STUDY MODULE DESCRIPTION FORM

Name of the module/subject	Code
Basics of Drive Systems Design	**1010641251010648481**

Field of study	Profile of study (general academic, practical)	Year /Semester
Mechanical Engineering	**(brak)**	**3 / 5**
Elective path/specialty	Subject offered in:	Course (compulsory, elective)
Mechatronics	**Polish**	**obligatory**

Cycle of study:	Form of study (full-time,part-time)
First-cycle studies	**full-time**

No. of hours	No. of credits
Lecture: **2** Classes: **1** Laboratory: **-** Project/seminars: **2**	**6**

Status of the course in the study program (Basic, major, other)	(university-wide, from another field)
(brak)	**(brak)**

Education areas and fields of science and art	ECTS distribution (number and %)
technical sciences	**6 100%**
Technical sciences	**6 100%**

Responsible for subject / lecturer:

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Responsible for subject / lecturer:

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Prerequisites in terms of knowledge, skills and social competencies:

1	**Knowledge**	Student has knowledge of physics (statics, kinematics and dynamics), mathematics, Basic of machines design I after completing the program of study
2	**Skills**	Student has the problem-solving skills of the basics of machine design based on their knowledge, ability to obtain the information from identified sources
3	**Social competencies**	Student understands the need to broaden their competence, willingness to work together as a team

Assumptions and objectives of the course:

1. Provide students with knowledge of the basics of machine design.
2. Develop students' skills:
- calculation and design of components and assemblies of machines,
- making and reading the technical documentation on the basis of the knowledge from the Engineering Drawing course
- practical use of the knowledge gained from the course: Mechanics, Strength of materials, Theory of machines, Materials, Basics of Machines Design I.
3. Development of students' teamwork skills.

Study outcomes and reference to the educational results for a field of study

Knowledge:

1. 1. Has a basic knowledge of the basics of machine design and the theory of machines and mechanisms, including information about the structure of power transmission system, of kinematic diagrams and functions of gears. - [[K1A_W05]]
2. 2. Has a basic knowledge of the basics of machine design and the theory of machines and mechanisms, including information about couplings, parameters of power transmission systems and kinds of power transmission systems. - [[K1A_W05]]
3. 3. Has a basic knowledge of the basics of machine design and the theory of machines and mechanisms, including information about belt drives. - [[K1A_W05]]
4. 4. Has a basic knowledge of the basics of machine design and the theory of machines and mechanisms, including information about chain drives. - [[K1A_W05]]
5. 5. Has a basic knowledge of the basics of machine design and the theory of machines and mechanisms, including information about power screw assemblies. - [[K1A_W05]]
6. 6. Is up-to-date with the latest trends in mechanical engineering, i.e. machine design, increase in safety and ease of operation, use of modern construction materials. - [[K1A_W18]]

Skills:
1. Is able to prepare technical documentation (descriptive and graphic)of an engineering task. - [[K1A_U04]]
2. Is able to use acquired mathematical theories to create and analyze simple mathematical models of machines, their components and simple technical systems. - [[K1A_U07]]
3. Is able to create a diagram of a system, select its items and perform basic calculations using ready-made computational packages for mechanical propulsion of a machine. - [[K1A_U09]]
4. Is able to perform strength calculations of frames and supporting structures in machines using basic theories of strength. - [[K1A_U10]]
5. . Is able to use popular packages for technical drawings edition and 3D modeling in sufficient detail to enable the creation of documentation in accordance with the applicable standards and models of virtual machines in three-dimensional space. - [[K1A_U12]]
6. able to hand draw a simple schematic or a machine component in accordance with the principles of technical drawing. - [[K1A_U14]]
7. Is able to plan and carry out the process of constructing simple assemblies or machines and formulate requirements for electronic and automatic control systems for industry professionals in mechatronic systems. - [[K1A_U19]]
Social competencies:
1. Understands the need and knows the possibilities of lifelong learning. - [[K1A_K01]]
2. Is aware of and understands the importance and impact of non-technical aspects of mechanical engineering activities and its impact on the environment and responsibility for own decisions. - [[K1A_K02]]
3. Is aware of the importance of behavior in a professional manner, compliance with the rules of professional ethics and respect for cultural diversity. - [[K1A_K03]]
4. Has a sense of responsibility for one?s own work and is willing to comply with the principles of teamwork and taking responsibility for collaborative tasks. - [[K1A_K04]]

Assessment methods of study outcomes
Forming assessment:
a) in a scope of the excercise classes: assessment of the answers for the questions concerning the knowledge which was presented during previous classes
a) in a scope of lectures: assessment of the answers for the questions concerning the knowledge which was presented during previous lectures
Summarizing assessment:
a) in a scope of the exercise classes: written exam.
b) in a scope of lectures: written exam.
Course description
The structure of the machine drive system, the functions of transmission, clutch, the basic parameters of the drive, drive types, kinematic diagrams. Split couplings, design review and applications. Starting layout drive with clutch. Clutch: fixed, controlled, sensitive, overload. Calculation of couplings and the rules for the selection. The general division of drives, design review, the basic parameters. Rules for selection of gear ratios and the calculation of torques. Gears: classification, the outline of the teeth. Helical gear: geometry, kinematics. wheels, interdental force, the base of the structure. Bevel gear, the geometric parameters of the wheels, interdental force. State of stress in the gear wheel teeth. Design calculations of spur gear. Worm gears, geometry, kinematics. Planetary Gear, examples of construction. General characteristics of belt drives, power and tension in the belt cords, power and gear efficiency. The calculation and selection of the design characteristics of belt drives. Chain drives. Power screw assemblies.
Basic bibliography:
1. J. Żółtowski, Podstawy Konstrukcji Maszyn, Oficyna Wydawnicza Politechniki Warszawskiej, 2002.
2. R. Knosala, A. Gwiazda, A. Baier, P. Gendarz, Podstawy Konstrukcji Maszyn, WNT, Warszawa 2000.
3. A. Dziurski, L. Kania, A. Kasprzycki, E. Mazanek, Przykłady obliczeń z Podstawy Konstrukcji Maszyn, Tom 1 i 2, WNT, Warszawa 2005.
Additional bibliography:
1. Dietrich M.; Podstawy konstrukcji maszyn, Wydawnictwo Naukowo - Techniczne 1995.
2. Niezgodziński M. E., Niezgodziński T.; Wzory, wykresy i tablice wytrzymałościowe, Wydawnictwo Naukowo ? Techniczne, 1996,
3. Sempruch J., Piątkowski T,; Podstawy konstrukcji maszyn z CAD, Piła, Państwowa Wyższa Szkołą zawodowa w Pile, 2006

Result of average student's workload	
Activity	**Time (working hours)**

1. Lectures	30
2. Consultations	2
3. Preparation to pass the exam	410
4. Participation in the exam	2
5. Participation in the exercise classes	15
6. Preparation to the exercise classes	8
7. Preparation to pass the exercise classes	10
8. Participation in the exercise classes exam	2
9. Participation in the project activities	30
10. Preparation of the project	30
11. Consultation project	5
12. Preparation to pass the project exercises	15
13. Participation in project passing	2

Student's workload

Source of workload	hours	ECTS
Total workload	161	6
Contact hours	88	4
Practical activities	82	3