Subject programme

1. Subject name / subject module: **Engineering Project**
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: **Ocetkiewicz Tomasz, mgr 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

Mode of study																					Total
	PWS	ECTS	Project work	PWS	ECTS	...	PWS	ECTS	...	PWS	ECTS	Project work – student hours	PWS	ECTS	...	PWS	ECTS	...	PWS	ECTS	ECTS
Full-time studies			16	76	4							8									4
Part-time studies																					
Credit rigor	...			graded assignment																	

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 project work	16/0
Participation in student hours	8/0
Preparation of engineering project	74/0
Participation in an exam / graded assignment / final grading	2/0
Total student workload (TSW)	100/0
ECTS credits	4
* Student's workload related to practical forms	100/0
Student's workload in classes requiring direct participation of academic teachers	24/0

7. Implementation notes: recommended duration (semesters), recommended admission requirements, relations between the forms of classes:

   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_W03	Student has sufficient knowledge in the field of mechanical engineering, necessary to understand at an advanced level the complex relationships between mechatronic systems and use this knowledge to select appropriate methods, tools, and components	Project work	inquiry methods	Engineering project assessment, active participation in-class.
K_W05	Student has adequate knowledge of automation, control systems, electronics, and electrical engineering, necessary to			

	understand at a sufficient level the complex dependencies in mechatronic systems and to use this knowledge to prepare solutions for engineering tasks.			
K_W06	Student possesses sufficient knowledge of selected issues in the field of applied computer science related to programming, software design, computer networks, databases, engineering graphics to prepare engineering projects.			
K_W07	Student possesses sufficient knowledge of selected issues in the field of mechanical engineering to prepare engineering projects.			
K_W08	Student possesses sufficient knowledge of selected issues in the field of automation, control engineering, electronics, and electrical engineering, to solve an engineering problem defined as a design of an automation system, a controller, a robot.			
K_W09	Student possesses sufficient knowledge to understand the parameters and properties of components and materials that can be used to solve an engineering task.			
K_W11	Student possesses sufficient knowledge of technical standards and norms commonly used in technical solutions for prototyping of electronics devices, and about their life-cycle.			
K_W12	Student possesses sufficient knowledge to understand the issues related to obtaining information using distance learning methods and is able to use this knowledge to prepare an engineering project.			
Skills				
K_U01	Student is able to obtain information through the selection of sources, interpret the data, prepare a critical analysis, synthesize data, and draw conclusions to solve an engineering problem.	Project work	inquiry methods	Engineering project assessment, active participation in-class.
K_U02	Student possesses sufficient skills to formulate and solve problems and perform tasks required to solve engineering tasks.			
K_U05	Student has adequate skills to use the norms and standards applicable for preparing solutions to engineering problems.			

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

0% - 60%	ndst	81% - 90%	db
61% - 70%	dst	91% - 93%	db+
71% - 80%	dst+	94% - 100%	bdb

Activity	Grades	Calculation	To Final
Final project	5 bdb	5*100%	5,0

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

Project work

1. Preparation of an engineering project adapted to the area of studies in the field of computer science nad mechatronics.

11. Required teaching aids

Specialist laboratory

12. Literature:
    a. Basic literature:

    - Blum J.; Exploring Arduino ; tools and techniques for engineering wizardry; ISBN 978-1-118-54936-0; Wiley 2013

    - Bob Dukish; Coding the Arduino; ISBN 978-1-4842-3510-2; Apress, Berkeley, CA 2018

    - M. Daud Alam, Uwe F. Gühl; Project-Management in Practice; ISBN 978-3-662-52944-7; Springer 2016

    b. Supplementary literature:

    - Tianhong Pan, Yi Zhu ; Designing Embedded Systems with Arduino; ISBN 978-981-10-4418-2; Springer 2018

    - Indira Knight; Connecting Arduino to the Web; ISBN 978-1-4842-3480-8; Apress, Berkeley, CA 2018

    - Jeff Cicolani; Beginning Robotics with Raspberry

    c. Internet sources:

    - Sparkfun Tutorial - learn.sparkfun.com

    - Arduino Language Reference - www.arduino.cc/reference/en

    - Forbot Kurs Arduino - forbot.pl/blog/kurs-arduino-srodowisko-jak-zaczac-programowac-id936

    - Forbot Kurs Arduino II - forbot.pl/blog/kurs-arduino-ii-wstep-spis-tresci-id15494

    - Adafruit Learn - learn.adafruit.com

    - Arduino Library List - www.arduinolibraries.info

    - Last Minute Engineers Tutorials - lastminuteengineers.com/electronics/arduino-projects/

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. Project work	Ocetkiewicz Tomasz, mgr inż.