



COURSE DESCRIPTION CARD - SYLLABUS

Course name

Automation of Materials Transportation

Course

Field of study

Management and Production Engineering

Area of study (specialization)

Level of study

First-cycle studies

Form of study

full-time

Year/Semester

3/5

Profile of study

general academic

Course offered in

Polish

Requirements

elective

Number of hours

Lecture

15

Laboratory classes

15

Other (e.g. online)

Tutorials

Projects/seminars

Number of credit points

2

Lecturers

Responsible for the course/lecturer:

DSc. Eng. Karol BULA

Responsible for the course/lecturer:

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Faculty of Mechanical Engineering

Piotrowo 3 st., 60-965 Poznań

Prerequisites

The student should have knowledge of the typical tools and equipment used in material technologies.

Course objective

Student should obtain knowledge about selected issues in automation of materials processes and automated devices in foundry, metal forming and processing of plastics.

Course-related learning outcomes

Knowledge

The student has knowledge about manufacturing technologies mainly used in the machinery industry. It applies to metallurgy and foundry processes, plastic forming, and plastics processing.



The student has knowledge about the automation and robotization of production processes, including the structure of numerical control and automatic regulation.

Skills

The student is able to develop assumptions regarding the selection of automation systems and robotization of production processes and make a choice of a justified degree of automation and robotization.

Social competences

The student understands the social aspects of processes automation and problems associated with their use.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lecture

Written colloquium at the end of the semester, contains 4 to 5 questions of any kind of presented technologies (credit in case of obtaining at least 50,1% correct answers).

Laboratory classes

Passing on the basis of written tests and oral answers in the field of automated devices used in foundry, metal forming and processing of plastics, properly made reports. All laboratory exercises must be passed with positive note.

Programme content

Lecture

1. General information about elements used to automate technological processes. Structure and control systems.
2. Automation of distribution of powdered raw materials executed with pressurized feeder as well as with mechanical one.
3. Programmable volumetric and gravimetric dosing units in materials modification.
4. Central drying systems, feeding and transportation systems of polymer pellets used in extrusion lines and injection molding divisions.
5. Devices for supplying of materials for metal forming.
6. Automation of supplying material for stamping processes.
7. Control systems for machines connected with stamping press in metal forming processes.



8. Description of automation methods in foundry technology: processing of molding sands, mold technology, die-casting, high-pressure die-casting and thixotropic method of castings manufacturing. Manipulators and robots used in the treatment of various foundry processes.

9. The examples of foundry automated machines and equipment with manipulators and robots: molding sand processing station, molding lines, a circus and high-pressure die-casting machines.

Laboratory

1. Programming of 2-axis robot and calibration of volumetric dosing unit equipped with screw device.
2. Determination of through output of the feeder with air transportation.
3. Determination of through output of the feeder with mechanical grips.
4. Programming of a station for transportation of pre-formed elements for plastic forming.
5. Construction of a robot equipped with color sensor.
6. Writing of program for robot maneuver and their activation.

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. Schmid D.: Mechatronika (opracowanie merytoryczne w wersji polskiej M. Olszewski). Toruńskie Zakłady Graficzne ZAPOLEX Sp. z o.o. Toruń 2006
2. Chudzikiewicz R., Mechanizacja i automatyzacja odlewni, WNT, Warszawa 1980.
3. Golański T.: Mechanizacja i automatyzacja w tłocznictwie, WNT, Warszawa 1978.
4. Praca zbiorowa: Techniki barwienia, zdobienia i znakowania wyrobów z tworzyw sztucznych, Wydawnictwo PLASTECH 2002.
5. Wilczyński K.: Wybrane zagadnienia przetwórstwa tworzyw sztucznych, WPW, Warszawa 2011.

Additional

1. Fedoryszyn A., Smyk K., Ziółkowski Z., Maszynoznawstwo odlewnicze, Wyd. AGH Kraków, 2008.
2. Dobrucki W.: Zarys obróbki plastycznej metali. Katowice: Śląsk 1975.



3. Erbel S., Golański T., Kuczyński K., Marciniak Z. i inni: Technologia obróbki plastycznej na zimno. Warszawa: SIMP-ODK 1983.
4. Frącz W.: Przetwórstwo tworzyw polimerowych, Wyd. Poli. Rzeszowskiej, Rzeszów 2011.
5. Plastics Guide. WNT, Warsaw 2006r.

Breakdown of average student's workload

	Hours	ECTS
Total workload	50	2,0
Classes requiring direct contact with the teacher	30	1,0
Student's own work (literature studies, preparation for laboratory classes/tutorials, preparation for tests/exam, project preparation) ¹	20	1,0

¹ delete or add other activities as appropriate