Curriculum

Field of study: Energy Transition

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General characteristics of the field of study

Basic information

Faculty name:	Faculty of Energy and Fuels
Field of study:	Energy Transition
Level:	Second-cycle (engineer) programme
Profile:	General academic
Form:	Full-time studies
ISCED classification:	0713
Number of ECTS credits necessary to complete studies at a given level:	90
Professional title awarded to graduates:	magister inżynier
Cycle start date:	2025/2026, winter/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
Environmental engineering, mining and energy	100%	90

Relationship between the field of study and the development strategy and mission of the university

The Energy Transition program fully aligns with the mission of AGH University of Science and Technology, addressing the needs of the dynamically evolving energy sector. This second-cycle study program has been designed to tackle key challenges in Poland's and the world's energy transition, covering topics such as renewable energy sources, energy storage, waste management and utilization, sector digitalization, as well as legal and economic aspects.

The curriculum is continuously updated to follow the latest trends and regulations, ensuring that graduates acquire the competencies necessary to implement innovative solutions in the energy sector. The program is aligned with the Polish Qualifications Framework and AGH's development strategy, responding to national and international challenges related to decarbonization and energy security.

Graduates of the program will gain interdisciplinary knowledge and skills, enabling them to actively participate in the energy transition process and preparing them for careers in both the industrial sector and research & development.

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 Energy Transition study program takes into account the current socio-economic needs arising from rapid changes in the energy sector, climate policy, and labor market demands. This program addresses the growing need for specialists capable of managing decarbonization processes, implementing renewable energy sources, and integrating advanced storage technologies and digital solutions into the sector.

The learning outcomes have been developed in close collaboration with industry representatives, government bodies, and research institutions, ensuring alignment with employer expectations and the challenges of the energy transition. Graduates will be well-equipped to take on key roles in the energy industry, public administration, and R&D organizations, actively contributing to the

development of a modern, sustainable energy system.

Education paths – scope in Polish and in English

Graduation paths – scope in Polish and in English

Not applicable.

The names of the majors in Polish and in English

Name [pl]	Name [en]

General information about the curriculum

Field of study: Energy Transition

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

The Energy Transition program aims to educate specialists capable of efficiently managing and implementing modern technologies and strategies related to the transformation of the energy sector. Students gain interdisciplinary knowledge in the following areas:

- Renewable energy sources (RES) and energy storage,
- Sustainable development and circular economy,
- Climate policy and decarbonization strategies,
- Modern hydrogen technologies and alternative fuels,
- Modeling and optimization of energy systems,
- Energy economics, regulations, and markets.

The curriculum combines a strong theoretical foundation with a practical approach, including project-based learning, laboratory work, hands-on training, research projects, and collaboration with industry and energy sector institutions.

The courses Circular Economy and From Idea to Startup fall within the domain of social sciences.

Graduates of the Energy Transition program are well-prepared to work in the rapidly evolving energy and environmental sectors, both in Poland and internationally. They can find employment in:

- Energy companies (generation, distribution, energy management, RES development),
- Enterprises in the circular economy (recycling, waste-to-energy solutions),
- Companies specializing in energy storage technologies (batteries, hydrogen, alternative fuels),
- Public administration and international organizations (ministries, energy and climate agencies),
- Research and development centers and universities (innovative energy technologies, decarbonization strategies),
- Consulting and advisory firms (strategic energy transition planning, market analysis),
- Manufacturing industries implementing energy efficiency solutions and CO_2 emission reduction strategies.

Graduates can further develop their competencies through:

- Doctoral studies in energy, renewable energy technologies, energy management, and climate policy,
- Specialized courses and certifications (e.g., RES project management, energy system analysis),
- MBA programs in energy and sustainable development,
- International academic exchange programs and postgraduate studies in energy and environmental technologies.

The Energy Transition program provides comprehensive preparation for careers in the modern energy sector, enabling graduates to actively contribute to the global energy transition.

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

Monitoring the career paths of students and graduates clearly indicates the need to create new programs and specializations, particularly in emerging and developing fields that have the potential to become key drivers of the economy over time. One such area is the energy transition.

Through continuous analysis of graduates' career paths and collaboration with employers, the Energy Transition study program provides students with up-to-date, market-relevant knowledge and skills, enhancing their competitiveness in the job market.

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

To ensure high-quality education and better align the Energy Transition study program with current labor market needs, it is essential to systematically involve industry representatives, students, and doctoral candidates in the process of designing and improving the educational offering.

To achieve this, efforts are being made to enhance the role of students and doctoral candidates in the improvement of education through the analysis of periodic surveys on teaching quality, which include suggestions for new courses and teaching methods. Collaboration with industry and energy sector institutions is continuously expanding through:

- Seminars led by industry experts, providing students with up-to-date knowledge on the energy transition,
- Jointly organized workshops and R&D projects in cooperation with energy companies,
- Development of internship and mentoring programs, allowing students to gain practical experience in energy and sustainability-related companies.

Strengthening and formalizing these initiatives will enable better adaptation of the study program to the challenges of modern energy transition and enhance graduates' competitiveness in the job market. On July 8, 2021, the Faculty of Energy received a positive accreditation assessment from the Polish Accreditation Committee for the Energy program conducted at the AGH University of Science and Technology at the level of first and second cycle studies with a general academic profile. The program was prepared in accordance with the guidelines of the accreditation committee.

Information on including examples of good practice in the curriculum

The Energy Transition study program has been developed with consideration of best educational, organizational, and industry practices, supporting effective learning and preparing students for the challenges of the modern energy transition. The program includes:

- Best practices in teaching methods – The curriculum incorporates Good Practices at WEiP, developed based on surveys and discussions with students and teachers.
- Modern teaching methods – Use of real-life case studies and analysis of case studies in courses related to energy policy and renewable technologies, as well as the combination of traditional lectures with interactive e-learning tools and computer simulations (blended learning). Additionally, the program emphasizes practical team projects (project-based learning).
- Collaboration with the business sector and industry institutions – Enabling students to participate in real-world projects and internships; involvement of specialists from industry, public administration, and international organizations in the educational process.
- Practical approach and professional skills development – Internships and mentorship programs organized in cooperation with businesses and public institutions; master's theses based on real-world industrial challenges – research projects aligned with the current needs of the energy sector.

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

The study program and its potential modifications take into account the feedback, opinions, and recommendations of graduates, employers, the Faculty's Social Council, as well as future employers from the industrial sector. The labor market and socio-economic environment are continuously monitored, and information is collected regarding employers' expectations for graduates.

Duration, rules and form of the practical placement

Not applicable.

Admission criteria, rules and policies

Field of study: Energy Transition

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

A candidate for the program should have a passion for both science and technical subjects, as well as a very good command of English. Natural candidates for these studies are graduates with an engineering degree in fields such as Energy Engineering, Renewable Energy and Energy Management, and Modern Fuel Technologies.

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 rules and conditions of recruitment are determined each year by the AGH Senate Resolution regarding the conditions, procedure, and deadlines for the start and completion of recruitment for the first year of first- and second-cycle studies beginning in a 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: 10
Maximum number of students: 36

Learning outcomes

Field of study: Energy Transition

Knowledge

KEU symbol	Learning outcomes prescribed to a field of study	CEU symbol
ETR2A_W01	The graduate has advanced knowledge of the mathematical description of processes in the fields of energy and environmental protection, as well as proficiency in optimization techniques and advanced mathematical methods essential for process modeling.	P7S_WG_A
ETR2A_W02	The graduate knows the methods of energy assessment of processes - balancing, energy and exergy analysis, determining indicators of cumulative energy consumption, thermo-ecological analysis, utilization of waste energy, district heating, combined heat and power systems, and methods of energy auditing.	P7S_WG_A
ETR2A_W03	The graduate has knowledge of natural fuel resources, their physical and chemical properties, and the use of renewable energy sources in power generation, heating and cooling.	P7S_WG_A
ETR2A_W04	The graduate has knowledge of the lifecycle of devices, facilities, and technical systems in the energy sector, and is familiar with the principles of operation and maintenance of energy machines and equipment, as well as refrigeration and heat devices.	P7S_WG_A_Inz, P7S_WK_A
ETR2A_W05	The graduate has the knowledge necessary to understand the social, economic, legal, and other non-technical aspects of engineering activities. Additionally, they are familiar with the basic principles of creating and developing various forms of individual entrepreneurship.	P7S_WK_A_Inz, P7S_WK_A
ETR2A_W06	The graduate is knowledgeable in the methods of designing and selecting equipment, installations, and energy processes, systems for emission reduction and using commercial computer programs effectively.	P7S_WG_A
ETR2A_W07	The graduate knows of methods for utilizing renewable energy resources (water, solar, geothermal, wind, biomass), detailed knowledge of energy conversion, transportation technologies, energy storage, and hydrogen production.	P7S_WG_A
ETR2A_W08	The graduate knows the general principles of creating and developing forms of individual entrepreneurship, utilizing knowledge from the fields of science and academic disciplines relevant to the studied field of study.	P7S_WK_A_Inz, P7S_WG_A

Skills

KEU symbol	Learning outcomes prescribed to a field of study	CEU symbol
ETR2A_U01	The graduate is able to obtain information from literature, databases, and other appropriately selected sources, including in English or another foreign language recognized as an international communication language in the field of energy; is capable of integrating the acquired information, interpreting and critically evaluating it, as well as drawing conclusions and formulating and thoroughly justifying opinions.	P7S_UK_A
ETR2A_U02	The graduate is capable of planning and conducting experiments, including measurements and computer simulations, interpreting obtained results, analyzing data, testing hypotheses, and developing mathematical models for both steady-state and dynamic processes in energy systems. They effectively apply technical advancements, consider non-technical aspects, and assess the technical, economic, and environmental impacts of engineering solutions in the energy sector.	P7S_UW_A_Inz_01, P7S_UW_A
ETR2A_U03	The graduate is able to analyze and compare applied technical solutions, particularly devices, facilities, systems, processes, and services in energy sector.	P7S_UW_A
ETR2A_U04	The graduate is capable of designing energy systems, devices, and processes, as well as selecting suitable machines and installations, by applying advanced engineering knowledge and skills to ensure efficiency, sustainability, and compliance with technical standards. This includes supporting the energy transition in the power sector and in heating and cooling systems through the integration of low-emission technologies, renewable energy sources, and innovative energy management solutions.	P7S_UW_A_Inz_02

KEU symbol	Learning outcomes prescribed to a field of study	CEU symbol
ETR2A_U05	Is able to perform a techno-economic analysis of designed and modernized energy, heating, and cooling installations using methods of cumulative energy consumption indicators and economic analysis.	P7S_UW_A
ETR2A_U06	The graduate is capable of utilizing information and communication technologies (ICT) appropriate for engineering tasks and can effectively work in a team on engineering and economic projects.	P7S_UO_A, P7S_UW_A
ETR2A_U07	The graduate is capable of independently planning and pursuing lifelong learning, as well as supporting and guiding others in their learning processes. This includes the ability to identify personal and professional development needs, set appropriate learning goals, and select effective learning strategies and resources.	P7S_UU_A
ETR2A_U08	The graduate is capable of planning and engaging in lifelong learning, particularly in acquiring, processing, transferring, storing, and utilizing energy.	P7S_UK_A
ETR2A_U09	The graduate is able to prepare a scientific paper in English, recognized as the primary language, presenting the results of their own research.	P7S_UK_A

Social competence

KEU symbol	Learning outcomes prescribed to a field of study	CEU symbol
ETR2A_K01	The graduate understands the significance and impact of non-technical aspects of engineering activities, particularly their environmental effects, and recognizes the responsibility associated with decision-making.	P7S_KK_A
ETR2A_K02	The graduate is aware of their responsibilities, acts with entrepreneurial and professional integrity, and takes initiatives to promote the public interest. This includes advocating for energy efficiency, rational energy use, and contributing to the country's energy security.	P7S_KO_A
ETR2A_K03	A graduate is aware of the need for effective prioritization during the implementation of both personal and assigned tasks. They are also conscious of the responsibility associated with performing professional roles, taking into account changing social needs, including caring for the development of professional achievements, maintaining the ethos of the profession, as well as observing and enhancing professional ethical standards, while actively working towards their compliance.	P7S_KR_A
ETR2A_K04	Is able to think and act creatively and entrepreneurially, understands the need for lifelong learning, and can inspire and organize the learning process for others.	P7S_KO_A

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

Major: Energy Transition

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	ETR2A_W04
P7S_WK_A_Inz	knowledge of basic principles of creating and developing various forms of individual entrepreneurship	ETR2A_W05, ETR2A_W08

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;	ETR2A_U02
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	ETR2A_U04

Field of study-prescribed outcomes coverage matrix

Field of study: Energy Transition

2025/2026/S/IIi/EiP/ETR/all

Course	Code	Semestr	ETR2A_W01	ETR2A_W02	ETR2A_W03	ETR2A_W04	ETR2A_W05	ETR2A_W06	ETR2A_W07	ETR2A_W08	ETR2A_U01	ETR2A_U02	ETR2A_U03	ETR2A_U04	ETR2A_U05	ETR2A_U06	ETR2A_U07	ETR2A_U08	ETR2A_U09	ETR2A_K01	ETR2A_K02	ETR2A_K03	ETR2A_K04
Renewable Energy Technologies	SETRS.IIi1K.02952.25	1s	x	x	x			x	x		x		x	x	x	x			x	x	x	x	x
Environmental Protection in Energy Sector	SETRS.IIi1K.04568.25	1s	x	x	x		x	x	x	x	x	x	x			x	x	x	x	x		x	x
Energy Efficient Solutions in Sustainable Buildings	SETRS.IIi1K.12869.25	1s		x				x						x					x				
Advanced Energy Conversion and Storage	SETRS.IIi1S.04570.25	1s	x	x	x	x		x	x		x		x	x	x		x	x	x	x	x	x	
Circular Economy	SETRS.IIi1HS.08852.25	1s				x	x				x					x				x				x
Students Research Group	SETRS.IIi1S.02166.25	1s	x	x		x		x			x	x	x				x		x	x		x	
Hydrogen and Alternative Liquid Fuels	SETRS.IIi1S.12857.25	1s		x	x	x		x	x		x		x	x		x	x	x	x	x		x	x
CO2 Mitigation Technologies	SETRS.IIi1S.17335.25	1s		x	x	x	x	x			x	x				x	x	x	x	x	x	x	x
Batteries and Fuel Cells	SETRS.IIi2S.01676.25	2s	x	x	x	x	x	x	x	x		x	x	x		x	x			x	x	x	x
Energy Economics, Policy and Markets	SETRS.IIi2K.15677.25	2s	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x		x	x	x	x
Energy Transition in Energy Sector	SETRS.IIi2S.19038.25	2s	x	x	x	x	x	x	x	x	x	x	x		x	x	x	x	x	x	x	x	x
Modelling of Energy Systems	SETRS.IIi2S.12666.25	2s	x	x		x		x	x		x	x	x	x	x	x	x	x		x		x	x
Waste to Energy and Alternative Solid Fuels	SETRS.IIi2S.19040.25	2s			x			x			x	x	x	x		x	x	x		x			
From Idea to Startup	SETRS.IIi2HS.19041.25	2s					x			x					x	x			x		x		x
Students Research Group	SETRS.IIi2S.02166.25	2s	x	x		x		x	x		x		x			x	x	x	x	x	x	x	x
Diploma Thesis	SETRS.IIi4O.01412.25	3s					x			x	x		x			x	x	x	x	x	x	x	x

Course	Code	Semestr	ETR2A_W01	ETR2A_W02	ETR2A_W03	ETR2A_W04	ETR2A_W05	ETR2A_W06	ETR2A_W07	ETR2A_W08	ETR2A_U01	ETR2A_U02	ETR2A_U03	ETR2A_U04	ETR2A_U05	ETR2A_U06	ETR2A_U07	ETR2A_U08	ETR2A_U09	ETR2A_K01	ETR2A_K02	ETR2A_K03	ETR2A_K04
Diploma Seminar	SETRS.IIi4O.01432.25	3s	x	x		x	x	x	x	x	x					x	x	x	x	x		x	x
Sum (obligatory):			8	9	6	7	7	9	8	6	9	5	8	6	5	9	8	7	7	10	6	9	9
Sum (elective):			2	4	3	4	2	5	2	1	5	3	4	2	1	5	5	4	5	5	3	4	4
Sum:			10	13	9	11	9	14	10	7	14	8	12	8	6	14	13	11	12	15	9	13	13

Characteristics matrix of learning outcomes in relation to modules

Major: Energy Transition

2025/2026/S/IIi/EiP/ETR/all

Course	Code	Semestr	P7S_WG_A	P7S_WG_A_Inz	P7S_WK_A	P7S_WK_A_Inz	P7S_UK_A	P7S_UW_A_Inz_01	P7S_UW_A	P7S_UW_A_Inz_02	P7S_UO_A	P7S_UU_A	P7S_KK_A	P7S_KO_A	P7S_KR_A
Renewable Energy Technologies	SETRS.IIi1K.02952.25	1s	x				x		x	x	x		x	x	x
Environmental Protection in Energy Sector	SETRS.IIi1K.04568.25	1s	x		x	x	x	x	x		x	x	x	x	x
Energy Efficient Solutions in Sustainable Buildings	SETRS.IIi1K.12869.25	1s	x				x			x					
Advanced Energy Conversion and Storage	SETRS.IIi1S.04570.25	1s	x	x	x		x		x	x		x	x	x	x
Circular Economy	SETRS.IIi1HS.08852.25	1s		x	x	x	x		x		x		x	x	
Students Research Group	SETRS.IIi1S.02166.25	1s	x	x	x		x	x	x			x	x		x
Hydrogen and Alternative Liquid Fuels	SETRS.IIi1S.12857.25	1s	x	x	x		x		x	x	x	x	x	x	x
CO2 Mitigation Technologies	SETRS.IIi1S.17335.25	1s	x	x	x	x	x	x	x		x	x	x	x	x
Batteries and Fuel Cells	SETRS.IIi2S.01676.25	2s	x	x	x	x		x	x	x	x	x	x	x	x
Energy Economics, Policy and Markets	SETRS.IIi2K.15677.25	2s	x	x	x	x	x	x	x	x	x	x	x	x	x
Energy Transition in Energy Sector	SETRS.IIi2S.19038.25	2s	x	x	x	x	x	x	x		x	x	x	x	x
Modelling of Energy Systems	SETRS.IIi2S.12666.25	2s	x	x	x		x	x	x	x	x	x	x	x	x
Waste to Energy and Alternative Solid Fuels	SETRS.IIi2S.19040.25	2s	x				x	x	x	x	x	x	x		
From Idea to Startup	SETRS.IIi2HS.19041.25	2s	x		x	x	x		x		x			x	
Students Research Group	SETRS.IIi2S.02166.25	2s	x	x	x		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_UK_A	P7S_UW_A_Inz_01	P7S_UW_A	P7S_UW_A_Inz_02	P7S_UO_A	P7S_UU_A	P7S_KK_A	P7S_KO_A	P7S_KR_A
Diploma Thesis	SETRS.IIi4O.01412.25	3s	x		x	x	x		x		x	x	x	x	x
Diploma Seminar	SETRS.IIi4O.01432.25	3s	x	x	x	x	x		x		x	x	x	x	x
Sum (obligatory):			10	7	9	7	10	5	10	6	9	8	10	10	9
Sum (elective):			6	4	5	2	6	3	6	2	5	5	5	4	4
Sum:			16	11	14	9	16	8	16	8	14	13	15	14	13

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

Major: Energy Transition

2025/2026/S/IIi/EiP/ETR/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
Renewable Energy Technologies	Lectures, Laboratory classes, Project classes	Examination, Report, Project	ETR2A_W02, ETR2A_W03, ETR2A_W07, ETR2A_W01, ETR2A_W06, ETR2A_U01, ETR2A_U03, ETR2A_U04, ETR2A_U05, ETR2A_U06, ETR2A_U09, ETR2A_K01, ETR2A_K02, ETR2A_K03, ETR2A_K04
Environmental Protection in Energy Sector	Lectures, Laboratory classes, Project classes	Activity during classes, Execution of laboratory classes, Execution of a project	ETR2A_W01, ETR2A_W02, ETR2A_W03, ETR2A_W05, ETR2A_W06, ETR2A_W07, ETR2A_W08, ETR2A_U01, ETR2A_U02, ETR2A_U03, ETR2A_U06, ETR2A_U07, ETR2A_U08, ETR2A_U09, ETR2A_K01, ETR2A_K03, ETR2A_K04
Energy Efficient Solutions in Sustainable Buildings	Lectures, Auditorium classes, Laboratory classes, Project classes	Participation in a discussion, Test, Case study, Participation in a discussion, Execution of exercises, Test, Activity during classes, Execution of laboratory classes, Report, Preparation and conduct of scientific research, Activity during classes, Execution of a project, Project, Presentation	ETR2A_W02, ETR2A_W06, ETR2A_U04, ETR2A_U09
Advanced Energy Conversion and Storage	Lectures, Auditorium classes, Project classes, Practical classes	Examination, Test, Project, Report	ETR2A_W01, ETR2A_W02, ETR2A_W03, ETR2A_W04, ETR2A_W06, ETR2A_W07, ETR2A_U03, ETR2A_U04, ETR2A_U05, ETR2A_U08, ETR2A_U01, ETR2A_U07, ETR2A_U09, ETR2A_K01, ETR2A_K02, ETR2A_K03
Circular Economy	Lectures, Project classes	Activity during classes, Participation in a discussion, Case study, Participation in a discussion, Execution of a project, Involvement in teamwork, Presentation	ETR2A_W05, ETR2A_W04, ETR2A_U01, ETR2A_U06, ETR2A_K01, ETR2A_K04
Students Research Group	Practical classes	Project	ETR2A_W01, ETR2A_W02, ETR2A_W04, ETR2A_W06, ETR2A_U01, ETR2A_U02, ETR2A_U03, ETR2A_U07, ETR2A_U09, ETR2A_K01, ETR2A_K03
Hydrogen and Alternative Liquid Fuels	Lectures, Laboratory classes, Seminars	Activity during classes, Execution of laboratory classes, Presentation	ETR2A_W02, ETR2A_W03, ETR2A_W04, ETR2A_W07, ETR2A_W06, ETR2A_U01, ETR2A_U03, ETR2A_U04, ETR2A_U06, ETR2A_U07, ETR2A_U08, ETR2A_U09, ETR2A_K01, ETR2A_K03, ETR2A_K04

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
CO2 Mitigation Technologies	Lectures, Seminars	Test, Case study, Activity during classes, Participation in a discussion, Test, Case study	ETR2A_W02, ETR2A_W03, ETR2A_W04, ETR2A_W05, ETR2A_W06, ETR2A_U01, ETR2A_U02, ETR2A_U06, ETR2A_U07, ETR2A_U08, ETR2A_U09, ETR2A_K01, ETR2A_K02, ETR2A_K03, ETR2A_K04
Batteries and Fuel Cells	Lectures, Laboratory classes, Project classes	Activity during classes, Test, Examination, Execution of laboratory classes, Preparation and conduct of scientific research, Project, Case study	ETR2A_W01, ETR2A_W02, ETR2A_W03, ETR2A_W04, ETR2A_W05, ETR2A_W06, ETR2A_W07, ETR2A_W08, ETR2A_U02, ETR2A_U03, ETR2A_U04, ETR2A_U06, ETR2A_U07, ETR2A_K02, ETR2A_K03, ETR2A_K01, ETR2A_K04
Energy Economics, Policy and Markets	Lectures, Project classes	Activity during classes, Execution of a project	ETR2A_W01, ETR2A_W02, ETR2A_W03, ETR2A_W04, ETR2A_W05, ETR2A_W06, ETR2A_W07, ETR2A_W08, ETR2A_U01, ETR2A_U02, ETR2A_U03, ETR2A_U04, ETR2A_U05, ETR2A_U06, ETR2A_U07, ETR2A_U08, ETR2A_K01, ETR2A_K02, ETR2A_K03, ETR2A_K04
Energy Transition in Energy Sector	Lectures, Auditorium classes, Project classes, Discussion seminars, Practical classes	Examination, Test, Project, Presentation, Report	ETR2A_W01, ETR2A_W02, ETR2A_W03, ETR2A_W04, ETR2A_W06, ETR2A_W07, ETR2A_W05, ETR2A_W08, ETR2A_U03, ETR2A_U05, ETR2A_U06, ETR2A_U07, ETR2A_U08, ETR2A_U01, ETR2A_U02, ETR2A_U09, ETR2A_K01, ETR2A_K02, ETR2A_K03, ETR2A_K04
Modelling of Energy Systems	Lectures, Laboratory classes, Project classes	Activity during classes, Participation in a discussion, Activity during classes, Execution of laboratory classes, Execution of a project, Involvement in teamwork	ETR2A_W01, ETR2A_W02, ETR2A_W04, ETR2A_W06, ETR2A_W07, ETR2A_U05, ETR2A_U06, ETR2A_U07, ETR2A_U01, ETR2A_U02, ETR2A_U03, ETR2A_U04, ETR2A_U08, ETR2A_K01, ETR2A_K03, ETR2A_K04
Waste to Energy and Alternative Solid Fuels	Lectures, Auditorium classes, Laboratory classes	Activity during classes, Participation in a discussion, Test, Case study, Activity during classes, Participation in a discussion, Execution of exercises, Test, Activity during classes, Execution of laboratory classes, Report, Test results, Oral answer, Completion of laboratory classes	ETR2A_W03, ETR2A_W06, ETR2A_U01, ETR2A_U02, ETR2A_U06, ETR2A_U08, ETR2A_U04, ETR2A_U07, ETR2A_U03, ETR2A_K01
From Idea to Startup	Lectures, Project classes	Activity during classes, Participation in a discussion, Case study, Project, Presentation	ETR2A_W05, ETR2A_W08, ETR2A_U06, ETR2A_U09, ETR2A_U05, ETR2A_K02, ETR2A_K04
Students Research Group	Practical classes	Project	ETR2A_W02, ETR2A_W04, ETR2A_W06, ETR2A_W07, ETR2A_W01, ETR2A_U01, ETR2A_U03, ETR2A_U06, ETR2A_U07, ETR2A_U08, ETR2A_U09, ETR2A_K01, ETR2A_K02, ETR2A_K03, ETR2A_K04
Diploma Thesis	Diploma Thesis	Diploma thesis, Presentation	ETR2A_W05, ETR2A_W08, ETR2A_U01, ETR2A_U03, ETR2A_U07, ETR2A_U08, ETR2A_U09, ETR2A_U06, ETR2A_K01, ETR2A_K02, ETR2A_K03, ETR2A_K04

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 Seminar	Discussion seminars, Seminars	Presentation, Participation in a discussion, Diploma thesis preparation, Presentation	ETR2A_W01, ETR2A_W02, ETR2A_W04, ETR2A_W05, ETR2A_W06, ETR2A_W07, ETR2A_W08, ETR2A_U01, ETR2A_U06, ETR2A_U07, ETR2A_U08, ETR2A_U09, ETR2A_K01, ETR2A_K03, ETR2A_K04

ECTS credits calculations

Field of study: Energy Transition

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	45
core science classes relevant to a given major	
practical classes, developing practical skills, including laboratory, design, practical and workshop classes	50
classes subject to choice by the student (in the amount of not less than 30% of the number of ECTS credits necessary to obtain qualifications corresponding to the level of education)	30
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	5
foreign language classes	2
practical placements	
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 credits 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)	85
classes shaping practical skills in the amount greater than 50% of the number of ECTS credits required to complete studies at a given level (applies only to studies with a practical profile)	

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

Field of study: Energy Transition

Enrollment rules for the next semester

A student is enrolled in the next semester after successfully completing all study program modules required for the current semester.

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

Enrollment is possible with the maximum allowable deficit of credits permitted for the study program.

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)

With the approval of the Dean of the Faculty in consultation with the course instructor.

Monitoring semesters

No control semesters.

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

A student has the right to pursue studies in a specific program under an Individual Study Organization (IOS) with the approval of the Dean of the Faculty.

The IOS at the Faculty of Energy and Fuels complies with the AGH Study Regulations and the Faculty Council's guidelines.

Approval from the Dean for IOS for exceptionally talented and outstanding students requires:

- A minimum GPA of 4.25,
- A detailed IOS program approved by the academic supervisor and the head of the department,
- Final approval of the detailed IOS program.

Implementation of practical placements including monitoring system and completion rules

Not applicable.

Rules of elective modules taking

A student selects one or more elective modules from the pool of elective modules assigned to a given semester, in accordance with the study program and curriculum, by registering in the university's electronic system.

The minimum required number of students to launch a module is 8.

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

Not applicable.

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

A master's thesis is a mandatory component of the study program. The submission of the thesis requires the completion of all courses outlined in the study program (obtaining the so-called absolution) and a positive evaluation of the thesis by both the supervisor and the reviewer.

The detailed rules for implementing the study program are determined by the Dean of the Faculty.

A student may be admitted to the diploma examination if they:

- Have completed all courses required by the study program,
- Have submitted the thesis within the required deadline,
- Have submitted all necessary documents required by the Dean of the Faculty.

The diploma process is conducted in accordance with the AGH Study Regulations and the specific rules of the Faculty of Energy and Fuels.

The diploma examination consists of:

- A presentation of the thesis,
- A discussion about the thesis,
- An assessment of knowledge at the second-cycle level, conducted as an oral examination with at least three questions.

The requirements related to the preparation, format, and scope of the master's thesis are governed by the AGH Study Regulations. However, detailed guidelines regarding topic selection, implementation, editing standards, and evaluation criteria are defined by the Faculty of Energy and Fuels.

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

The final grade for the degree (OK), in accordance with the Faculty Council resolution, is a weighted average calculated as follows:

OK = 0.6S + 0.2E + 0.2*P

where:

S – Grade Point Average (GPA) from studies,
E – Grade from the diploma examination,
P – Grade for the master’s thesis.

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

For the diploma examination process, the Dean appoints the Diploma Examination Committee or the Chairman of the Committee, who then determines the date and composition of the Committee for a given examination.

The Diploma Examination Committee must consist of at least three members, including:

- The Chairman,
- Two Committee Members.

The thesis supervisor cannot serve as the Chairman.

The thesis must be submitted to the Dean’s Office at least 5 working days before the scheduled defense date to be eligible for the diploma examination.