COURSE OUTLINE

(1) GENERAL

SCHOOL			
ACADEMIC UNIT	**Interdisciplinary Graduate Programme in the BRAIN and MIND sciences**		
LEVEL OF STUDIES	7		
COURSE CODE	**B&M-R-125**	SEMESTER	**depending on availability**
COURSE TITLE	Cellular biology and pathophysiology of the retina		

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
laboratory exercises	6	9-27
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*	Special background, skills development
PREREQUISITE COURSES:	B&M -105 Introduction to Molecular and Cellular Neuroscience I. Perception B&M -102 Introduction to Systems Neuroscience I. Perception B&M -102A Introduction to Systems Neuroscience II. Movement & Cognitive Functions Also recommended: B&M-210 Cerebral Cortex: Perception & Movement B&M-227 Introduction Molecular Neurobiology
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	English
IS THE COURSE OFFERED TO ERASMUS STUDENTS	YES
COURSE WEBSITE (URL)	https://elearn.uoc.gr/course/view.php?id=4451

(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*

As part of the laboratory exercise, the student will be introduced to the scientific questions investigated at the Laboratory of Cellular Biology and Pathophysiology of the Retina, which is part of the Laboratory of Vision and Optics, Faculty of Medicine, University of Crete. Research in our laboratory focuses on two distinct areas.

The first area concerns the investigation of changes occurring in retinal neurons in preclinical models of neurodegeneration. These changes may be quantitative, morphological, involve alterations in the

distribution of cells within the tissue, as well as changes in the synaptic connections they form with each other (*connectomics*). Thorough study of these alterations provides further insight into the pathophysiology of the disease under investigation and, consequently, the potential to identify new therapies.

The second area involves the evaluation of the effectiveness of innovative drugs designed for intravitreal administration and for sustained release of compounds into the retina. The rationale for these studies is based on the very short residence time of most drugs within the vitreous cavity of the eye. We collaborate with groups of chemical engineers who design these drugs, while our laboratory assesses their potential toxicity, pharmacokinetics, and possible therapeutic efficacy in preclinical models of ocular inflammation.

Upon completion of the laboratory exercise, the student will be able to:

- Reproduce, analyze, integrate, and apply the knowledge acquired from compulsory and elective courses of the program within the research framework of their project.
- Use this knowledge as a basis for original ideas and research.
- Apply acquired knowledge at a high level of abstraction.
- Think conceptually, develop, and deepen arguments.
- Analyze and carry out complex scientific tasks.
- Collaborate effectively with colleagues and supervisors.
- Take responsibility for the results of their work.
- Communicate conclusions and knowledge—potentially derived from original research, self-study, or experience—to both specialized and non-specialized audiences with clarity and precision.

If the laboratory exercise develops into a thesis project, further engagement with the research topic enables the student to:

- Independently conduct fundamental research based on methodological knowledge.
- Make original contributions to the development and application of ideas in the field of research.
- Recognize the limitations of existing knowledge in their scientific field and at the interface with related fields, and adapt their actions accordingly.
- Identify and analyze complex problems and solve them strategically and creatively.
- Take responsibility for managing complex processes.
- Communicate in a targeted manner with colleagues, specialists and non-specialists, as well as supervisors, according to the context, using conventions relevant to the field of expertise.

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
……
Others…
…….

- 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

- Showing social, professional and ethical responsibility and sensitivity to gender issues
- Criticism and self-criticism
- Production of free, creative and inductive thinking

(3) SYLLABUS

Training in research methods related to the investigation of cellular changes in the inner retina in preclinical models of neurodegeneration and/or the potential efficacy of innovative drugs in preclinical models of ocular inflammation. In particular, the student will be trained in some of the following areas:

- Microsurgery of the eye.
- Preclinical models of ocular pathophysiology.
- Handling of experimental animals.
- Preparation of tissue samples and cryosections.
- Immunofluorescence.
- Confocal microscopy.
- Pharmacokinetic studies following intravitreal administration.

(4) TEACHING and LEARNING METHODS - EVALUATION

DELIVERY *Face-to-face, Distance learning, etc.*	Face-to-face
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, communication with students*	Use of confocal microscopy software. Use of publisher databases/electronic repositories of scientific articles
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* Study and analysis of bibliography: 50-150 project: 100-300 essay writing: 25-75 non-directed study: 50-150 Course total: ***225-675***
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.*	Evaluation Language: English The student's dedication to conducting the study, autonomy and independence, critical review and analysis of the literature, progress over time, and the quality of the report are evaluated. Evaluation criteria are outlined in the study guide and communicated to students at the beginning of the course.

(5) ATTACHED BIBLIOGRAPHY

- Suggested bibliography:

Scientific articles published in reputable scientific journals relevant to the research interests of the Laboratory of Cellular Biology and Pathophysiology of the Retina (Laboratory of Vision and Optics), Faculty of Medicine, University of Crete.