Subject programme

1. Subject name / subject module: **Computer systems architecture**
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: **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

Teaching activities with the tutor																						
Mode of study	Form of classes																					Total
	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	...	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 laboratory classes	**22/0**
Independent study of the subject – preparing for graded assignment	**26/0**
Participation in an exam / graded assignment / final grading	**2/0**
Total student workload (TSW)	**50/0**
ECTS credits	**2**
* Student's workload related to practical forms	**50/0**
Student's workload in classes requiring direct participation of academic teachers	**22/0**

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_W06	**Student knows main number representation systems and standards applied in computer systems, basics of Boolean algebra (incl. its application by logic gates) and key principles of data flow, memory organisation, theory of computation and common Instruction**	**Laboratory work**	**inquiry methods**	**Assesment of laboratory tasks.**
Skills				
K_U16	**Student is able to design and analyse a simple Arithmetic Logic Unit using digital logic circuits simulator software and program a low-level set of instructions in Microprocessor Simulator.**	**Laboratory work**	**inquiry methods**	**Assesment of laboratory tasks.**

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

0% - 50%	ndst	**81% - 90%**	db
51% - 70%	dst	**91% - 93%**	db+
71% - 80%	dst+	**94% - 100%**	bdb

Activity	Grades	Calculation	To Final
Laboratory tasks	**bdb (5)**	**5*90%**	**4,5**
Attendance	**on 80% of classes**	**0,80*5 = 5,0*10%**	**0,5**
Final score			**5**

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

Laboratory work

1. the essence of computer systems organization and architecture: short of computer evolution and history; level of virtual computers; structure of von Neumann computer (IAS);
2. generations of computer technogy; coplement number systems; floating-point numbers; EEE-754 Standard; binary codes; representation of numbers; arrays and records;
3. a simple computer (data format, instruction format; instruction fetch; instruction execution, instruction set; addressing modes, other addressing modes; address calculations, assemblering); organization of memory systems ((S/D)RAM, LIFO/FIFO; cache and stack memories; (EP)ROM);
4. organization of input/output system (system bus, address bus, control bus, data bus, bus structure; (a)synchronous transmissions,; tristate driver); arithmetic and logic unit,; control unit; organization of simple (micro)processor (CPU);
5. instruction list (CPU, CU); principles of assembler language; interrupt system (hardware and software);
6. CISC and RISC architecture conception;
7. short information about: superscalar system, vector computer (processor), operation systems (DOS, UNIX, BIOS).

11. Required teaching aids

Laboratory classes - specialist laboratory

12. Literature:

a. Basic literature:

- Ramachandran Umakisre, Leahy William D., Computer systems : an integrated approach to architecture and operating systems, Pearson Education, 2011

b. Supplementary literature:

- Hohl William, Hinds Christopher, ARM Assembly Language: Fundamentals and Techniques, Second Edition, CRC Press, 2014
- Jiménez Manuel, et al., Introduction to Embedded Systems: Using Microcontrollers and the MSP430, Springer 2013
- Donzellini Giuliano et al., Introduction to Digital Systems Design, Springer, 2018

c. Internet sources:

- https://link.springer.com/book/10.1007%2F978-3-319-56839-3

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. Laboratory classes	Buler Piotr, mgr.