Curriculum

Field of study: Electronics and Telecommunications

General characteristics of the field of study

Basic information

Faculty name:	Faculty of Computer Science, Electronics and Telecommunications
Field of study:	Electronics and Telecommunications
Level:	Second-cycle (engineer) programme
Profile:	General academic
Form:	Full-time studies
ISCED classification:	
Number of ECTS credits necessary to complete studies at a given level:	90
Professional title awarded to graduates:	magister inżynier
Cycle start date:	2024/2025, summer semester
Duration of studies (number of semesters):	3

Field of science to which the field of study is assigned:

Field engineering and technical sciences

Discipline of science to which the field of study is assigned:

Discipline	Percentage	ECTS
Automation, electronic, electrical engineering and space technologies	64%	58
Technical computing and telecommunications	36%	32

Relationship between the field of study and the AGH University development strategy and the AGH University mission

A general academic profile of first-cycle and second-cycle studies at the Faculty of Computer Science, Electronics and Telecommunications constitute an attractive educational offer for people seeking employment in the IT sector. Education includes the acquisition of specialized directional skills and social competences. Thanks to carefully prepared and updated education programs, the studies prepare well for professional work, opening the way to professional and social promotion. In the graduates' opinion, studies in this field are: a source of satisfaction from own achievements and a sense of belonging to the community of engineers - graduates of a renowned technical university. The AGH development strategy imparts a clear mark on the Electronics and Telecommunications curriculum, it should be mentioned here: (1) improving and diversifying the educational offer, (2) increasing the knowledge, skills and social competences of the graduate, (3) supporting student activity, (4) preparation for professional and social activity, (5) activities stimulating research at the highest level, (6) expanding the educational skills in English, (7) supporting innovative and implementation activities through the development of cooperation with the economy.

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

The development of the information society requires staff qualified in the use of technically and technologically advanced

ICT systems, but also competent in the design, implementation and maintenance of such systems, and studies at the Electronics and Telecommunications Department prepare for such a role, among others. The local specificity of Małopolska is - apart from the commonly known high demand from companies in the telecommunications and telecommunications industry, also a visible increase in demand for engineers with high competences in the field of systems and systems - which is the result of opening and expanding branches of international companies, e.g. Aptiv Technical Center (formerly Delphi), Energy Micro, Silicon Creation) and many dynamically developing and conquering new markets domestic entities (Fideltronik, Elsta Electronics, Aldec, Semi Half). High opinions about the field have been expressed many times by representatives of enterprises - members of the Social Council operating at WIET, which is an important expression of the needs of the labor market, a source of proposals, an opinion-maker and consultant for introduced directional changes and current corrections. Some improvements to the curriculum are made at the request of students, taking into account the opinion of the Faculty Student Government Council (WRSS). Students participate in the process of creating study plans and programs of individual subjects.

Education paths – scope in Polish and in English

- Sieci i Usługi (PL)
- Networks and Services (EN)

Graduation paths – scope in Polish and in English

The names of the majors in Polish and in English

Name [pl]	Name [en]

General information about the curriculum

Field of study: Electronics and Telecommunications

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

A graduate of Electronics and Telecommunications, Networks and Services diploma path has knowledge in the field of:
•methods of coding, compression and analysis of information transmission quality in networks
and telecommunications systems,
•information security, cryptography techniques and threat detection
and prevention,
•reliability standards, error diagnosis, methods of fault location
and testing of telecommunications network elements,
•multimedia interactive services.

and is able to:
•design telecommunications networks taking into account QoS and security,
•design transmission systems, select communication protocols,
•is able to assess the usefulness and possibility of using new achievements in the field of information coding techniques, data transmission protocols and telecommunications network architectures to design and produce new telecommunications networks containing innovative solutions.

Information on including the conclusions from the students and graduates careers monitoring in the curriculum

These studies are well-rated by graduates. This is evidenced by research conducted by the Career Center and external centers. For example, according to research conducted by the AGH Career Center, almost 80% of respondents, graduates of the Electronics and Telecommunications major at AGH, are satisfied with their professional position and the knowledge and skills acquired during their studies. In turn, in the ranking of engineering studies conducted this year (2018) by the weekly "Perspektywy" run by WIET, the "Electronics and Telecommunications" major took first place in Poland. Reports on the fate of graduates are systematically prepared by the Center for Monitoring Professional Staff established within the AGH Career Center, CK AGH. The reports include basic indicators: professional status, compatibility of work with employment, time to start work, as well as more detailed ones, including time to search for a job, legal status of employment, number of job offers, factors determining the start of work, assessment of studies in the context of preparation for the job performed, graduates' earnings. CK AGH also conducts educational and professional monitoring of graduates of full-time first-cycle studies. Based on the results of the surveys, it was established that the competences related to the ability to use knowledge and apply acquired skills are still insufficiently covered in the education process. Showing the application of knowledge (through situational scenarios, case studies and examples of use) are considered an underestimated element of education, which adversely affects the level of consolidation of knowledge and, as a result, the skills presented by graduates in the workplace. Appropriate training preparing research and teaching staff to change this state of affairs was provided for in the application to ZPR AGH. This is a project, the implementation of which covers the years 2018-2022 (competition POWR.03.05.00-IP.08-00-PZ3/17, project value: PLN 39,187,505.98, eligible expenses, i.e. direct costs for WIET amount to PLN 1,592,759.00). The second observation in the results of the analysis of the fate of graduates for the Electronics and Telecommunications major is the deficit of soft skills in students, which is a characteristic and quite common feature in IT-related majors. Steps have been taken to introduce team engineering diploma theses and additional courses for students as part of the aforementioned POWER projects.

Information on including the requirements and recommendations of the accreditation committees, in particular the Polish Accreditation Committee and industry accreditation committees in the curriculum

1. Defects in the curriculum of part-time studies (too much lectures in relation to “active” classes)

Based on the recommendations of the Polish Accreditation Committee and modifications to the curricula resulting from the adopted National Qualification Framework, changes were introduced to the curricula of the EiT major. The effect of this was new curricula in force since the academic year 2013/2014. The share of “Active” classes (exercises, laboratories, projects, seminars) in full-time first-cycle and second-cycle studies exceeds 50% of all classes, in the case of second-cycle studies, these deviations range between 2% and 5%, depending on the specialization in part-time second-cycle studies. Work is currently underway to modify the curriculum of first-cycle EiT full-time studies (as part of the POWER program), and in the following years it will also include part-time studies.

2. Comments on the diploma process:
2.1. numerous diploma theses conducted by assistant professors (diploma theses are not entrusted through the Faculty Council).

2.2. some works do not formulate a research task, there are purely review works
2.3. two-person work without indicating the contribution of individual authors

Ad.2.1. Due to the large number of students, including graduate students, diploma theses must also be supervised by experienced doctors. According to paragraph 5, par. 25 of the Study Regulations, "The student prepares the diploma thesis under the supervision of an authorized academic teacher (thesis supervisor): professor or habilitated doctor for master's theses and professor, habilitated doctor and doctor for engineering and bachelor's theses. The Dean of the Faculty, after seeking the opinion of the Faculty Council, may authorize a doctor to supervise a master's diploma thesis, and a specialist in a given field - to supervise an engineering, bachelor's or master's diploma thesis.". The entrustment of supervising diploma theses is made to doctors in accordance with the resolution of the Faculty Council 646/2018 paragraph 6, pursuant to which: "The Dean of the Faculty authorizes the supervision of master's diploma theses of doctors or specialists with a doctoral degree". Ad.2.2. and 2.3. The principles of diplomas have been introduced and the procedures for diplomas have been developed in each of the Diploma Departments: Resolution 369/2016 with annexes 1 and 2.

Information on including examples of good practice in the curriculum

In order to achieve better and better educational outcomes, the teaching staff uses teaching methods consistent with current trends in academic teaching. In addition to the traditional explanatory method, some lectures use problem-based and demonstration-based methods, as well as discussion elements. During laboratory classes, various activation methods are often used, such as discussion, quizzes or group work. The participation of most employees in didactic training conducted as part of the POWER-WIET program, which is used to improve didactic competences, allows for a broader and more systematic implementation of innovative didactic methods. These trainings include, among others, problem-based methods (including WebQuest, Design Thinking), methods of teaching by doing (including case study, the inverted university method, the 3P method), activation methods (including gamification, Escape Room, methods using interactive systems), methods increasing teaching effectiveness (including coaching, mentoring, tutoring, the 4C approach). The specificity of teaching forms means that lectures (regardless of the forms of student activation used) primarily serve to achieve the learning outcomes related to knowledge, while auditorium exercises, laboratories and project work - mainly to skills, but also to social competences. Below are examples of teaching methods and good practices implemented in the teaching process:

*Knowledge + Skills = Lecture + Laboratory + Project. The basis for the implementation of many subjects is the combination of laboratory classes with project work.

*Design Laboratory. Introduction of the subject in the 5th semester of studies, which introduces research topics related to the field of study and leads to the implementation of a simple project in accordance with the assumed methodology. A characteristic feature of this subject is also the preparation of documentation in English, allowing the acquisition of the ability to create reports, reviews of the state of knowledge in a given topic and scientific publications.

*Implementation of teamwork, both within teams formed during laboratory exercises and project work, serves to improve the competence of cooperation in a group.

*Participation of companies from the socio-economic environment in conducting classes. Scientific research and cooperation with the socio-economic environment of the Faculty's employees make it possible to introduce elective subjects to the educational offer, correlated with current trends in the development of electronic and telecommunications systems. The effect of such cooperation is the introduction of subjects to the study program, which are initially prepared and conducted jointly by academic teachers and employees of companies with which the Faculty cooperates. In subsequent years, thanks to the transfer of knowledge, the competences of the Faculty's employees increase, which allows for the complete takeover of conducting such subjects (e.g.: Assembly of Electronic Systems, Advanced Enterprise Networks)
*Scientific and research competences are also shaped in students of first and second cycle studies as part of the subject "Scientific Club".
To sum up, in the curriculum of the Electronics major, it is possible to indicate Good Practices that can be disseminated and implemented in other academic centers due to the observed effects of the educational process:
• basing the curriculum on the competences of the staff running the major, related to the scientific research generated in the unit and the expectations of the labor market,
• organizing elective subjects in cooperation with companies from the socio-economic environment, and taking over their management as the staff compensation increases,
• realization of diploma theses in cooperation with external companies, as well as works constituting the basis for registering intangible assets at AGH and applying for patent protection;
• possibility of passing one of the elective subjects based on work in the Scientific Club.
• use of innovative teaching methods; a method proven in several subjects is the so-called a flipped classroom, requiring knowledge and understanding of the material that will be discussed in class,
•combining laboratory classes with project work, enabling consolidation of knowledge and skills,
•implementation of project work in teams, in order to acquire social competences expected on the labor market.
•defining a fixed workload in organizing elective subjects, allowing students to freely choose them,
•implementation of the Diploma system to support the process of completing diploma theses,
•hybrid teaching – combining classic forms of classes with e-learning elements.

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

In order to properly develop the concept of education at the faculty offering the EiT major, the Social Council (SC) was established. The Council is a collegial advisory body working to develop cooperation between WIET and external economic entities and organizations. The main issues of its operation are adapting the scope of knowledge, skills and social competences of WIET graduates to the needs and requirements of employers and developing cooperation between the University in the field of research and development with entities from its environment. The Council is one of the forms of implementation of the WIET development strategy in the field of expanding cooperation with external stakeholders. The Social Council is open in nature. It consists of representatives of enterprises, institutions, state and local government offices, as well as individual natural persons whose activities are related to the directions of education of students and scientific research carried out at WIET. The tasks of the Social Council are specified in the Regulations of the RS. These include:
•exchange of information on employers' expectations towards AGH graduates and related assistance in monitoring the professional development of the Faculty's graduates,
•formulation of proposals to adapt the Faculty's educational and research offer to the current expectations of companies and institutions,
•promoting the participation of employees of external entities in the student education process by, among others, organizing didactic classes with their participation, as well as assistance in organizing student internships and placements,
•actions to promote the Faculty and the fields of study conducted by the Faculty,
•supporting the exchange of information between the communities represented in the Social Council and creating conditions conducive to undertaking joint ventures in the areas of education, research and development activities and initiating such ventures.

Duration, rules and form of the practical placement

Not applicable

Admission criteria, rules and policies

Field of study: Electronics and Telecommunications

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

Holding the title of engineer or master's degree in Electronics, Electronics and Telecommunications or Electrical Engineering or in the field of Acoustic Engineering or Biomedical Engineering or Teleinformatics

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

The principles and conditions of recruitment are specified in Resolution of the AGH Senate on the conditions, procedure and start and end dates of recruitment for the first year of first and second cycle studies in the given academic year.

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: 24
Maximum number of students: 36

Learning outcomes

Field of study : Electronics and Telecommunications

Knowledge

KEU symbol	Learning outcomes prescribed to a field of study	CEU symbol
ETE2A_W01	has an extended and in-depth knowledge of mathematics, including elements of stochastic processes, discrete mathematics and optimization, including knowledge needed for modeling and analysis of advanced embedded systems or networks telecommunications and their optimization	P7S_WG_A
ETE2A_W02	has a deep and podbudowaną in theory, knowledge of the techniques of transmission and processing of information, including the knowledge necessary to understand the optical telecommunications systems, cable networks and wireless	P7S_WG_A
ETE2A_W03	has a deep and structured knowledge of modeling and simulation of selected electronic systems or telecommunications networks	P7S_WG_A
ETE2A_W04	has an ordered theory, knowledge of design embedded systems or telecommunications networks and services, taking account of the specific requirements, such as: working in the high frequency, compliance with the standards electromagnetic compatibility, including the negative effects of electromagnetic waves, meet the standards of reliability, safety, diagnose errors, defects and testing,	P7S_WG_A_Inz, P7S_WG_A
ETE2A_W05	has an ordered knowledge of methods of coding, compression and quality analysis of transmission information in networks and telecommunications systems; understand the considerations for information security, knows the basic techniques of cryptography and the detection and prevention of information security;	P7S_WK_A, P7S_WG_A
ETE2A_W06	has the knowledge necessary to understand the pozatechnicznych circumstances of engineering activities, including copyright, knows the trends and the most important new developments in the field of electronics and telecommunications and, to a lesser extent-computer science;	P7S_WK_A_Inz, P7S_WK_A

Skills

KEU symbol	Learning outcomes prescribed to a field of study	CEU symbol
ETE2A_U01	can independently develop their knowledge, acquire information from literature, databases, and other sources; can integrate information, their interpretation and critical evaluation, and also draw conclusions and formulate and justify reviews;	P7S_UU_A
ETE2A_U02	able to work individually and in a team, as well as to communicate and exchange information using basic networking techniques;	P7S_UO_A
ETE2A_U03	can develop a detailed documentation of the results of the implementation of the experiment, the task of the research or design; can give a presentation and discussion on the data; speaks English sufficiently to communicate, also in professional matters, reading comprehension literature, as well as to prepare and give a short presentation;	P7S_UK_A
ETE2A_U04	able to use known methods and mathematical models - if necessary, modify them appropriately - for analysis and design of elements and electronic circuits and systems and telecommunications networks;	P7S_UW_A, P7S_UW_A_Inz_01
ETE2A_U05	can design electronic devices or data transmission systems, taking into account the specified performance criteria and economic, if necessary adapting existing or developing new methods of design or computer tools aided design; can schedule the testing process and is able to formulate the design specification of a complex system, an electronic system, network device or data transmission system	P7S_UW_A_Inz_02, P7S_UW_A

KEU symbol	Learning outcomes prescribed to a field of study	CEU symbol
ETE2A_U06	can make and, using appropriate analytical tools, simulation and experimental-test hypotheses related to the modeling and design of electronic systems or telecommunications networks and services, it can integrate knowledge from a variety of sources, and in particular in the field of electronics, telecommunications, computer science and mathematical methods, using a systems approach, taking into account the aspects of pozatechnicznych, including economic and legal protection intellectual property, impact on the environment	P7S_UW_A, P7S_UW_A_Inz_01
ETE2A_U07	able to propose improvements to the existing design solutions and models of components, systems and electronic systems and telecommunications systems and networks, on the basis of the assessment of the State of knowledge in the field of materials, items, and electronic systems coding techniques, information, data transmission protocols and architectures for telecommunications networks, can create innovative solutions;	P7S_UW_A_Inz_02, P7S_UK_A

Social competence

KEU symbol	Learning outcomes prescribed to a field of study	CEU symbol
ETE2A_K01	can think and act in a way that is creative and enterprising; in solving cognitive problems and practical consult experts if you have difficulty with an independent solution to the problem	P7S_KO_A, P7S_KK_A
ETE2A_K02	understand the need to formulate and transmit to the public - m.in. through the mass media - information and reviews about the achievements of the electronics, telecommunications, and other aspects of engineering activity; shall endeavour to provide such information and opinions in a commonly understandable by presenting different points of view;	P7S_KO_A, P7S_KR_A

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

Major : Electronics and Telecommunications

Knowledge

CEU symbol	Learning outcomes for qualifications including engineering competence	KEU references
P7S_WG_A_Inz	knowledge of basic processes taking place in the life cycle of technical devices, facilities and systems	ETE2A_W04
P7S_WK_A_Inz	knowledge of basic principles of creating and developing various forms of individual entrepreneurship	ETE2A_W06

Skills

CEU symbol	Learning outcomes for qualifications including engineering competence	KEU references
P7S_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;	ETE2A_U04, ETE2A_U06
P7S_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	ETE2A_U05, ETE2A_U07

Field of study-prescribed outcomes coverage matrix

Field of study: Electronics and Telecommunications

2024/2025/S/IIi/IEiT/ETE/all

Course	Code	Semestr	ETE2A_W01	ETE2A_W02	ETE2A_W03	ETE2A_W04	ETE2A_W05	ETE2A_W06	ETE2A_U01	ETE2A_U02	ETE2A_U03	ETE2A_U04	ETE2A_U05	ETE2A_U06	ETE2A_U07	ETE2A_K01	ETE2A_K02
Internet of Things	IETES.IIi1O.1f83f2aee1ad9157cfc79882cee20a35.24	1s		x													x
How to Manage Own Career	IETES.IIi1O.60a7ac9b1fb15.24	1s						x	x							x	x
Data transfer over IP networks	IETES.IIi1O.dfe06192c14ee3a4ad235bfe95c7a1b3.24	1s		x			x	x					x			x	
Computer Aided Mathematics in Telecommunications	IETES.IIi1O.0897950ff7664fb81cf340ee17dba9d4.24	1s	x						x		x	x				x	x
Digital telecommunications	IETES.IIi1O.772f1be09b15f9a523c4414d7e2a6787.24	1s	x	x	x	x	x	x	x	x	x	x	x	x		x	x
Security of Information Systems	IETES.IIi1O.ec268b4c15de9d575585d1f197b6ca5f.24	1s	x	x			x	x	x				x	x		x	
Fibre Optics and Photonics	IETES.IIi1O.f6860c1573993faa732e05772ba4d089.24	1s		x					x				x	x		x	
System Architect Essentials for Business Process Management	IETES.IIi2O.6caa013974b5ed91f0a1afe58169c4ed.24	2s						x		x	x		x	x		x	x
Optical Networks	IETES.IIi2O.ed608804b3efdaf14f15037f677f1103.24	2s		x				x							x	x	
Evolution of TV Systems and Digital Imaging	IETES.IIi2O.239f04be749147cea22e0f1872cbcd66.24	2s		x	x	x	x	x	x								x
Programming for Android	IETES.IIi2O.152553bc6e2d5d33b5bee04b0679d257.24	2s		x	x	x						x	x			x	
Hardware acceleration of telecommunication protocols	IETES.IIi2O.a5a1923abfd06d3468aa570692ce0bb7.24	2s	x			x	x						x		x	x	x
Digital signal processing in telecommunications	IETES.IIi2O.c5e4cf7b343d9fd8bb3e5dfd21311636.24	2s	x	x			x		x				x			x	
Modelling and simulation of networks and services	IETES.IIi2O.8d06955a97183592b73dc79f0e087f94.24	2s	x	x	x				x		x	x				x	

Course	Code	Semestr	ETE2A_W01	ETE2A_W02	ETE2A_W03	ETE2A_W04	ETE2A_W05	ETE2A_W06	ETE2A_U01	ETE2A_U02	ETE2A_U03	ETE2A_U04	ETE2A_U05	ETE2A_U06	ETE2A_U07	ETE2A_K01	ETE2A_K02
Introduction to LTE	IETES.IIi2O.8132a75d237ee864a53e3803cb198969.24	2s				x				x	x		x				x
Methodology of ICT projects	IETES.IIi2O.9ba3689f060b4a1b5e6c11a9fab34e72.24	2s						x	x	x				x		x	x
Entrepreneurship and project management	IETES.IIi2O.8a65b504a917b400c2d506bfe6879cbf.24	2s						x	x							x	
Technical Foreign Language (level B+)	IETES.IIi2O.c43c6520b1fb6a0a4e231196f9f8080e.24	2s															
Management of telecommunication networks and services	IETES.IIi4O.941cccb014987f534d5fc10a61729a9b.24	3s		x		x	x		x		x		x				x
Diploma Thesis	IETES.IIi4O.ce236d300ae227d571b537fee0065de8.24	3s								x	x	x					x
Artificial Intelligence	IETES.IIi4O.d2f19a29238de641e38786f82d6b6f44.24	3s						x	x	x	x					x	x
Advanced Programming in Android	IETES.IIi4O.88c50570c2f88034a288424a326e98d6.24	3s		x			x	x									
Advanced External Routing Methods in IP Networks	IETES.IIi4O.f6ec570cd4784b323dca8377addceaad.24	3s		x									x	x		x	x
Advanced Multimedia Information Processing and Communications	IETES.IIi4O.dd7a96790b047c7c7578992ced15d141.24	3s					x		x	x	x		x			x	
Diploma Seminar	IETES.IIi4O.113e607328fe3b1feac36d5c37a13bcd.24	3s								x	x	x					x
Sum (obligatory):			6	7	2	2	5	7	9	4	5	5	6	4	2	12	7
Sum (elective):			0	6	2	4	4	4	4	4	5	1	6	2	0	5	7
Sum:			6	13	4	6	9	11	13	8	10	6	12	6	2	17	14

Characteristics matrix of learning outcomes in relation to modules

Major: Electronics and Telecommunications

2024/2025/S/IIi/IEiT/ETE/all

Course	Code	Semestr	P7S_WG_A	P7S_WG_A_Inz	P7S_WK_A	P7S_WK_A_Inz	P7S_UU_A	P7S_UO_A	P7S_UK_A	P7S_UW_A	P7S_UW_A_Inz_01	P7S_UW_A_Inz_02	P7S_KO_A	P7S_KK_A	P7S_KR_A
Internet of Things	IETES.IIi1O.1f83f2aee1ad9157cfc79882cee20a35.24	1s	x										x		x
How to Manage Own Career	IETES.IIi1O.60a7ac9b1fb15.24	1s			x	x	x						x	x	x
Data transfer over IP networks	IETES.IIi1O.dfe06192c14ee3a4ad235bfe95c7a1b3.24	1s	x		x	x				x		x	x	x	
Computer Aided Mathematics in Telecommunications	IETES.IIi1O.0897950ff7664fb81cf340ee17dba9d4.24	1s	x				x		x	x	x		x	x	x
Digital telecommunications	IETES.IIi1O.772f1be09b15f9a523c4414d7e2a6787.24	1s	x	x	x	x	x	x	x	x	x	x	x	x	x
Security of Information Systems	IETES.IIi1O.ec268b4c15de9d575585d1f197b6ca5f.24	1s	x		x	x	x			x	x	x	x	x	
Fibre Optics and Photonics	IETES.IIi1O.f6860c1573993faa732e05772ba4d089.24	1s	x				x			x	x	x	x	x	
System Architect Essentials for Business Process Management	IETES.IIi2O.6caa013974b5ed91f0a1afe58169c4ed.24	2s			x	x		x	x	x	x	x	x	x	x
Optical Networks	IETES.IIi2O.ed608804b3efdaf14f15037f677f1103.24	2s	x		x	x			x			x	x	x	
Evolution of TV Systems and Digital Imaging	IETES.IIi2O.239f04be749147cea22e0f1872cbcd66.24	2s	x	x	x	x	x						x		x
Programming for Android	IETES.IIi2O.152553bc6e2d5d33b5bee04b0679d257.24	2s	x	x						x	x	x	x	x	
Hardware acceleration of telecommunication protocols	IETES.IIi2O.a5a1923abfd06d3468aa570692ce0bb7.24	2s	x	x	x				x	x		x	x	x	x
Digital signal processing in telecommunications	IETES.IIi2O.c5e4cf7b343d9fd8bb3e5dfd21311636.24	2s	x		x		x			x		x	x	x	

Course	Code	Semestr	P7S_WG_A	P7S_WG_A_Inz	P7S_WK_A	P7S_WK_A_Inz	P7S_UU_A	P7S_UO_A	P7S_UK_A	P7S_UW_A	P7S_UW_A_Inz_01	P7S_UW_A_Inz_02	P7S_KO_A	P7S_KK_A	P7S_KR_A
Modelling and simulation of networks and services	IETES.IIi2O.8d06955a97183592b73dc79f0e087f94.24	2s	x				x		x	x	x		x	x	
Introduction to LTE	IETES.IIi2O.8132a75d237ee864a53e3803cb198969.24	2s	x	x				x	x	x		x	x		x
Methodology of ICT projects	IETES.IIi2O.9ba3689f060b4a1b5e6c11a9fab34e72.24	2s			x	x	x	x		x	x		x	x	x
Entrepreneurship and project management	IETES.IIi2O.8a65b504a917b400c2d506bfe6879cbf.24	2s			x	x	x						x	x	
Technical Foreign Language (level B+)	IETES.IIi2O.c43c6520b1fb6a0a4e231196f9f8080e.24	2s													
Management of telecommunication networks and services	IETES.IIi4O.941cccb014987f534d5fc10a61729a9b.24	3s	x	x	x		x		x	x		x	x		x
Diploma Thesis	IETES.IIi4O.ce236d300ae227d571b537fee0065de8.24	3s						x	x	x	x		x		x
Artificial Intelligence	IETES.IIi4O.d2f19a29238de641e38786f82d6b6f44.24	3s			x	x	x	x	x				x	x	x
Advanced Programming in Android	IETES.IIi4O.88c50570c2f88034a288424a326e98d6.24	3s	x		x	x									
Advanced External Routing Methods in IP Networks	IETES.IIi4O.f6ec570cd4784b323dca8377addceaad.24	3s	x							x	x	x	x	x	x
Advanced Multimedia Information Processing and Communications	IETES.IIi4O.dd7a96790b047c7c7578992ced15d141.24	3s	x		x		x	x	x	x		x	x	x	
Diploma Seminar	IETES.IIi4O.113e607328fe3b1feac36d5c37a13bcd.24	3s						x	x	x	x		x		x
Sum (obligatory):			9	2	9	7	9	4	7	11	8	7	14	12	7
Sum (elective):			8	4	6	4	4	4	5	6	3	6	9	5	7
Sum:			17	6	15	11	13	8	12	17	11	13	23	17	14

Matrix of learning outcomes prescribed to a field of study with related forms of classes and the method of testing

Major: Electronics and Telecommunications

2024/2025/S/IIi/IEiT/ETE/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
Internet of Things	Lectures, Project classes	Project, Presentation, Execution of a project, Presentation	ETE2A_W02, ETE2A_K02
How to Manage Own Career	Lectures, Auditorium classes	Activity during classes, Test, Activity during classes	ETE2A_W06, ETE2A_U01, ETE2A_K01, ETE2A_K02
Data transfer over IP networks	Laboratory classes, Project classes	Execution of laboratory classes, Project, Examination, Case study, Project, Examination	ETE2A_W02, ETE2A_W05, ETE2A_W06, ETE2A_U05, ETE2A_K01
Computer Aided Mathematics in Telecommunications	Lectures, Auditorium classes, Project classes, Seminars	Execution of exercises, Test, Examination, Presentation, Execution of exercises, Test, Examination, Presentation, Project, Examination, Execution of exercises, Test, Project, Examination, Presentation	ETE2A_W01, ETE2A_U04, ETE2A_U01, ETE2A_U03, ETE2A_K01, ETE2A_K02
Digital telecommunications	Lectures, Project classes	Execution of a project, Test, Project, Examination, Involvement in teamwork, Execution of a project, Test, Project, Examination, Involvement in teamwork	ETE2A_W01, ETE2A_W02, ETE2A_W03, ETE2A_W05, ETE2A_W04, ETE2A_W06, ETE2A_U01, ETE2A_U02, ETE2A_U03, ETE2A_U04, ETE2A_U05, ETE2A_U06, ETE2A_K01, ETE2A_K02
Security of Information Systems	Lectures, Laboratory classes	Test, Test	ETE2A_W05, ETE2A_W01, ETE2A_W02, ETE2A_U05, ETE2A_U06, ETE2A_U01, ETE2A_W06, ETE2A_K01
Fibre Optics and Photonics	Lectures, Laboratory classes	Test, Examination, Test, Examination	ETE2A_W02, ETE2A_U01, ETE2A_U05, ETE2A_U06, ETE2A_K01

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
System Architect Essentials for Business Process Management	Laboratory classes, Discussion seminars	Activity during classes, Participation in a discussion, Execution of a project, Execution of laboratory classes, Project, Case study, Involvement in teamwork, Completion of laboratory classes, Activity during classes, Participation in a discussion, Case study, Involvement in teamwork, Test results, Completion of laboratory classes	ETE2A_W06, ETE2A_U05, ETE2A_U06, ETE2A_U02, ETE2A_U03, ETE2A_K01, ETE2A_K02
Optical Networks	Lectures, Laboratory classes	Oral answer, Activity during classes, Execution of exercises, Oral answer, Completion of laboratory classes	ETE2A_W02, ETE2A_W06, ETE2A_U07, ETE2A_K01
Evolution of TV Systems and Digital Imaging	Discussion seminars	Activity during classes, Participation in a discussion, Scientific paper, Presentation	ETE2A_W06, ETE2A_W04, ETE2A_W05, ETE2A_W02, ETE2A_W03, ETE2A_U01, ETE2A_K02
Programming for Android	Lectures, Project classes	Project, Project	ETE2A_W03, ETE2A_W04, ETE2A_W02, ETE2A_U05, ETE2A_U04, ETE2A_K01
Hardware acceleration of telecommunication protocols	Lectures, Laboratory classes	Execution of laboratory classes, Execution of laboratory classes	ETE2A_W01, ETE2A_W05, ETE2A_W04, ETE2A_U07, ETE2A_U05, ETE2A_K01, ETE2A_K02
Digital signal processing in telecommunications	Lectures, Project classes	Execution of laboratory classes, Execution of laboratory classes	ETE2A_W01, ETE2A_W02, ETE2A_W05, ETE2A_U01, ETE2A_U05, ETE2A_K01
Modelling and simulation of networks and services	Project classes, Discussion seminars	Test, Project, Examination, Test, Examination	ETE2A_W01, ETE2A_W02, ETE2A_W03, ETE2A_U01, ETE2A_U03, ETE2A_U04, ETE2A_K01
Introduction to LTE	Lectures, Laboratory classes	Activity during classes, Completion of laboratory classes	ETE2A_W04, ETE2A_U02, ETE2A_U03, ETE2A_U05, ETE2A_K02
Methodology of ICT projects	Project classes	Execution of a project, Test, Involvement in teamwork	ETE2A_W06, ETE2A_U01, ETE2A_U02, ETE2A_U06, ETE2A_K01, ETE2A_K02
Entrepreneurship and project management	Lectures	Execution of exercises, Execution of a project, Test	ETE2A_W06, ETE2A_U01, ETE2A_K01
Technical Foreign Language (level B+)	Auditorium classes		
Management of telecommunication networks and services	Lectures, Project classes	Test, Test, Project	ETE2A_W04, ETE2A_W02, ETE2A_W05, ETE2A_U01, ETE2A_U03, ETE2A_U05, ETE2A_K02

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
Diploma Thesis	Diploma Thesis	Diploma thesis preparation	ETE2A_U02, ETE2A_U03, ETE2A_U04, ETE2A_K02
Artificial Intelligence	Project classes, Discussion seminars	Execution of a project, Project, Report, Work done within the framework of a practical placement, Involvement in teamwork, Presentation, Preparation and conduct of scientific research, Participation in a discussion, Project, Presentation	ETE2A_W06, ETE2A_U02, ETE2A_U03, ETE2A_U01, ETE2A_K01, ETE2A_K02
Advanced Programming in Android	Project classes	Test	ETE2A_W06, ETE2A_W02, ETE2A_W05
Advanced External Routing Methods in IP Networks	Lectures, Laboratory classes	Test, Case study, Test, Case study	ETE2A_W02, ETE2A_U05, ETE2A_U06, ETE2A_K01, ETE2A_K02
Advanced Multimedia Information Processing and Communications	Laboratory classes, Project classes	Test, Project, Test, Project	ETE2A_W05, ETE2A_U01, ETE2A_U02, ETE2A_U05, ETE2A_U03, ETE2A_K01
Diploma Seminar	Seminars	Presentation	ETE2A_U02, ETE2A_U03, ETE2A_U04, ETE2A_K02

Detailed rules of the implementation of the curriculum estabilished by the Dean of the Faculty (the so-called Study Rules)

Field of study: Electronics and Telecommunications

Enrollment rules for the next semester

The Rules of Study at AGH describe in detail the rules for passing the semester of study (§ 17) and the procedure in the absence of such a pass (§ 18 ÷ 21).

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

The AGH Study Regulations in § 17 specify the rules for enrollment in the next semester of studies within the so-called allowable deficit of ECTS points. The Faculty of Computer Science, Electronics and Telecommunications has a procedure PD - PS - 03 specifying the process of applying for enrollment with a deficit:
http://www.iet.agh.edu.pl/pl/studenci/procedury/wpis-z-deficytem-punktow/

ECTS credits debt ceiling

15

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)

Not applicable

Monitoring semesters

2

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

In accordance with § 9 of the Regulations of Studies at AGH, INDIVIDUALISATION OF THE EDUCATIONAL PROCESS
https://www.agh.edu.pl/fileadmin/default/templates/images/dokumenty/regulamin_studiow/regulamin_studiow_pierwszego_i_drugiego_stopnia_w_agh_pazdziernik_2017.pdf

Implementation of practical placements including monitoring system and completion rules

Not applicable

Rules of elective modules taking

In the Electronics and Telecommunications major, specialist education is also carried out based on elective modules. Students choose subjects from a list proposed by the research teams of the Department of Electronics, reviewed by the Faculty Team for the Quality of Education (which includes representatives of the Faculty of Social Sciences and Humanities) and approved by the Dean's Representative for Education. The topics proposed by the research team are related to the conducted scientific activity or the needs of the labor market. Enrollment for elective subjects is carried out for the next academic year before the holidays of the previous year. Due to the limited number of places in elective subjects, the average grade is taken into account when enrolling.

Rules of education paths, graduation paths, major choice/eligibility

Registration for diploma paths takes place before the start of studies in the first semester.

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

Second-cycle studies in the field of Electronics and Telecommunications end with the student's thesis. It is carried out under the direction of an authorized academic teacher (job supervisor), who defines the mode and schedule of its implementation. The text of the diploma thesis is verified using the Unified Anti-plagiarism System https://jsa.opi.org.pl. Supervision over the diploma process is carried out by the Diplomacy Commission appointed by the Resolution of the Faculty Council, its tasks are: approval of the topics of the works, appointment of reviewers and organization of diploma exams.
Details of the diploma process are available at: http://www.iet.agh.edu.pl/pl/studenci/procedury/, in Resolution 369/2016 RW WIET and in the Regulations of the AGH University of Science and Technology (§ 25 ÷ 27).

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

Second-cycle studies in the field of Electronics and Telecommunications end with the student completing a diploma thesis. It is carried out under the supervision of an authorized academic teacher (thesis supervisor), who determines the mode and schedule of its implementation. The text of the diploma thesis is verified using the Unified Anti-plagiarism System https://jsa.opi.org.pl. The diploma process is supervised by the Diploma Committee established by the Resolution of the Faculty Council, its tasks include: approving the topics of theses, appointing reviewers of theses and organizing diploma exams. Details of the diploma process are available at: http://www.iet.agh.edu.pl/pl/studenci/procedury/, in Resolution 369/2016 RW WIET and in the AGH Study Regulations (§ 25 ÷ 27).

Other requirements related to the implementation of the curriculum resulting from the AGH University Study Regulations or other regulations in force at the University

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A graduate of the Faculty of Electronics and Telecommunications, the diploma path of Embedded Systems has knowledge in the field of testing and reliability, electromagnetic compatibility, functional safety and standards for the construction of electronic devices, computer architectures, hardware acceleration of calculations, SoC systems, real-time operating systems, communication systems, design of analog-digital mixed systems, also in the ASIC integrated form and also can: design of devices taking into account EMC requirements, quality of QoS services and functional safety (SIL), design transmission systems (antenna systems, fiber-optic networks), select communication protocols, design high-efficiency power systems, design sensor systems, is able to assess the suitability and the possibility of using new developments in the field of electronic systems and data transmission techniques to manufacture devices innovative in nature.
A graduate of the Faculty of Electronics and Telecommunications, the diploma path Networks and Services has knowledge of: methods of coding, compression and analysis of the quality of information transmission in networks and telecommunications systems, information security, cryptography and detection techniques and risk prevention, reliability standards, error diagnoses, fault location methods and testing of telecommunications network elements, multimedia interactive services and he can: design of telecommunication networks including QoS and security, design transmission systems, select communication protocols, is able to assess the suitability and the possibility of using new achievements in the field of information coding techniques, data transmission protocols and telecommunications network architectures for designing and manufacturing new telecommunications networks containing innovative solutions.

Mentor of the field of study: dr inż. Jacek Kołodziej

View full description of the field of study

Study programme determined by Resolution No. 110/2019 of the AGH UST Senate of 26 June 2019