

# FACULTY OF MECHANICAL AND POWER ENGINEERING

## SUBJECT CARD

**Name of subject in Polish:** Zintegrowane systemy produkcji  
**Name of subject in English:** Integrated Production Systems  
**Main field of study (if applicable):** Power engineering  
**Specialization (if applicable):** Computer aided mechanical and power engineering  
**Profile:** academic  
**Level and form of studies:** 2nd level, full-time  
**Kind of subject:** optional/specialization  
**Subject code:** W09ENG-SM0062  
**Group of courses:** NO

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	15		30		
Number of hours of total student workload (CNPS)	30		60		
Form of crediting	crediting with grade		crediting with grade		
For group of courses mark final course with (X)					
Number of ECTS points	1		2		
including number of ECTS points for practical (P) classes			2		
including number of ECTS points for direct teacher-student contact (BK) classes	0.5		1.5		

\*delete as applicable

## PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

Knowledge of basic problems concerning manufacturing processes.

Ability to use CATIA software in range of 3D parts creation with parameters and their assembly.

## SUBJECT OBJECTIVES

C1 To familiarize students with CIM (Computer Integrated Manufacturing) - integrated manufacturing environment.

C2 To familiarize students with the development directions of technologies such as: CAD, CFD, MES, CAM, CAPP, MRP, ERP.

C3 Presentation of so-called methods Rapid Prototyping and the so-called Reverse Engineering.

C4 To develop the skills to integrate of the engineering activities into one CAD/CAM system

## SUBJECT LEARNING OUTCOMES

relating to knowledge:

PEU\_W01- Knows the basic production processes and the principles of their integration within the enterprise IT platform.

PEU\_W02 - Has basic knowledge of CAD, CAE, CAPP, CAM.

PEU\_W03 - He knows the methods of rapid prototyping and reverse engineering.

relating to skills:

PEU\_U01- Is able to elaborate a complete machine part design in one integrated CATIA package from the concept stage to simulation of the manufacturing process using MES and CAM.

PEU\_U02 - Is able to use online knowledge resources to select and obtain models of machine parts and is able to prepare a coherent presentation regarding the implemented project.

### PROGRAM CONTENT

Lectures		Number of hours
Lec 1	Introduction to classes. The essence of CIM.	2
Lec 2	Overview of manufacturing techniques.	2
Lec 3	Introduction to CAD.	2
Lec 4	Introduction to FEM	2
Lec 5	Introduction to CFD.	2
Lec 6	Introduction to CAM and CNC.	2
Lec 7	Rapid prototyping. Reverse engineering	2
Lec 8	Credit	1
	Total hours	<b>15</b>
Laboratory		Number of hours
Lab 1	Organizational matters. The issue of topics.	2
Lab 2	Conducting of the necessary calculations. Development of the necessary calculation sheets.	2
Lab 3	Conducting of the necessary calculations. Development of the necessary calculation sheets.	2
Lab 4	Conducting of the necessary calculations. Development of the necessary calculation sheets.	2
Lab 5	Conducting of the necessary parametric models in the CATIA system and their integration with calculation sheets.	2
Lab 6	Conducting of the necessary parametric models in the CATIA system and their integration with calculation sheets.	2
Lab 7	Conducting of the necessary parametric models in the CATIA system and their integration with calculation sheets.	2
Lab 8	Conducting of the necessary FEM calculations in the CATIA system and optimization of designed parts.	2
Lab 9	Conducting of the necessary FEM calculations in the CATIA system and optimization of designed parts.	2
Lab 10	Conducting of the necessary FEM calculations in the CATIA system and optimization of designed parts.	2
Lab 11	Preparation of the technical drawings in the CATIA system.	2
Lab 12	Preparation of the technical drawings in the CATIA system.	2
Lab 13	Elaboration of the manufacturing process of the selected part and familiarization with the CATIA CAM module.	2
Lab 14	Elaboration of the manufacturing process of the selected part and familiarization with the CATIA CAM module.	2

Lab 15	Presentation of results and defense of the project	2
	Total hours	<b>30</b>

### TEACHING TOOLS USED

- N1. Informative lecture using multimedia technologies.  
N2. Introduction to laboratory classes.  
N3. Preparation of the work results in the form of presentation.  
N4. Consultations.  
N5. Own work - preparation for the laboratory.

### EVALUATION OF SUBJECT LEARNING OUTCOMES ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end))	Learning outcomes number	Way of evaluating learning outcomes achievement
C (lecture)	PEU_W01-PEU_W03	Semester work
C (laboratory)	PEU_U01-PEU_U02	Presentation of the results and defense of the project

### PRIMARY AND SECONDARY LITERATURE

#### **PRIMARY LITERATURE:**

- [1] Dorf R. „Handbook of Design, Manufacturing and Automation”, John Wiley & Sons, Inc., Toronto 1994
- [2] Khan W. Raouf A. „Standards for Engineering Design and Manufacturing”, Taylor & Francis Group, LLC, London 2006.
- [3] Saaksvuori A., Immonen A. „Product Lifecycle Management”, Springer, Berlin, 2008.
- [4] Xun Xu „Integrating Advanced Computer-Aided Design, Manufacturing, and Numerical Control: Principles and Implementations”, IGI Global New York 2009.
- [5] Wu B. „Handbook of Manufacturing and Supply Systems Design”, Taylor&Francic, London 2002.

#### **SECONDARY LITERATURE:**

- [1] Leondes C. „Computer-Aided Design, Engineering, and Manufacturing Systems Techniques And Applications VOLUME 2. Computer Integrated Manufacturing”, CRC Press LLC, New York 2001.
- [2] Leondes C. „Computer-Aided Design, Engineering, and Manufacturing Systems Techniques And Applications VOLUME 5. The Design of Manufacturing Systems”, CRC Press LLC, New York 2001.
- [3] Leondes C. „Computer-Aided Design, Engineering, and Manufacturing Systems Techniques And Applications VOLUME 6. Manufacturing Systems Processes”, CRC Press LLC, New York 2001.
- [4] Leondes C. „Computer Aided and Integrated Manufacturing Systems. Volume 2. Intelligent Systems Technologies”, World Scientific Publishing Co. Pte. Ltd. , Singapore 2003.

#### **SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)**

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