευστάθιος Φριλίγγος, Καθηγητής Τμήματος Ιατρικής Παν. Ιωαννίνων, Πρόεδρος
2. Σάββας Χριστοφορίδης, Καθηγητής Τμήματος Ιατρικής Παν. Ιωαννίνων
3. Δημήτριος Λιακόπουλος, Επίκουρος Καθηγητής Τμήματος Ιατρικής Παν. Ιωαννίνων
4. Θεολόγος Μιχαηλίδης, Αναπληρωτής Καθηγητής Τμήματος ΒΕΤ Παν. Ιωαννίνων
5. Βασίλειος Δουρής, Επίκουρος Καθηγητής Τμήματος ΒΕΤ Παν. Ιωαννίνων
6. Πασχάλης-Θωμάς Δούλιας, Επίκουρος Καθηγητής Τμήματος Χημείας Παν. Ιωαννίνων
7. Χρήστος Γκόγκας, Ερευνητής Β, Ινστιτούτο Βιοϊατρικών Ερευνών, ΙΤΕ

#### Συντονιστική Επιτροπή

1. Ευστάθιος Φριλίγγος, Καθηγητής Τμήματος Ιατρικής Παν. Ιωαννίνων, Πρόεδρος
2. Σάββας Χριστοφορίδης, Καθηγητής Τμήματος Ιατρικής Παν. Ιωαννίνων
3. Δημήτριος Λιακόπουλος, Επίκουρος Καθηγητής Τμήματος Ιατρικής Παν. Ιωαννίνων
4. Βασίλειος Δουρής, Επίκουρος Καθηγητής Τμήματος ΒΕΤ Παν. Ιωαννίνων
5. Πασχάλης-Θωμάς Δούλιας, Επίκουρος Καθηγητής Τμήματος Χημείας Παν. Ιωαννίνων

Ιστοσελίδα <http://msc-mcbb.ac.uoi.gr>