Pt aviz CA și aprobare SUO
Prorector MA,

Anexa 27a
H.S. 28/30.10.2025

CURRICULUM

Valid beginning with the academic year 2026-2027

UNIVERSITY OF ORADEA

FACULTY OF ENERGY ENGINEERING AND INDUSTRIAL MANAGEMENT

Master's Program: **Green Energy for Sustainability and Resilience**

Fundamental Field: **Engineering Sciences**

Master's Field: **Energy Engineering**

Master's Type: **Professional**

Duration of studies / number of credits: **2 years /120 credits**

Type of education: **full time (FT)**

Location where the courses for the study program will be taught: **Universitatea din Oradea (Romania); Universidad de Extremadura (Spain); Universidade de Évora (Portugal); Atlantic Technical University (Ireland); University Gläve (Suedia); Otto-von-Guericke-Universität Magdeburg (Germania)**

Teaching mode: **hybrid**

APROBAT ÎN ȘEDINȚA DE SENAT
DIN DATA DE
30. OCT. 2025
Președinte:
Conf.univ.dr. Vasile-Aurel CĂUȘ

Pt DAC - rog auditare internă
Prorector MA,

1. Mission of the master's program *Green Energy for Sustainability and Resilience*

The master's degree in ***Green Energy for Sustainability and Resilience (GESR)*** is developed within the framework of the EU GREEN Alliance, in which all associates are members. EU GREEN aims to establish a broad European educational area firmly committed to sustainability in its four key dimensions (environmental, social, economic and cultural) providing solutions locally while acting globally. The development of new joint programmes that are aligned with the SDG and education for sustainability is one of the main objectives of EU GREEN. This master is designed to address the critical global need for highly skilled professionals who can lead the transition towards a sustainable, resilient, and low-carbon energy future. The programme is dedicated to educating a new generation of specialists capable of designing, managing, and implementing innovative energy solutions at local, national, and international levels.

On the other hand, the Master's Degree in ***Green Energy for Sustainability and Resilience*** is closely aligned with the objectives of **Cluster 3,** one of the six clusters on which the thematic area *Structuring research-based learning through Excellence Clusters* of the EU GREEN Alliance is based. This cluster 3 focuses on engineering and technology for sustainable development. By providing advanced education in renewable energy technologies, energy efficiency, storage systems, and environmental impact assessment, the program directly contributes to the cluster's mission of developing innovative, low-carbon solutions that address pressing societal and environmental challenges. Its interdisciplinary approach—integrating engineering, environmental sciences, economics, and social perspectives—mirrors the cluster's emphasis on combining technological innovation with sustainability principles

This Master's degree offers a strong practical and research orientation, with direct involvement of industry stakeholders, internships, and hands-on learning methodologies. A structured mobility scheme across the partner universities enhances students' academic experience, fosters intercultural competencies, and provides exposure to diverse energy practices and contexts across Europe.

Modern society is fundamentally shaped by the interplay of ecology, energy, and technology. Recognizing this interconnectedness is essential. This is why education in energy engineering is of paramount importance. Its essential mission is to cultivate specialists capable of securing renewable energy sources, optimizing consumption, and applying deep interdisciplinary knowledge to ensure the sustainability of civilization for both present and future generations.

The ***Green Energy for Sustainability and Resilience*** master's program is intrinsically aligned with the university's core strengths in Energy Engineering, Industrial Engineering, and Engineering and Management. Building upon the foundational knowledge acquired at the undergraduate level, the programme delivers advanced, specialized training in Energy Engineering. It is designed to cultivate robust research capabilities, thereby providing an essential foundation for progression to doctoral studies. Furthermore, graduates are equipped to address critical regional energy challenges, contributing professional expertise to enhance the complexity, efficiency, and resilience of local energy systems.

A key strength of the program lies in its international design: each participating university and country brings recognized expertise in specific areas of renewable energy. Students will benefit from this diversity by learning directly from the best practices and technological innovations of each region—gaining deep insight into various renewable energy systems and how they are implemented in different climatic, regulatory and socio-economic contexts.

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The ***GESR*** program is also innovative in its design, where two universities work together in semesters 1-3 for the delivery of 30 total credits in each semester, where some students take these in a virtual environment while other classmates are in a live class, making for greater sustainability of teaching resources overall.

This is a hybrid masters, which contributes to our Alliance's alignment with sustainability as well as offers flexibility and technologically innovative teaching. While all subjects are compulsory, these will be taken by some parts of the student cohort in live classes, either at the entry university or in one of their two obligatory mobilities, while other students will take these online, synchronously. This means that in one subject the three modes exist simultaneously.

Student mobility is an integrated and compulsory part of the ***GESR*** program. Every student is required to do a minimum of 2 semesters of mobility in different institutions which are not their entry institution or where they hold long-term residency. Student mobility will be regulated and funded for students by the EU GREEN program through specialized Erasmus grants. Other funding possibilities from other programs will be explored once the degree program has been launched.

1. The student starts the program in the entry partner of origin. In the case of a student joining from a non-partner, or from a country outside the EU, they can choose their entry point institution, though non-EU tuition fees may apply in some cases. In the second, third or fourth semesters the student can choose to undertake their mobility, including the possibility of doing practicums as a mobility, with a minimum of 3 months or 30 credits mobility stay. A lottery system to determine mobility availability will be established, so that all countries receive students in mobilities, where students may be given some scaled preferences for mobilities where possible.
2. The mobility period can be undertaken during the master final work (internship/project/dissertation)/ as well.

2. Objectives of *Green Energy for Sustainability and Resilience* master's program

The main objective of the master's program is to provide students with advanced, interdisciplinary training in renewable energy technologies—including solar, wind, hydropower, biomass, geothermal, and marine energy—energy storage, energy efficiency, project management, and environmental impact assessment. The programme adopts a multidisciplinary perspective that integrates engineering, environmental sciences, economics, and social dimensions of energy systems, equipping graduates to address complex challenges holistically.

The program's curriculum is strategically designed to prepare graduates with the skills to drive transformative changes through the following core objectives:

- prepare students with comprehensive knowledge in renewable energy technologies—such as solar, wind, hydropower, biomass, geothermal, and marine energy—as well as in energy storage, energy efficiency, project management, and environmental impact assessment.
- integrate engineering, environmental sciences, economics, and the social dimensions of energy systems, enabling graduates to address complex energy challenges from a systemic and holistic viewpoint.

- embed a robust competency framework into the curriculum, ensuring students develop critical skills beyond technical knowledge. These include:
  - ✓ understanding the complexity of energy systems.
  - ✓ envisioning sustainable energy futures and forecasting potential challenges.
  - ✓ evaluating solutions against ethical, societal, and sustainability criteria.
  - ✓ implementing effective strategies for change in diverse contexts.
  - ✓ fostering collaboration, self-awareness, and leadership capabilities.
- allow students to gain deep insights into how renewable energy systems are implemented across different climatic, regulatory, and socio-economic contexts in Europe.
- provide a strong practical orientation through direct industry involvement, internships, and hands-on learning methodologies, preparing students for real-world challenges.
- align the programme directly with strategic European priorities for climate neutrality and technological innovation, and to make a direct contribution to achieving key United Nations Sustainable Development Goals, particularly SDG 7 (Affordable and Clean Energy) and SDG 13 (Climate Action).

Upon completion, graduates will be prepared to assume leadership roles in the global energy sector, contributing meaningfully to economic development, social equity, and environmental sustainability.

3. Competencies acquired after completing the master's program:

Professional

C.1. Ability to design, model, and optimize integrated energy systems utilizing renewable sources (solar, wind, hydro, biomass, geothermal) to meet specific sustainability and resilience requirements.

C.2. Capability to conduct comprehensive techno-economic assessments and environmental impact analyses, to evaluate the viability and sustainability of energy projects.

C.3. Proficiency in using specialized software tools to model, simulate, and predict the performance of complex energy systems under varying conditions and scenarios.

C.4. Competence in formulating, analyzing, and implementing energy policies, regulatory frameworks, and strategic roadmaps for the transition to a low-carbon economy.

C.5. Ability to manage and optimize the operation of modern energy networks, ensuring grid reliability and energy efficiency.

C.6. Skill in conducting applied research, developing innovative solutions and contributing to technological advancements in the field of green energy.

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Transversal

CT.1. Ability to work effectively and lead teams in multicultural, multidisciplinary environments, demonstrating strong interpersonal skills and shared responsibility for project outcomes;

CT.2 Proficiency in communicating complex technical concepts clearly and persuasively to diverse audiences, including specialists, non-specialists, policymakers, and community stakeholders;

CT.3. Capacity to address complex challenges with innovative, systemic solutions, anticipating emerging trends and adapting strategies in a rapidly evolving energy landscape.

4. Master's Program Learning outcomes (PLO)

The EQF Level 7 descriptors focus on three main categories:
1. *Knowledge* (PLO 1,2)
2. *Skills* (PLO 3,4,5)
3. *Responsibility and Autonomy* (PLO 6,7,8,9)

PLO's

1. Critically evaluate advanced concepts and technologies related to renewable and sustainable energy systems, including their integration into resilient infrastructure.
2. Design and optimise sustainable and resilient energy solutions using interdisciplinary tools and methodologies, including system modelling and lifecycle thinking.
3. Apply scientific and engineering principles to analyze, monitor, and manage energy processes in complex, real-world contexts.
4. Plan, lead, and conduct applied research or innovation projects in energy sustainability, using appropriate research methods, data analysis tools, and critical interpretation.
5. Assess the environmental, economic, and social impacts of energy technologies and policies, demonstrating a commitment to sustainability, ethics, and the UN Sustainable Development Goals.
6. Collaborate effectively within multidisciplinary and intercultural teams to develop and implement innovative energy solutions.
7. Demonstrate autonomy and initiative in complex professional contexts, taking responsibility for decision-making and professional development.
8. Communicate complex technical and sustainability concepts clearly and effectively to specialist and non-specialist audiences, including policy-makers, industry, and the public.
9. Anticipate and respond to emerging challenges in the energy transition, demonstrating leadership and adaptability in a fast-changing sector.

5. Finalities[1]

[1] Graduates of undergraduate university program will access the following possible occupations according to the "Classification of Occupations in Romania"- ISCO-08.

Graduate title: Master in Green Energy for Sustainability and Resilience
Qualification code:
Possible occupations, according to COR (Romanian Classification of Occupations): *Plant dispatcher – 215102; Thermal Power Plant Research Engineer – 215136; Thermal Power Plant Research and Development Engineer – 215137; Photovoltaic Power Plant Engineer – 215151; Wind Power Plant Engineer – 215152; Hydro energy engineer – 215114.*

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CURRICULUM
Year of study I

Code	Curricular units	Semester I				Total of hours	Type of Examination	Credits	IS [hours]	The University responsabile for the subjects
		C	S	L	P					
	COMPULSORY									
FIEMI-	Introduction to Renewable Energy	2	1	-	-	42	Ex	5	83	Universidad de Extremadura (Spain)
FIEMI-	Thermodynamics for Renewable Energies	2	-	1	2	70	Ex	5	55	Universidad de Extremadura (Spain)
FIEMI-	Solar Photovoltaics and Instalations	2	-	1	2	70	Ex	5	55	Universidad de Extremadura (Spain)
FIEMI-	Biomass and Bioenergy	2	1	-	-	42	Ex	5	83	Universidade de Évora (Portugal)
FIEMI-	Solar Thermal	2	-	1	2	70	Ex	5	55	Universidade de Évora (Portugal)
FIEMI-	Biorefineries	2	1	-	-	42	Ex	5	83	Universidade de Évora (Portugal)
	TOTAL	**12**	**3**	**3**	**6**	**336**		**30**	**414**	

Code	Curricular units	Semester II				Total of hours	Type of Examination	Credits	IS [hours]	The University responsabile for the subjects
		C	S	L	P					
	COMPULSORY									
FIEMI-	Fundamentals in Heat Transfer	3	-	2	-	70	Ex	5	55	Universitatea din Oradea (România)
FIEMI-	Deep and Shallow Geothermal and Heat Pumps	2	-	2	-	56	Vp	5	69	Universitatea din Oradea (România)
FIEMI-	Hydro Energy Systems	2	-	2	-	56	Vp	5	69	Universitatea din Oradea (România)
FIEMI-	Materials for Energy Storage	2	-	1	-	42	Ex	5	83	Otto-von-Guericke-Universität Magdeburg (Germania)
FIEMI-	Hydrogen and Fuel Cells	2	-	1	-	42	Ex	5	83	Otto-von-Guericke-Universität Magdeburg (Germania)
FIEMI-	Social Engagement for Renewable Energy	2	-	1	-	42	Ex	5	83	Otto-von-Guericke-Universität Magdeburg (Germania)
	TOTAL	**13**	**-**	**9**	**-**	**308**		**30**	**442**	

Legend: C - Course; S - Seminar; L - Practical (laboratory); P - Project; IS - Individual Study; Type of Examination - Verification Form, Ex. - examination; Pr - Project; Credits - number of ECTS credits; IS - Individual study.

Head of departament,
Lecturer Nicolae RANCOV, Ph.D.

RECTOR,
Professor habil. Constantin BUNGĂU

ROMÂNIA MINISTERUL EDUCAȚIEI ȘI CERCETĂRII UNIVERSITATEA DIN ORADEA RECTORAT 1

DEAN,
Associate Professor Cristina HORA, Ph.D.

DECANAT

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CURRICULUM
Year of study II

Code	Curricular units	Semester I				Total of hours	Type of Examination	Credits	IS [hours]	The University responsabile for the subjects
		C	S	L	P					
	COMPULSORY									
FIEMI-	Feasibility for Renewable Energy	2	-	-	1	42	Ex	6	108	Atlantic Technical University (Ireland)
FIEMI-	Smart and Secure Energy Systems	2	-	1	-	42	Ex	6	108	Atlantic Technical University (Ireland)
FIEMI-	Sustainability and Systems Thinking	2	1	-	-	42	Ex	6	108	Atlantic Technical University (Ireland)
FIEMI-	Design and Modelling of Energy Systems	2	-	1	-	42	Ex	6	108	University Gläve (Suedia)
FIEMI-	Energy Management for Sustainability and Resilience	2	1	-	-	42	Ex	6	108	University Gläve (Suedia)
	TOTAL	**10**	**2**	**2**	**1**	**210**		**30**	**540**	

Code	Curricular units	Semester II				Total of hours	Type of Examination	Credits	IS [hours]	The University responsabile for the subjects
		C	S	L	P					
	COMPULSORY									
FIEMI-	Master's Thesis	-	-	-	14	196	Ex	30	554	Origin/partener University
	TOTAL	-	-	-	**14**	**196**		**30**	**554**	

Legend: C - Course; S - Seminar; L - Practical (laboratory); P - Project; IS - Individual Study; Type of Examination - Verification Form, Ex. - examination; Pr - Project; Credits - number of ECTS credits; IS - Individual study.

Head of departament,
Lecturer Nicolae RANCOV, Ph.D.

RECTOR,
Professor habil. Constantin BUNGĂU

RECTORAT 1 UNIVERSITATEA DIN ORADEA MINISTERUL EDUCAȚIEI ȘI CERCETĂRII

DEAN,
Associate Professor Cristina HORA, Ph.D.

DECANAT Facultatea de Inginerie Energetică și Management Industrial

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I. REQUIREMENTS FOR THE AWARD OF THE MASTER'S DIPLOMA

Number of allocated credits, according to law: 120 – credits;

1) 120 credits for compulsory curricular unit;
2) 0 credits for optional and practice;
3) 30 credits allocated to the dissertation (included in the number of credits allocated for compulsory at 1)
4) 10 credits allocated to the dissertation exam, consisting of **presenting and defending** the dissertation

II. THE ACADEMIC YEAR STRUCTURE (in weeks)

Year	Teaching activities		Exam sessions					Practice work	Holiday		
	sem. I	sem. II	Winter	Winter retake	Summer	Summer retake	Autum retake		winter	spring	summer
Year I	14	14	3	1	3	1	2	0	3	1	10
Year II	14	14	3	1	2	2	1	0	3	1	0

III. NUMBER OF HOURS FOR COMPULSORY CURRICULAR AND OPTIONAL UNITS: 686

YEAR	SEMESTER I	SEMESTER II
1st year	24	22
2nd year	15	14

Crt. no.	Curricular unit	No. of hours		Total		Standard ARACIS
		Year I	Year II	Hours	%	
1	Compulsory	644	406	1050	100	
2	Optional	0	0	0	0	
Total		**644**	**406**	**1050**	**100**	
3	Elective	0	0	0	0	

III SHARE OF DISCIPLINES IN COMPULSORY CATEGORIES (COMPULSORY+OPTIONAL) + ELECTIVE:

- Compulsory Curricular units: 100 %, number of hours: 1050;
- Optional Curricular units: 0 %, number of hours: 0;
- Elective Curricular units: 0 %, number of hours: 0;
- Course / applications Ratio: 490 / 560 = 0,875

Total hours Compulsory Curricular units: 1050 hours

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IV. GRADUATION EXAM (DISSERTATION)

1) Communicating the theme of the dissertation: semester 3;
2) Developing the dissertation: 14 x 14 hours = 196 hours
3) Defending the dissertation July, September

V. A CREDIT POINT REQUIRES A TOTAL OF 25 HOURS/SEMESTER OF TEACHING AND INDIVIDUAL ACTIVITY

Head of departament,
Lecturer Nicolae RANCOV, Ph.D.

RECTOR,
Professor habil. Constantin BUNGĂU

RECTORAT 1 UNIVERSITATEA DIN ORADEA MINISTERUL EDUCAȚIEI ȘI CERCETĂRII

DEAN,
Associate Professor Cristina HORA, Ph.D.

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UNIVERSITATEA DIN ORADEA

UNIVERSITATEA DIN ORADEA
DEPARTAMENTUL PENTRU ASIGURAREA CALITĂŢII
Intrări / Ieşiri
Nr. 391 din 29.10.2025

Anexa 02.a

FIŞA DE AUDIT INTERN

pentru ~~programele de studii Licenţă/Master/Doctorat/~~

Planuri de învăţământ

Denumirea programului de studii: Green Energy for Sustainability and Resilience (în limba engleză)

Nivelul (licenţă / master/doctorat): MASTER

Domeniul de studii: Engineering Sciences/Energy Engineering

Facultatea/Şcoala Doctorală: ENERGY ENGINEERING AND INDUSTRIAL MANAGEMENT

Tipul evaluării ~~(AP/A/EP):~~ EVALUARE PI

Forma de învăţământ: IF/ID/IFR: IF

I. Neconformităţi constatate:

1. La cerinţele normative	-
2. La standarde şi indicatori de performanţă	-

II. Evidenţieri (dacă este cazul):

1. Indicatori de referinţă

Sunt respectate cerinţele ARACIS cu privire la întocmirea PI.

III: Recomandări:

-

Data 28.10.2025

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Membrii CMAI

Semnătura

Prof.univ.habil.dr. Elena Botezat

Conf.univ.dr. Tomina Săveanu

Persoana de contact	Observaţii	Semnătura

Comisia de arbitraj (dacă este cazul)

Nume, Prenume	Verdict Final	Semnătura