



# Study programme

**Major:** Mechatronic Engineering with English as instruction language

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## General characteristics of the major

### Basic information

Faculty name:	Faculty of Mechanical Engineering and Robotics
Major name:	Mechatronic Engineering with English as instruction language
Level:	First-cycle (engineer) programme
Profile:	General academic
Form:	Full-time studies
ISCED classification:	0714
Number of ECTS credits necessary to complete studies at a given level:	210
Professional title awarded to graduates:	inżynier
Cycle start date:	2021/2022, winter semester
Duration of studies (number of semesters):	7

### Field of science to which the major is assigned:

Field engineering and technical sciences

### Discipline of science to which the major is assigned:

Discipline	Percentage	ECTS
Mechanical engineering	68%	143
Automation, electronics and electrical engineering	23%	48
Technical computing and telecommunications	9%	19

### Relationship between the major and the AGH UST development strategy and the AGH UST mission

In the Mission Statement of the University, there is emphasis placed on the creation of modern education courses, which follow worldwide trends and which support the national economy through the supply of highly-qualified engineers. Mechatronic Engineering is such a course as defined in our educational objectives. Program educational objectives are aimed at preparation of graduates for work in industry, design offices as well as research and development.

The education system in AGH is aimed at educating students in logical, constructive and forward thinking skills, making reasonable decisions and fast and accurate conclusions, and is in full accordance with the aims of education accepted for Mechatronic Engineering, and can be seen in the social skills and competencies set in the program objectives.

The next point of the current mission of the University and the objectives of Mechatronic Engineering is cooperation with other educational and industrial institutions in the country and abroad, which is consistent with all of the program educational objectives.

The next issue is scientific research and its use in education, as mentioned in both the AGH Mission Statement and in the educational objectives of Mechatronic Engineering.

### Information on taking into account the socio-economic demand while creating the study programme and indication of the assumed learning outcomes matching the identified demand

In the national economy of Poland, a stronger emphasis is put on a development of the high technology industry. In the country, and especially in the Małopolska region, branches of the largest global corporations are established, and domestic enterprises are created, in which there is a need for engineering staff having knowledge of modern mechanical and electronic systems design, control and programming, as well as a synergistic combination of these systems. It is in the public

interest to provide this type of professionals. In the mechatronic engineering program, students learn about the latest trends in mechatronic design using computer aided tools. They are taught the solutions used in the high technology industry.

**Learning paths - scope in Polish and in English**

**Diploma paths - scope in Polish and in English**

**The names of the specialties in Polish and in English**

Name [pl]	Name [en]
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## General information about the study programme

Major: Mechatronic Engineering with English as instruction language

### **General information related to the study program (general learning objectives and employment opportunities, typical jobs and opportunities for graduate continuing education)**

Mechatronic engineering is the interdisciplinary program composed of basic courses (e.g. mathematics, physics), major courses (e.g. mechanics, control theory, computer science, electronics) as well as of specialty courses.

Contents of major and specialty courses comprise techniques of computer aided engineering, problems of virtual prototyping, elements of modern control and basics of robotics. Students learn about methods and tools for analysis and synthesis of mechatronic systems and integration in mechatronics.

The aim of the Mechatronics engineering first cycle study program is to build the students' engineering knowledge considered as theoretical background and practical engineering problems. The study comprises laboratory and project classes where students gather practical engineering skills.

The study in Mechatronic engineering prepares to work in interdisciplinary teams that design, manufacture and/or utilize various mechatronic systems. The interdisciplinary knowledge helps the program graduates to communicate with other engineers in the course of solving the practical, complex engineering problems.

The graduates of the program are prepared to work in: design units, research and development institutions as well as in companies that manufacture or use mechatronic devices.

The graduates are also prepared to continue study at the Master level both at home University (Faculty of Mechanical Engineering and Robotics offers second level Mechatronic engineering program) and at other faculties or universities in Poland or abroad.

Program Educational Objectives:

- \* Progress to a Master's studies.
- \* Be employed by industry in design offices focused on mechanical or mechatronic systems.
- \* Be employed by industry or academia in research and development, experimentation and testing of mechanical, mechatronic or control systems.
- \* Increase their level of leadership within their respective organizations.
- \* Communicate effectively and work collaboratively in multidisciplinary work environments.
- \* Be committed to lifelong learning to enhance their professional knowledge.

### **Information on the study programme including the conclusions from the students and graduates careers monitoring**

The careers of graduates are constantly monitored by the AGH Career Center. A Unit of Monitoring of Graduates Professional Development operates within the Centre aimed at job market analysis and research activities including monitoring of graduates career paths (first destination surveys). AGH UST graduates are interviewed several times after completing their studies. From these surveys, reports are prepared containing information such as the distribution of graduate employment, the strengths and weaknesses of graduates, and respondents' comments on suggested changes in the programs. These reports are then annually submitted to the authorities of the university and faculties. Based on them, changes in the particular programs and subjects are proposed. These may include the introduction of new subjects or changes to the existing ones, e.g. a change to CAD modeling software.

### **Information on the study programme taking into account the requirements and recommendations of the accreditation committees, in particular the Polish Accreditation Committee and industry accreditation committees**

Mechatronic engineering in English is accredited by ABET. The accreditation commission did not recommend changes to the study program, but ordered to increase the emphasis on student outcome monitoring. According to the recommendations, a suitable system was developed and implemented.

### **Information on including examples of good practice in the study program**

The Mechatronic engineering program uses combining objects into large modules, so that students would learn

comprehensively and carry out multidisciplinary projects.

**Information on cooperation in the preparation of the study programme with external stakeholders, in particular associations, professional and social organizations**

Within the Faculty of Mechanical Engineering and Robotics, there is a Social Board, which gathers several dozen representatives of the management staff of enterprises associated with AGH. Board members are annually surveyed for the needs and requirements of graduates of Mechatronics Engineering. The results of these surveys are then analyzed and taken into account in the creation and modification of study programs.

**Duration, rules and form of the apprenticeship**

As part of the studies, the student is required to complete a 4-week professional apprenticeship, during the summer break in the sixth semester of study. Each student implements the apprenticeship individually in a company of his choice, which activity is related to mechanical engineering, mechatronics or manufacturing engineering. The most important companies with which the department cooperates include KGHM Polska Miedź, PZL Sp. z o.o., KHW S.A., WOLFRAM, CDM Smith Sp. z o.o., EMT-Systems Sp. z o.o., KIRCHHOFF Polska Sp. z o.o.

## **Admission criteria, rules and policies**

Major: Mechatronic Engineering with English as instruction language

### **Description of competences expected from the candidate applying for admission to studies**

Finished secondary school with certificate sufficient to enrol in any university in the country where the certificate was issued.

### **Recruitment conditions, including the winners and finalists of the central level high school scientific Olympics, as well as winners of international and national contests**

Recruitment is conducted in accordance with the annual Resolution of the Senate

### **The expected limit of admissions to studies along with an indication of the minimum number of admitted candidates required to successfully launch a study cycle**

Minimum number of students: 15

Maximum number of students: 60

## Learning outcomes

Major: Mechatronic Engineering with English as instruction language

### Knowledge

KEU symbol	Directional learning outcomes	CEU symbol
<b>IMA1A_W01</b>	extensive knowledge of mathematics, including algebra, analysis, probabilistic and elements of discrete and applied mathematics, including numerical and mathematical methods, necessary for formulating and solving complex problems in mechatronics	P6S_WG_A
<b>IMA1A_W02</b>	knowledge of physics, including oscillating and wave motion, thermodynamics, optics, electricity and magnetisms and solid state physics, including the knowledge necessary for understanding basic physical phenomena occurring in mechatronic systems and components and their surroundings	P6S_WG_A
<b>IMA1A_W03</b>	knowledge of chemistry necessary for understanding basic chemical phenomena occurring in mechatronic systems and components and their surroundings and knowledge of properties of materials used in mechatronics	P6S_WG_A
<b>IMA1A_W04</b>	elementary knowledge of electronics and electrical engineering	P6S_WG_A, P6S_WG_A_Inz
<b>IMA1A_W05</b>	basic knowledge of robotics	P6S_WG_A, P6S_WG_A_Inz
<b>IMA1A_W06</b>	basic knowledge of actuators and sensors, including vision systems used in mechatronic systems and devices	P6S_WG_A, P6S_WG_A_Inz
<b>IMA1A_W07</b>	basic knowledge of metrology, knowledge and understanding of the methods of measuring basic physical quantities, knowledge of computational methods and IT tools necessary to analyse experiment results	P6S_WG_A, P6S_WG_A_Inz
<b>IMA1A_W08</b>	well-ordered and theory-based knowledge of technical mechanics necessary for formulating and solving problems in mechatronics	P6S_WG_A, P6S_WG_A_Inz
<b>IMA1A_W09</b>	well-ordered and theory-based knowledge of basic automatics and control theory	P6S_WG_A, P6S_WG_A_Inz
<b>IMA1A_W10</b>	well-ordered knowledge of microprocessor systems, basics of IT science, programming methods and techniques	P6S_WG_A, P6S_WG_A_Inz
<b>IMA1A_W11</b>	well-ordered and theory-based knowledge of the construction of precise machinery, including the theory of machines and mechanisms necessary for formulating and solving problems in mechatronics	P6S_WG_A, P6S_WG_A_Inz
<b>IMA1A_W12</b>	knowledge and understanding of the methodology of designing mechatronic devices and methods and techniques used for the design, including the artificial intelligence method; knowledge of computer tools for the design and simulation of mechatronic devices	P6S_WG_A, P6S_WG_A_Inz
<b>IMA1A_W13</b>	knowledge of the current state and recent development trends of mechatronics	P6S_WG_A, P6S_WG_A_Inz
<b>IMA1A_W14</b>	elementary knowledge of the life cycle of mechatronic devices and systems	P6S_WG_A, P6S_WG_A_Inz
<b>IMA1A_W15</b>	elementary knowledge to understand non-technical aspects of engineering; knowledge of basic health and safety rules in the industries of mechatronics	P6S_WK_A
<b>IMA1A_W16</b>	elementary knowledge of the protection of intellectual property and patent laws	P6S_WK_A
<b>IMA1A_W17</b>	elementary knowledge of management, including quality management and business activity	P6S_WK_A



KEU symbol	Directional learning outcomes	CEU symbol
IMA1A_W18	knowledge of the general rules for creation and development of individual entrepreneurship	P6S_WK_A_Inz, P6S_WK_A

## Skills

KEU symbol	Directional learning outcomes	CEU symbol
IMA1A_U01	ability to acquire information from literature, databases and other sources, integrate, select and interpret the information, draw conclusions, formulate and justify opinions	P6S_UW_A
IMA1A_U02	ability to work individually or in team, to estimate the time needed to complete an assigned task; able to develop and complete a schedule of works and meet the deadlines	P6S_UO_A
IMA1A_U03	ability to develop documentation related to the completion of an engineering task and prepare text discussing the results of the task	P6S_UK_A
IMA1A_U04	ability to prepare and give a brief presentation of the results of the engineering task completed	P6S_UK_A
IMA1A_U05	English language skills sufficient to communicate and read data sheets, application notes, manuals of the components of mechatronic systems, IT tools and other similar documents	P6S_UK_A
IMA1A_U06	competence in independent study, also to improve professional qualifications	P6S_UU_A
IMA1A_U07	ability to use methods and mathematical models and computer simulations to analyse and assess the operation of mechatronic equipment and systems	P6S_UW_A, P6S_UW_A_Inz_0 1
IMA1A_U08	ability to use properly selected programming environments, simulators and computer aided design tools for the simulation, design and verification of components of mechatronic devices and systems	P6S_UW_A, P6S_UW_A_Inz_0 1
IMA1A_U09	ability to plan and carry out experiments, including measurements and computer simulations, interpret the results and draw conclusions	P6S_UW_A, P6S_UW_A_Inz_0 1
IMA1A_U10	ability to formulate the specification of simple mechatronic systems at the level of functions being performed	P6S_UW_A, P6S_UW_A_Inz_0 1
IMA1A_U11	ability to perform critical analysis of the performance and assess the existing technical solutions in mechatronic devices and systems	P6S_UW_A, P6S_UW_A_Inz_0 1
IMA1A_U12	ability to design simple mechatronic devices or systems for various applications, taking into consideration the required operating and economic criteria, using proper methods, techniques and tools	P6S_UW_A, P6S_UW_A_Inz_0 2
IMA1A_U13	ability to use data sheets and application notes to select appropriate components of the mechatronic device or system being designed	P6S_UW_A, P6S_UW_A_Inz_0 1, P6S_UW_A_Inz_0 2
IMA1A_U14	ability to formulate an algorithm; to use high-level programming languages and proper IT tools to develop programs and software for microcontrollers and microprocessors used in a mechatronic system	P6S_UW_A, P6S_UW_A_Inz_0 2
IMA1A_U15	ability to select a kinematic structure and design a mechanical structure for it with the aim of performing specified functions using properly selected computer aided design (CAD) and engineering (CAE) software	P6S_UW_A, P6S_UW_A_Inz_0 2

KEU symbol	Directional learning outcomes	CEU symbol
<b>IMA1A_U16</b>	ability to perform a synthesis, stability analysis and simulation testing of a continuous or a discrete control algorithm for a given single- or multi-dimensional, linear or non-linear object	P6S_UW_A, P6S_UW_A_Inz_0 1, P6S_UW_A_Inz_0 2
<b>IMA1A_U17</b>	ability to design, build, start up and test a simple combinational and sequential electronic circuit	P6S_UW_A, P6S_UW_A_Inz_0 1, P6S_UW_A_Inz_0 2
<b>IMA1A_U18</b>	ability, while formulating and solving tasks, including the design of mechatronic components and systems, to perceive their non-technical aspects, including the environmental, economic and legal aspects	P6S_UW_A, P6S_UW_A_Inz_0 1, P6S_UW_A_Inz_0 2
<b>IMA1A_U19</b>	observing health and safety rules	P6S_UW_A, P6S_UW_A_Inz_0 1
<b>IMA1A_U20</b>	ability to evaluate the usefulness of routine methods and tools for solving simple engineering tasks typical for mechatronics and select and apply proper methods and tools	P6S_UW_A, P6S_UW_A_Inz_0 1, P6S_UW_A_Inz_0 2

## Social competence

KEU symbol	Directional learning outcomes	CEU symbol
<b>IMA1A_K01</b>	understanding of the need and knowledge of the possibility of constant individual learning (MA, PhD, postgraduate studies, courses) to improve professional, personal and social competence	P6S_KR_A
<b>IMA1A_K02</b>	awareness of the importance and understanding of the non-technical aspects and consequences of the activity of a mechatronic engineer, including its environmental impact and the resultant responsibility for decisions made	P6S_KO_A
<b>IMA1A_K03</b>	awareness of the importance of professional conduct, observing professional ethics and respect of different standpoints and cultures	P6S_KR_A
<b>IMA1A_K04</b>	awareness of the responsibility for own work and readiness to comply with the rules of team work and accepting responsibility for tasks performed collectively	P6S_KO_A
<b>IMA1A_K05</b>	ability to correctly set priorities in meeting own or external objectives	P6S_KO_A
<b>IMA1A_K06</b>	ability to think and act in an enterprising manner	P6S_KR_A
<b>IMA1A_K07</b>	awareness of the social role of a graduate of technical studies, especially as regards the need to formulate and communicate to society, via the media, information and opinions regarding the achievements of mechatronics and other aspects of the activity of a mechatronic engineer; striving to convey such information and opinions in a commonly understandable manner	P6S_KR_A, P6S_KO_A
<b>IMA1A_K08</b>	Readiness to critical assessment of own knowledge and perceived content, acknowledge of knowledge importance in problem solving and readiness to consult experts	P6S_KK_A

# Compliance table of engineering competence (Inz) with directional learning outcomes (KEU)

Major: Mechatronic Engineering with English as instruction language

## Knowledge

CEU symbol	Learning outcomes for qualifications including engineering competence	KEU references
P6S_WG_A_Inz	knowledge of basic processes taking place in the life cycle of technical devices, facilities and systems	IMA1A_W04, IMA1A_W05, IMA1A_W06, IMA1A_W07, IMA1A_W08, IMA1A_W09, IMA1A_W10, IMA1A_W11, IMA1A_W12, IMA1A_W13, IMA1A_W14
P6S_WK_A_Inz	knowledge of basic principles of creating and developing various forms of individual entrepreneurship	IMA1A_W18

## Skills

CEU symbol	Learning outcomes for qualifications including engineering competence	KEU references
P6S_UW_A_Inz_01	ability to plan and carry out experiments, including measurements and computer simulations as well as to interpret the obtained results and draw conclusions out of them. When identifying and formulating the specification of engineering problems and solving them, being able to: - use analytical, simulation and experimental methods; - recognize their systemic and non-technical aspects, including ethical connotations; - conduct a preliminary economic assessment of the proposed solutions and planned engineering activities; - perform a critical analysis of the functioning of existing technical solutions to further evaluate them;	IMA1A_U07, IMA1A_U08, IMA1A_U09, IMA1A_U10, IMA1A_U11, IMA1A_U13, IMA1A_U16, IMA1A_U17, IMA1A_U18, IMA1A_U19, IMA1A_U20
P6S_UW_A_Inz_02	ability to design solutions in compliance with the given specification as well as being able to: create simple devices, facilities and systems typical for the study major or implement processes using skillfully chosen methods, techniques, tools and materials	IMA1A_U12, IMA1A_U13, IMA1A_U14, IMA1A_U15, IMA1A_U16, IMA1A_U17, IMA1A_U18, IMA1A_U20

### Directional outcomes coverage matrix

Major: Mechatronic Engineering with English as instruction language

## 2021/2022/S/Ii/IMiR/IMA/all

[illegible]

Subject	Code	IMA1A_W01	IMA1A_W02	IMA1A_W03	IMA1A_W04	IMA1A_W05	IMA1A_W06	IMA1A_W07	IMA1A_W08	IMA1A_W09	IMA1A_W10	IMA1A_W11	IMA1A_W12	IMA1A_W13	IMA1A_W14	IMA1A_W15	IMA1A_W16	IMA1A_W17	IMA1A_W18	IMA1A_U01	IMA1A_U02	IMA1A_U03	IMA1A_U04	IMA1A_U05	IMA1A_U06	IMA1A_U07	IMA1A_U08	IMA1A_U09	IMA1A_U10	IMA1A_U11	IMA1A_U12	IMA1A_U13	IMA1A_U14	IMA1A_U15	IMA1A_U16	IMA1A_U17	IMA1A_U18	IMA1A_U19	IMA1A_U20	IMA1A_K01	IMA1A_K02	IMA1A_K03	IMA1A_K04	IMA1A_K05	IMA1A_K06	IMA1A_K07	IMA1A_K08
Spanish B2 course – compulsory course of 135 hours for students of FIRST-CYCLE studies – semester 1/3 (STUDY PROGRAMME IN ENGLISH)	IMiRIMAS.II2JO.4f8b27be3def6751b9ffceb4796be96b.21																			x		x	x	x																							
English B2 course – compulsory course of 135 hours for students of FIRST-CYCLE studies – semester 1/3 (STUDY PROGRAMME IN ENGLISH)	IMiRIMAS.II2JO.a8eea28ed793685c0f9e3473cf83b620.21																			x		x	x	x																							
German B2 course – compulsory course of 135 hours for students of FIRST-CYCLE studies – semester 1/3 (STUDY PROGRAMME IN ENGLISH)	IMiRIMAS.II2JO.4e7283329845414c8997480d3bea5b29.21																			x		x	x	x																							
Mechanics 1	IMiRIMAS.II2O.6e6f759c0a971d68d2499ec2af5cc76d.21	x	x								x			x						x	x	x	x																								
Basics of mechatronics	IMiRIMAS.II2K.f55f0dd2700ba182721e9faf8ef30029.21											x	x	x												x				x	x	x											x				
Fundamentals of material science	IMiRIMAS.II2K.77e21d3e3e5f79b362bc5d0d4e7738c5.21		x	x																x	x	x																									
Mathematics 2	IMiRIMAS.II2P.d2486ebab86e7b981a660c4d0e0b19ec.21	x																		x	x					x																					
Physics 2	IMiRIMAS.II2P.e4f6c7a276d8f7720505264b04b5bc2a.21		x					x												x	x	x			x				x																		
Computer networks and databases	IMiRIMAS.II2K.aae91c7e0926513ffb5c4e11cfca05.21									x										x																											

Subject	Code	IMAI1_W01	IMAI1_W02	IMAI1_W03	IMAI1_W04	IMAI1_W05	IMAI1_W06	IMAI1_W07	IMAI1_W08	IMAI1_W09	IMAI1_W10	IMAI1_W11	IMAI1_W12	IMAI1_W13	IMAI1_W14	IMAI1_W15	IMAI1_W16	IMAI1_W17	IMAI1_W18	IMAI1_U01	IMAI1_U02	IMAI1_U03	IMAI1_U04	IMAI1_U05	IMAI1_U06	IMAI1_U07	IMAI1_U08	IMAI1_U09	IMAI1_U10	IMAI1_U11	IMAI1_U12	IMAI1_U13	IMAI1_U14	IMAI1_U15	IMAI1_U16	IMAI1_U17	IMAI1_U18	IMAI1_U19	IMAI1_U20	IMAI1_K01	IMAI1_K02	IMAI1_K03	IMAI1_K04	IMAI1_K05	IMAI1_K06	IMAI1_K07	IMAI1_K08
French B2 course – compulsory course of 135 hours for students of FIRST-CYCLE studies – semester 2/3 (STUDY PROGRAMME IN ENGLISH)	IMiRIMAS.li4JO.5a3c75c8fac2b5a0783ceb3b9c7d9c98.21																		x		x	x	x																								
Spanish B2 course – compulsory course of 135 hours for students of FIRST-CYCLE studies – semester 2/3 (STUDY PROGRAMME IN ENGLISH)	IMiRIMAS.li4JO.3c852f86c53eb5f1f214c902c1d613d0.21																		x		x	x	x																								
English B2 course – compulsory course of 135 hours for students of FIRST-CYCLE studies – semester 2/3 (STUDY PROGRAMME IN ENGLISH)	IMiRIMAS.li4JO.300ee33abb9652455b508d9d45af9e79.21																		x		x	x	x																								
German B2 course – compulsory course of 135 hours for students of FIRST-CYCLE studies – semester 2/3 (STUDY PROGRAMME IN ENGLISH)	IMiRIMAS.li4JO.9a331200fa654c821d96ad5434aa09a8.21																		x		x	x	x																								

Subject	Code	IMAI1_W01	IMAI1_W02	IMAI1_W03	IMAI1_W04	IMAI1_W05	IMAI1_W06	IMAI1_W07	IMAI1_W08	IMAI1_W09	IMAI1_W10	IMAI1_W11	IMAI1_W12	IMAI1_W13	IMAI1_W14	IMAI1_W15	IMAI1_W16	IMAI1_W17	IMAI1_W18	IMAI1_U01	IMAI1_U02	IMAI1_U03	IMAI1_U04	IMAI1_U05	IMAI1_U06	IMAI1_U07	IMAI1_U08	IMAI1_U09	IMAI1_U10	IMAI1_U11	IMAI1_U12	IMAI1_U13	IMAI1_U14	IMAI1_U15	IMAI1_U16	IMAI1_U17	IMAI1_U18	IMAI1_U19	IMAI1_U20	IMAI1_K01	IMAI1_K02	IMAI1_K03	IMAI1_K04	IMAI1_K05	IMAI1_K06	IMAI1_K07	IMAI1_K08
Russian B2 course – compulsory course of 135 hours for students of FIRST-CYCLE studies – semester 2/3 (STUDY PROGRAMME IN ENGLISH)	IMiRIMAS.li4JO.2792ec57b99b0f28f75f1125b9839b34.21																			x		x	x	x																							
Mechanics 2	IMiRIMAS.li4O.b790ebd95113bbc2e7ca7a5b6c965ed9.21	x	x					x	x											x	x	x	x																x	x			x	x	x	x	
Strength of materials	IMiRIMAS.li4O.c90d41b2f262cef3eac783e45ce89655.21	x	x						x							x		x	x																												
Manufacturing processes	IMiRIMAS.li4K.92da88cba784cbe17e9f29c6c03c75d8.21			x									x	x												x	x					x					x		x								
Engineering drawing	IMiRIMAS.li4K.f124403ecf1482fcdaf6f25a448878d08.21		x					x	x			x	x									x	x									x															
Control Theory Fundamentals	IMiRIMAS.li4K.f95a351b4f2fa6dbf371faa169bd9468.21									x															x		x			x	x																
Metals and plastics process engineering	IMiRIMAS.li4K.b342f28f9ade4bfaba3e2a863f18b5be.21						x					x			x											x					x	x	x		x						x	x					
Numerical methods and statistics	IMiRIMAS.li4K.08d58cdf7f6f8191c793eb5a9142fc8e.21	x							x																									x					x								
Spanish B2 course – compulsory course of 135 hours for students of FIRST-CYCLE studies – semester 3/3 (STUDY PROGRAMME IN ENGLISH)	IMiRIMAS.li8JO.ef4b74e20166ac972af4bb4a15c9afae.21																			x			x	x	x																						
Signal processing and identification in monitoring of mechatronic devices	IMiRIMAS.li8K.a3b9c8abf699589365ba01b1a4438574.21	x					x	x																		x	x	x													x	x					

Subject	Code	IMAI1A_W01	IMAI1A_W02	IMAI1A_W03	IMAI1A_W04	IMAI1A_W05	IMAI1A_W06	IMAI1A_W07	IMAI1A_W08	IMAI1A_W09	IMAI1A_W10	IMAI1A_W11	IMAI1A_W12	IMAI1A_W13	IMAI1A_W14	IMAI1A_W15	IMAI1A_W16	IMAI1A_W17	IMAI1A_W18	IMAI1A_U01	IMAI1A_U02	IMAI1A_U03	IMAI1A_U04	IMAI1A_U05	IMAI1A_U06	IMAI1A_U07	IMAI1A_U08	IMAI1A_U09	IMAI1A_U10	IMAI1A_U11	IMAI1A_U12	IMAI1A_U13	IMAI1A_U14	IMAI1A_U15	IMAI1A_U16	IMAI1A_U17	IMAI1A_U18	IMAI1A_U19	IMAI1A_U20	IMAI1A_K01	IMAI1A_K02	IMAI1A_K03	IMAI1A_K04	IMAI1A_K05	IMAI1A_K06	IMAI1A_K07	IMAI1A_K08
Signal processing and identification in control of mechatronic devices	IMiRIMAS.ii8K.7bde94b25a46e0c7834a6cca1053f716.21	x					x	x																		x	x	x																			
French B2 course – compulsory course of 135 hours for students of FIRST-CYCLE studies – semester 3/3 (STUDY PROGRAMME IN ENGLISH)	IMiRIMAS.ii8JO.643f4f5964a211a7f803d34132079fa3.21																		x			x	x	x																							
German B2 course – compulsory course of 135 hours for students of FIRST-CYCLE studies – semester 3/3 (STUDY PROGRAMME IN ENGLISH)	IMiRIMAS.ii8JO.143e7db5678a2d393271a64a452dac7c.21																		x			x	x	x																							
Russian B2 course – compulsory course of 135 hours for students of FIRST-CYCLE studies – semester 3/3 (STUDY PROGRAMME IN ENGLISH)	IMiRIMAS.ii8JO.8f67b761b206666bcb89425b613b4241.21																		x			x	x	x																							
English B2 course – compulsory course of 135 hours for students of FIRST-CYCLE studies – semester 3/3 (STUDY PROGRAMME IN ENGLISH)	IMiRIMAS.ii8JO.e59199a0d131cbf1fcb2df06288246bc.21																		x			x	x	x																							



Subject	Code	IMA1A_W01	IMA1A_W02	IMA1A_W03	IMA1A_W04	IMA1A_W05	IMA1A_W06	IMA1A_W07	IMA1A_W08	IMA1A_W09	IMA1A_W10	IMA1A_W11	IMA1A_W12	IMA1A_W13	IMA1A_W14	IMA1A_W15	IMA1A_W16	IMA1A_W17	IMA1A_W18	IMA1A_U01	IMA1A_U02	IMA1A_U03	IMA1A_U04	IMA1A_U05	IMA1A_U06	IMA1A_U07	IMA1A_U08	IMA1A_U09	IMA1A_U10	IMA1A_U11	IMA1A_U12	IMA1A_U13	IMA1A_U14	IMA1A_U15	IMA1A_U16	IMA1A_U17	IMA1A_U18	IMA1A_U19	IMA1A_U20	IMA1A_K01	IMA1A_K02	IMA1A_K03	IMA1A_K04	IMA1A_K05	IMA1A_K06	IMA1A_K07	IMA1A_K08
Fundamentals of design of mechanisms in mechatronic devices	IMiRIMAS.II8K.153db64907e3a4c34f41fa08fe994c84.21	x			x		x	x	x	x	x	x	x	x	x	x		x	x	x	x	x																	x			x	x	x			
Fundamentals of electronics	IMiRIMAS.II8K.3f32d9458ca09b39a2f169d59ba2ed39.21		x	x																		x				x		x											x			x					
Industrial robots	IMiRIMAS.II10K.d9d56796a4187e066d7c64f63388d289.21				x	x		x		x	x		x						x	x	x		x							x	x	x	x	x				x		x	x	x	x				
Service robots	IMiRIMAS.II10K.dd20e13e82208fa3be3aea1418e7a11f.21			x	x	x	x	x		x	x	x									x	x		x	x									x						x							
Virtual prototyping in design	IMiRIMAS.II10K.5738c938a2510c62c521003b9c402cdd.21											x														x		x								x					x						
Actuating, sensing and control mechatronic systems	IMiRIMAS.II10K.acb2261096f4959f3e17518a7752f1a1.21			x		x	x			x		x	x		x				x	x	x	x	x					x			x		x									x	x				
Apprenticeship	IMiRIMAS.II20K.07d9217526ceb16a48b84e8d0490caba.21														x						x																				x	x					
Mechatronic design	IMiRIMAS.II20K.b9b04e35dacca7185105bf5accebae6d.21											x	x							x	x		x					x										x				x					
Object oriented programming and software engineering	IMiRIMAS.II20K.153127f23664ea08f0373d5c0d44776b.21										x																		x						x							x	x				
Control theory	IMiRIMAS.II20K.111bf9b26c26da2370a1fd8d447df5d7.21	x		x					x	x	x		x							x	x	x	x	x		x	x		x	x					x				x			x	x	x	x		
Enterprise	IMiRIMAS.II40HS.5e3bd48beed246742c46ee0db1f2b165.21																x	x	x	x	x		x																			x	x	x			
Management engineering	IMiRIMAS.II40HS.5da9fa5ac8549dbf93b8729412ac132b.21	x			x	x												x								x																					
Composite structures and their applications	IMiRIMAS.II40K.0abba2767c105a9994b6029d38f2807a.21			x					x				x		x	x		x		x		x				x	x	x										x			x		x				
Law in technology	IMiRIMAS.II40HS.eb3ade49aab401575d941e08c1a79b57.21																x		x																					x			x				
Python for machine learning and data science	IMiRIMAS.II40K.98532dccb91282a4a1e97f41a066e625.21							x					x	x						x					x	x	x								x					x							x
Computer and machine vision systems	IMiRIMAS.II40K.164eecf50e9125b80986c2b74bd90e05.21						x	x															x																								x
Intellectual property in technology	IMiRIMAS.II40HS.317fd13810a46b985e67f46b269a4094.21																x		x																					x			x				



## Characteristics matrix of learning outcomes in relation to modules

Major: Mechatronic Engineering with English as instruction language

2021/2022/S/Ii/IMiR/IMA/all

Subject	Code	P6S_WG_A	P6S_WG_A_Inz	P6S_WK_A	P6S_WK_A_Inz	P6S_UW_A	P6S_UO_A	P6S_UK_A	P6S_UU_A	P6S_UW_A_Inz_01	P6S_UW_A_Inz_02	P6S_KR_A	P6S_KO_A	P6S_KK_A
Basics of marketing	IMiRIMAS.Ii1HS.df0d0e69162cc55c76c49848847b3619.21			x	x	x						x		
Macroeconomy	IMiRIMAS.Ii1HS.d53323415401154df2552ec3295f4d8d.21			x	x								x	
Physics 1	IMiRIMAS.Ii1P.6a57bdba13a275784da9318b77db98f1.21	x				x			x				x	
Chemistry	IMiRIMAS.Ii1P.b35af661086a998d405fdf0c666cf74f.21	x				x	x						x	
Basic of informatics	IMiRIMAS.Ii1O.5b84d4dd64a1b462fa6c8536bfcabc40f.21	x	x			x					x		x	
Mathematics 1	IMiRIMAS.Ii1P.17936b14eb48662d3be98d580b3d60f6.21	x				x	x			x		x		
Russian B2 course - compulsory course of 135 hours for students of FIRST-CYCLE studies - semester 1/3 (STUDY PROGRAMME IN ENGLISH)	IMiRIMAS.Ii2JO.d79e2a7b04d11cb631da8c41ede0d9dd.21					x		x						
French B2 course - compulsory course of 135 hours for students of FIRST-CYCLE studies - semester 1/3 (STUDY PROGRAMME IN ENGLISH)	IMiRIMAS.Ii2JO.8cde28af23df9f7ab255c368305e9d08.21					x		x						
Spanish B2 course - compulsory course of 135 hours for students of FIRST-CYCLE studies - semester 1/3 (STUDY PROGRAMME IN ENGLISH)	IMiRIMAS.Ii2JO.4f8b27be3def6751b9ffceb4796be96b.21					x		x						
English B2 course - compulsory course of 135 hours for students of FIRST-CYCLE studies - semester 1/3 (STUDY PROGRAMME IN ENGLISH)	IMiRIMAS.Ii2JO.a8eea28ed793685c0f9e3473cf83b620.21					x		x						

Subject	Code	P6S_WG_A	P6S_WG_A_Inz	P6S_WK_A	P6S_WK_A_Inz	P6S_UW_A	P6S_UO_A	P6S_UK_A	P6S_UU_A	P6S_UW_A_Inz_01	P6S_UW_A_Inz_02	P6S_KR_A	P6S_KO_A	P6S_KK_A
German B2 course – compulsory course of 135 hours for students of FIRST-CYCLE studies – semester 1/3 (STUDY PROGRAMME IN ENGLISH)	IMiRIMAS.li2JO.4e7283329845414c8997480d3bea5b29.21					x		x						
Mechanics 1	IMiRIMAS.li2O.6e6f759c0a971d68d2499ec2af5cc76d.21	x	x			x	x	x		x	x	x	x	
Basics of mechatronics	IMiRIMAS.li2K.f55f0dd2700ba182721e9faf8ef30029.21	x	x			x				x	x		x	
Fundamentals of material science	IMiRIMAS.li2K.77e21d3e3e5f79b362bc5d0d4e7738c5.21	x				x	x	x				x		
Mathematics 2	IMiRIMAS.li2P.d2486ebab86e7b981a660c4d0e0b19ec.21	x				x	x			x		x		
Physics 2	IMiRIMAS.li2P.e4f6c7a276d8f7720505264b04b5bc2a.21	x	x			x	x	x	x	x		x	x	
Computer networks and databases	IMiRIMAS.li2K.aae91c7e0926513ffbb5c4e11cfcfa05.21	x	x			x								
French B2 course – compulsory course of 135 hours for students of FIRST-CYCLE studies – semester 2/3 (STUDY PROGRAMME IN ENGLISH)	IMiRIMAS.li4JO.5a3c75c8fac2b5a0783ceb3b9c7d9c98.21					x		x						
Spanish B2 course – compulsory course of 135 hours for students of FIRST-CYCLE studies – semester 2/3 (STUDY PROGRAMME IN ENGLISH)	IMiRIMAS.li4JO.3c852f86c53eb5f1f214c902c1d613d0.21					x		x						
English B2 course – compulsory course of 135 hours for students of FIRST-CYCLE studies – semester 2/3 (STUDY PROGRAMME IN ENGLISH)	IMiRIMAS.li4JO.300ee33abb9652455b508d9d45af9e79.21					x		x						
German B2 course – compulsory course of 135 hours for students of FIRST-CYCLE studies – semester 2/3 (STUDY PROGRAMME IN ENGLISH)	IMiRIMAS.li4JO.9a331200fa654c821d96ad5434aa09a8.21					x		x						
Russian B2 course – compulsory course of 135 hours for students of FIRST-CYCLE studies – semester 2/3 (STUDY PROGRAMME IN ENGLISH)	IMiRIMAS.li4JO.2792ec57b99b0f28f75f1125b9839b34.21					x		x						

Subject	Code	P6S_WG_A	P6S_WG_A_Inz	P6S_WK_A	P6S_WK_A_Inz	P6S_UW_A	P6S_UO_A	P6S_UK_A	P6S_UU_A	P6S_UW_A_Inz_01	P6S_UW_A_Inz_02	P6S_KR_A	P6S_KO_A	P6S_KK_A
Mechanics 2	IMiRIMAS.li4O.b790ebd95113bbc2e7ca7a5b6c965ed9.21	x	x			x	x	x		x	x	x	x	
Strength of materials	IMiRIMAS.li4O.c90d41b2f262cef3eac783e45ce89655.21	x	x	x	x									
Manufacturing processes	IMiRIMAS.li4K.92da88cba784cbe17e9f29c6c03c75d8.21	x	x			x				x	x	x		
Engineering drawing	IMiRIMAS.li4K.f124403ecf1482fcda6f25a448878d08.21	x	x			x		x			x			
Control Theory Fundamentals	IMiRIMAS.li4K.f95a351b4f2fa6dbf371faa169bd9468.21	x	x			x		x		x				
Metals and plastics process engineering	IMiRIMAS.li4K.b342f28f9ade4bfaba3e2a863f18b5be.21	x	x			x				x	x		x	
Numerical methods and statistics	IMiRIMAS.li4K.08d58cdf7f6f8191c793eb5a9142fc8e.21	x	x			x				x	x			
Spanish B2 course – compulsory course of 135 hours for students of FIRST-CYCLE studies – semester 3/3 (STUDY PROGRAMME IN ENGLISH)	IMiRIMAS.li8JO.ef4b74e20166ac972af4bb4a15c9afae.21					x		x						
Signal processing and identification in monitoring of mechatronic devices	IMiRIMAS.li8K.a3b9c8abf699589365ba01b1a4438574.21	x	x			x				x		x	x	
Signal processing and identification in control of mechatronic devices	IMiRIMAS.li8K.7bde94b25a46e0c7834a6cca1053f716.21	x	x			x				x		x	x	
French B2 course – compulsory course of 135 hours for students of FIRST-CYCLE studies – semester 3/3 (STUDY PROGRAMME IN ENGLISH)	IMiRIMAS.li8JO.643f4f5964a211a7f803d34132079fa3.21					x		x						
German B2 course – compulsory course of 135 hours for students of FIRST-CYCLE studies – semester 3/3 (STUDY PROGRAMME IN ENGLISH)	IMiRIMAS.li8JO.143e7db5678a2d393271a64a452dac7c.21					x		x						
Russian B2 course – compulsory course of 135 hours for students of FIRST-CYCLE studies – semester 3/3 (STUDY PROGRAMME IN ENGLISH)	IMiRIMAS.li8JO.8f67b761b206666bcb89425b613b4241.21					x		x						

Subject	Code	P6S_WG_A	P6S_WG_A_Inz	P6S_WK_A	P6S_WK_A_Inz	P6S_UW_A	P6S_UO_A	P6S_UK_A	P6S_UU_A	P6S_UW_A_Inz_01	P6S_UW_A_Inz_02	P6S_KR_A	P6S_KO_A	P6S_KK_A
English B2 course – compulsory course of 135 hours for students of FIRST-CYCLE studies – semester 3/3 (STUDY PROGRAMME IN ENGLISH)	IMiRIMAS.li8JO.e59199a0d131cbf1fcb2df06288246bc.21					x		x						
Fundamentals of design of mechanisms in mechatronic devices	IMiRIMAS.li8K.153db64907e3a4c34f41fa08fe994c84.21	x	x	x	x	x	x	x				x	x	
Fundamentals of electronics	IMiRIMAS.li8K.3f32d9458ca09b39a2f169d59ba2ed39.21	x	x			x		x		x		x	x	
Industrial robots	IMiRIMAS.li10K.d9d56796a4187e066d7c64f63388d289.21	x	x			x	x	x		x	x	x	x	
Service robots	IMiRIMAS.li10K.dd20e13e82208fa3be3aea1418e7a11f.21	x	x			x	x	x	x	x	x		x	
Virtual prototyping in design	IMiRIMAS.li10K.5738c938a2510c62c521003b9c402cdd.21	x	x			x				x	x	x	x	
Actuating, sensing and control mechatronic systems	IMiRIMAS.li10K.acb2261096f4959f3e17518a7752f1a1.21	x	x	x		x	x	x		x	x		x	
Apprenticeship	IMiRIMAS.li20K.07d9217526ceb16a48b84e8d0490caba.21			x			x					x	x	
Mechatronic design	IMiRIMAS.li20K.b9b04e35dacca7185105bf5accebae6d.21	x	x			x	x	x		x	x		x	
Object oriented programming and software engineering	IMiRIMAS.li20K.153127f23664ea08f0373d5c0d44776b.21	x	x			x				x	x		x	
Control theory	IMiRIMAS.li20K.111bf9b26c26da2370a1fd8d447df5d7.21	x	x			x	x	x		x	x	x	x	
Enterprise	IMiRIMAS.li40HS.5e3bd48beed246742c46ee0db1f2b165.21			x	x	x	x	x				x	x	
Management engineering	IMiRIMAS.li40HS.5da9fa5ac8549dbf93b8729412ac132b.21	x	x	x		x				x				
Composite structures and their applications	IMiRIMAS.li40K.0abba2767c105a9994b6029d38f2807a.21	x	x	x		x		x		x	x		x	
Law in technology	IMiRIMAS.li40HS.eb3ade49aab401575d941e08c1a79b57.21			x	x							x		
Python for machine learning and data science	IMiRIMAS.li40K.98532dccb91282a4a1e97f41a066e625.21	x	x			x		x	x	x	x	x		x

Subject	Code	P6S_WG_A	P6S_WG_A_Inz	P6S_WK_A	P6S_WK_A_Inz	P6S_UW_A	P6S_UO_A	P6S_UK_A	P6S_UU_A	P6S_UW_A_Inz_01	P6S_UW_A_Inz_02	P6S_KR_A	P6S_KO_A	P6S_KK_A
Computer and machine vision systems	IMiRIMAS.li40K.164eecf50e9125b80986c2b74bd90e05.21	x	x					x						x
Intellectual property in technology	IMiRIMAS.li40HS.317fd13810a46b985e67f46b269a4094.21			x	x							x		
Systems of mechatronic devices monitoring	IMiRIMAS.li40K.3ee9f68f2b035c33e632ce95e858a4ac.21	x	x					x					x	
Diploma Seminar	IMiRIMAS.li40K.113e607328fe3b1feac36d5c37a13bcd.21	x	x	x	x	x	x	x	x	x	x	x	x	
Computer aided manufacturing	IMiRIMAS.li40K.c07a3f207b7b692bde6454c8d79b9724.21	x	x			x		x		x		x	x	
Final Project	IMiRIMAS.li40K.d0b468d65b7dc665a0381d9957a5c950.21	x	x	x	x	x	x	x		x	x	x	x	
		9	9	8	5	24	4	22	2	7	4	9	9	2
		27	22	5	4	26	13	14	3	19	15	14	18	0
Sum:		36	31	13	9	50	17	36	5	26	19	23	27	2

## Matrix of directional learning outcomes with related forms of classes and the method of testing

Major: Mechatronic Engineering with English as instruction language

2021/2022/S/Ii/IMiR/IMA/all

Name of the module	Activity	Method of verification and assessment of learning outcomes achieved by the student in individual forms of classes and activities for the entire module	KEU references
Basics of marketing	Lecture	Test	IMA1A_W17, IMA1A_W18, IMA1A_U01, IMA1A_K06
Macroeconomy	Lecture	Test	IMA1A_W17, IMA1A_W18, IMA1A_K02
Physics 1	Lecture, Auditorium classes	Activity during classes, Participation in a discussion, Test, Involvement in teamwork, Activity during classes, Participation in a discussion, Test, Involvement in teamwork	IMA1A_W02, IMA1A_U01, IMA1A_U06, IMA1A_K04, IMA1A_K05
Chemistry	Lecture, Laboratory classes	Test, Examination, Test, Examination, Report	IMA1A_W03, IMA1A_U01, IMA1A_U02, IMA1A_K04
Basic of informatics	Lecture, Laboratory classes	Activity during classes, Execution of laboratory classes, Test, Examination, Test results, Activity during classes, Execution of laboratory classes, Test, Examination, Test results	IMA1A_W10, IMA1A_U14, IMA1A_K04, IMA1A_K05
Mathematics 1	Lecture, Auditorium classes	Activity during classes, Examination, Activity during classes, Execution of exercises, Test	IMA1A_W01, IMA1A_U07, IMA1A_U01, IMA1A_U02, IMA1A_K01
Russian B2 course – compulsory course of 135 hours for students of FIRST-CYCLE studies – semester 1/3 (STUDY PROGRAMME IN ENGLISH)	Foreign language classes	Activity during classes, Participation in a discussion, Execution of exercises, Test, Examination, Test results, Essays written during classes, Presentation	IMA1A_U03, IMA1A_U05, IMA1A_U04, IMA1A_U01
French B2 course – compulsory course of 135 hours for students of FIRST-CYCLE studies – semester 1/3 (STUDY PROGRAMME IN ENGLISH)	Foreign language classes	Activity during classes, Participation in a discussion, Execution of exercises, Test, Examination, Test results, Essays written during classes, Presentation	IMA1A_U03, IMA1A_U05, IMA1A_U04, IMA1A_U01
Spanish B2 course – compulsory course of 135 hours for students of FIRST-CYCLE studies – semester 1/3 (STUDY PROGRAMME IN ENGLISH)	Foreign language classes	Activity during classes, Participation in a discussion, Execution of exercises, Test, Examination, Test results, Essays written during classes, Presentation	IMA1A_U03, IMA1A_U05, IMA1A_U04, IMA1A_U01



<b>Name of the module</b>	<b>Activity</b>	<b>Method of verification and assessment of learning outcomes achieved by the student in individual forms of classes and activities for the entire module</b>	<b>KEU references</b>
English B2 course – compulsory course of 135 hours for students of FIRST-CYCLE studies – semester 1/3 (STUDY PROGRAMME IN ENGLISH)	Foreign language classes	Activity during classes, Participation in a discussion, Execution of exercises, Test, Examination, Test results, Essays written during classes, Presentation	IMA1A_U03, IMA1A_U05, IMA1A_U04, IMA1A_U01
German B2 course – compulsory course of 135 hours for students of FIRST-CYCLE studies – semester 1/3 (STUDY PROGRAMME IN ENGLISH)	Foreign language classes	Activity during classes, Participation in a discussion, Execution of exercises, Test, Examination, Test results, Essays written during classes, Presentation	IMA1A_U03, IMA1A_U05, IMA1A_U04, IMA1A_U01
Mechanics 1	Lecture, Auditorium classes	Activity during classes, Participation in a discussion, Execution of exercises, Test, Scientific paper, Case study, Involvement in teamwork, Test results, Activity during classes, Participation in a discussion, Execution of exercises, Test, Examination, Scientific paper, Case study, Involvement in teamwork, Test results, Oral answer	IMA1A_W01, IMA1A_W02, IMA1A_W10, IMA1A_W13, IMA1A_U20, IMA1A_U01, IMA1A_U02, IMA1A_U03, IMA1A_U04, IMA1A_K01, IMA1A_K04, IMA1A_K05, IMA1A_K06, IMA1A_K07
Basics of mechatronics	Lecture, Laboratory classes, Project classes	Project, Activity during classes, Execution of a project, Project, Involvement in teamwork, Presentation, Activity during classes, Execution of a project, Project, Involvement in teamwork, Presentation	IMA1A_W11, IMA1A_W12, IMA1A_W13, IMA1A_U10, IMA1A_U07, IMA1A_U11, IMA1A_U12, IMA1A_K05
Fundamentals of material science	Lecture, Laboratory classes	Activity during classes, Examination, Activity during classes, Examination	IMA1A_W02, IMA1A_W03, IMA1A_U01, IMA1A_U02, IMA1A_U03, IMA1A_K01
Mathematics 2	Lecture, Auditorium classes	Activity during classes, Examination, Activity during classes, Execution of exercises, Test	IMA1A_W01, IMA1A_U07, IMA1A_U01, IMA1A_U02, IMA1A_K01
Physics 2	Lecture, Auditorium classes, Laboratory classes	Activity during classes, Participation in a discussion, Execution of laboratory classes, Test, Examination, Activity during classes, Participation in a discussion, Test, Activity during classes, Participation in a discussion, Execution of laboratory classes, Test, Report, Involvement in teamwork	IMA1A_W02, IMA1A_W07, IMA1A_U01, IMA1A_U06, IMA1A_U02, IMA1A_U03, IMA1A_U09, IMA1A_K04, IMA1A_K05, IMA1A_K01, IMA1A_K07
Computer networks and databases	Laboratory classes	Activity during classes, Execution of laboratory classes, Report, Test results	IMA1A_W10, IMA1A_U01

<b>Name of the module</b>	<b>Activity</b>	<b>Method of verification and assessment of learning outcomes achieved by the student in individual forms of classes and activities for the entire module</b>	<b>KEU references</b>
French B2 course – compulsory course of 135 hours for students of FIRST-CYCLE studies – semester 2/3 (STUDY PROGRAMME IN ENGLISH)	Foreign language classes	Activity during classes, Participation in a discussion, Execution of exercises, Test, Examination, Test results, Essays written during classes, Presentation	IMA1A_U03, IMA1A_U05, IMA1A_U04, IMA1A_U01
Spanish B2 course – compulsory course of 135 hours for students of FIRST-CYCLE studies – semester 2/3 (STUDY PROGRAMME IN ENGLISH)	Foreign language classes	Activity during classes, Participation in a discussion, Execution of exercises, Test, Examination, Test results, Essays written during classes, Presentation	IMA1A_U03, IMA1A_U05, IMA1A_U04, IMA1A_U01
English B2 course – compulsory course of 135 hours for students of FIRST-CYCLE studies – semester 2/3 (STUDY PROGRAMME IN ENGLISH)	Foreign language classes	Activity during classes, Participation in a discussion, Execution of exercises, Test, Examination, Test results, Essays written during classes, Presentation	IMA1A_U03, IMA1A_U05, IMA1A_U04, IMA1A_U01
German B2 course – compulsory course of 135 hours for students of FIRST-CYCLE studies – semester 2/3 (STUDY PROGRAMME IN ENGLISH)	Foreign language classes	Activity during classes, Participation in a discussion, Execution of exercises, Test, Examination, Test results, Essays written during classes, Presentation	IMA1A_U03, IMA1A_U05, IMA1A_U04, IMA1A_U01
Russian B2 course – compulsory course of 135 hours for students of FIRST-CYCLE studies – semester 2/3 (STUDY PROGRAMME IN ENGLISH)	Foreign language classes	Activity during classes, Participation in a discussion, Execution of exercises, Test, Examination, Test results, Essays written during classes, Presentation	IMA1A_U03, IMA1A_U05, IMA1A_U04, IMA1A_U01
Mechanics 2	Lecture, Auditorium classes	Activity during classes, Participation in a discussion, Execution of exercises, Test, Examination, Scientific paper, Case study, Involvement in teamwork, Test results, Activity during classes, Participation in a discussion, Execution of exercises, Test, Examination, Scientific paper, Case study, Involvement in teamwork, Test results	IMA1A_W01, IMA1A_W02, IMA1A_W07, IMA1A_W08, IMA1A_U01, IMA1A_U02, IMA1A_U03, IMA1A_U04, IMA1A_U20, IMA1A_K01, IMA1A_K04, IMA1A_K05, IMA1A_K06, IMA1A_K07
Strength of materials	Lecture, Auditorium classes, Laboratory classes	Activity during classes, Execution of exercises, Execution of laboratory classes, Test, Examination, Report, Oral answer, Activity during classes, Execution of exercises, Execution of laboratory classes, Test, Examination, Report, Oral answer, Activity during classes, Execution of exercises, Execution of laboratory classes, Test, Examination, Report, Oral answer	IMA1A_W01, IMA1A_W02, IMA1A_W08, IMA1A_W15, IMA1A_W17, IMA1A_W18

<b>Name of the module</b>	<b>Activity</b>	<b>Method of verification and assessment of learning outcomes achieved by the student in individual forms of classes and activities for the entire module</b>	<b>KEU references</b>
Manufacturing processes	Lecture, Auditorium classes	Test, Activity during classes, Test	IMA1A_W03, IMA1A_W12, IMA1A_W13, IMA1A_U12, IMA1A_U18, IMA1A_U20, IMA1A_U07, IMA1A_U08, IMA1A_K01
Engineering drawing	Lecture, Project classes	Execution of exercises, Execution of a project, Test, Project, Execution of exercises, Execution of a project	IMA1A_W08, IMA1A_W11, IMA1A_W12, IMA1A_W07, IMA1A_U03, IMA1A_U04, IMA1A_U12, IMA1A_W02
Control Theory Fundamentals	Lecture, Auditorium classes, Laboratory classes	Activity during classes, Execution of exercises, Execution of laboratory classes, Test, Examination, Report, Activity during classes, Execution of exercises, Execution of laboratory classes, Test, Examination, Report, Activity during classes, Execution of exercises, Execution of laboratory classes, Test, Examination, Report	IMA1A_W09, IMA1A_U10, IMA1A_U11, IMA1A_U08, IMA1A_U05
Metals and plastics process engineering	Lecture, Laboratory classes	Activity during classes, Test, Activity during classes, Test, Involvement in teamwork	IMA1A_W06, IMA1A_W11, IMA1A_U12, IMA1A_U13, IMA1A_W14, IMA1A_U15, IMA1A_U07, IMA1A_U11, IMA1A_K04, IMA1A_K05
Numerical methods and statistics	Lecture, Auditorium classes, Laboratory classes	Activity during classes, Activity during classes, Execution of exercises, Test results, Activity during classes, Execution of exercises, Execution of laboratory classes, Test results	IMA1A_W01, IMA1A_W07, IMA1A_U14, IMA1A_U20
Spanish B2 course – compulsory course of 135 hours for students of FIRST-CYCLE studies – semester 3/3 (STUDY PROGRAMME IN ENGLISH)	Foreign language classes	Activity during classes, Participation in a discussion, Execution of exercises, Test, Examination, Test results, Essays written during classes, Presentation	IMA1A_U03, IMA1A_U05, IMA1A_U04, IMA1A_U01
Signal processing and identification in monitoring of mechatronic devices	Lecture, Laboratory classes, Project classes	Activity during classes, Involvement in teamwork, Activity during classes, Involvement in teamwork, Execution of a project, Execution of laboratory classes, Examination	IMA1A_W01, IMA1A_W06, IMA1A_W07, IMA1A_U07, IMA1A_U08, IMA1A_U09, IMA1A_K01, IMA1A_K02
Signal processing and identification in control of mechatronic devices	Lecture, Laboratory classes, Project classes	Activity during classes, Involvement in teamwork, Activity during classes, Involvement in teamwork, Execution of a project, Execution of laboratory classes, Examination	IMA1A_W01, IMA1A_W06, IMA1A_W07, IMA1A_U07, IMA1A_U08, IMA1A_U09, IMA1A_K01, IMA1A_K02

<b>Name of the module</b>	<b>Activity</b>	<b>Method of verification and assessment of learning outcomes achieved by the student in individual forms of classes and activities for the entire module</b>	<b>KEU references</b>
French B2 course – compulsory course of 135 hours for students of FIRST-CYCLE studies – semester 3/3 (STUDY PROGRAMME IN ENGLISH)	Foreign language classes	Activity during classes, Participation in a discussion, Execution of exercises, Test, Examination, Test results, Essays written during classes, Presentation	IMA1A_U03, IMA1A_U05, IMA1A_U04, IMA1A_U01
German B2 course – compulsory course of 135 hours for students of FIRST-CYCLE studies – semester 3/3 (STUDY PROGRAMME IN ENGLISH)	Foreign language classes	Activity during classes, Participation in a discussion, Execution of exercises, Test, Examination, Test results, Essays written during classes, Presentation	IMA1A_U03, IMA1A_U05, IMA1A_U04, IMA1A_U01
Russian B2 course – compulsory course of 135 hours for students of FIRST-CYCLE studies – semester 3/3 (STUDY PROGRAMME IN ENGLISH)	Foreign language classes	Activity during classes, Participation in a discussion, Execution of exercises, Test, Examination, Test results, Essays written during classes, Presentation	IMA1A_U01, IMA1A_U05, IMA1A_U04, IMA1A_U03
English B2 course – compulsory course of 135 hours for students of FIRST-CYCLE studies – semester 3/3 (STUDY PROGRAMME IN ENGLISH)	Foreign language classes	Activity during classes, Participation in a discussion, Execution of exercises, Test, Examination, Test results, Essays written during classes, Presentation	IMA1A_U03, IMA1A_U05, IMA1A_U04, IMA1A_U01
Fundamentals of design of mechanisms in mechatronic devices	Lecture, Laboratory classes, Project classes	Activity during classes, Activity during classes, Activity during classes	IMA1A_W01, IMA1A_W08, IMA1A_W11, IMA1A_W12, IMA1A_W13, IMA1A_W14, IMA1A_W05, IMA1A_W07, IMA1A_W09, IMA1A_W10, IMA1A_W15, IMA1A_W18, IMA1A_U01, IMA1A_U02, IMA1A_U03, IMA1A_U04, IMA1A_K01, IMA1A_K05, IMA1A_K06, IMA1A_K04
Fundamentals of electronics	Lecture, Laboratory classes	Activity during classes, Execution of laboratory classes, Test, Report, Oral answer, Activity during classes, Execution of laboratory classes, Test, Report, Involvement in teamwork, Oral answer	IMA1A_W02, IMA1A_W04, IMA1A_U09, IMA1A_U07, IMA1A_U03, IMA1A_K01, IMA1A_K04
Industrial robots	Lecture, Laboratory classes, Project classes	Execution of a project, Execution of laboratory classes, Examination, Report, Execution of a project, Execution of laboratory classes, Examination, Report, Presentation, Activity during classes, Execution of a project, Execution of laboratory classes, Examination, Report, Presentation	IMA1A_W05, IMA1A_W06, IMA1A_W11, IMA1A_W13, IMA1A_W10, IMA1A_W08, IMA1A_U01, IMA1A_U05, IMA1A_U08, IMA1A_U20, IMA1A_U02, IMA1A_U14, IMA1A_U03, IMA1A_U11, IMA1A_U12, IMA1A_U13, IMA1A_U15, IMA1A_K02, IMA1A_K04, IMA1A_K05, IMA1A_K03

Name of the module	Activity	Method of verification and assessment of learning outcomes achieved by the student in individual forms of classes and activities for the entire module	KEU references
Service robots	Lecture, Laboratory classes, Project classes	Test, Execution of laboratory classes, Test, Execution of a project	IMA1A_W04, IMA1A_W05, IMA1A_W06, IMA1A_W07, IMA1A_W08, IMA1A_W10, IMA1A_W11, IMA1A_W12, IMA1A_U02, IMA1A_U03, IMA1A_U07, IMA1A_U14, IMA1A_U20, IMA1A_U06, IMA1A_K04
Virtual prototyping in design	Lecture, Laboratory classes	Activity during classes, Participation in a discussion, Test, Activity during classes, Participation in a discussion, Test	IMA1A_W12, IMA1A_U15, IMA1A_U07, IMA1A_U09, IMA1A_K01, IMA1A_K04
Actuating, sensing and control mechatronic systems	Lecture, Laboratory classes, Project classes	Execution of laboratory classes, Test, Project, Examination, Report, Execution of a project, Execution of laboratory classes, Test, Project, Examination, Report, Execution of a project, Execution of laboratory classes, Test, Project, Examination, Report	IMA1A_W06, IMA1A_W07, IMA1A_W13, IMA1A_W04, IMA1A_W10, IMA1A_W12, IMA1A_W15, IMA1A_U02, IMA1A_U17, IMA1A_U19, IMA1A_U20, IMA1A_U01, IMA1A_U05, IMA1A_U12, IMA1A_U14, IMA1A_U03, IMA1A_U04, IMA1A_U09, IMA1A_K04, IMA1A_K05
Apprenticeship	Practical placement	Report on completion of a practical placement, Confirmation of completion of practical placement programme	IMA1A_W15, IMA1A_U02, IMA1A_K04, IMA1A_K03
Mechatronic design	Lecture, Laboratory classes, Project classes	Project, Examination, Execution of laboratory classes, Project, Examination, Report	IMA1A_W12, IMA1A_U20, IMA1A_W13, IMA1A_U01, IMA1A_U02, IMA1A_U04, IMA1A_U08, IMA1A_U14, IMA1A_K04
Object oriented programming and software engineering	Lecture, Laboratory classes, Project classes	Execution of a project, Execution of laboratory classes, Test, Test results, Execution of a project, Execution of laboratory classes, Test, Test results, Execution of a project, Execution of laboratory classes, Test, Test results	IMA1A_W10, IMA1A_U14, IMA1A_U10, IMA1A_K05, IMA1A_K04
Control theory	Lecture, Auditorium classes, Laboratory classes	Activity during classes, Activity during classes, Execution of exercises, Report, Involvement in teamwork, Activity during classes, Execution of laboratory classes, Report, Involvement in teamwork	IMA1A_W01, IMA1A_W04, IMA1A_W08, IMA1A_W09, IMA1A_W12, IMA1A_W10, IMA1A_U05, IMA1A_U07, IMA1A_U10, IMA1A_U11, IMA1A_U16, IMA1A_U20, IMA1A_U08, IMA1A_U01, IMA1A_U02, IMA1A_U03, IMA1A_U04, IMA1A_K02, IMA1A_K04, IMA1A_K05, IMA1A_K06, IMA1A_K07
Enterprise	Lecture, Seminars	Activity during classes, Execution of a project, Project, Test results, Activity during classes, Execution of a project, Project, Involvement in teamwork, Test results	IMA1A_W17, IMA1A_W18, IMA1A_U01, IMA1A_W16, IMA1A_U02, IMA1A_K04, IMA1A_U04, IMA1A_K05, IMA1A_K06

<b>Name of the module</b>	<b>Activity</b>	<b>Method of verification and assessment of learning outcomes achieved by the student in individual forms of classes and activities for the entire module</b>	<b>KEU references</b>
Management engineering	Lecture, Seminars	Test, Project, Scientific paper, Test, Project, Scientific paper	IMA1A_W01, IMA1A_W17, IMA1A_W05, IMA1A_W06, IMA1A_U07
Composite structures and their applications	Lecture, Laboratory classes	Activity during classes, Participation in a discussion, Execution of exercises, Execution of laboratory classes, Test, Activity during classes, Participation in a discussion, Execution of exercises, Test, Case study, Involvement in teamwork	IMA1A_W03, IMA1A_W08, IMA1A_W15, IMA1A_W12, IMA1A_W17, IMA1A_W14, IMA1A_U01, IMA1A_U13, IMA1A_U03, IMA1A_U12, IMA1A_U20, IMA1A_U07, IMA1A_U08, IMA1A_U09, IMA1A_K04, IMA1A_K05, IMA1A_K02
Law in technology	Lecture, Seminars	Activity during classes, Participation in a discussion, Presentation	IMA1A_W16, IMA1A_W18, IMA1A_K01, IMA1A_K03
Python for machine learning and data science	Lecture, Laboratory classes, Project classes	Participation in a discussion, Execution of laboratory classes, Participation in a discussion, Execution of laboratory classes, Participation in a discussion, Execution of a project	IMA1A_W07, IMA1A_W12, IMA1A_W13, IMA1A_U01, IMA1A_U05, IMA1A_U07, IMA1A_U14, IMA1A_U06, IMA1A_K01, IMA1A_K08
Computer and machine vision systems	Lecture, Laboratory classes, Project classes	Activity during classes, Execution of a project, Report, Activity during classes, Execution of laboratory classes, Report, Involvement in teamwork, Oral answer, Activity during classes, Execution of a project, Report, Involvement in teamwork, Presentation	IMA1A_W06, IMA1A_W07, IMA1A_U04, IMA1A_K08
Intellectual property in technology	Lecture, Seminars	Participation in a discussion, Project	IMA1A_W16, IMA1A_W18, IMA1A_K01, IMA1A_K03
Systems of mechatronic devices monitoring	Lecture, Project classes, Seminars	Activity during classes, Presentation, Activity during classes, Presentation, Presentation	IMA1A_W07, IMA1A_W10, IMA1A_W06, IMA1A_U05, IMA1A_K04
Diploma Seminar	Seminars	Review of a thesis, Diploma thesis preparation, Presentation	IMA1A_W01, IMA1A_W02, IMA1A_W03, IMA1A_W04, IMA1A_W05, IMA1A_W06, IMA1A_W07, IMA1A_W08, IMA1A_W09, IMA1A_W10, IMA1A_W11, IMA1A_W12, IMA1A_W13, IMA1A_W14, IMA1A_W15, IMA1A_W16, IMA1A_W17, IMA1A_W18, IMA1A_U01, IMA1A_U02, IMA1A_U03, IMA1A_U04, IMA1A_U05, IMA1A_U06, IMA1A_U07, IMA1A_U08, IMA1A_U09, IMA1A_U10, IMA1A_U11, IMA1A_U12, IMA1A_U13, IMA1A_U14, IMA1A_U15, IMA1A_U16, IMA1A_U17, IMA1A_U18, IMA1A_U19, IMA1A_U20, IMA1A_K01, IMA1A_K02, IMA1A_K03, IMA1A_K04, IMA1A_K05, IMA1A_K06, IMA1A_K07

<b>Name of the module</b>	<b>Activity</b>	<b>Method of verification and assessment of learning outcomes achieved by the student in individual forms of classes and activities for the entire module</b>	<b>KEU references</b>
Computer aided manufacturing	Lecture, Laboratory classes, Project classes	Execution of laboratory classes, Activity during classes, Execution of laboratory classes, Report, Involvement in teamwork, Test results, Activity during classes, Execution of laboratory classes, Report, Involvement in teamwork, Test results	IMA1A_W12, IMA1A_U01, IMA1A_U08, IMA1A_U03, IMA1A_K01, IMA1A_K03, IMA1A_K04
Final Project	Diploma Thesis	Diploma thesis preparation	IMA1A_W01, IMA1A_W02, IMA1A_W03, IMA1A_W04, IMA1A_W05, IMA1A_W06, IMA1A_W07, IMA1A_W08, IMA1A_W09, IMA1A_W10, IMA1A_W11, IMA1A_W12, IMA1A_W13, IMA1A_W14, IMA1A_W15, IMA1A_W16, IMA1A_W17, IMA1A_W18, IMA1A_U01, IMA1A_U02, IMA1A_U03, IMA1A_U04, IMA1A_U05, IMA1A_U07, IMA1A_U08, IMA1A_U09, IMA1A_U10, IMA1A_U11, IMA1A_U12, IMA1A_U13, IMA1A_U14, IMA1A_U15, IMA1A_U16, IMA1A_U17, IMA1A_U18, IMA1A_U19, IMA1A_U20, IMA1A_K01, IMA1A_K02, IMA1A_K03, IMA1A_K04, IMA1A_K05, IMA1A_K06, IMA1A_K07

## ECTS credits calculations

Major: Mechatronic Engineering with English as instruction language

### The total number of ECTS credits the student needs to obtain in the form of:

classes conducted with the direct participation of academic teachers or other persons conducting classes	191
core science classes relevant to a given major	55
practical classes, developing practical skills, including laboratory, design, practical and workshop classes	78
classes subject to choice by the student (in the amount of not less than 30% of the number of ECTS points necessary to obtain qualifications corresponding to the level of education)	64
classes in the field of humanities or social sciences - in the case of fields of study assigned to disciplines within fields other than humanities or social sciences, respectively	6
foreign language classes	5
apprenticeships	4
classes related to the academic activity conducted at the University in the discipline or disciplines to which the field of study is assigned, in the amount greater than 50% of the number of ECTS points required to complete studies at a given level, taking into account the participation of students in classes preparing to conduct scientific activity or participate in this activity (applies only to studies with a general academic profile)	144
classes shaping practical skills in the amount greater than 50% of the number of ECTS points required to complete studies at a given level (applies only to studies with a practical profile)	



## **Detailed rules of the implementation of the study programme established by the Dean of the Faculty (the so-called Study Rules)**

Major: Mechatronic Engineering with English as instruction language

### **Enrollment rules for the next semester**

The rules of registration for the semester are specified in paragraph 17 of the AGH UST Study Regulations

### **Enrollment rules for the next semester as a part of the so-called ECTS credits debt ceiling**

The allowed deficiency of ECTS is:

When entering the 2nd semester – 7 ECTS

When entering the 3rd semester – 9 ECTS

When entering the semester 4th and 5th – 15 ECTS

When entering the 6th semester – 9 ECTS

When entering the 7th semester – 0 ECTS

### **ECTS credits debt ceiling**

9

### **Organization of classes within the so-called blocks of classes (i.e. such organization of subjects or individual forms of classes that creates exceptions to the cyclical nature of classes in particular weeks of a given semester of studies)**

In the first-cycle studies of Mechatronic engineering, there are no blocks

### **Monitoring semesters**

3, 6

### **Study rules in case of the individual organization of studies approved for a specific student**

Individual studies are conducted under the scientific supervision of an academic teacher with DSc. or Prof. scientific title. Possibility to start the studies from the 4th semester. The required average grade from the completed semesters at least 4.5, it is advisable to have additional achievements (publications, work in a research club, social activities, awards, distinctions). An individual study program may consist of modules included in approved study plans and individual unapproved modules. The program of unapproved individual modules is approved by the Faculty Council. The study program is approved by the Dean.

### **Implementation of apprenticeships including monitoring system and completion rules**

In order to complete the apprenticeship student should prepare:

- \* letter of recommendation,

- \* draft of the Agreement on the apprenticeship or draft of the Agreement on the unpaid apprenticeship.

All necessary documents are confirmed by the Dean's Representative for student apprenticeships.

Passing the apprenticeship is carried out by the program or profile tutor, or his / her attorney for apprenticeships on the basis of a certificate of attendance and a report on the apprenticeship.

### **Rules of elective modules taking**

The principles of electivity of the subjects are defined in the Syllabus of Mechatronic Engineering program

### **Rules of study paths, diploma paths, specialty choice/eligibility**

In the first-cycle studies of Mechatronic engineering, there are no paths, profiles and specialties.

**Rules related to the preparation of diploma projects and theses as well as the implementation of the degree granting**

The final thesis preparation and diploma awarding process is carried out in accordance with the paragraphs 25, 26 and 27 of the AGH UST Study Regulations.

Students take the diploma exam, prepare and defend the degree thesis.

**Principles for determining the overall evaluation of graduation (the final grade)**

The general result of graduation is calculated as the sum of:  $0.6 \times$  the average of grades obtained during studies +  $0.3 \times$  final grade of the diploma thesis +  $0.1 \times$  grade of the diploma exam.

**Other requirements related to the implementation of the study programme resulting from the AGH UST Study Regulations or other regulations in force at the University**