Subject programme

1. Subject name / subject module: **Elements of Mechanical Design**
2. Lecture language: **English**
3. The location of the subject in study plans:
   - Area or areas of the studies: **Computer Engineering and Mechatronics**
   - Degree of the studies: **1st degree studies**
   - Field or fields (implementation of effects standard): **Mechatronics**
4. Supervision of subject implementation:
   - The Institute / Another unit: **Institute of Informatics and Mechatronics**
   - The person responsible for the subject: **Szczutkowski Marek, dr inż.**
   - People cooperating in the development of the programme of the subject:
5. The number of hours and forms of teaching for individual study system and the evaluation method:

Teaching activities with the tutor																						
Mode of study	Form of classes																					Total
	...	SOW	ECTS	Laboratory work	SOW	ECTS	...	SOW	ECTS	...	SOW	ECTS	...	SOW	ECTS	...	SOW	ECTS	...	SOW	ECTS	ECTS
Full-time studies				22	28	2																**2**
Part-time studies																						
Credit rigor				Exam																		

6. Student workload – ECTS credits balance:

   1 ECTS credit corresponds to 25-30 hours of student work needed to achieve the expected learning outcomes including the student's own work

Activity (please specify relevant work for the subject)	**Hourly student workload (full-time studies/part-time studies)**
Participation in lectures	-
Participation in laboratory classes	22
Preparation to laboratory classes	10
Independent study of the subject	4
Preparation to an exam test	8
Participation in an exam / graded assignment	2
Total student workload (TSW)	50
ECTS credits	2
* Student's workload related to trainings	50
Student's workload in classes requiring direct participation of academic teachers	22

7. Implementation notes: recommended duration (semesters), recommended admission requirements, relations between the forms of classes:
   - Recommended admission requirements – none.
   - Recommended duration of the subject is taken from the course plan.
8. Specific learning outcomes – knowledge, skills and social competence:

Specific learning outcomes for the subject		**Form**	**Teaching method**	**Methods for testing of (checking, assessing) learning outcomes**
Outcome symbol	**Outcome description**			
Knowledge				
K_W02	**A student has basic knowledge in the field of mechanical properties of materials.**	**Laboratory work**	**Inquiry methods**	**Exam Student learning activities**
K_W03	**A student is familiar with common machine elements such as shafts, couplings, springs, bearings, and gears. Student is also familiar with electric motors and controls. Student has basic knowledge necessary to understand relationships and phenomena ap**			
K_W07	**A student knows and understands steps of the mechanical design process.**			
K_W09	**A student knows and understands selected specific issues related to materials used in mechanical design.**			
Skills				
K_U02	**A student is able to read engineering drawing, ssolve simple design problems as well as perform tasks typical in mechanical design.**	**Laboratory work**	**Inquiry methods**	**Exam Student learning activities**

9. Assessment rules / criteria for each form of education and individual grades:

0% - 50%	ndst	**80% - 86%**	db
51% - 70%	dst	**87% - 93%**	db+
71% - 79%	dst+	**94% - 100%**	bdb

Activity	Grades	Calculation	To Final
Lab reports	dst, db, bdb, db (3,4,5,4)	arithmetic mean (3,4,5,4) * 40%	1,6
Attendance	on 75% of all classes	75% * 5 -> 3,75 * 10%	0,375
Exam	bdb (5)	5.0 * 50%	2,5
Final result			4,475
Grade		4,475/5 = 89,5%	**db+ (4,5)**

10. The learning contents with the form of the class activities on which they are carried out:

(Laboratory work)

1 The Nature of Mechanical Design;

2 Materials in Mechanical Design;

3 Stress and Deformation Analysis;

4 Combined Stresses;

5 Design for Different Types of Loading;

6 Columns;

7 Belt Drives and Chain Drives;

8 Kinematics of Gears;

9 Spur Gear Design;

10 Helical Gears, Bevel Gears, and Wormgearing;

11 Keys, Couplings, and Seals;

12 Shaft Design;

13 Tolerances and Fits;

14 Rolling Contact Bearings;

15 Completion of the Design of a Power Transmission;

16 Plain Surface Bearings;

17 Linear Motion Elements;

18 Springs;

19 Fasteners;

20 Machine Frames, Bolted Connections, and Welded Joints;

21 Electric Motors and Controls;

22 Motion Control: Clutches and Brakes.

11. Required teaching aids:

a. Lecture - multimedia projector.

b. Laboratory classes - specialist laboratory.

c. Exercises - a room adapted for conducting classes in the form of exercises / workshops, multimedia projector.

12. Literature:

a. Basic literature:

- Golenko A., Fundamentals of Machine Design, A Coursebook for Polish and Foreign Students, Politechnika Wrocławska, 2010

b. Supplementary literature:

- Mittemeijer E.J., Fundamentals of Materials Science, Springer-Verlag Berlin Heidelberg, 2011
- Toliyat H.A., Kliman G.B., Handbook of Electric Motors, Marcel Dekker, Inc., 2004
- Ulman D., The Mechanical Design Process, McGraw-Hill Education, 2009
- Nee A.Y.C.,

c. Internet sources:

- https://www.dbc.wroc.pl/Content/7154/Golenko_Fundamentals%20of%20Machine%20Design.pdf, 12.2020
- http://www.issp.ac.ru/ebooks/books/open/Materials_Science_and_Technology.pdf, 12.2020
- http://kaizenha.com/wp-content/uploads/2016/04/Materials-Textbook-8th-Edition.pdf, 12.2020
- http://www.umt.fme.vutbr.cz/images/opory/Design%20of%20Mechatronic%20Systems/1UM.pdf, 12.2020
- https://cbse.nic.in/publications/FINAL_ENGINEERING_GRAPHICS_XII_PDF_FOR_WEB.pdf, 12.2020
- https://doc.lagout.org/science/0_Computer%20Science/9_Others/Textbook%20of%20Engineering%20Drawing.pdf, 12.2020

13. Available educational materials divided into forms of class activities (Author's compilation of didactic materials, e-learning materials, etc.)

14. Teachers implementing particular forms of education:

Form of education	Name and surname
1. Lecture	
2. Laboratory classes	Szczutkowski Marek, dr inż.
3. Training	
4. Project classes	
5. Workshop classes	
6. Simulation game	
7. Language classes	