

**AGH**AGH UNIVERSITY OF SCIENCE
AND TECHNOLOGY

Module name: Process engineering

Academic year: 2013/2014 Code: RMS-1-403-s ECTS credits: 3

Faculty of: Mechanical Engineering and Robotics

Field of study: Mechatronics with English as instruction language Specialty: —

Study level: First-cycle studies Form and type of study: Full-time studies

Lecture language: English Profile of education: Academic (A) Semester: 4

Course homepage: —

Responsible teacher: prof. dr hab. inż. Świętoniowski Andrzej (swiatoni@imir.agh.edu.pl)

Academic teachers: dr inż. Pietrzykowski Andrzej (apietrz@agh.edu.pl)

Description of learning outcomes for module

MLO code	Student after module completion has the knowledge/ knows how to/is able to	Connections with FLO	Method of learning outcomes verification (form of completion)
Social competence			
M_K001	awareness of the responsibility for own work and readiness to comply with the rules of team work and accepting responsibility for tasks performed collectively	MS1A_K04	Activity during classes, Involvement in teamwork
M_K002	ability to correctly set priorities in task	MS1A_K05	Activity during classes, Involvement in teamwork
Skills			
M_U001	ability to use methods and mathematical models and computer simulations to analyse and assess the operation of mechatronic equipment and systems for technology series	MS1A_U07	Activity during classes, Test
M_U002	ability to perform critical analysis of the performance and assess the existing technical solutions in mechatronic devices and systems being used in technology series	MS1A_U11	Activity during classes, Test

M_U003	ability to design simple mechatronic devices or systems for various technology series, taking into consideration the required operating and economic criteria, using proper methods, techniques and tools	MS1A_U12	Activity during classes, Test
M_U004	ability to use data sheets and application notes to select appropriate components of the mechatronic device or system being designed	MS1A_U13	Activity during classes, Test
Knowledge			
M_W001	basic knowledge of machines for plastic working processes, drives, actuators and sensors, including vision systems used in mechatronic systems	MS1A_W06	Test
M_W002	well-ordered and theory-based knowledge of the construction of machines for plastic working processes, powder forging, polymers processes including the theory of machines and mechanisms necessary for formulating and solving problems in mechatronics	MS1A_W11	Test
M_W003	ability to design simple mechatronic devices for various applications in technology systems, taking into consideration the required operating and economic criteria, using intelligent systems, computer aided design and engineering software .	MS1A_U12	Test
M_W004	knowledge of new trends in mechatronic systems for production systems	MS1A_U13	Test
M_W005	elementary knowledge of the life cycle of mechatronic devices and systems using in machines and technology equipments	MS1A_W14	Test
M_W006	ability to select a kinematic structure and design a mechanical structure for it with the aim of performing specified functions using properly selected computer aided design (CAD) and engineering (CAE) software	MS1A_U15	Activity during classes, Test

FLO matrix in relation to forms of classes

MLO code	Student after module completion has the knowledge/ knows how to/is able to	Form of classes										
		Lectures	Auditorium classes	Laboratory classes	Project classes	Conversation seminar	Seminar classes	Practical classes	Others	Fieldwork classes	Workshops	E-learning
Social competence												

M_K001	awareness of the responsibility for own work and readiness to comply with the rules of team work and accepting responsibility for tasks performed collectively	-	-	+	-	-	-	-	-	-	-	-
M_K002	ability to correctly set priorities in task	-	-	+	-	-	-	-	-	-	-	-
Skills												
M_U001	ability to use methods and mathematical models and computer simulations to analyse and assess the operation of mechatronic equipment and systems for technology series	-	-	+	-	-	-	-	-	-	-	-
M_U002	ability to perform critical analysis of the performance and assess the existing technical solutions in mechatronic devices and systems being used in technology series	-	-	+	-	-	-	-	-	-	-	-
M_U003	ability to design simple mechatronic devices or systems for various technology series, taking into consideration the required operating and economic criteria, using proper methods, techniques and tools	-	-	+	-	-	-	-	-	-	-	-
M_U004	ability to use data sheets and application notes to select appropriate components of the mechatronic device or system being designed	-	-	+	-	-	-	-	-	-	-	-
Knowledge												
M_W001	basic knowledge of machines for plastic working processes, drives, actuators and sensors, including vision systems used in mechatronic systems	+	-	-	-	-	-	-	-	-	-	-
M_W002	well-ordered and theory-based knowledge of the construction of machines for plastic working processes, powder forging, polymers processes including the theory of machines and mechanisms necessary for formulating and solving problems in mechatronics	+	-	-	-	-	-	-	-	-	-	-

M_W003	ability to design simple mechatronic devices for various applications in technology systems, taking into consideration the required operating and economic criteria, using intelligent systems, computer aided design and engineering software .	+	-	-	-	-	-	-	-	-	-	-
M_W004	knowledge of new trends in mechatronic systems for production systems	+	-	-	-	-	-	-	-	-	-	-
M_W005	elementary knowledge of the life cycle of mechatronic devices and systems using in machines and technology equipments	+	-	-	-	-	-	-	-	-	-	-
M_W006	ability to select a kinematic structure and design a mechanical structure for it with the aim of performing specified functions using properly selected computer aided design (CAD) and engineering (CAE) software	+	-	-	-	-	-	-	-	-	-	-

Module content

Lectures

Plastic working technology – general principle and application.
 Design and operation of machines for plastic working processes. Main trends and perspective of their development.
 Basic principles of the metal ceramics technology. Design and construction of the machine and equipment. Main trends and perspective of the technology development.
 Principles of polymers processes. Machines and equipments of the process). Principles of composites processes. Their machines and equipments.
 Control systems as an integral part of machine design. Condition monitoring of the process and machine construction.
 Intelligent system technologies and their applications.
 Mechatronic aspects of the products quality in plastic working and polymers processes.
 Fundamentals of the mathematical modeling and computer simulation of the engineering processes.

Laboratory classes

Determination of geometric, kinematic and parameters of metal forming processes,
 Metal flow modeling and load measurements in metal forming processes,
 Analysis of the opportunities offered by novel technologies,
 Analysis of automated technological processes in selected industrial companies – onsite classes.

Method of calculating the final grade

Ocena z kolokwiów i aktywności na wykładach

Prerequisites and additional requirements

Prerequisites and additional requirements not specified

Recommended literature and teaching resources

Sińczak J. (red) Procesy przeróbki plastycznej Wyd. Naukowe „Akapit” Kraków 2003
Niebel B.W., Draper A.B., Wysk R.A., Modern Manufacturing Process Engineering Mc Graw-Hill Publishing Company 1996
Szczepanik S. Przeróbka plastyczna materiałów spiekanych, proszków i kompozytów. Wyd. Nauk AGH 2003
Pielichowski J.J, Pruszyński A.A. Technologia tworzyw sztucznych. WNT W-wa 1994
Lu Y.Z. Industrial Inteligeny Control - Fundamentals and aplications John Wiley & Sons New York 1996.
Metal Forming: Fundamental and Applications, Taylan Altan, Soo- Oh, Harold L.Gegel. American Society for Metals, Metals Park, OH 44073.

Scientific publications of module course instructors related to the topic of the module

Additional scientific publications not specified

Additional information

None

Student workload (ECTS credits balance)

Student activity form	Student workload
Participation in lectures	15 h
Participation in laboratory classes	30 h
Examination or Final test	2 h
Contact hours	10 h
Realization of independently performed tasks	5 h
Preparation for classes	15 h
Summary student workload	77 h
Module ECTS credits	3 ECTS