

## COURSE OUTLINE

### “LABORATORY COURSE V: METHODS IN MOLECULAR BIOLOGY”

#### 1. GENERAL

<b>SCHOOL</b>	HEALTH SCIENCES		
<b>DEPARTMENT</b>	MOLECULAR BIOLOGY AND GENETICS		
<b>STUDY LEVEL</b>	ISCED LEVEL 6		
<b>COURSE CODE</b>	<b>MBG322</b>	<b>SEMESTER</b>	5 <sup>th</sup>
<b>COURSE TITLE</b>	LABORATORY COURSE V: METHODS IN MOLECULAR BIOLOGY		
<b>TEACHING ACTIVITIES</b>	<b>HOURS/WEEK</b>	<b>ECTS CREDITS</b>	
<i>In case credits are awarded to individual components of the course eg. Lectures, laboratory practicals, etc. If credit units are awarded for the whole course, indicate the weekly teaching hours and total credits</i>	4	6	
<b>COURSE TYPE</b> <i>General, Background, Scientific field course, Expertise Course, Skills Development etc</i>	SCIENTIFIC FIELD		
<b>PREREQUISITE COURSES:</b>	NO		
<b>LANGUAGE OF TEACHING AND EXAMINATIONS:</b>	GREEK ENGLISH FOR ERASMUS STUDENTS		
<b>THE COURSE IS OFFERED TO ERASMUS STUDENTS</b>	YES		
<b>COURSE WEBSITE (URL)</b>	<a href="https://eclass.duth.gr/courses/ALEX01204/">https://eclass.duth.gr/courses/ALEX01204/</a>		

#### 2. LEARNING OUTCOMES

<p><b>Learning outcomes</b></p> <p><i>Describe the learning outcomes of the course, the specific knowledge, skills and competencies that students will acquire after successfully completing the course. Refer to Appendix A.</i></p> <ul style="list-style-type: none"> <li>• Description of learning outcomes for the course according to the level of study - refer to the European Higher Education Area Qualifications Framework</li> <li>• Descriptive Indicators of Levels 6, 7 &amp; 8 of the European Qualifications Framework for Lifelong Learning and Annex B Curriculum Vitae Summary Guide</li> </ul>		
<p>The objectives of the course are:</p> <p>a) to enable the students to develop skills in experimental design, formulation and control of scientific hypotheses in Molecular Biology, emphasizing the application of the scientific method in this field,</p> <p>b) to familiarize students, both theoretically and practically, with a range of fundamental methods and techniques used in Molecular Biology,</p> <p>c) to familiarize students with interpreting and evaluating experimental results.</p> <p>Learning Outcomes</p> <p>After successfully completing the course, students will:</p> <ul style="list-style-type: none"> <li>• acquire practical experimentation skills in modern molecular biology,</li> <li>• be able to describe and analyze the principles underlying the basic techniques of molecular biology,</li> <li>• be able to follow and perform a range of modern molecular biology techniques,</li> <li>• acquire abilities to analyze, evaluate and interpret experimental data of the most important state-of-the-art techniques,</li> <li>• be able to design/propose experimental methodology in order to answer a simple molecular biology question using appropriate techniques.</li> </ul>		
<p><b>General Skills</b></p> <p><i>Which of the general competencies that the student will have acquired on the completion of the studies (see also the Diploma Supplement and below) are relevant to this course?</i></p> <table style="width: 100%; border: none;"> <tr> <td style="vertical-align: top;"> <ul style="list-style-type: none"> <li><i>Research, analysis and synthesize of data and information, using the necessary technologies</i></li> <li><i>Adaptation to new situations</i></li> <li><i>Decision making</i></li> <li><i>Autonomous work</i></li> <li><i>Team work</i></li> <li><i>Work in an international environment</i></li> </ul> </td> <td style="vertical-align: top;"> <ul style="list-style-type: none"> <li><i>Work in an interdisciplinary environment</i></li> <li><i>Production of new research ideas</i></li> <li><i>Project design and management</i></li> <li><i>Respect for diversity and multiculturalism</i></li> <li><i>Respect for the natural environment</i></li> <li><i>Development of social, professional and moral responsibility and gender sensitivity</i></li> <li><i>Promotion of free, creative and inductive thinking</i></li> </ul> </td> </tr> </table>	<ul style="list-style-type: none"> <li><i>Research, analysis and synthesize of data and information, using the necessary technologies</i></li> <li><i>Adaptation to new situations</i></li> <li><i>Decision making</i></li> <li><i>Autonomous work</i></li> <li><i>Team work</i></li> <li><i>Work in an international environment</i></li> </ul>	<ul style="list-style-type: none"> <li><i>Work in an interdisciplinary environment</i></li> <li><i>Production of new research ideas</i></li> <li><i>Project design and management</i></li> <li><i>Respect for diversity and multiculturalism</i></li> <li><i>Respect for the natural environment</i></li> <li><i>Development of social, professional and moral responsibility and gender sensitivity</i></li> <li><i>Promotion of free, creative and inductive thinking</i></li> </ul>
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Search, analysis and synthesis of data and information, ICT Use  
 Adaptation to new situations  
 Decision making  
 Autonomous work  
 Teamwork  
 Production of new research ideas  
 Critical thinking  
 Promoting free, creative and inductive reasoning  
 Apply scientific principles, methods and knowledge to medical practice and research

### 3. COURSE CONTENT

1. Transformation in the bacterium E. coli.
2. Mini-preparation of plasmid DNA
3. Quantification of DNA
4. Restriction enzyme digestion
5. DNA electrophoresis in agarose gel
6. PCR & Primer design
7. qPCR
8. Protein expression in E. coli.
9. Methods of protein purification
10. Isolation and purification of recombinant protein by affinity chromatography following overexpression in E. coli
11. In situ hybridization
12. Anatomy of the mouse embryo
13. Basic principles of cell culture
14. Next Generation Sequencing - Microbiome

### 4. TEACHING and LEARNING METHODS - EVALUATION

<b>TYPE OF TRAINING</b> <i>Face-to-face, Distance learning, etc..</i>	Face to face										
<b>USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY</b> <i>Use of ICT in teaching, laboratory education, and in communication with the students</i>	Use of ICT in Teaching Use of ICT in Laboratory Education Use of ICT in Communication with students										
<b>MODES OF DELIVERY</b> <i>Describe the teaching methods in detail. Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, practicum, 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</i>	Active exploratory approach through the implementation of a research scenario. Students will be evaluated by written examinations and / or reports of results at the end of each laboratory exercise and at the end of the course: A) by evaluating the laboratory book and B) by written examinations at the end of the semester.										
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="background-color: #d9ead3;">Activity</th> <th style="background-color: #d9ead3;">Workload/semester</th> </tr> </thead> <tbody> <tr> <td>Laboratory Exercise</td> <td style="text-align: center;">52</td> </tr> <tr> <td>Bibliographic research &amp; analysis</td> <td style="text-align: center;">98</td> </tr> <tr> <td>Writing project</td> <td style="text-align: center;">30</td> </tr> <tr> <td><b>Course Total</b></td> <td style="text-align: center;"><b>180</b></td> </tr> </tbody> </table>		Activity	Workload/semester	Laboratory Exercise	52	Bibliographic research & analysis	98	Writing project	30	<b>Course Total</b>	<b>180</b>
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<p style="text-align: center;"><b>STUDENT PERFORMANCE EVALUATION</b></p> <p style="text-align: center;"><i>Describe of the methods of evaluation language, methods of evaluation, types of exams, 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</i></p> <p style="text-align: center;"><i>Are evaluation criteria known to the students?</i></p>	<p><b>Student evaluation languages</b> Greek, English</p> <p><b>Method (Formative or Concluding)</b> Formative</p> <p><b>Student evaluation methods</b> Written exam with multiple choice test (30%) Written Examination with Short Response Questions (10%) Written Examination with Extended Response Questions (25%) Written Problem Solving (15%) Laboratory book (labook), (20%)</p> <p>The evaluation criteria are presented in the course guide available on the course's website.</p>
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### 5. SUGGESTED BIBLIOGRAPHY

Title: Laboratory calculations in biosciences (Greek Translation)  
 Author: Lisa Seidman, Eudoxus code: 5319

**Course Notes**

The course notes are available through the e-class platform.