SYLLABUS OF A MODULE

Polish name of a module	**RECYKLING TWORZYW POLIMEROWYCH**
English name of a module	**PLASTICS RECYCLING**
ISCED classification - Code	0715
ISCED classification - Field of study	*Mechanics and metal trades*
Languages of instruction	*English*
Level of qualification:	*1 – BSc (EQF 6)*
Number of ECTS credit points	*6*
Examination:	*A - assignment*
Available in semester:	*Y - both*

Number of hours per semester:

Lecture	Exercises	Laboratory	Seminar	E-learning	Project
15	**0**	**30**	0	0	0

MODULE DESCRIPTION

Module objectives

O1. To acquaint students with the methods and technologies of plastics recycling.

O2. Acquisition by students of practical skills in designing and conducting the processing process with the use of secondary materials and the ability to carry out processing in a manner that enables recycling.

PRELIMINARY REQUIREMENTS FOR KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Knowledge of materials science, polymer materials and methods of their processing.
2. Knowledge of the basic technologies of processing polymer materials.
3. Ability to work independently and in a group.
4. The ability to correctly interpret and present your own actions.

LEARNING OUTCOMES

LO 1 – student has knowledge of the methods of recycling polymer materials,

LO 2 – student is able to propose the type of recycling and choose the right method of recycling and prove the validity of the adopted solution,

LO 3 – student knows the general principles of operation, operation and selection of machines used in the plastics processing and their plastics recycling.

MODULE CONTENT

Type of classes – lecture	**Number of hours**
Lec 1 - Introduction to recycling of plastics.	**1**
Lec 2-3 - Production of plastics in the world and in Europe.	**2**
Lec 4-5 - Plastics application segments.	**2**
Lec 6-7 - Statistical presentation of polymer waste.	**2**
Lec 8-9 - Classification of polymer waste.	**2**
Lec 10 - Identification and traceability of plastic products.	**1**
Lec 11 - Energy recovery. Raw material and material recycling.	**1**
Lec 12 - Sorting and identification of waste.	**1**
Lec 13 - Waste shredding. Washing and drying of waste.	**1**
Lec 14 - Machines and devices used in the recycling process. Methods of manufacturing of regranulates.	**1**
Lec 15- Recycling of rubber.	**1**
Sum	**15**
Type of classes– laboratory.	**Number of hours**
Lab 1-2 - Identification and sorting of plastic waste.	**2**
Lab 3-4 - Shredding of plastics using a mill.	**2**
Lab 5-10 - Manufacture of injection molded parts from recycled materials.	**6**
Lab 11-13 - Testing the properties of obtained molded parts.	**3**
Lab 14-15 - Structure of recycled molded parts.	**2**
Lab 16-21 Manufacture of plastic parts from plastics mixed with other	**6**

materials	
Lab 22-27 Investigations of properties of obtained plastic parts with other materials	**6**
Lab 28-30 Analyze of structure and obtained data from exercises	**3**
Sum	**30**

TEACHING TOOLS

1. - lecture with the use of multimedia presentations
2. - demonstration of technological processes
3. - exercise stations equipped with machinery and laboratory equipment

WAYS OF ASSESSMENT (F – FORMATIVE, S – SUMMATIVE

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

*) 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**
1. Contact hours with teacher		
1.1	Lectures	15
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:	**50**
2. Student's individual work		
2.1	Preparation for tutorials and tests	10
2.2	Preparation for laboratory exercises, writing reports on laboratories	35
2.3	Preparation of project	0
2.4	Preparation for final lecture assessment	10
2.5	Preparation for examination	10
2.6	Individual study of literature	35
	Total number of hours of student's individual work:	**100**
	Overall student's workload:	**150**
Overall number of ECTS credits for the module		**6 ECTS**
Number of ECTS points that student receives in classes requiring teacher's supervision:		**1.8 ECTS**
Number of **ECTS** credits acquired during practical classes including laboratory exercises and projects:		**2.6 ECTS**

BASIC AND SUPPLEMENTARY RESOURCE MATERIALS

1. Francesco La Mantia, Handbook of Plastics Recycling, iSmithers Rapra Publishing, 2002 - 442
2. James H. Clark, José Aguado Alonso, José Aguado Villalba, José Aguado, David P. Serrano, D. A. Serrano, Feedstock Recycling of Plastic Wastes, Royal Society of Chemistry, 1999 - 192
3. Anna Fråne, Åsa Stenmarck, Stefán Gíslason, Søren Løkke, Malin zu Castell Rüdenhausen, Hanne L Raadal, Margareta Wahlström, Future solutions for Nordic plastic recycling, Nordic Council of Ministers, 2015 - 46
4. Trevor M. Letcher, Plastic Waste and Recycling: Environmental Impact, Societal Issues, Prevention, and Solutions, Academic Press, 2020 - 686
5. Lizzi Andersen, Kenneth Sandberg, Per Lundqvist, Jens Thulin, Janus Kirkeby, Trine Lund Neidel, Asbjørn Weidling, Plastic sorting at recycling centres:

Guideline, Nordic Council of Ministers, 2015 - 5
6. Manas Chanda, Salil K. Roy, Plastics Fabrication and Recycling, CRC Press, 2016 - 216

MODULE COORDINATOR (NAME, SURNAME, E-MAIL ADDRESS)

Module coordinator:

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