Projekt "Perspektywy Współpraca Synergia Zarządzanie w Tarnowie" współfinansowany jest przez Unię Europejską ze środków Europejskiego Funduszu Społecznego w ramach Programu Operacyjnego Wiedza Edukacja Rozwój. Projekt realizowany w ramach konkursu Narodowego Centrum Badań i Rozwoju z III Osi priorytetowej: Szkolnictwo wyższe dla gospodarki i rozwoju; Działanie 3.5 Kompleksowe programy szkół wyższych. Nr umowy o dofinansowanie projektu: POWR.03.05.00-00-Z087/17-00.

Module SYLLABUS

Organizational unit name	The Polytechnic Institute – Department of Materials Science		
Field of study	Materials Science		
Module name	Advanced polymers in materials science		
Module code	POWER.IP.7	**Erasmus code**	6.0
ECTS	3	**Module type**	Optional
Year of study	4	**Semester**	7

Form of classes	**Hours total**	**Form of assessment**
workshop classes	30	Graded credit

Coordinator teacher	Dr inż. Paulina Bednarz		
Academic teacher	Dr inż. Paulina Bednarz		
Language of instruction	English		
Basic courses	No	**Open course / course at he another field of study**	No
Profile of education	Practical profile	**Study level**	First-cycle level

Prerequisites and additional requirements

1. A well-established knowledge of physics and / or solid state chemistry.
2. Knowledge of the structure of polymers.
3. Knowledge of physicochemical properties of polymers.
4. Knowledge of polymer processing methods.
5. Knowledge of the relationship between the properties of selected polymeric materials and processing parameters.

Learning outcomes for module

No.	**Student after module completion has the knowledge/knows how to/is able to Learning outcome code**	**Learning outcome type**	**Method of learning outcomes verification**	**Form of cla-sses**
				Workshops
1.	The student has knowledge about the type of biomaterials used for the construction of a specific type of implant and other elements for tissue assembly, reconstruction and regeneration	Knowledge	Test/research report	Y
2.	The student knows the research methods used to assess the physicochemical and biological properties of biomaterials	Knowledge	Test/research report	Y

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3.	The student can choose the right materials for the construction of a particular implant and propose a method for its production	Skills	Test/research report	Y
4.	The student is able on the basis of acquired knowledge and using a set of standards to propose a kind of physicochemical and biological research of a given biomaterial for a specific application	Skills	Working with international norms	Y
5.	The student is aware of the responsibility for his own and team work	Social competence	delivered presentation	Y

Didactic methods

Forms of classes:
Classes have the form of a workshop, within which the first 10 hours will be conducted in the form of a lecture, the next 16 hours will take the form of laboratory exercises, and during the last class participants will give a lecture with the results of their own research and discussion on the group forum.

Teaching methods:
Conventional lecture, laboratory method and paper method.

Rules of assessment

Obtaining a positive evaluation of the workshops. Assessment must comply with the current university regulations.

Module content (brief)

During the lecture and laboratory classes the students will get to know how to design and manufacture polymer biomaterials so that they can meet requirements for the specific target application.

Module content (comprehensive)

1. Lecture 1: Introduction to Polymer Biomaterials (2h)
2. Lecture 2: Biomaterials Surfaces: Physics & Chemistry (2h)
3. Lecture 3: Protein-Surface Interactions & Cell-Surface Interactions: Host Responses to Biomaterials (2h)
4. Lecture 4: Surface Modification of Biomaterials (2h)
5. Lecture 5: Testing methods of polymer biomaterials(2h)
6. Scientific project: Working with international norm ISO 10993 (2h)
7. Scientific project: Manufacturing and testing of polymer biomaterials for specific application (16h)
8. Seminar: Delivering a presentation of obtained results and group discussion (2h)

Recommended literature and teaching resources

1. Severian Dumitriu, Valentin Popa: Polymeric Biomaterials: Structure and Function, Volume 1, CRC Press, 2013
2. Mike Jenkins: Biomedical Polymers, Elsevier, 2007
3. Laura Poole-Warren, Penny Martens, Rylie Green: Biosynthetic Polymers for Medical Applications, Elsevier, 2015
4. Mike Jenkins, Artemis Stamboulis: Durability and Reliability of Medical Polymers, Elsevier, 2012

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5. Xiang Cheng Zhang: Science and Principles of Biodegradable and Bioresorbable Medical Polymers: Materials and Properties, Woodhead Publishing Series in Biomaterials, Woodhead Publishing, 2016	
Connection with area of study	engineering sciences
Student workload (ECTS credits balance)	
Student workload form	Student workload [hours]
Participation in workshops	30
Completion of a research report	10
Individual consultations and final research presentation	10
Summary student workload	50
Module ECTS credits	
Workload of the direct assistance of the academic teacher	**1.4**
Workload of the practical classes	**2**

Annotation:
1 hour = 45 minutes