STUDY MODULE DESCRIPTION FORM

Name of the module/subject		Code
Processing of polymeric materials		**1010702211010702654**
Field of study **Chemical Technology**	Profile of study (general academic, practical) **(brak)**	Year /Semester **1 / 1**
Elective path/specialty **Composites and Nanomaterials**	Subject offered in: **Polish**	Course (compulsory, elective) **obligatory**
Cycle of study: **Second-cycle studies**	Form of study (full-time,part-time) **full-time**	
No. of hours Lecture: **30** Classes: **-** Laboratory: **45** Project/seminars: **-**		No. of credits **4**
Status of the course in the study program (Basic, major, other) **(brak)**	(university-wide, from another field) **(brak)**	
Education areas and fields of science and art **technical sciences**		ECTS distribution (number and %) **4 100%**

Responsible for subject / lecturer:

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Prerequisites in terms of knowledge, skills and social competencies:

1	**Knowledge**	Basic knowledge of material science particularly polymers, physics, polymers rheology and processing
2	**Skills**	The ability to determine the processing properties of polymers, ability to use the research apparatus and processing machines
3	**Social competencies**	The ability to improve the personal expertise in polymer science and manual skills connected with apparatus and machines operations

Assumptions and objectives of the course:

Get knowledge of main polymer processing technologies: injection moulding, extrusion, thermoforming, pressing and rotational moulding. Ability to select the appropriate polymer processing technology for production of any product. Get knowledge of measurements methods of polymer materials flow and modifications of polymer melt flow.

Study outcomes and reference to the educational results for a field of study

Knowledge:

1. A deep knowledge of various polymers processing methods - [K_W03, K_W06, K_W13]
2. Understanding of relationship between polymers rheology and polymers processing - [K_W04, K_W07]
3. Knowledge of rheology rules which influence the processing methods and properties of polymeric materials - [K_W03, K_W06, K_W13]

Skills:

1. Ability to select the appropriate polymer processing technology for production of any product - [K_U15, K_U16, K_U20]
2. Ability to operate the machines for polymer processing - [K_U10, K_U12]
3. Ability to appreciate the rheological properties of polymeric materials in polymer processing technologies - [K_U16, K_U21]

Social competencies:

1. Awareness of necessity to life long learning to deep the knowledge in polymer processing - [K_K01]
2. Ability to collaborate in research and development group and to carry the responsibility - [K_K04]
3. Knowledge of the role of polymeric materials processing in contemporary industry and applications - [K_K04]

Assessment methods of study outcomes

Laboratory assessment on the basis of the current work in the laboratory and the test checking the knowledge gained during laboratories.

The lectures end with a written exam, for a knowledge and understanding of the material and the ability to draw conclusions from this knowledge.

Course description

- Introduction to polymer processing,
- Description of main polymer processing methods: injection moulding, extrusion, thermoforming and rotational moulding,
- Characteristics of polymer processing methods in dependence on their viscosity in the molten state,
- Selection of polymer processing method for production of specific products,
- Testing the polymer flow in ?spiral? injection test,
- The laws governing the flow of molten polymers,
- Measurements of MFR values for chosen polymers,
- Influence of processing parameters on the viscosity and melt flow of polymers.

Basic bibliography:

1. Tim A. Ostwald, Understanding Polymer Processing, Carl Hanser Verlag, Munchen 2010.
2. Natalie Rudolph, Tim Osswald, Understanding Polymer Rheology ? From Molecular Structure to Polymer Processing, Carl Hanser Verlag, Munchen 2014.
3. T. A. Osswald, G. Menges; Material Science of Polymer Engineerings, 3rd edition, Hanser Verlag, Monachium 2012.
4. Collective work, Plastics Technology Handbook, Taylor & Francis, New York 2006.

Additional bibliography:

1. Articles in scientific newspapers: Polimery, Kunststoffe, Journal of Applied Polymer Science, Polymer.
2. C. Rauwendaal, ?Polymer Extrusion?, Carl Hanser Verlag, Munich 2001.
3. R. J. Craford, J. L. Throne; Rotational Moulding Technology, New York 2001.

Result of average student's workload

Activity	Time (working hours)
1. lecture	30
2. consultation to the lecture	4
3. consultation to the laboratory	4
4. preparation for laboratory	15
5. laboratory	45
6. exam preparation	15
7. exam	2

Student’s workload

Source of workload	hours	ECTS
Total workload	115	4
Contact hours	85	0
Practical activities	0	0