COURSE OUTLINE

(1) GENERAL

SCHOOL	Health Sciences		
ACADEMIC UNIT	Medicine		
LEVEL OF STUDIES	Post-graduate		
COURSE CODE	**MKBB104**	**SEMESTER**	**A (1st)**
COURSE TITLE	**Functional analysis of genes: for the design to the living system**		

INDEPENDENT TEACHING ACTIVITIES *if credits are awarded for separate components of the course, e.g. lectures, laboratory exercises, etc. If the credits are awarded for the whole of the course, give the weekly teaching hours and the total credits*	**WEEKLY TEACHING HOURS**	**CREDITS**
Lectures	4	5
Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).		

COURSE TYPE *general background, special background, specialised general knowledge, skills development*	Specialised general knowledge (post-graduate course)
PREREQUISITE COURSES:	
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek and English
IS THE COURSE OFFERED TO ERASMUS STUDENTS	Yes
COURSE WEBSITE (URL)	http://ecourse.uoi.gr/course/view.php?id=1815

(2) LEARNING OUTCOMES

Learning outcomes

The course learning outcomes, specific knowledge, skills and competences of an appropriate level, which the students will acquire with the successful completion of the course are described.

Consult Appendix A

- *Description of the level of learning outcomes for each qualifications cycle, according to the Qualifications Framework of the European Higher Education Area*
- *Descriptors for Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Appendix B*
- *Guidelines for writing Learning Outcomes*

Students are expected to understand basic principles of modern research strategies through paradigms of development of molecular tools, model study systems and integrated analysis of important reference proteins and become familiarized with relevant computational methods and wet-lab experimental designs.

General Competences

Taking into consideration the general competences that the degree-holder must acquire (as these appear in the Diploma Supplement and appear below), at which of the following does the course aim?

Search for, analysis and synthesis of data and information, with the use of the necessary technology
Adapting to new situations
Decision-making
Working independently
Team work
Working in an international environment
Working in an interdisciplinary environment
Production of new research ideas
Project planning and management
Respect for difference and multiculturalism
Respect for the natural environment
Showing social, professional and ethical responsibility and sensitivity to gender issues
Criticism and self-criticism
Production of free, creative and inductive thinking
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Others…

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- Search for, analysis and synthesis of data and information, with the use of the necessary technology
- Decision-making
- Working independently
- Team work
- Working in an interdisciplinary environment
- Respect for difference and multiculturalism
- Criticism and self-criticism

(3) SYLLABUS

- **Section 1: Gene delineation, manipulation, and expression**
  Themes taught
  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

- **Section 2: Protein function and interactions**
  Themes taught
  Functional analysis of proteins: I: 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.

- **Section 3: Model organisms**
  Themes taught
  Model organisms: Zebrafish in biological research, The yeast genetic model, The *Drosophila* genetic model, The mouse as a model in biomedical research

- **Section 4: Familiarization with computational methods**
  Themes taught
  Bioinformatic analysis of biological data, Statistical analysis of experimental data

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.

(4) TEACHING and LEARNING METHODS - EVALUATION

DELIVERY *Face-to-face, Distance learning, etc.*	Teaching courses to small groups of students given by several instructors (academic personnel from different disciplines and research specialties).
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, communication with students*	Powerpoint slides and videos are used in the lectures. Predicted use of electronic voting systems. The powerpoint slides and videos presented, as well as complementary teaching material (videos, links

to important research articles or related textbooks, etc.), are freely accessible to the students through the e-course system of the University of Ioannina. Teaching material is updated at least annually. Other possibilities offered by the e-course system are also applied (e.g. uploading of quizzes or short problems of study and feedback to the students' answers with comments by the teaching stuff). The e-course is also used for communication with the students (http://ecourse.uoi.gr/course/view.php?id=1815). E-mail addresses of the teaching staff are made available to the students and are also freely used as a means of communication.

TEACHING METHODS

The manner and methods of teaching are described in detail.
Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.

The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the ECTS

Activity	***Semester workload***
Lectures	38
Seminars (delivered by external lecturers)	12
Analysis of bibliography	10
Course total	***60***

STUDENT PERFORMANCE EVALUATION

Description of the evaluation procedure

Language of evaluation, methods of evaluation, summative or conclusive, multiple choice questionnaires, short-answer questions, open-ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other

Specifically-defined evaluation criteria are given, and if and where they are accessible to students.

Language of evaluation: Greek and English

Methods:

(a) Intermediate evaluation through short questions and quizzes that are discussed with the students in the context of each thematic module taught.
(b) Evaluation of the students in the analysis and presentation of peer-reviewed articles that are assigned to them by the teaching staff: presentations are given at the end of the semester and the grades from these presentations contribute by 20% to their final grade
(c) Written exam (which contributes to their final grade by 80%)
Each written exam may include:
Short-answer questions
Open-ended questions
Questions requiring combination of knowledge from different chapters
Questions requiring critical thinking/interpretation

Evaluation criteria:

Successful performance (grade 5/10) in the written exam evaluating students on comprehension of the course material, based on the lessons taught and the corpus of teaching material that is accessible in page http://ecourse.uoi.gr/enrol/index.php?id=1815.
Student grades are based on a decimal scale and are given with accuracy of ±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). The

	final grade incudes a 20% contribution from student grades in article presentations. Written exams are kept officially in the PPS files (Director's office) for at least two years and are accessible to students for analysis of questions and comments on the themes and the student answers. Reexamination dates after exam failure are scheduled in collaboration with the course Coordinator until the end of the second (first re-exam) or the third semester (second re-exam), at latest. Failure in the second re-exam is considered as a reason for discontinuation of the student affiliation to the program by the Steering Committee. All exam procedures and evaluation criteria are included in the study program rules and regulations, which are accessible at the website http://msc-mcbb.ac.uoi.gr

(5) ATTACHED BIBLIOGRAPHY

- Suggested bibliography:

Peer-reviewed articles from the literature and textbook chapters that are suggested by the academic teachers on the thematic chapter they teach. This bibliography is available to the students in the corresponding webpage at e-course. Indicatively, the proposed bibliography includes chapters from books *Molecular Cell Biology 8e* (Lodish, 2019), *Bioinformatics and Functional Genomics* (Pevsner, 2019), *Introduction to Bioinformatics 5e* (Lesk, 2021), review and/or original research articles from *Nature, Cell, Science, Nat Chem Biol, Nat Protocols, Nat Rev Genet, Cell Rep, Sci Rep, Mol Cell, J Mol Biol, J Biol Chem, Proteomics, Nucleic Acids Res*, etc..

- Related academic journals:

See http://ecourse.uoi.gr/course/view.php?id=1815