COURSE DESCRIPTION CARD - SYLLABUS

Course name
Technological Properties of Plastics [S1IMat1>WTTS]

Course

Field of study
Materials Engineering

Year/Semester
4/7

Area of study (specialization)
–

Profile of study
general academic

Level of study
first-cycle

Course offered in
Polish

Form of study
full-time

Requirements
elective

Number of hours

Lecture
15

Laboratory classes
0

Other (e.g. online)
0

Tutorials
0

Projects/seminars
15

Number of credit points

3,00

Coordinators

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Lecturers

Prerequisites

Student should have a basic knowledge of materials science and processing technologies of polymer materials.

Course objective

Student should obtain knowledge about the methods for investigation of the technological properties of polymeric materials and the ability to analyze results in the aspect of their manufacturing and recycling.

Course-related learning outcomes

Knowledge:
student has knowledge about the technological research of polymeric materials.
student has detailed knowledge of polymeric materials and their useful properties at the processing stage.

Skills:
student is able to obtain information from literature, in particular can describe groups of materials, processes of their production and processing.

student is able to apply methods of testing engineering materials and operate specialized scientific and research equipment.
student is able to prepare documented problems in materials engineering, manufacturing technology, materials testing methods.

Social competences:
student is aware of the non-technical aspects and effects of engineering activities, including its impact on the environment.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

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Lecture:
Written colloquium at the end of the semester, contains open questions of any kind of presented technologies (credit in case of obtaining at least 50,1% correct answers).
Laboratory classes:
Every single exercise should be passed by giving the written answer and additional final report on a training. All laboratory exercises must be passed with positive note.

Programme content

1. Technological properties of bulk raw materials.
2. Technological properties of polymers in molten state.
3. Technological properties of vulcanisates.
4. Technological properties of crosslinked resins.

Course topics

Lecture
1. Testing methods for evaluation the technological parameters of polymers (powders, pellets).
2. Methods used for evaluation of polymer properties in molten state.
3. Technological properties of PVC dry-blend - methods of characterization .
4. Methods for assessing and testing the effect of reprocessing on the structure and properties of polymers.
5. Measurement methods of moisture content in bulk polymers and their influence on processing.
6. Technological properties of rubber.
7. Technological properties of polyester and epoxy resins.

Laboratory classes
1. Investigation of shrinkage of injection molede parts.
2. Investigation of Barus effect in profile shaping.
3. Plastic flow testing in mold shaped in spiral of Archimedes.
4. Investigation of gel point during curing process of polyester and epoxy resins.
5. Evaluation of time restriction for application of single and multicomponent adhesives.
6. Estimation of moisture content in thermoplastic pellets.

Teaching methods

Lecture: multimedia presentation illustrated with examples given on a board.
Laboratory classes: demonstration of machine and equipment operation, performing experiments, solving tasks, discussion, teamwork.

Bibliography

Basic
1. T. Broniewski , J. Kapko, W. Płaczek, J. Thomalla - Metody badań i ocena właściwości tworzyw sztucznych, WNT, Warszawa, 2000.
2. K. Wilczyński, Reologia w przetwórstwie tworzyw sztucznych, WNT, Warszawa, 2001.
3. J.F. Rabek, Polimery, otrzymywanie, metody badawcze, zatosowanie, Wydawnictwa naukowe PWN, Warszawa, 2013
4. P. Penczek, i in., Chemia i technologia żywic epoksydowych, WNT, Warszawa, 2002.

5. K. Wilczyński, Przetw. Tworzyw Sztucznych, wyd. Politechnika Warszawska, 2000.
6. K. Wilczyński, Przetwórstwo tworzyw sztucznych, Oficyna wydawnicza Politechniki Warszawskiej 2018.
7. M. Bernaciak, Klejenie tworzyw sztucznych- wprowadzenie do technologii, podręcznik dla inżynierów, Wyd. AMB Technic 2015.
Additional
1. J. Czaplicki, Klejenie tworzyw konstrukcyjnych , Wydawn. Kom. I Łączn., Warszawa, 1987.
2. B. Antczak, i in., Guma: poradnik inżyniera i technika, WNT, Warszawa, 1981.
3. H. Saechtling, Poradnik Tworzyw Sztucznych, Wydawnictwa Naukowo-Techniczne, Warszawa 2007.

Breakdown of average student's workload

	Hours	ECTS
Total workload	75	3,00
Classes requiring direct contact with the teacher	50	2,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	25	1,00