ETE905 - Polymers – Special Topics

COURSE OUTLINE

(1) GENERAL

SCHOOL	SCHOOL OF ENGINEERING		
ACADEMIC UNIT	DEPARTMENT OF MATERIALS SCIENCE ENGINEERING		
LEVEL OF STUDIES	UNDERGRADUATE		
COURSE CODE	905	**SEMESTER**	9
COURSE TITLE	Polymers – Special Topics		
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		3	3
Add rows if necessary. The organization of teaching and the teaching methods used are described in detail at (d).			
COURSE TYPE *general background, special background, specialized general knowledge, skills development*	special background and specialized general knowledge		
PREREQUISITE COURSES:	NO		
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	GREEK		
IS THE COURSE OFFERED TO ERASMUS STUDENTS	-		
COURSE WEBSITE (URL)	http://www.materials.uoi.gr/en/0.02.01.html		

(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 aims to introduce students to advanced polymer subjects. The main purpose is to acquaint students with technological issues concerning polymers and their applications, such as drug hosts, applications in nanotechnology, magnetic storage media, optical applications of organic materials, nanocomposites and building materials. Reference is made to biopolymer, biocompatible and biodegradable polymers as well as to semiconductor and inorganic polymers.
Upon successful completion of the course the student is able to:

- Understand how a polymer based material is designed in relation to the required applications
- Separate applications in which polymers are used from similar applications in which other materials are used
- Comprehend high-tech items that use polymers and related polymer-based materials.

Students are now fully specialized in the field of Polymers with the main purpose and goal for several of them to prepare their dissertation in the direction of Polymers, now understanding better and obtain more specialized knowledge / concepts / applications of polymers in several

areas of technological excellence.
The teaching aids are also updated with a detailed overview of all new aids that have been published or are going to be published in the course content while the teaching material is renewed at least every 2 years since a significant research activity takes place worldwide in various fields.
There is no overlap of the teaching material with other courses. It is the only course that deals with the applications of Polymers in various research fields.
Basic knowledge is considered necessary and several times the compulsory courses in the field of Polymers (Polymer Science - Polymer Engineering - Materials Laboratory V) must have been passed, otherwise the students face significant problems in understanding and fully responding to the work they receive.

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

1) Working independently
2) Working in an interdisciplinary environment

(3) SYLLABUS

Course outline and topics

- ✓ Polymers with the use as biomaterials.
- ✓ Sterilization and surface modification for increased biodegradation.
- ✓ Biodegradable polymer biomaterials.
- ✓ Dendrimers and dendritic polymers.
- ✓ Composition and morphological topography of block copolymers and terpolymers.
- ✓ Liquid crystals, polymer blends and polymer gels.
- ✓ Inorganic polymers.
- ✓ Polymers for dental applications.
- ✓ Smart polymer materials for drug carrier applications.
- ✓ Nanocomposites, hybrid nanomaterials.
- ✓ Polymer composites with natural fibres.

The overall aims and objectives are to understand basic concepts, meanings concerning advanced polymer science and engineering.

(4) TEACHING and LEARNING METHODS - EVALUATION

DELIVERY *Face-to-face, Distance learning, etc.*	In class, lectures through powerpoint presentations
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, communication with students*	Use of ICT in teaching, communicating with students during teaching and also communicating with the students during office hours
TEACHING METHODS *The manner and methods of teaching are*	

Activity	***Semester workload***
Lectures	39

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*		
	Essay and self-study	36
	Course total	75
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 METHOD OF EVALUATION: Project assignment of an important part of the class topics to see whether they understand its content. The project is graded from 6 up to 10 depending on quality (at least 20 pages in specific format). The project is also presented with powerpoint. (i) Final written examination: 100% or (ii) Presentation of the assigned essay via powerpoint presentation in class in front of the other students plus written essay of at least 20 pages: 100%	

(5) ATTACHED BIBLIOGRAPHY

-Suggested bibliography:

- Lecture Notes, A. Avgeropoulos, N. Zafeiropoulos, M. Karampela, University of Ioannina, Ioannina, 2017

- SYNTHETIC MACROMOLECULES, A. Ntontos, Kostarakis Publishing, Athens, 2002, (ISBN: 960-87655-0-1)

- POLYMERS CHEMISTRY, C. Hiemenz, T. P. Lodge, Greek translation by S. Vratolis, H. Kakoulidis, Th. Prevedoros, Scientific Editing by S. Anastasiadis, University of Crete Publishing, Heraklion-Crete, 2014 (ISBN: 978-960-524-429-3)

Scientific articles from international scientific journals of various publishers (ACS, RSC publicizing, Wiley, Springer, etc.)