

## SYLLABUS OF A MODULE

Polish name of a module	<b>Przetwórstwo polimerów</b>
English name of a module	<b>POLYMER PROCESSING</b>
ISCED classification - Code	0715
ISCED classification - Field of study	<i>Mechanics and metal trades</i>
Languages of instruction	<i>English</i>
Level of qualification:	<i>1 – BSc (EQF 6)</i>
Number of ECTS credit points	<i>6 ECTS</i>
Examination:	<i>A - assignment</i>
Available in semester:	<i>A – autumn only</i>

### Number of hours per semester:

Lecture	Tutorials	Laboratory	Seminar	E-learning	Project
<b>30</b>	--	<b>30</b>	--	--	--

## **MODULE DESCRIPTION**

### **Module objectives**

- O1. To acquaint students with various methods of polymer processing and polymer materials.
- O2. To acquaint students with the possibilities of controlling the properties of finished products by selecting the processing parameters
- O3. To acquaint students with the construction of simple, self-made tools and devices for plastics processing

### **PRELIMINARY REQUIREMENTS FOR KNOWLEDGE, SKILLS AND OTHER COMPETENCES**

1. Fundamentals of physics, chemistry, mathematics, mechanics and thermodynamics.
2. Fundamentals of materials science.
3. Safety rules during the use of laboratory equipment and technological machines.
4. Capability of using source literature.
5. Capability of individual work and collaboration in a group.
6. Data analysis and presentation of results.

### **LEARNING OUTCOMES**

- LO 1 – Knowledge on polymeric materials and their application.
- LO 2 – Knowledge on different polymer processing methods - process, tools, products.
- LO 3 – Ability to adjust basic processing parameters in selected polymer processing methods.

## MODULE CONTENT

Type of classes – lecture	Number of hours
Lec 1 - 2 – Polymers, plastics, blends, composites – materials for polymer processing	2
Lec 3 - 4 – Injection moulding	2
Lec 5 - 6 - Non-conventional injection moulding processes	2
Lec 7 - 8 – Extrusion	2
Lec 9 - 10 – Extrusion blow moulding	2
Lec 11 - 12 – Blown film extrusion, coextrusion	2
Lec 13 – 14 – EPS products manufacturing, EPS cutting	2
Lec 15 – 16 – Rotational moulding	2
Lec 17 – 18 – Compression moulding	2
Lec 19 – 20 – Thermoforming	2
Lec 21 – 22 – Welding of plastics	2
Lec 23 – Polymer coatings manufacturing	1
Lec 24 – Polymers dyeing	1
Lec 25 – 26 – Composites manufacturing	2
Lec 27 – 28 – Rubber processing	2
Lec 29 – 30 – Rapid Prototyping (3d printing)	2
<b>Sum</b>	<b>30</b>
Type of classes– laboratory.	Number of hours
Lab 1 - 2 – Identification of polymers	2
Lab 3 - 4 – Melt Flow Rate measurement	2
Lab 5 - 10 – Injection moulding	6
Lab 11 - 12– Extrusion, extrusion blow moulding	2
Lab 13 – Polymer coatings manufacturing by fluidization	1
Lab 14 - 15 – Thermoforming	2
Lab 16 - 17 – EPS (Expanded Polystyrene) product manufacturing and EPS cutting	2
Lab 18 - 19 – Welding of plastic films and other products	2
Lab 20 - 21 - Sticking and bonding selected plastic elements	2
Lab 22 - 23 – Rotational moulding	2
Lab 24 - 25 – Compression moulding of thermoset resins. Rubber processing – compression moulding	2
Lab 26 - 27 – Casting of polymer resins	2
Lab 28 - 29 - Sieve/screen printing	2
Lab 30 – 3D printing by FDM method	1
<b>Sum</b>	<b>30</b>

## TEACHING TOOLS

1 - lecture with the use of multimedia presentations
2 - stands equipped with machines and other equipment for polymer processing
3 - instructions to laboratory exercises

## WAYS OF ASSESSMENT ( F – FORMATIVE, S – SUMMATIVE

<b>F1.</b> - assessment of preparation for laboratory exercises
<b>F2.</b> - assessment of the ability to apply the acquired knowledge while doing the exercises
<b>F3.</b> - evaluation of reports on the implementation of exercises covered by the curriculum
<b>F4.</b> - assessment of activity during classes
<b>S1.</b> - assessment of the ability to solve the problems posed and the manner of presentation obtained results - pass mark *
<b>S2.</b> - assessment of mastery of the teaching material being the subject of the lecture – pass mark*

\*) in order to receive a credit for the module, the student is obliged to attain a passing grade in all laboratory classes as well as in achievement tests.

## STUDENT'S WORKLOAD

L.p.	Forms of activity	Average number of hours required for realization of activity
<b>1. Contact hours with teacher</b>		
1.1	Lectures	30
1.2	Tutorials	0
1.3	Laboratory	30
1.4	Seminar	0
1.5	Project	0
1.6	Examination	5
Total number of contact hours with teacher:		<b>65</b>
<b>2. Student's individual work</b>		
2.1	Preparation for tutorials and tests	10
2.2	Preparation for laboratory exercises, writing reports on laboratories	20
2.3	Preparation of project	0
2.4	Preparation for final lecture assessment	20
2.5	Preparation for examination	10
2.6	Individual study of literature	25
Total number of hours of student's individual work:		<b>85</b>
Overall student's workload:		<b>150</b>
<b>Overall number of ECTS credits for the module</b>		<b>6 ECTS</b>
Number of ECTS points that student receives in classes requiring teacher's supervision:		<b>2.4 ECTS</b>
Number of <b>ECTS</b> credits acquired during practical classes including laboratory exercises and projects:		<b>2.0 ECTS</b>

## BASIC AND SUPPLEMENTARY RESOURCE MATERIALS

1. Osswald T.A., Baur E., Brinkmann S., Oberbach K., Schmachtenberg E.: International Plastics Handbook, Hanser Publishers, Munich 2006.
2. Rauwendaal C.: Understanding Extrusion. 2nd Edition, Hanser Publishers, Munich, Hanser Publications, Cincinnati, 2010.
3. Davis, B., Gramann, P., Rios, A., Osswald, T.: Compression Molding, HANSER 2003.
4. James L. Throne: Understanding Thermoforming, HANSER 2008
5. Glenn L. Beall, James L. Throne: Hollow Plastic Parts: Design and Manufacture, HANSER 2004.
6. Gebhardt A., Hötter J.S.: Additive Manufacturing. 3D Printing for Prototyping and Manufacturing, Hanser Publishers, Munich, 2016

## MODULE COORDINATOR (NAME, SURNAME, E-MAILADDRESS)

**Module coordinator:** PhD Eng Milena Trzaskalska - [trzaskalska@ipp.pcz.pl](mailto:trzaskalska@ipp.pcz.pl)

### Academic teachers:

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