MINISTRY OF EDUCATION AND RESEARCH

UNIVERSITY OF PETROŞANI
FACULTY OF MECHANICAL AND ELECTRICAL ENGINEERING

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

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

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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VALID BEGINNING WITH ACADEMIC YEAR 2026 - 2027

No.	YEAR I	Subject code	Subject type	1st Semester				2nd Semester				Credit points		Exams, colloquy		Nr. hours/topic			No. individual study hours	No. of hours/study topic
	Subject			C	S	L	P	C	S	L	P	1st Sem.	2nd Sem.	1st Sem.	2nd Sem.	Course*	Appl.**	Total		
1	Green Design and Manufacturing	2RCP1IF01	DF/DOB	2	2		2					7		E1		28	56	84	91	175
2	Unconventional materials and technologies	2RCP1IF02	DF/DOB	2		2						6		E1		28	28	56	94	150
3	Energetic and environmental resources	2RCP1IS03	DS/DOB	2		2						6		E1		28	28	56	94	150
4	Elective subject OP 11	2RCP1OC04	DC/DOP	2	2							6		E1		28	28	56	94	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					2		2			6		E2	28	28	56	94	150
7	Energy efficiency of industrial processes	2RCP2IS07	DS/DOB					2		1	1		6		E2	28	28	56	94	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					2		2			6		E2	28	28	56	94	150
10	Practical training (84 hours)	2RCP2IS10	DS/DOB								6		6		C2	0	84	84	66	150
TOTAL year I				**10**	**6**	**4**	**2**	**8**	**0**	**7**	**7**	**30**	**30**	**8E+2C**		**252**	**364**	**616**	**884**	**1500**
				22				**22**				**60**								

No.	YEAR II	Subject code	Subject type	3rd Semester				4th Semester				Credit points		Exams, colloquy		Nr. hours/topic			No. individual study hours	No. of hours/study topic
	Subject			C	S	L	P	C	S	L	P	3rd Sem.	4th Sem.	3rd Sem.	4th Sem.	Course*	Appl.**	Total		
11	Modelling and Simulation of Electromechanical Systems	2RCP3IS11	DS/DOB	2		1	1					6		E3		28	28	56	94	150
12	Life Cycle Assessment	2RCP3IF12	DF/DOB	2		2						6		E3		28	28	56	94	150
13	Sustainable Transportation Systems	2RCP3IS13	DS/DOB	2		2						6		E3		28	28	56	94	150
14	Elective subject OP 21	2RCP3OF14	DF/DOP	2		2						6		E3		28	28	56	94	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					2	2				7		E4	28	28	56	119	175
17	Green Accounting	2RCP4IC17	DC/DOB					2	2				7		E4	28	28	56	119	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								8		10		C4	0	112	112	138	250
TOTAL year II				**8**	**0**	**7**	**7**	**4**	**4**	**0**	**14**	**30**	**30**	**6E+3C**		**168**	**448**	**616**	**884**	**1500**
				22				**22**				**60**								

*** - Delivery mode: 50% Face-to-face (FF) and 50% Synchronous Online (SO)**

**** - Delivery mode: 65% Face-to-face (FF) and 35% Synchronous Online (SO)**

RECTOR,
Prof. dr. eng. Sorin-Mihai RADU

DEAN,
Assoc. prof. dr. eng. Ilie UTU

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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 Resourse Management
9	OP 12	I	Waste and hazardous substances	Industrial waste processing
14	OP 21	II	Clean energy	Smart Technologies Applied in Industrial Engineering

FREE ELECTIVE SUBJECTS													
No.	Subject code	Academic year	Name of subject	Sem. I			Sem. II			Crd. pts.	Exams, Colloquy	Nr. hours/topic		
				C	S	L	C	S	L			Course	Appl.	Total
20	F11	I	Tehnical English	2	2					3	A/R	28	28	56
21	F12	I	Numerical modelling of thermal processes				1		3	3	A/R	14	42	56
22	F21	II	Continuous process management systems	2	2					3	A/R	28	28	56
23	F22	II	Research Techniques in Industrial Engineering				2	2		3	A/R	28	28	56

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HOUR ALLOCATION BY SUBJECT GROUP							
Total course hours:	420						
Total hours of applications:	812						
Total teaching hours:	1232						
Total teaching hours / Total hours (%)	1232	/	1232	x	100		100.00
Total application hours / Total hours (%)	812	/	1232	x	100		65.91
Total course hours / Total application hours (%)	420	/	812	x	100		51.72
SUBJECT GROUPS					**No. of hours**		**No. of hours / Total hours (%)**
Fundamental courses DF					308		24.72
Specialization courses DS					868		69.66
Complementary courses DC	Physical education and sports				70	0	5.62
	Economic and humanities disciplines					70	0.00
TOTAL					**1246**		**100.00**
Compulsory courses DOB					1064		86.36
Optional courses DOP					168		13.64
Elective courses DFA					224		18.18

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; R**CP** - 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** - specialization 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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