Course code **Course item**

1. INFORMATION ABOUT THE COURSE

a. Basic information

Course title	***Machine Design Optimization***
Field of study	*Mechanical Engineering*
Cycle	*first degree*
Study profile	*general academic*
Study mode	*full-time*
Specialisation	
Unit responsible for the field of study	*Faculty of Mechanical Engineering, Department of Design*
Lecturer	*Michał Piotrowski, PhD*
Introductory courses	*Mathematics, Mechanics, Physics, Information Technology, Organization and Management, Fundamentals of Machine Design (FMD - lectures and practical classes) Engineering Graphics (EG with CAD]*
Prerequisites	*Basic knowledge of mathematics, mechanics, physics, information technology and management is required. CAD, machine design etc..*

b. Semester/ weekly timetable

Semester	Lectures (W)	Classes (C)	Laboratories (L)	Project classes (P)	Seminars (S)	Fieldwork (T)	ECTS credits ECTS*
winter /summer	15			15			6

C. Assumed outcomes and aims - aims bind the course programme with the study programme and are referred to in learning outcomes point 2

2. LEARNING OUTCOMES (acc. to National Qualifications Framework)

No.	Description of learning outcomes	Reference to learning outcomes for the field of study	Reference to learning outcomes for the area of study
KNOWLEDGE			
K1	*has knowledge of chemistry useful for understanding the issues of materials science and solid state physics*	K1_W03	P6S_WG
K2	*has knowledge in the field of construction and engineering graphics*	K1_W07	P6S_WG
K3	*has knowledge of machine operation*	K1_W08	P6S_WG
K4	*has knowledge in the field of metrology and measurement*	K1_W12	P6S_WG

	systems		
K5	*has basic knowledge of management, including quality management, and running a business*	K1_W16	P6S_WK
Skills			
S1	*can use numerical methods in machine construction*	K1_U08	P6S_UW
S2	*is able to present the results of research and design work*	K1_U11	P6S_UK
SOCIAL COMPETENCES			
SC1	*is aware of the responsibility for their own work and is ready to comply with the rules of teamwork and take responsibility for jointly implemented tasks*	K1_K02	P6S_KK
SC2	*is aware of the importance and understands the non-technical aspects and effects of the activities of a mechanical engineer, including its impact on the environment, and the related responsibility for decisions made*	K1_K4	P6S_KO
SC3	*is aware of the importance of the role of a mechanical engineer in innovative activity*	K1_K06	P6S_KR

3. TEACHING METHODS

Multimedia lecture, laboratory lessons, project, design classes, presentation, discussion, case study

4. METHODS OF EXAMINATION

class attendance, final project presentation, reports from the exercises

5. COURSE CONTENT

Specify the content separately for each type of classes in accordance with point I.B. Lecture	The course bases on three distinct sections: advanced mechanics theory, design optimization, and design for manufacturing. The advanced mechanics section covers situations that are likely to be seen in a real world design problem and focuses on developing student knowledge from a theoretical foundation. The key design optimization section of the course focuses on how to choose the best design for the situation based on a set of machine design criteria. This section uses various methods including MatLab optimization codes, and will combine theory and practical knowledge of machine design. Finally, the design for manufacturing section shows students how to communicate designs to individuals or companies responsible for manufacturing. This section focuses on the knowledge of standards and manufacturing processes and other important issues.
Laboratory	-
Projects	With accordance to the above mentioned procedure are based on weekly evaluated projects on specific individually given subjects.

6. VALIDATION OF LEARNING OUTCOMES

(Each learning outcome from the list requires validation methods to ensure that it was achieved by a student.)

Learning outcome	Form of assessment (for example:)					
	Oral examination	Written examination	Test	Project	Report	Class attendance
W1 – W2				x	x	x
U1 – U2				x	x	x
K1				x	x	x

7. LITERATURE

Basic literature	*Optimization Methods for Engineering Design* *Applications and Theory, 2013 Brigham Young University* *Bhandari V.B., 2010, Design of Machine Elements (3rd ed.). Tata McGraw-Hill Education.*
Supplementary literature	*Shigley J., Mischke Ch., Brown T., 2004. Standard Handbook of Machine literature Design. McGraw-Hill.* *Buckingham E., 1949. Analytical Mechanics of Gears. McGraw-Hill Book Co.* *Harris T.A., 2000. Rolling Bearing Analysis. 4th ed. Wiley-Interscience.* *Canfiel S., 1999. "Gear Types", Dynamics of Machinery, Tennessee Tech University. Department of Mechanical Engineering, ME 362 lecture notes.*

8. TOTAL STUDENT WORKLOAD REQUIRED TO ACHIEVE EXPECTED LEARNING OUTCOMES EXPRESSED IN TIME AND ECTS CREDITS

Student's activity		Student workload– number of hours (for example:)
Classes conducted under a direct supervision of an academic teacher or other persons responsible for classes	Participation in classes indicated in point 2.2	75
	Supervision hours	5
Student's own work	Preparation for classes	45
	Reading assignments	15
	Other (preparation for exams, tests, carrying out a project etc)	15
Total student workload		145
	Final number of ECTS credits	6