

MINISTRY OF EDUCATION AND RESEARCH

UNIVERSITY OF PETROȘANI
FACULTY OF MECHANICAL AND ELECTRICAL ENGINEERING

CURRICULUM
(valid starting with the academic year 2026–2027)

<i>Professional master's degree program:</i>	RESPONSIBLE CONSUMPTION AND PRODUCTION
<i>Fundamental field:</i>	ENGINEERING SCIENCES
<i>Master's degree field:</i>	INDUSTRIAL ENGINEERING
<i>Duration of studies:</i>	2 YEARS
<i>Type of education:</i>	Full time (F)
<i>full-time (F)/part-time (IFR)/distance learning (ID)</i>	

MISSION OF THE STUDY PROGRAM:

The mission of the professional master's degree program in **Responsible Consumption and Production** is to shape the behaviors necessary to become specialists in the field of industrial systems in an increasingly complex and dynamic economic environment with a view to sustainable development and to develop scientific research capabilities based on modern, computer-assisted concepts with a view to responsible consumption and production. Graduates of this specialization acquire the necessary training for the design, operation, and maintenance of systems used in various industries, enterprises, and companies, in accordance with environmental protection and clean energy use.

TRAINING OBJECTIVES

The overall objective of the study program: To train specialists with master's degrees in the field of responsible consumption and production, well prepared to adapt to the domestic and international economic environment, with thorough knowledge in engineering fields of operation. They can identify the modern concepts, models, and methods underlying the functioning of industrial systems in the context of sustainable development, possessing knowledge of the energy efficiency of industrial systems and sustainable transport systems. Furthermore, specialists trained in this way are able to design, regulate, and operate environmentally friendly industrial installations, equipment, and systems, and are capable of working in research, design, and production.

Specific objectives of the study program: to impart knowledge and develop the skills necessary to acquire the following competencies.

BASIC GROUP (COR/ESCO): 2144 – Mechanical engineers

214486 Research assistant in mechanical engineering and mechanical installations

214461 Process Equipment Research Engineer

214479 Research Engineer in Packaging Machinery and Technology

COMPETENCIES

Professional competences

- CP1. Defines technical requirements
- CP2. Conducts scientific research
- CP3. Prepares feasibility studies
- CP4. Assesses financial viability
- CP5. Performs analytical mathematical calculations
- CP6. Manages engineering projects
- CP7. Interprets technical requirements
- CP8. Uses ethnic drawing software
- CP9. Adjusts product designs
- CP10. Analyzes packaging requirements
- CP11. Approves engineering designs
- CP12. Provides troubleshooting
- CP13. Develops new packaging designs
- CP14. Interprets technical drawings
- CP15. Uses CAE systems
- CP16. Uses CAD software
- CP17. Performs a feasibility study on solar energy absorption cooling
- CP18. Performs a feasibility study on solar heating
- CP19. Identifies the installed source for heat pumps
- CP20. Evaluate district heating and cooling systems
- CP21. Conduct a feasibility study on heat pumps
- CP22. Analyze production processes with a view to improvement
- CP23. Operate scientific research and laboratory equipment
- CP24. Perform performance tests

Transversal skills

- TS1. Demonstrates initiative
- TS2. Adopts ways to promote biodiversity and animal welfare
- TS3. Accepts criticism and guidance
- TS4. Adopts ways to reduce pollution
- TS5. Respects commitments
- TS6. Takes responsibility
- TS7. Manages frustration
- TS8. Demonstrates commitment
- TS9. Evaluates the impact of individual behavior on the environment
- TS10. Thinks analytically
- TS11. Adapts to change
- TS12. Adopts ways to reduce the negative impact of consumption
- TS13. Apply scientific, technological, and engineering knowledge
- TS14. Respect diversity of values and cultural norms
- TS15. Involve others in environmentally friendly behaviors
- TS16. Demonstrate intercultural competence
- TS17. Think holistically

LEARNING OUTCOMES

a. Knowledge

- K1. The student/graduate identifies and describes the basic principles and methods of mechanical engineering.
- K2. The student/graduate explains and interprets theoretical and experimental results, technical documentation, phenomena, and processes in the field of mechanical engineering.
- K3. The student/graduate demonstrates in-depth knowledge of the field of specialization, including theoretical concepts and cutting-edge research methods.
- K4. The student/graduate demonstrates the ability to produce complex documentary syntheses, identify research problems, and propose original solutions in the field of mechanical engineering.
- K5. The student/graduate demonstrates the ability to design, optimize, and develop advanced mechanical systems, processes, components, or equipment, taking into account the entire product life cycle and economic, ethical, environmental, safety, and sustainability constraints.
- K6. The student/graduate demonstrates the ability to use advanced numerical methods and specialized software (CAD/CAE/CAM) for modeling, simulating, and analyzing the behavior of complex mechanical systems.
- K7. The student/graduate has knowledge of planning, organizing, and interpreting the results of complex experiments using high-level measurement and control equipment, and formulating critical conclusions.
- K8. The student/graduate demonstrates the ability to integrate knowledge from various disciplines to generate innovative solutions and achieve technology transfer to the industrial environment.

b. Skills

- S1. The student/graduate operates with basic methods and techniques in the field and associates them with graphic representations specific to the field of mechanical engineering.
- S2. The student/graduate applies criteria, evaluation methods, concepts, theories, and programs in the design of mechanical systems.
- S3. The student/graduate selects and applies basic concepts, principles, and methods in the field for mechanical and strength calculations specific to mechanical structures and systems.
- S4. The student/graduate selects and applies criteria, principles, and evaluation methods for identifying, modeling, and experimenting with mechanical phenomena and processes.
- S5. The student/graduate develops professional projects of medium complexity by selecting, combining, and using concepts, principles, methodologies, and technologies in the field of mechanical engineering.

c. Responsibility and autonomy

- RA1. The student/graduate selects and uses bibliographic sources specific to the field.
- RA2. The student/graduate demonstrates autonomy in learning about issues specific to industrial products, phenomena, and processes.
- RA3. The student/graduate has an increased responsibility to ensure that engineering solutions comply with ethical standards, safety, health, and environmental regulations, being aware of the long-term impact on society and sustainable development.
- RA4. The student/graduate has a responsibility to contribute to the professional training of younger engineers (bachelor's degree graduates or students) through guidance and transfer of expertise.

RA5. The student/graduate can take the initiative and manage large-scale engineering projects, from conception and planning to execution, monitoring, and evaluation, without constant direct supervision.

RA6. The student/graduate is able to address and structure complex or novel engineering problems for which standard solutions are not sufficient, developing their own methodologies for analysis and solution. RA7. The student/graduate can make critical technical and managerial decisions based on rigorous analysis and synthesis of information, assuming responsibility for their consequences.

RA8. The student/graduate has the intellectual freedom and skills necessary to propose new directions for research, develop innovative solutions, and initiate technological partnerships.

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No.	YEAR I	Subject code	Subject type	1 st Semester				2 nd Semester				Credit points		Exams, colloquy		Nr. hours/subject			No. individual study hours	No. of hours/study subject
	Subject			C	S	L	P	C	S	L	P	1 st Sem.	2 nd Sem.	1 st Sem.	2 nd Sem.	Course	Appl.	Total		
1	Green Design and Manufacturing in Mechanical	2RCP1IF01	DF/DOB	3	2		2					7		E1		42	56	98	77	175
2	Unconventional materials and technologies	2RCP1IF02	DF/DOB	3		2						6		E1		42	28	70	80	150
3	Energetic and environmental resources	2RCP1IS03	DS/DOB	3		2						6		E1		42	28	70	80	150
4	Elective subject OP 11	2RCP1OC04	DC/DOP	3	2							6		E1		42	28	70	80	150
5	Ethics and academic integrity	2RCP1IC05	DC/DOB	2	2							5		C1		28	28	56	69	125
6	Consumption and Production Patterns	2RCP2IS06	DS/DOB					3		2			6		E2	42	28	70	80	150
7	Energy efficiency of industrial processes	2RCP2IS07	DS/DOB					3		2	1		6		E2	42	42	84	66	150
8	Sustainable development in industry	2RCP2IF08	DF/DOB					2		2			6		E2	28	28	56	94	150
9	Elective subject OP 12	2RCP2OS09	DS/DOP					3		2			6		E2	42	28	70	80	150
10	Practical training 1 (84 hours)	2RCP2IS10	DS/DOB								6		6		C2	0	84	84	66	150
TOTAL year I				14	6	4	2	11	0	8	7	30	30	8E+2C		350	378	728	772	1500
				26				26				60								

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 Prof.dr.eng. Sorin-Mihai RADU

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No.	YEAR II	Subject code	Subject type	3 rd Semester				4 th Semester				Credit points		Exams, colloquy		Nr. hours/unit			No. individual study hours	No. of hours / study subject
	Subject			C	S	L	P	C	S	L	P	3 rd Sem.	4 th Sem.	3 rd Sem.	4 th Sem.	Course	Appl.	Total		
11	Modelling and Simulation of Electromechanical Systems	2RCP3IS11	DS/DOB	3		1	1					6		E3		42	28	70	80	150
12	Life Cycle Assessment	2RCP3IF12	DF/DOB	3		2						6		E3		42	28	70	80	150
13	Sustainable Transportation Systems	2RCP3IS13	DS/DOB	3		2						6		E3		42	28	70	80	150
14	Elective subject OP 21	2RCP3OF14	DF/DOP	3		2						6		E3		42	28	70	80	150
15	Speciality training 1 (84 hours)	2RCP3IS15	DS/DOB				6					6		C3		0	84	84	66	150
16	Ecological Reconstruction of Degraded Lands	2RCP4IS16	DS/DOB					3	2				7		E4	42	28	70	105	175
17	e-Business	2RCP4IC17	DC/DOB					3	2				7		E4	42	28	70	105	175
18	Speciality training 2 (84 hours)	2RCP4IS18	DS/DOB								6		6		C4	0	84	84	66	150
19	Practical training for dissertation (140 hours)	2RCP4IS19	DS/DOB								10		10		C4	0	140	140	110	250
TOTAL year II				12	0	7	7	6	4	0	16	30	30	6E+3C		252	476	728	772	1500
				26				26				60								

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ELECTIVE SUBJECTS					
No.	Subject code	Academic year	Name of subjects		
4	OP 11	I	Romanian and European Administrative Structures, Mechanisms and Institutions		Sustainable Human Resource Management
9	OP 12	I	Waste and hazardous substances		Industrial waste processing
14	OP 21	II	Clean energy		Smart technologies

FREE ELECTIVE SUBJECTS																		
No.	Subject code	Academic year	Name of subject	1 st Sem.			2 nd Sem.			Credit points		Exams,Colloquy		Nr. hours/subject			No. individual study hours	No. of hours / study subject
				C	S	L	C	S	L	1 st Sem.	2 nd Sem.	1 st Sem.	2 nd Sem.	Course	Appl.	Total		
20	F11	I	Norms and legislation on environmental	2	2					3		A/R		28	28	56	19	75
21	F12	I	Computer-assisted experimental research				2		2		3		A/R	28	28	56	19	75
22	F21	II	Continuous process management systems	2	2					3		A/R		28	28	56	19	75
24	F22	II	Research Techniques				2	2			3		A/R	28	28	56	19	75

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HOUR ALLOCATION BY SUBJECT GROUP						
Total course hours:	602					
Total hours of applications:	854					
Total teaching hours:	1456					
Total course hours / Total hours (%)	602	/	1456	x	100	41.35
Total application hours / Total hours (%)	854	/	1456	x	100	58.65
Total course hours / Total application hours (%)	602	/	854	x	100	70.49
SUBJECT GROUPS				No. of hours		No. of hours / Total hours (%)
Fundamental disciplines DF				364		25.00
Specialized disciplines DS				1022		70.19
Complementary discipline DC	Physical education and sports			70	0	4.81
	Economic and humanities disciplines				70	
TOTAL				1456		100.00
Compulsory subjects DOB				1246		85.58
Optional subjects DOP				210		14.42
Elective subjects DFA				224		15.38

Comments: For 1 credit point of the discipline, 25 hours are allocated for teaching preparation and individual study by the student.

Legend:

Discipline code: 2 - Faculty of Mechanical and Electrical Engineering; CPR - Responsible Consumption and Production;

1...4 - semester in which the course is taught; I - compulsory course; O - optional course;

Discipline type:

F - elective course; F - fundamental course; S - specialized course; C - complementary course; DOB - compulsory course; DOP - optional course; DFA - elective course;

Other:

C - course; S - seminar; L - laboratory work; P - project; Exams (E1...4) - exam taken in semester 1...4; Colloquiums (C1...4) - colloquium taken in semester 1...4; A/R - admitted/rejected

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