Subject programme

1. Subject name / subject module: **Elelctive Subject: Wireless Interfaces**
2. Lecture language: **English**
3. The location of the subject in study plans:
   - Area or areas of the studies: **Computer Control Systems Engineering**
   - Degree of the studies: **2nd 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: **Buler Piotr, mgr**
   - 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	Teaching activities with the tutor – Form of classes												Total
	...	SOW	ECTS	Laboratory work	SOW	ECTS	...	SOW	ECTS	...	SOW	ECTS	ECTS
Full-time studies				45	55	4							**4**
Part-time studies													
Credit rigor				Graded assigment									

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	45
Preparation to laboratory classes	45
Independent study of the subject	-
Preparation to a final test	10
Participation in an exam / graded assignment	2
Total student workload (TSW)	100
ECTS credits	4
* Student's workload related to practical forms	100
Student's workload in classes requiring direct participation of academic teachers	45

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_W07	**Student has structured and theoretically founded knowledge in the field of technical informatics, covering key issues encountered in wireless computer networks, especially those used in IOT systems. Student knows the practical application of this knowledge in mechatronics through the use of appropriate methods and tools.**	**Laboratory work**	**Inquiry methods**	**Final test, Student learning activities**
Skills				
K_U02	**Student is able to use information and communication techniques (ICT) with particular emphasis on the creation of project documentation related to wireless computer networks, for the purposes of implementing projects and tasks in the field of mechatronics.**	**Laboratory work**	**Inquiry methods**	**Final test, Student learning activities**
Social competence				

K_K01	**Student is ready to critically assess the acquired knowledge and received content, understands the need for continuous improvement of the substantive workshop, can set directions and areas of personal professional self-improvement, and inspire and organize the learning process of other people.**	**Laboratory work**	**Inquiry methods**	**Final test, Student learning activities**

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

Activity	Grades	Calculation	To final
Final test	bdb (5)	5 * 50%	2,50
Tasks done during laboratories	dst, db, bdb, db (3, 4, 5, 4)	arithmetic mean (3,4,5,4) * 50%	2,00
Final result			4,50

0 – 3.00	ndst	**4.01 – 4.50**	db
3.01 – 3.50	dst	**4.51 – 4.7**	db+
3.51 – 4.00	dst+	**4.71 – 5.0**	bdb

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

(Laboratory work)

Types of signals and the antennas used for communication; methods of signal propagation; techniques of multiplexing; analog modulation and digital modulation; spread spectrum technology; medium accessing techniques; data security consideration. Short distance communication protocols: Bluetooth; Bluetooth Low Energy; iBeacon; Zigbee; Z-Wave; 6LoWPAN; hardware platforms; power consumption. Long distance communicaton protocols: NB-IOT; LoRaWAN; Sigfox; developement boards; power consumption. Wireless idenfication: RFID; RFC. Design examples: home automation; sensor networks; smart devices; IOMT.

11. Required teaching aids:

a. Lecture - multimedia projector

b. Laboratory classes - specialist laboratory

12. Literature:

a. Basic literature:

Alan Holt, Chi-Yu Huang: 802.11 Wireless Networks, Springer-Verlag, London, 2010.

Min Chen, Shigang Chen: RFID Technologies for Internet of Things, Springer, Cham, 2016.

b. Supplementary literature:

Chris Carthern, William Wilson, Richard Bedwell, Noel Rivera: Cisco Networks, Apress, Berkeley, 2015.

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	Buler Piotr, mgr