

SYLLABUS

1. Data about the program of study

1.1	Institution	Technical University of Cluj-Napoca
1.2	Faculty	Faculty of Electrical Engineering
1.3	Department	Power Engineering and Management
1.4	Field of study	Energy Engineering
1.5	Cycle of study	Master of Science
1.6	Program of study/ Qualification	Modern Power Systems
1.7	Form of education	Full time
1.8	Subject code	8.00

2. Data about the subject

2.1	Subject name	Research / Internship I		
2.2	Course responsible/ lecturer	Assoc. Prof. Eng. Horia G. BELEIU, PhD - horia.beleiu@enm.utcluj.ro		
2.3	Teachers in charge of Seminars/ Laboratory/ Project	All teaching staff are involved in the master's program.		
2.4 Year of study	1	2.5 Semester	1	2.6 Type of assessment (<i>E – exam, C – colloquium, V – verification</i>)
2.7 Subject category	<i>DF – fundamental, DD – in the field, DS – specialty, DC – complementary</i>			DA
	<i>DI – compulsory, DO – elective, Dfac – optional</i>			DI

3. Estimated total time

3.1 Number of hours per week:	13	of which	3.2 Course	-	3.3 Seminar	-	3.3 Laboratory	-	3.3 Project	13
3.2 Total hours per semester	182	of which	3.5 Course	-	3.6 Seminar	-	3.6 Laboratory	-	3.6 Project	182
3.7 Individual study:										
(a) Manual, lecture material and notes, bibliography										4
(b) Supplementary study in the library, online and in the field										2
(c) Preparation for seminars/laboratory works, homework, reports, portfolios, essays										2
(d) Tutoring										4
(e) Exams and tests										2
(f) Other activities										4
3.8 Total hours of individual study [<i>sum (3.7(a) to 3.7(f))</i>]					10					
3.9 Total hours per semester [<i>sum of 3.4 and 3.8</i>]					200					
3.10 Number of credit points					8					

4. Prerequisites (where applicable)

4.1	Curriculum	To know: • General knowledge of electrical engineering and power engineering. • Advanced mathematics, artificial intelligence techniques.
4.2	Competences	• To know methods and techniques for gathering and searching information on a given topic; • Computer usage; • To adapt to teamwork.

5. Requirements (where appropriate)

5.1	For the course	• To have a coordinator for research activities.
5.2	For the applications	-

6. Specific competences

Professional competences	After completing the course, students will be able to: - Perform synthesis and logical structuring of informational material. - Identify appropriate mathematical methods for addressing the initially established theoretical objectives. - Combine theoretical knowledge with that acquired through practical activities. - Identify the objectives of the research activity to be carried out in the dissertation. - Understand the structure and methods for drafting the dissertation. After completing the course, students will acquire the following skills: - Use computing systems. - Operate classical and modern measuring instruments. - Utilize bibliographic search tools. - Work in a team to achieve common objectives.
Cross competences	Applying the values and ethics of the engineering profession and responsibly executing professional tasks under conditions of limited autonomy and qualified assistance. Promoting logical, convergent, and divergent reasoning, practical applicability, evaluation, and self-evaluation in decision-making. Carrying out activities and fulfilling roles specific to teamwork at various hierarchical levels. Encouraging initiative, dialogue, cooperation, a positive attitude, respect for others, diversity, and multiculturalism, while continuously improving one's own activities.

7. Expected learning outcomes

On completion of the discipline, the student will be able to demonstrate:

Knowledge	Has in-depth knowledge of the measurement, monitoring and digital decision-support principles applied to energy systems. Critically understands the role of EMS/SCADA, artificial intelligence and expert systems in analysis, diagnosis and operational optimisation. Integrates concepts at the interface between power engineering, automation and informatics in order to solve complex problems.
Skills	Configures data flows, interprets operational information and develops algorithms or prototypes for monitoring, prediction and optimisation. Uses EMS/SCADA platforms, machine-learning techniques and digital tools for analysis, reporting and decision support. Formulates improvement recommendations based on measured data and on results obtained through intelligent methods.
Responsibility and autonomy	Acts autonomously in evaluating data quality, model robustness and the limits of algorithmic solutions. Assumes responsibility for decision traceability, the ethical use of data and the technical impact of the proposed solutions. Contributes to the innovation of professional procedures and to the organisation of analysis and monitoring activities in complex contexts.

8. Discipline objectives (based on specific competencies acquired)

8.1 General objective	Identification and establishment of the research topic for the dissertation.
8.2 Specific objectives	1. To perform the synthesis and logical structuring of informational material. 2. To combine theoretical knowledge with that acquired through practical activities. 3. To identify the objectives of the research activity to be carried out in the dissertation. 4. To understand the structure and methods for drafting the dissertation.

9. Contents

9.1. Course (Lectures)		Number of hours	Teaching methods	Additional remarks
1	Annex with the Curriculum Plans_master_MSEM			
9.2. Applications - Seminar /Laboratory/Project		Number of hours	Teaching methods	Additional remarks
1	Identifying the objectives of the research activity to be carried out in the dissertation.	2		

2	Study of measurement and monitoring systems for energy quantities and indicators.	2	Modern multimedia tools, Systematic consultations with the dissertation supervisor and other technical, specialized consultants, Participation in student scientific circles.	
3	Establishing the theoretical and experimental research plan to be carried out in the dissertation.	2		
4	Study of specialized software products useful for solving applications related to the topic.	2		
5	Documentation on the dissertation topic.	2		
6	Establishing the research objectives.	2		
7	Preparing a report on the activities carried out in the first semester	1		
Bibliography: It is established together with the dissertation supervisor.				

10. Alignment of course content with expectations of the epistemic community, professional associations, and representative employers in the field

The content of the course covers an important part of the expectations of clients and responsible parties regarding the competencies of graduates in research activities.

11. Assessment

Activity type	10.1 Assessment criteria	10.2 Assessment methods	11.3 Weight in the final grade (%)
10.4 Research activity	Oral verification of knowledge based on the work performed.	Questions or test.	33% (grade V).
	Verification of the research activity notebook.	Submission of the research report.	33% (grade C).
	Attendance.		34% (grade P).
11.6 Minimum standard of performance: Calculation formula for the grade: $N = \text{PASS}$, if $V \geq 5$, $P \geq 90\%$, $C \geq 5$. Condition for obtaining credits: $N = \text{PASS}$.			

Date of completion	Lecturers	Title/ Surname/ Name:	Signature
September 2024	Course	Assoc. Prof. Eng. Horia G. BELEIU, PhD	
	Applications Seminar/ Laboratory/ Project	The teaching staff involved in the master's program.	

**Date of approval in the council of the Department of Power
Engineering and Management**

September 2024

Head of Department:

Assoc. Prof. Eng. Horia G. BELEIU, PhD



Date of approval in the Faculty of Electrical Engineering Council

September 2024

Dean:

Assoc. Prof. Eng. Andrei C. CZIKER, PhD