COURSE OUTLINE

1. GENERAL

SCHOOL	APPLIED BIOLOGY AND BIOTECHNOLOGY		
ACADEMIC UNIT	BIOTECHNOLOGY		
LEVEL OF STUDIES	BACHELOR OF SCIENCE		
COURSE CODE	**241**	**SEMESTER**	9th (fall semester)
COURSE TITLE	APPLICATIONS OF BIOMATERIALS IN BIOTECHNOLOGY		

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	2	0,08
Laboratory Courses	2	0,08
Tutorials/essays/practice actions	2,3	0,09
TOTAL ECTS (Table 4)		**5,00**
Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (4).		

COURSE TYPE *general background, special background, specialised general knowledge, skills development*	Advanced (Level 7)
PREREQUISITE COURSES:	No
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek
IS THE COURSE OFFERED TO ERASMUS STUDENTS	YES (in English)
COURSE WEBSITE (URL)	https://oeclass.aua.gr/eclass/courses/4863/

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*

The course is the basic introduction in the scientific field of biomaterials and their application in biosciences, as well as every related technique and method for the specified application of biomaterials in agriculture, life and health sciences as well as traditional and modern biomedical device**s.**

The educational content is aiming to introduce students to the fundamental concepts of biomaterials, covering a very wide range of interdisciplinary sectors, including extensive coverage of materials science, biology, chemistry, tissue engineering and toxicology.

It also refers to the different groups and classifications of biomaterials (polymers, metals, ceramics, synthetics), their chemistry, mechanical and physicochemical properties, as well as the design and synthesis of biomaterials, their biocompatibility, toxicity and decay.

Finally, the course aims to help students to understand of the contribution of biomaterials in modern life sciences, at the same time stipulating the perspective of a dedicated professional career on designing novel biomaterials with tailor-made physicochemical and biological properties.

Upon the successful completion of the course the student will be able to:

- **Understand the fundamental concepts of biomaterials, associated technologies and fields of application.**
- Know the different groups of **biomaterials and their applications**.

- Design **biocompatibility and biointeraction studies.**
- Know the main **physical and chemical methods for preparing biomaterials** and modifying their surface.
- Carry out the **physicochemical characterization of biomaterials**.
- Know thein-**vitro and in-vivo techniques to test and certify biomaterials.**
- **Apply the acquired skills to design and select materials** for applications in agriculture, food science and medicine**.**
- Collaborate with her/his colleagues to draft and present a biomaterial application plan in a real case study of their choice, in parallel developing the required oral and written communication skills.

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…

- Autonomous study
- Group study
- Interdisciplinary study
- Generation of new research ideas
- Promotion of the free, creative and deductive reasoning

3. SYLLABUS

1. Historical evolution of biomaterials
2. Basic concepts of biomaterials
3. Chemistry and structure of biomaterials
4. Biocompatibility
5. Biological materials from plants and animals
6. Polymeric biomaterials
7. Metallic biomaterials
8. Ceramic biomaterials
9. Application of biomaterials in biotechnology
10. Application of biomaterials in agriculture and life and health sciences

4. TEACHING and LEARNING METHODS - EVALUATION

DELIVERY *Face-to-face, Distance learning, etc.*	Class courses (amphitheater/lab courses room)
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, communication with students*	Presentation software (PowerPoint) Distant educational support through the e-class electronic platform. Communication of assessment of student tests and group studies through e-mail
TEACHING METHODS *The manner and methods of teaching are described in detail.* *Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography,*	

Activity	***Semester workload***
Lectures	26 h
Practical courses focusing on method application and case studies by smaller	26 h

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*	student groups	
	Group essay (groups of 3-5 students): draft of an application plan of biomaterials in real analytical application and/or need.	30 h
	Autonomous study	43 h
	Total ***(25hours of working input per credit unit)***	***125 h*** ***(5 ECTS)***
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*	I. Written final exam (50%) including: - Multiple choice questions - Critical analysis questions regarding different approaches for biomaterial synthesis and manufacturing - Comparative review of theorical educational elements II.Presentation of group essays (50%) The final grade for the course is determined by the total results for the different parts of the examination.	

5. ATTACHED BIBLIOGRAPHY

-Suggested textbooks:

- Αναστασοπούλου, Ι., Δρίτσα, Β., Θεοφανίδης, Θ., Υφαντής, Δ., Υφαντής, Κ., 2015. Βιοϋλικά - Εφαρμογές. [ηλεκτρ. βιβλ.] Αθήνα:Σύνδεσμος Ελληνικών Ακαδημαϊκών Βιβλιοθηκών. Available on: http://hdl.handle.net/11419/3635
- Ratner, B. D., Hoffman, A. S., Schoen, F. J., & Lemons, J. E. (2004). *Biomaterials science: an introduction to materials in medicine*. Academic press.

-Related scientific journals:

- Biomaterials, ISSN: 0142-9612
- ActaBiomaterialia, ISSN: 1742-7061