



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

Polymer processing II

### Course

Field of study

Mechanical Engineering

Area of study (specialization)

Materials processing technology

Level of study

Second-cycle studies

Form of study

full-time

Year/Semester

??

Profile of study

general academic

Course offered in

polish

Requirements

elective

### Number of hours

Lecture

15

Laboratory classes

15

Other (e.g. online)

0

Tutorials

0

Projects/seminars

0

### Number of credit points

0

### Lecturers

Responsible for the course/lecturer:

Marek Szostak

Responsible for the course/lecturer:

Jacek Andrzejewski

### Prerequisites

Knowledge of material science of polymeric materials and methods of their processing.

The ability to logically thinking, associate facts and use contemporary information from professional and specialist literature.

Understanding the need for continuous knowledge acquisition and use of modern technological knowledge.

### Course objective

Detailed knowledge of polymer processing methods.

### Course-related learning outcomes

Knowledge

1. Student has detailed knowledge of polymeric materials and their processing properties.
2. Student should characterize, propose and define methods of processing polymer materials.



### Skills

1. Student is able to choose polymer material and their processing conditions.
2. The student can propose the material, processing method and type of shaping tool.
3. Student is able to define the detailed conditions for processing plastics and their impact on the quality of the product.
4. Student is able to carry out polymer processing in a safe manner.

### Social competences

1. The student is aware of the importance of using plastics in the economy and social life.
2. Student is able to cooperate in a group.
3. Student is able to think and act in an entrepreneurial manner.

### Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

#### Lecture:

Written test carried out at the end of the semester (credit if at least 50.1% of correct answers are obtained). Up to 50.0% - ndst, from 50.1% to 60.0% - dst, from 60.1% to 70.0% - dst +, from 70.1 to 80.0 - db, from 80.1% up to 90.0% - db +, from 90.1% - very good.

#### Laboratory:

Crediting based on the oral or written answer regarding the content of each laboratory exercise, report on each laboratory exercise as instructed by the laboratory teacher. All exercises must be passed (positive assessment of responses and reports) as a condition for obtaining credit for the laboratories.

### Programme content

#### Lecture:

1. Basic properties of amorphous and crystalline polymers.
2. Modification of processing properties of polymer materials, methods of their assessment.
3. Extrusion processing: process stability, impact of technological conditions on the quality of extruded products, construction and selection of extrusion line elements, basics of extrusion heads and calibration tools.
4. Advanced technologies for injection of polymer materials, injection with water and gas, micro injection, products with metal joints, IML technologies and multi-material injection, hot runner technique, normals for injection molds.
5. Rotational moulding technology.



6. Modern methods of preparing composites and nanocomposites.
7. Preparation and using of recycled polymeric materials in injection and extrusion processes.

#### Laboratory

1. Production of flat film in extrusion technology.
2. Extrusion blow moulding technology.
3. Rotational moulding technology.
4. Injection of plastics and their modification with mineral fillers.
5. The use of recycled plastics in injection technique.
6. Technics of preparation of polymer composites.
7. Assessment of the impact of modifications for injected materials.

#### Teaching methods

1. Lecture: multimedia presentation, illustrated with examples given on the board.
2. Laboratory exercises: practical exercises, performing experiments, discussion, teamwork.

#### Bibliography

##### Basic

1. G. Wypych - Handbook of Polymers. ChemTec Publishing, Toronto 2012.
2. Z. Tadmor, C.G. Gogos - Principles of polymer processing. Wiley&Sons, New Jersey 2006.
3. J.Karger-Kocsis - Polypropylene handbook. Springer Nature, Cham 2019

##### Additional

Journals: PlasticsEurope, Journal of Plastics Technology (Kunststoffe), Polimery (Polymers-Warsaw), CompositesWorld

Web: ScienceDirect, Scopus, Researchgate, Web of Science



### Breakdown of average student's workload

	Hours	ECTS
Total workload	50	
Classes requiring direct contact with the teacher	30	
Student's own work (literature studies, preparation for laboratory classes/tutorials, preparation for tests/exam, project preparation) <sup>1</sup>	20	

<sup>1</sup> delete or add other activities as appropriate