



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

Plastic processing [S2TCh2-TP>PTS]

### Course

Field of study

Chemical Technology

Year/Semester

1/2

Area of study (specialization)

Polymer Technology

Profile of study

general academic

Level of study

second-cycle

Course offered in

Polish

Form of study

full-time

Requirements

compulsory

### Number of hours

Lecture

30

Laboratory classes

45

Other

0

Tutorials

0

Projects/seminars

0

### Number of credit points

6,00

### Coordinators

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### Lecturers

### Prerequisites

The student has the necessary knowledge of chemistry to enable understanding of chemical phenomena and processes. The student has knowledge in the field of technology and chemical engineering, machine science and apparatus of the chemical industry.

### Course objective

Transfer of knowledge in the field of plastics processing. Developing the skills to acquire technological knowledge in the field of plastics processing and to become familiar with the principles of functioning of modern processing plants.

### Course-related learning outcomes

Knowledge:

1. The student has expanded and in-depth knowledge in the field of plastics processing necessary for modeling, planning, optimization and characterization of industrial technological processes. [K\_W1, K\_W11]
2. The student has knowledge in the field of processing, including the appropriate selection of polymer materials, raw materials, methods, techniques, apparatus and equipment for their implementation and

characterization of the products obtained. [K\_W3]

3. The student has expanded knowledge about advanced devices and apparatus used in plastics processing [K\_W13]

#### Skills:

1. The student has the ability to obtain and critically evaluate information from literature, databases and other sources and formulate opinions and reports on plastics processing on this basis. [K\_U1]

2. The student has the ability to communicate with specialists and non-specialists in the field of plastics processing and related fields. [K\_U4]

3. The student posiada umiejętność wykorzystywania wiedzy nabytej w ramach specjalności w działalności zawodowej. [K\_U23]

#### Social competences:

1. The student is aware of the need for lifelong learning and professional development in the field of plastics processing. [K\_K1]

2. The student is aware of the limitations of science and technology related to plastics processing, including environmental protection. [K\_K2]

3. The student is able to think and act in a creative and entrepreneurial way. [K\_K6]

### Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lecture: Stationary: written exam (open or closed questions). Online: final test using the test module on the eKursy platform (20-30 questions). Grade criteria: 3 - 50.1%-60.0%; 3.5 - 60.1%-70%; 4 - 70.1%-80.0%; 4.5 - 80.1%-90%; 5 - from 90.1%.

Laboratory classes: Stationary form - oral answer or written test from the material contained in the exercises and the given theoretical issues; presence and realization of all laboratory exercises provided in the study program; grade from reports prepared after each exercise. A final grade will be given based on the average grades of the oral/written answers and reports for each exercise, divided by the number of exercises performed. Online form - oral answer and/or written test from the material contained in the exercises, tutorial videos and the theoretical issues provided, conducted in the "live view" mode with the webcam turned on via eMeeting or Zoom platform during a direct conversation with the teacher and/or using the test module on the eKursy platform; online presence and completion of all laboratory exercises provided in the study program; grade from the reports prepared after each exercise and sent via the eKursy platform or by e-mail using the university's e-mail system. A final grade will be given based on the average grade of the oral/written answers and reports for each exercise, divided by the number of exercises performed.

### Programme content

Issues in the field of plastics processing and concerning the principles of functioning of modern processing plants.

### Course topics

The course content includes the following topics:

1) The importance of polymers and polymer processing in the modern world - what is processing.

2) Modification of polymer materials with particular emphasis on processing modification.

3) Methods for preparing plastics for processing - pre-treatment processes.

4) Indices of processability of polymer materials.

5) Plastic processing methods:

- extrusion: basics of extrusion process together with discussion of technological lines and special extrusion techniques: blow film extrusion, foaming extrusion, film extrusion, co-extrusion;

- the basics of the conventional injection molding process together with a discussion of special injection techniques: foaming injection, water assisted injection molding, gas assisted injection molding, micro injection molding, large injection molding, precision injection molding, etc.;

- pressing;

- foaming;

- pressureless molding;

- rotational molding;

#### 6) Methods of secondary processing of plastics:

- thermoforming;
- combining (welding, sealing, gluing, riveting);
- machining, plastic forming, surface treatment.

The laboratory exercises include:

- Tests of the films functional properties.
- Blow film extrusion.
- Material recycling of polymer.
- Injection molding.
- Methods for preparing polymer materials for processing.
- Thermoforming
- Combining the polymer materials.
- Influence of temperature on the functional properties of polymeric materials.

### Teaching methods

1. Lecture: multimedia presentation, illustrated with examples on the board.
2. Laboratories - practical classes.

### Bibliography

Basic:

1. J. Ferguson, Z. Kembłowski: „Reologia stosowana płynów”, Łódź 1995.
2. K. Wilczyński: „Reologia w Przetwórstwie Tworzyw Sztucznych”, WNT W-wa 2001.
3. R. Sikora: „Przetwórstwo tworzyw wielkocząsteczkowych”, PWN W-wa 1987.
4. R. Sikora: „Podstawy przetwórstwa tworzyw polimerowych”, WPL Lublin 1992.
5. K. Wilczyński: „Przetwórstwo tworzyw sztucznych”, WPW W-wa 2000.
6. A. Smorawiński: „Technologia wtrysku”, WNT W-wa 1984.

Additional:

1. H. Saechtling: „Tworzywa sztuczne. Poradnik”, WNT Warszawa 2000.
2. W. Szlezyngier, „Podstawy reologii polimerów”, PRz. Rzeszów 1994.
3. R. Sikora i in., „Przetwórstwo tworzyw polimerowych. Podstawy logiczne, formalne i terminologiczne”, WPL Lublin 2006.

### Breakdown of average student's workload

	Hours	ECTS
Total workload	150	6,00
Classes requiring direct contact with the teacher	79	3,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	71	3,00