Curriculum

Field of study: Sustainable Energy Systems

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General characteristics of the field of study

Basic information

Faculty name:	Faculty of Energy and Fuels
Field of study:	Sustainable Energy Systems
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:	120
Professional title awarded to graduates:	magister inżynier
Cycle start date:	2026/2027, winter semester
Duration of studies (number of semesters):	4

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%	120

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

The “Sustainable Energy Systems” degree programme, delivered entirely in English, is being established in line with the recommendations of the AGH University authorities regarding the transformation of diploma pathways into independent degree programmes. At the same time, it aligns with the AGH Development Strategy. This degree programme represents a unique educational offering at AGH, designed as a response to the need for a comprehensive, integrated, and interdisciplinary approach to contemporary energy challenges. Its core principle is a systems approach, encompassing technical, environmental, social, and economic aspects across the entire lifecycle of planning, designing, and operating sustainable energy systems. Currently, the Faculty of Energy and Fuels offers an English-language diploma pathway in “Sustainable Energy Systems,” which, in accordance with the objectives of the “AGH KOMPAS” project (COMpetences, PASSion – Academy of Modern Professionals at AGH), will be transformed into a full degree programme. The proposed curriculum has been developed based on extensive experience from long-standing international cooperation within the EIT InnoEnergy MSc SELECT Master’s degree programme. The SES degree programme addresses the goals defined in the AGH Development Strategy, particularly Strategic Objective 1 – “Modern education attractive to students and the wider community both in Poland and abroad” – and supports efforts towards further internationalisation of education. It also contributes to the achievement of the following objectives:

- aligning the educational offer with current labour market needs and student expectations,
- developing multidisciplinary and international education,
- strengthening AGH's position in the international educational space,
- creating educational offerings in collaboration with socio-economic stakeholders.

The SES degree programme prepares future leaders capable of supporting the development of a sustainable society and economy, which has been clearly identified as one of the key elements of AGH’s vision as a university of the future.

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 Sustainable Energy Systems degree programme has been developed in response to current socio-economic needs, arising from the dynamic transformation of the energy sector, the advancement of climate policy, and the evolving demands of the labour market. The programme addresses the growing need for highly qualified professionals capable of meeting the challenges of modern energy systems.

The intended learning outcomes have been designed in close collaboration with representatives from industry, public administration, and research and development institutions, ensuring alignment with employer expectations and the current challenges of the energy transition. Graduates of the programme will be comprehensively prepared to work in international environments, across the industrial sector, public administration, R&D institutions, and consulting firms, making a meaningful contribution to the development of innovative and sustainable solutions for contemporary energy systems.

It is worth emphasizing that the study programme has been designed based on extensive experience gained through long-standing international cooperation within the EIT InnoEnergy MSc SELECT Master's programme, which ensures that the programme is well aligned with labour market needs and focused on the development of innovation-related competencies.

The SES pathway was awarded the EIT Label in 2024, confirming the programme’s compliance with EIT quality standards and its strong focus on entrepreneurship, innovation, and the integration of education, research, and business. The EIT Label is a prestigious distinction granted only to selected educational programmes that meet rigorous quality criteria in the areas of innovation and entrepreneurship education. Receiving this label is a recognition of the programme’s educational excellence and international character, significantly enhancing its visibility and attractiveness to students and employers worldwide.

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: Sustainable Energy Systems

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

The Sustainable Energy Systems degree programme aims to educate specialists capable of designing, analysing, and implementing comprehensive solutions for modern, sustainable energy systems. Its core principle is a systems approach that integrates technical, environmental, social, and economic aspects throughout the entire cycle of planning, designing, and operating sustainable energy systems. During the course of their studies, students gain skills in the following areas:

- Integrated energy system planning,
- Energy system modelling and optimisation,
- Design of hybrid systems based on renewable energy sources,
- Renewable energy technologies, batteries, and fuel cells,
- Energy economics and energy markets,
- Climate and energy policy and support mechanisms,
- Project management and entrepreneurship in the energy sector.

The study programme combines strong theoretical foundations with a practical approach, offering project-based, laboratory, and hands-on activities, as well as teamwork in an international environment with industrial partners in a Challenge-Based Education format. The courses Leadership & Team Management and Integrated Project of the Year in Sustainable Energy fall within the domain of social sciences. The knowledge, skills, and competences acquired will enable graduates to take on roles as designers, analysts, consultants, and project leaders in the field of modern sustainable energy systems.

Graduates will be well prepared for employment in areas such as:

- Energy companies (management of production, RES development and integration, system planning),
- Public administration and international organisations (e.g. agencies for energy, climate, infrastructure),
- Consulting and advisory firms (system analysis, energy policy, decarbonisation strategies),
- Research and development centres, universities, and think tanks,
- Start-ups and companies involved in innovative energy technologies.

Graduates are also well equipped to continue their academic path or pursue advanced qualifications. They may further develop their competences through:

- Doctoral studies in the fields of energy systems, sustainable technologies, or energy and climate policy,
- Certification programmes and specialised courses (e.g. techno-economic analysis, energy management),
- International exchange programmes and postgraduate studies in energy and sustainable development,
- Acceleration and mentoring programmes for entrepreneurs offered by EIT InnoEnergy.

The Sustainable Energy Systems degree programme offers comprehensive preparation for careers in the global energy sector, educating leaders capable of designing sustainable energy solutions that benefit both society and the environment. It also fosters entrepreneurial thinking, innovation, and the ability to establish and manage one’s own business.

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

An analysis of the career paths of students and graduates clearly demonstrates the need to introduce new study programs and specializations, particularly in areas that are currently developing or have the potential to become key sectors of the economy in the future.

Unlike most programs offered at AGH, the Sustainable Energy Systems curriculum places particular emphasis on solutions that support the decentralization of the power grid, the development of distributed energy systems, and hybrid configurations based on renewable energy sources.

The Sustainable Energy Systems program, built on ongoing analysis of graduate career trajectories and close collaboration with employers, equips students with knowledge and skills tailored to current market demands—significantly enhancing their professional competitiveness.

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 alignment of the Sustainable Energy Systems program with labor market demands, the continuous involvement of energy sector representatives, students, and doctoral candidates in the development and updating of the educational offer is essential. These efforts include, among others, engaging students and PhD candidates in the improvement of the educational process through the analysis of regular teaching quality surveys and the submission of proposals for new courses and teaching methods.

A strong emphasis is placed on active engagement and close collaboration with industry and institutions within the energy sector. This area is systematically developed, for example, through the organization of lectures delivered by industry experts, providing students with access to the latest knowledge about modern, sustainable energy systems. Additionally, research and development projects are carried out in cooperation with energy companies, allowing students to strengthen their skills in teamwork, project management, and international collaboration, while solving real-world problems presented by the industry.

Such an approach enables the program to be even more effectively adapted to the challenges of contemporary energy systems and significantly enhances the competitiveness of its graduates on the job market. It is worth noting that the curriculum proposed within the degree programme has been developed based on the experience gained through many years of international collaboration within the EIT InnoEnergy MSc SELECT Master's degree programme and also takes into account the results of graduate career tracking conducted by EIT InnoEnergy.

Information on including examples of good practice in the curriculum

The Sustainable Energy Systems study program has been designed to ensure high-quality education in line with current educational standards. The curriculum is continuously updated to reflect global trends, the latest European Union regulations, and the evolving demands of the labor market, ensuring that graduates acquire practical and up-to-date qualifications. The program includes the following key components:

- Proven teaching solutions - The program incorporates proven teaching methods developed at the Faculty of Energy and Fuels (WEiP), based on feedback from students and lecturers, as well as the results of discussions and quality assessments of teaching. These actions aim to improve the effectiveness and relevance of the courses.
- Innovative teaching methods - Classes are conducted using real-life examples and case study analyses, particularly in the areas of energy policy and the development of sustainable energy systems. The program combines traditional lectures with interactive teaching methods, such as e-learning, computer simulations, and project work in teams.
- Close collaboration with industry and energy sector institutions - Students participate in projects based on real data and problems, gaining practical experience. A key component in this context is the course "Integrated Project of the Year in Sustainable Energy" (IPoY), which is conducted using the Challenge-Based Education approach. In this course, students work on real and current challenges presented by industrial partners. Industry experts, both domestic and international, as well as public administration representatives and international organizations, are often involved in the educational process, providing knowledge aligned with the latest trends and industry needs.
- Practical orientation and professional development - Master’s theses are frequently developed in collaboration with industrial partners, based on real challenges and ongoing research projects, enabling students to develop competencies that are critical for their future careers.

This well-structured curriculum ensures that graduates not only receive a solid theoretical foundation but also acquire practical skills and experience necessary for effective action in the rapidly developing energy sector. It is also worth emphasizing that the new direction takes into account the recommendations contained in the reports of the Polish Accreditation Committee from 2015 and 2021.

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

The study programme and any potential modifications are developed with consideration of the feedback, opinions, expectations, and suggestions of graduates (including those of the Sustainable Energy Systems diploma pathway), current students, the Faculty’s Advisory Board, as well as future potential employers from various sectors such as industry, services, consulting firms, and public administration. The labour market and the socio-economic environment are continuously monitored, and information is gathered regarding employers’ expectations for graduates, both in Poland and across the European Union. The study programme has been developed based on the teaching and project experience accumulated within the SES study track. Particularly important in this context has been the collaboration with industrial partners involved in student project work within SES, including Shell-ETCA, TAURON Ciepło, EDF, E.ON, and EIT InnoEnergy itself.

Duration, rules and form of the practical placement

Not applicable.

Admission criteria, rules and policies

Field of study: Sustainable Energy Systems

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

Candidates applying for admission to the program must hold qualifications at Level 6 of the Polish Qualifications Framework (PRK) and possess English language proficiency at least at B2 level. Natural candidates for this programme are graduates holding an engineering degree, particularly from programmes such as Energy Engineering, Renewable Energy and Energy Management, and Modern Fuel Technologies. The programme is also open to graduates with a bachelor's degree in fields related to Sustainable Energy Systems who are interested in acquiring the knowledge, skills, and competences necessary for employment in the dynamically developing energy sector. These candidates are subject to a separate recruitment process for a bridging semester, which is designed to compensate for gaps in engineering-related subjects.

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 AGH Senate on the conditions and procedures for admission to the first year of second-cycle studies in a given academic year.

Candidates are admitted within the available number of places through a competitive selection process, based on a ranking list compiled according to the grades obtained from first-cycle studies (corresponding to Level 6 of the Polish Qualifications Framework) and the result of the entrance examination.

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: Sustainable Energy Systems

Knowledge

KEU symbol	Learning outcomes prescribed to a field of study	CEU symbol
SES2A_W01	The graduate possesses in-depth knowledge in the field of modeling and analysis of sustainable energy systems, including the principles of balancing processes occurring throughout the lifecycle of devices, as well as simulation, optimization, and scenario-based methods used to solve complex engineering problems.	P7S_WG_A
SES2A_W02	The graduate has knowledge of advanced renewable energy technologies, the principles of their integration with energy systems, including the use of energy storage, as well as the principles of designing and operating hybrid renewable energy systems and their role in the development of sustainable energy systems.	P7S_WG_A_Inz
SES2A_W03	The graduate understands the fundamental dilemmas of modern civilization as well as the economic, legal, and ethical conditions for the development of sustainable energy systems. The graduate comprehends the challenges related to ensuring universal access to affordable, stable, and reliable energy supply, while simultaneously protecting the environment, strengthening energy independence, and supporting socio-economic development.	P7S_WK_A
SES2A_W04	The graduate is familiar with the basic principles of creating and developing various forms of entrepreneurship in the field of sustainable energy, as well as the methods of techno-economic and environmental analysis of energy projects, taking into account regulatory, market, and investment conditions. The graduate is familiar with and understands the standards and legal regulations applied in the energy sector, as well as the principles of industrial property protection and copyright law.	P7S_WK_A_Inz, P7S_WK_A

Skills

KEU symbol	Learning outcomes prescribed to a field of study	CEU symbol
SES2A_U01	The graduate is able to formulate a technical or design problem related to a selected element of a sustainable energy system, select and apply existing methods to solve it or develop new methods appropriate to its specificity, and design an appropriate solution.	P7S_UW_A_Inz_02 , P7S_UW_A
SES2A_U02	The graduate is able to use available IT tools and computational environments that support operational planning and the development of a sustainable energy system under specific technical, environmental and spatial conditions. They are capable of performing computer simulations using these tools, preparing input assumptions, interpreting the obtained results, and effectively communicating them to a diverse group of stakeholders using specialist terminology.	P7S_UW_A_Inz_01 , P7S_UW_A
SES2A_U03	The graduate is able to plan and conduct laboratory experiments related to energy technologies used in sustainable energy systems.	P7S_UW_A_Inz_01 , P7S_UW_A
SES2A_U04	The graduate is able to formulate and test hypotheses related to basic problems concerning the functioning of sustainable energy systems and to critically assess their validity.	P7S_UW_A
SES2A_U05	The graduate, working in an international team, is able to analyse the impact of the transformation of the energy system into a sustainable one, taking into account environmental, economic and social impacts, is able to present the results in the form of a document and subject them to discussion in English.	P7S_UK_A
SES2A_U06	The graduate is able to collaborate effectively within a multi-person project team, taking on a leadership role and assuming responsibility for task implementation. The graduate is also able to plan their own activities within the group and support cooperation with other team members in working groups, taking into account their competencies and the project goals.	P7S_UO_A
SES2A_U07	The graduate is able to plan and undertake actions related to lifelong learning, particularly in the field of sustainable energy systems.	P7S_UU_A

Social competence

KEU symbol	Learning outcomes prescribed to a field of study	CEU symbol
SES2A_K01	The graduate is ready to critically assess their own knowledge and the content received, recognizes the importance of specialist knowledge in solving cognitive and practical problems in the field of sustainable energy systems, and is able to seek expert opinions in case of difficulties with solving a problem independently.	P7S_KK_A
SES2A_K02	The graduate is ready to engage in projects and social initiatives aimed at promoting the development of sustainable energy systems.	P7S_KO_A
SES2A_K03	The graduate is ready to act in an entrepreneurial and creative manner, identify social and technological needs, propose new energy products and services that address the challenges of modern sustainable energy systems, and manage projects related to their implementation.	P7S_KO_A
SES2A_K04	The graduate is aware of the responsibility associated with their role in society in the transformation towards sustainable energy systems and understands the need for continuous self-development and professional growth in order to effectively act as a leader, promote professional ethics, and contribute to achieving the goals of sustainable energy development.	P7S_KR_A

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

Major: Sustainable Energy Systems

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	SES2A_W02
P7S_WK_A_Inz	knowledge of basic principles of creating and developing various forms of individual entrepreneurship	SES2A_W04

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;	SES2A_U02, SES2A_U03
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	SES2A_U01

Field of study-prescribed outcomes coverage matrix

Field of study: Sustainable Energy Systems

2026/2027/S/IIi4/EiP/SES/all

Course	Code	Semestr	SES2A_W01	SES2A_W02	SES2A_W03	SES2A_W04	SES2A_U01	SES2A_U02	SES2A_U03	SES2A_U04	SES2A_U05	SES2A_U06	SES2A_U07	SES2A_K01	SES2A_K02	SES2A_K03	SES2A_K04
Sustainable Energy Sources	SSESS.IIi41K.19009.26	1s			x		x		x		x				x		x
Building Performance and Energy Systems Simulation	SSESS.IIi41K.19010.26	1s	x	x			x	x						x			
Thermal Conversion and Industrial System Analysis	SSESS.IIi41K.19011.26	1s	x	x			x		x					x			
Energy Innovation and Business Planning	SSESS.IIi41K.19012.26	1s				x					x					x	
Project of the Year in Sustainable Energy	SSESS.IIi41K.19013.26	1s			x	x					x	x			x	x	
Data-Driven Analysis of Sustainable Energy Systems	SSESS.IIi41K.19015.26	1s	x				x	x						x			x
Applied Informatics in Sustainable Energy Systems	SSESS.IIi41K.19016.26	1s	x					x						x			
Introduction to Energy Systems Modelling	SSESS.IIi42K.12224.26	2s	x					x									x
Renewable Energy Technologies	SSESS.IIi42K.02952.26	2s	x	x			x	x	x	x					x	x	
Energy and Environment	SSESS.IIi42K.01982.26	2s	x	x	x	x	x	x	x	x	x	x	x		x	x	x
Energy Efficiency	SSESS.IIi42K.05890.26	2s	x	x	x	x	x	x	x	x				x	x	x	x
Leadership & Team Management	SSESS.IIi42HS.05006.26	2s			x							x	x	x			x
Integrated Energy Resource Planning	SSESS.IIi44K.05886.26	3s	x					x						x			
Energy Policy, Markets and Economics	SSESS.IIi44K.12219.26	3s			x	x					x						x
Hybrid Renewable Energy Systems	SSESS.IIi44K.12220.26	3s	x	x			x	x	x	x				x	x		
Batteries and Fuel Cells	SSESS.IIi44K.01676.26	3s	x	x	x	x	x	x	x	x	x	x		x	x	x	x

Course	Code	Semestr	SES2A_W01	SES2A_W02	SES2A_W03	SES2A_W04	SES2A_U01	SES2A_U02	SES2A_U03	SES2A_U04	SES2A_U05	SES2A_U06	SES2A_U07	SES2A_K01	SES2A_K02	SES2A_K03	SES2A_K04
Integrated Project of the Year in Sustainable Energy	SSESS.IIi44HS.12221.26	3s			x	x					x	x	x	x	x	x	x
Energy Management Systems in Enterprises	SSESS.IIi44K.19018.26	3s	x			x	x			x		x		x	x	x	x
Students Research Group	SSESS.IIi44K.02166.26	3s	x	x				x	x	x		x	x	x			
Diploma Thesis	SSESS.IIi48K.01412.26	4s			x								x	x			
Diploma Seminar	SSESS.IIi48K.01432.26	4s			x								x	x			x
Sum (obligatory):			9	7	10	7	8	8	7	5	7	5	5	10	8	7	9
Sum (elective):			4	1	0	1	2	3	1	2	0	2	1	4	1	1	2
Sum:			13	8	10	8	10	11	8	7	7	7	6	14	9	8	11

Characteristics matrix of learning outcomes in relation to modules

Major: Sustainable Energy Systems

2026/2027/S/IIi4/EiP/SES/all

Course	Code	Semestr	P7S_WG_A	P7S_WG_A_Inz	P7S_WK_A	P7S_WK_A_Inz	P7S_UW_A_Inz_02	P7S_UW_A	P7S_UW_A_Inz_01	P7S_UK_A	P7S_UO_A	P7S_UU_A	P7S_KK_A	P7S_KO_A	P7S_KR_A
Sustainable Energy Sources	SSESS.IIi41K.19009.26	1s			x		x	x	x	x				x	x
Building Performance and Energy Systems Simulation	SSESS.IIi41K.19010.26	1s	x	x			x	x	x				x		
Thermal Conversion and Industrial System Analysis	SSESS.IIi41K.19011.26	1s	x	x			x	x	x				x		
Energy Innovation and Business Planning	SSESS.IIi41K.19012.26	1s			x	x				x				x	
Project of the Year in Sustainable Energy	SSESS.IIi41K.19013.26	1s			x	x				x	x			x	
Data-Driven Analysis of Sustainable Energy Systems	SSESS.IIi41K.19015.26	1s	x				x	x	x				x		x
Applied Informatics in Sustainable Energy Systems	SSESS.IIi41K.19016.26	1s	x					x	x				x		
Introduction to Energy Systems Modelling	SSESS.IIi42K.12224.26	2s	x					x	x						x
Renewable Energy Technologies	SSESS.IIi42K.02952.26	2s	x	x			x	x	x					x	
Energy and Environment	SSESS.IIi42K.01982.26	2s	x	x	x	x	x	x	x	x	x	x		x	x
Energy Efficiency	SSESS.IIi42K.05890.26	2s	x	x	x	x	x	x	x				x	x	x
Leadership & Team Management	SSESS.IIi42HS.05006.26	2s			x						x	x	x		x
Integrated Energy Resource Planning	SSESS.IIi44K.05886.26	3s	x					x	x				x		
Energy Policy, Markets and Economics	SSESS.IIi44K.12219.26	3s			x	x				x					x
Hybrid Renewable Energy Systems	SSESS.IIi44K.12220.26	3s	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_UW_A_Inz_02	P7S_UW_A	P7S_UW_A_Inz_01	P7S_UK_A	P7S_UO_A	P7S_UU_A	P7S_KK_A	P7S_KO_A	P7S_KR_A
Batteries and Fuel Cells	SSESS.IIi44K.01676.26	3s	x	x	x	x	x	x	x	x	x		x	x	x
Integrated Project of the Year in Sustainable Energy	SSESS.IIi44HS.12221.26	3s			x	x				x	x	x	x	x	x
Energy Management Systems in Enterprises	SSESS.IIi44K.19018.26	3s	x		x	x	x	x			x		x	x	x
Students Research Group	SSESS.IIi44K.02166.26	3s	x	x				x	x		x	x	x		
Diploma Thesis	SSESS.IIi48K.01412.26	4s			x							x	x		
Diploma Seminar	SSESS.IIi48K.01432.26	4s			x							x	x		x
Sum (obligatory):			9	7	11	7	8	10	10	7	5	5	10	9	9
Sum (elective):			4	1	1	1	2	4	3	0	2	1	4	1	2
Sum:			13	8	12	8	10	14	13	7	7	6	14	10	11

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

Major: Sustainable Energy Systems

2026/2027/S/IIi4/EiP/SES/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
Sustainable Energy Sources	Lectures, Project classes, Seminars	Examination, Activity during classes, Project, Activity during classes, Participation in a discussion, Presentation	SES2A_W03, SES2A_U01, SES2A_U03, SES2A_U05, SES2A_K02, SES2A_K04
Building Performance and Energy Systems Simulation	Lectures, Project classes, Laboratory classes	Test, Project, Report, Presentation, Execution of laboratory classes	SES2A_W01, SES2A_W02, SES2A_U01, SES2A_U02, SES2A_K01
Thermal Conversion and Industrial System Analysis	Lectures, Project classes, Laboratory classes	Test, Project, Report, Execution of laboratory classes	SES2A_W01, SES2A_W02, SES2A_U01, SES2A_U03, SES2A_K01
Energy Innovation and Business Planning	Lectures, Project classes	Examination, Report, Project, Report	SES2A_W04, SES2A_U05, SES2A_K03
Project of the Year in Sustainable Energy	Lectures, Project classes	Test, Project, Report, Presentation	SES2A_W03, SES2A_W04, SES2A_U05, SES2A_U06, SES2A_K02, SES2A_K03
Data-Driven Analysis of Sustainable Energy Systems	Lectures, Project classes, Laboratory classes	Execution of a project, Completion of laboratory classes, Project, Presentation, Report	SES2A_W01, SES2A_U01, SES2A_U02, SES2A_K01, SES2A_K04
Applied Informatics in Sustainable Energy Systems	Lectures, Project classes, Laboratory classes	Test, Project, Report, Presentation, Execution of laboratory classes	SES2A_W01, SES2A_U02, SES2A_K01
Introduction to Energy Systems Modelling	Lectures, Project classes, Laboratory classes	Examination, Project, Report, Presentation, Execution of laboratory classes	SES2A_W01, SES2A_U02, SES2A_K04
Renewable Energy Technologies	Lectures, Laboratory classes, Project classes	Examination, Report, Project	SES2A_W01, SES2A_W02, SES2A_U01, SES2A_U02, SES2A_U03, SES2A_U04, SES2A_K02, SES2A_K03
Energy and Environment	Lectures, Laboratory classes, Project classes, Seminars	Test, Execution of laboratory classes, Report on completion of a practical placement, Execution of a project, Case study, Presentation	SES2A_W01, SES2A_W02, SES2A_W03, SES2A_W04, SES2A_U03, SES2A_U04, SES2A_U05, SES2A_U01, SES2A_U02, SES2A_U06, SES2A_U07, SES2A_K03, SES2A_K04, SES2A_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
Energy Efficiency	Lectures, Laboratory classes, Project classes	Test, Execution of a project, Presentation, Execution of laboratory classes	SES2A_W01, SES2A_W02, SES2A_W03, SES2A_W04, SES2A_U01, SES2A_U02, SES2A_U03, SES2A_U04, SES2A_K01, SES2A_K02, SES2A_K03, SES2A_K04
Leadership & Team Management	Lectures, Project classes	Activity during classes, Activity during classes, Project, Presentation	SES2A_W03, SES2A_U06, SES2A_U07, SES2A_K01, SES2A_K04
Integrated Energy Resource Planning	Lectures, Laboratory classes, Project classes	Scientific paper, Execution of laboratory classes, Scientific paper, Scientific paper	SES2A_W01, SES2A_U02, SES2A_K01
Energy Policy, Markets and Economics	Lectures, Project classes, Seminars	Examination, Project, Report, Activity during classes, Test	SES2A_W03, SES2A_W04, SES2A_U05, SES2A_K04
Hybrid Renewable Energy Systems	Lectures, Laboratory classes, Project classes	Test, Report, Engineering project	SES2A_W01, SES2A_W02, SES2A_U01, SES2A_U02, SES2A_U03, SES2A_U04, SES2A_K01, SES2A_K02
Batteries and Fuel Cells	Lectures, Laboratory classes, Project classes	Examination, Execution of laboratory classes, Engineering project	SES2A_W01, SES2A_W02, SES2A_W03, SES2A_W04, SES2A_U01, SES2A_U02, SES2A_U03, SES2A_U04, SES2A_U05, SES2A_U06, SES2A_K01, SES2A_K02, SES2A_K03, SES2A_K04
Integrated Project of the Year in Sustainable Energy	Lectures, Project classes	Project, Report, Presentation, Project, Report, Presentation	SES2A_W03, SES2A_W04, SES2A_U05, SES2A_U06, SES2A_U07, SES2A_K01, SES2A_K02, SES2A_K03, SES2A_K04
Energy Management Systems in Enterprises	Lectures, Project classes, Seminars	Execution of a project, Project, Activity during classes	SES2A_W01, SES2A_W04, SES2A_U04, SES2A_U01, SES2A_U06, SES2A_K01, SES2A_K02, SES2A_K03, SES2A_K04
Students Research Group	Practical classes	Participation in competitions and festivals of science and technology, promotion of a faculty, the University	SES2A_W01, SES2A_W02, SES2A_U02, SES2A_U03, SES2A_U04, SES2A_U06, SES2A_U07, SES2A_K01
Diploma Thesis	Diploma Thesis	Diploma thesis preparation	SES2A_W03, SES2A_U07, SES2A_K01
Diploma Seminar	Seminars	Coordination, conduct of a research project, preparation of a scientific paper, organization, organization of conferences, camps and scientific trips.	SES2A_W03, SES2A_U07, SES2A_K01, SES2A_K04

ECTS credits calculations

Field of study: Sustainable Energy Systems

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	60
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)	40
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	11
foreign language classes	5
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: Sustainable Energy Systems

Enrollment rules for the next semester

A student is admitted to the next semester after obtaining credits for all modules specified in the study program.

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

Entry with the maximum allowable deficit for the field of study.

ECTS credits debt ceiling

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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 consent of the Dean of the Faculty in consultation with the course instructor.

Monitoring semesters

No follow-up 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 field according to an Individual Study Program (referred to as ISP), with the consent of the Faculty Dean.

The ISP at the Faculty of Energy and Fuels complies with the Study Regulations at AGH and the arrangements of the Faculty Council.

The Dean’s consent for an ISP for particularly talented and outstanding students requires:

- a minimum grade point average of 4.25,
- a detailed ISP program approved by the academic advisor and the head of the department,
- approval of the detailed ISP program.

Implementation of practical placements including monitoring system and completion rules

Not applicable.

Rules of elective modules taking

The student selects a module (or modules) from the pool of elective modules assigned to a given semester of studies, in accordance with the study program and curriculum, by registering in the University's electronic system. The minimum required number of students for a module to be launched 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 mandatory element of the study program is the completion of a master's thesis by the student. The prerequisite for submitting the thesis is the completion of all courses required by the study program (i.e., obtaining the so-called absolutorium) and a positive evaluation of the thesis by both the supervisor and the reviewer.

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

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

1. have completed all courses required by the study program,
2. have submitted the thesis within the required deadline,
3. have submitted all documents required by the Dean of the Faculty.

The diploma process is carried out in accordance with the AGH Study Regulations and the specific rules for the diploma process at the Faculty of Energy and Fuels.

The diploma examination includes:

1. a presentation of the diploma thesis,
2. a discussion of the thesis,
3. an assessment of the student's knowledge at the second-cycle level in the form of oral answers to at least three questions.

The requirements concerning the preparation of diploma theses, including their format and scope, are governed by the AGH Study Regulations. However, detailed guidelines regarding topic selection, implementation, formatting, and evaluation are defined in the guidelines developed by the Faculty of Energy and Fuels.

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

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

$FG = 0.6S + 0.2E + 0.2*T$

where:
S – grade point average from studies,
E – grade from the diploma examination,
T – grade for the diploma 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

To carry out the diploma process, the Dean appoints the Diploma Examination Committee or the Chair of the Diploma Examination Committee, who then sets the date and determines the composition of the Committee for a given examination.

The Diploma Examination Committee must consist of at least three members, including the Chair and two other members. The thesis supervisor may not serve as the Chair.

A thesis submitted to the Dean's Office no later than five working days before the scheduled examination date is eligible for defense on that date.