

Course code

Course item

1. INFORMATION ABOUT THE COURSE

a. Basic information

Course title	<i>Machine Design</i>
Field of study	<i>Mechanical Engineering</i>
Cycle	<i>first degree</i>
Study profile	<i>general academic</i>
Study mode	<i>full-time</i>
Specialisation	
Unit responsible for the field of study	<i>Faculty of Mechanical Engineering, Department of Design</i>
Lecturer	<i>Michał Piotrowski, PhD</i>
Introductory courses	<i>Mathematics, Mechanics, Physics, Information Technology, Organization and Management, Fundamentals of Machine Design (FMD - lectures and practical classes) Engineering Graphics (EG with CAD)</i>
Prerequisites	<i>Basic knowledge of mathematics, mechanics, physics, basic knowledge on the design theory, failure processes of machines and structural parts, typical, calculation models of structural parts, rules of selection of typical machine, elements, design methods of mechanical drives; basic skills in the area of manual and computer aided 2D technical drawings and 3D structure modelling, is required.</i>

b. Semester/ weekly timetable

Semester	Lectures (W)	Classes (C)	Laboratories (L)	Project classes (P)	Seminars (S)	Fieldwork (T)	ECTS credits ECTS*
winter /summer	30	15		30			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	<i>Has basic knowledge of general engineering construction principles of fields of studies associated with field of stud</i>	<i>K1_W10</i>	<i>P6S_WG</i>

K2	<i>Knows basic models and numerical methods used to machine design proces</i>	<i>K1_W19</i>	<i>P6S_WG</i>
K3	<i>Knows principles of safety rules related to that work and the reliability of machine</i>	<i>K1_W09</i>	<i>P6S_WG</i>
K4	<i>Has basic knowledge of machine engineering construction to the extent enabling the preparation of engineering documentation</i>	<i>K1_W18</i>	<i>P6S_WG</i>
Skills			
S1	<i>is able to plan and carry out measurements of geometric features of machine elements</i>	<i>K1_U04</i>	<i>P6S_UW</i>
S2	<i>is able to design simple machines and devices, taking into account the given technical, operational and economic criteria</i>	<i>K1_U05</i>	<i>P6S_UW</i>
S3	<i>is able to plan the production process of simple machines and devices and to estimate its costs initially</i>	<i>K1_U06</i>	<i>P6S_UW</i>
S4	<i>is able to design simple operating systems for machines and devices</i>	<i>K1_U07</i>	<i>P6S_UW</i>
S5	<i>is able to plan and carry out measurements of basic properties of engineering materials</i>	<i>K1_U13</i>	<i>P6S_UO</i>
SOCIAL COMPETENCES			
SC1	<i>understands the need and knows the possibilities of continuous training (second and third degree studies, postgraduate studies, courses) - improving professional, personal and social competences</i>	<i>K1_K01</i>	<i>P6S_KK</i>

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.	Presentation of design methods with reference to different criteria (i.e. strength, rigidity ones). Fatigue issues: fatigue process, strength calculations, The S-N curve, notch phenomenon, safety coefficient calculations. Screw-thread connections and joints: thread strength, screw mechanisms, distribution of forces, thread efficiency. Welding and similar connections calculations. Consequently issues on bolt, rivet and other joints. Design of shafts and axles, basic requirements of application of bearings, general information on joints and couplings. Mechanical transmissions: gear, chain and other systems. Properties, structure and their application. Geometrical, dynamic and other characteristics. Principles of calculations.
Lecture	
Laboratory	Students are divided into small groups in order to verify theoretical knowledge. With the usage of test stands designed and prepared at the department. Weekly classes follow the handbook of S. Mroziński, 2001.
Projects	With accordance to the above mentioned topics are based on weekly evaluated projects on specific individually given subjects that follow the above mentioned lectures.

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	<p><i>Golenko, Andrzej. "Fundamentals of machine design." A Coursebook for Polish and Foreign Students. Dolnośląska Biblioteka Cyfrowa, Wrocław (2010).</i></p> <p><i>Collins J.A., Staab G.H., Busby H.R., 2002. Mechanical Design of Machine Elements and Machines. Wiley.</i></p> <p><i>Oberg E., Jones F.D., McCauley J., Heald R.M., 2004. Machinery's Handbook (27th ed.). Industrial Press.</i></p> <p><i>Mroziński S., 2001. Podstawy konstrukcji maszyn: laboratorium. Wydaw. Uczelniane ATR Bydgoszcz.</i></p> <p><i>Bhandari V.B., 2010, Design of Machine Elements (3rd ed.). Tata McGraw-Hill Education.</i></p>
Supplementary literature	<p><i>Shigley J., Mischke Ch., Brown T., 2004. Standard Handbook of Machine literature Design. McGraw-Hill.</i></p> <p><i>Buckingham E., 1949. Analytical Mechanics of Gears. McGraw-Hill Book Co.</i></p> <p><i>Harris T.A., 2000. Rolling Bearing Analysis. 4th ed. Wiley-Interscience.</i></p> <p><i>Canfiel S., 1999. "Gear Types", Dynamics of Machinery, Tennessee Tech University. Department of Mechanical Engineering, ME 362 lecture notes.</i></p>

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