

## COURSE OUTLINE

### (1) GENERAL

SCHOOL	Natural Sciences		
ACADEMIC UNIT	Biology		
LEVEL OF STUDIES	Undergraduate		
COURSE CODE	BIO_FE02	SEMESTER	6/8
COURSE TITLE	Instrumental Analysis of Biomolecules		
<b>INDEPENDENT TEACHING ACTIVITIES</b> <i>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</i>		<b>WEEKLY TEACHING HOURS</b>	<b>CREDITS</b>
Lectures		3	3
<i>Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).</i>			
<b>COURSE TYPE</b> <i>general background, special background, specialised general knowledge, skills development</i>	Scientific Field		
<b>PREREQUISITE COURSES:</b>	None		
<b>LANGUAGE OF INSTRUCTION and EXAMINATIONS:</b>	Greek and English in case that foreign students participate		
<b>IS THE COURSE OFFERED TO ERASMUS STUDENTS</b>	Yes		
<b>COURSE WEBSITE (URL)</b>	No		

### (2) LEARNING OUTCOMES

<p><b>Learning outcomes</b></p> <p><i>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.</i></p> <p><i>Consult Appendix A</i></p> <ul style="list-style-type: none"> <li>• <i>Description of the level of learning outcomes for each qualifications cycle, according to the Qualifications Framework of the European Higher Education Area</i></li> <li>• <i>Descriptors for Levels 6, 7 &amp; 8 of the European Qualifications Framework for Lifelong Learning and Appendix B</i></li> <li>• <i>Guidelines for writing Learning Outcomes</i></li> </ul>
<p>By the completion of the course the students should:</p> <ul style="list-style-type: none"> <li>• Have a good understanding of the biochemical, physicochemical, crystallographic, immunological, and recombinant DNA techniques that are analyzed in the course and an understanding of their theoretical background.</li> <li>• Know which of these technics should be used in order to answer scientific questions.</li> </ul>
<p><b>General Competences</b></p>
<p>By the completion of the course the student should gain:</p> <ul style="list-style-type: none"> <li>• The ability to critically read scientific papers that use the above techniques.</li> <li>• The ability to start research in fields that use the above techniques.</li> </ul>

- The competence to teach High School students.
- The aptitude to continue their graduate studies in Biomedical Sciences.
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### (3) SYLLABUS

UV-Vis Spectrophotometry. Fluorescence, Chemiluminescence, Phosphorescence. IR Spectroscopy. Atomic Absorption, Atomic Emission and Atomic Fluorescence Spectrometry. Mass Spectrometry. Thin layer Chromatography, Column Chromatography (gel permeation, ion-exchange, adsorption, affinity), HPLC (types and methodology), Horizontal electrophoresis (cellulose acetate and agarose), Vertical electrophoresis in polyacrylamide gels, Isoelectric focusing, Two-dimensional electrophoresis, Analytical and Preparative Ultracentrifugation. Crystallization methods of Biological macromolecules. Introduction in computational biology: Scattering of electromagnetic radiation, X-ray diffraction, crystal symmetry, point groups & space groups, introduction in Fourier transforms, structure factor, the convolution theorem and its applications, The Patterson function, the phase problem and Structure solution methodologies (MIR, MAD, molecular replacement, direct methods). Recombinant DNA technology.

#### (4) TEACHING and LEARNING METHODS - EVALUATION

<b>DELIVERY</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, communication with students</i>	Power point, e-class	
<b>TEACHING METHODS</b> <i>The manner and methods of teaching are described in detail.</i> <i>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.</i>  <i>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>	<b>Teaching Method</b>	<b>Semester Workload</b>
	Lectures	39
	Independent study	36
	<b>Total number of hours for the Course</b>	<b>75</b>
<b>STUDENT PERFORMANCE EVALUATION</b> <i>Description of the evaluation procedure</i>  <i>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</i>  <i>Specifically-defined evaluation criteria are given, and if and where they are accessible to students.</i>	The student assessment language is Greek. The assessment is based on final written exams (50%) and paper analysis (50%). Foreign students can take the exams in English. The students are informed about the assessment criteria during the first day of class.	

#### (5) ATTACHED BIBLIOGRAPHY

- (6) Protein Crystallization, Second Edition, edited by Terese Bergfors, IUL Biotechnology Series
- (7) Fundamentals of Crystallography, C. Giacovazzo, H.L. Monaco, G. Artioli, D. Viterbo, G. Ferraris, G. Gilli, G. Zanotti, M. Catti, Edited by C. Giacovazzo, International Union of Crystallography (IUCr), Oxford Science Publications
- (8) Gene Cloning and DNA Analysis: An Introduction, Brown T.A., Edited by John Wiley & Sons, Ltd., Publication, 7<sup>th</sup> edition.
- (9) Recombinant DNA: Genes and Genomes - A Short Course, Watson.. J.D., Caudy A.A., Myers R.M., Witkowski J.A., Edited by New York : W.H. Freeman : Cold Spring Harbor Laboratory Press, 3rd edition.
- (10) Lippincott Illustrated Reviews: Immunology, Viselli S., Melvold R., Edited by Lippincott Williams & Wilkins, 2<sup>nd</sup> edition.
- (11) Janeway's Immunobiology: [Murphy K.](#), [Weaver,C.](#), Edited by Kindle, 9th Edition.
- (12) Notes

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