SYLLABUS

1. Information about the program

1.1 Higher education institution	Universitatea Politehnica Timișoara
1.2 Faculty[1] / Department[2]	ELECTRONICS, TELECOMMUNICATIONS AND INFORMATION TECHNOLOGIES / Applied Electronics Department
1.3 Field of study (name/code[3])	Electronics, Telecommunications and Information Technologies Engineering
1.4 Study cycle	Master
1.5 Study program (name/code/qualification)	Automotive Electronic Systems 202010/23925

2. Information about discipline

2.1a Name of discipline/The educational classe[4]	Design and Research Methodologies / DF						
2.1b Name of discipline in Romanian	Metodologia proiectării și cercetării						
2.2 Coordinator (holder) of course activities	Prof.dr.ing. Radu Vasiu						
2.3 Coordinator (holder) of applied activities[5]	Prof.dr.ing. Radu Vasiu						
2.4 Year of study[6]	1	**2.5** Semester	1	**2.6** Type of evaluation	E	**2.7** Regime of discipline[7]	DOP

3. Total estimated time (direct activities (fully assisted), partially assisted activities and unassisted activities[8])

3.1 Number of hours fully assisted/week	4 ,of which:	course	2	seminar/laboratory/project			2
3.1* Total number of hours fully assisted/sem.	56 ,of which:	course	28	seminar/laboratory/project			28
3.2 Number of on-line hours fully assisted/sem	,of which:	course		seminar/laboratory/project			
3.3 Number of hours partially assisted/week	,of which:	project, research		training		hours designing M.A. dissertation	
3.3* Number of hours partially assisted/ semester	,of which:	project of research		training		hours designing M.A. dissertation	
3.4 Number of hours of unassisted activities/ week	4.93 ,of which:	Additional documentation in the library, on specialized electronic platforms, and on the field					1
		Study using a manual, course materials, bibliography and lecture notes					1.93
		Preparation of seminars/ laboratories, homework, assignments, portfolios, and essays					2
3.4* Total number of hours of unasssited asctivities/ semester	69 ,of which:	Additional documentation in the library, on specialized electronic platforms, and on the field					14
		Study using a manual, course materials, bibliography and lecture notes					27
		Preparation of seminars/ laboratories, homework, assignments, portfolios, and essays					28
3.5 Total hrs./week[9]	8.93						
3.5* Total hrs./semester	125						
3.6 No. of credits	5						

4. Prerequisites (where applicable)

4.1 Curriculum	•
4.2 Learning outcomes	• Basic Knowledge of how to use a computer • Knowledge of the internet and WWW

5. Conditions (where applicable)

5.1 of the course	• Computer lab with internet connection, video projector/smartboard
5.2 to conduct practical activities	Computer lab with PCs, internet connection

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6. **Learning outcomes** acquired through this discipline

Knowledge	• C1. The student/graduate describes concepts of ethics, academic integrity, and regulations governing research activities. • C2. The student/graduate identifies connections between electronic engineering and other fields (management, social sciences, software engineering). • C3. The student/graduate explains advanced principles and methodologies for integrating hardware and software technologies into complex engineering systems. • C3. The student/graduate uses dedicated software tools for data analysis • C6. The student/graduate critically evaluates current trends and research directions in microelectronics, including emerging applications (AI, hardware, sensors, quantum devices). • C10. The student/graduate is able to explain theories, concepts, and analytical mathematical methods used in the design and control of electronic systems. •
Skills	• A1. The student/graduate applies scientific methods to develop, model, and validate concepts in the field of microelectronics. • A2. The student/graduate applies scientific methods to create, improve, or validate models, techniques, and software tools in microelectronics. • A6. The student/graduate develops and adapts innovative technological solutions by integrating knowledge from interdisciplinary fields (nanoelectronics, photonics, computer engineering). • A8. The student/graduate prepares technical documentation, research reports, and complex projects, complying with quality standards and intellectual property regulations.
Responsibility and autonomy	• RA1. The student/graduate coordinates research activities within multidisciplinary teams, adhering to standards of ethics, safety, and quality in microelectronics or power electronics. • RA2. The student/graduate carries out processes related to the management of complex microelectronics and power-electronics projects, assuming various team roles and processing research-generated data. • RA3. The student/graduate assumes responsibility for the accuracy of the interpretation of research results. • RA4. The student/graduate makes strategic and technical decisions based on the analysis of research outcomes. • RA6. The student/graduate makes strategic decisions in new and unpredictable situations, integrating technical, economic, and ethical criteria. • RA7. The student/graduate engages in lifelong learning, actively contributing to the advancement of knowledge and professional practices in the field • RA9. The student/graduate manages unforeseen technical situations and makes strategic decisions while respecting technical, economic, and ethical criteria. • RA10. The student/graduate works effectively in interdisciplinary teams and promotes innovation, actively contributing to the development and continuous improvement of power-electronic and microelectronic systems.

7. **Objectives of the discipline** (based on the grid of learning outcomes acquired)

• The student will develop professional competencies in research-design methodologies and academic writing.

- The student will acquire theoretical and practical knowledge regarding the development of research/design project proposals.
- The student will understand the challenges associated with the implementation of research/design projects.

- The student will develop academic writing skills necessary for disseminating research results.

8. Content

8.1 Course	Number of hours	Of which online	Teaching methods
• Introduction: Purpose and objectives of the course	2		Whiteboard, Virtual Campus, Videoprojector, laptop
• Project management stages: Initiating the project, resource planning, implementation, continuous evaluation, project completion.	2		
• Developing a funding proposal for a design / research / development project: Activity planning – defining work packages, partnership planning.	2		
• Resource planning: Human-resource planning, material-resource planning, cost estimation, implementation schedule, dissemination plan for project results.	2		
• Project management: Technical monitoring and progress evaluation.	2		
• Financial monitoring: Project management team – roles and responsibilities; the role of periodic reporting.	2		
• Operational management: Work meetings, project-plan updates, administrative project management – archiving administrative documents.	2		
• Project risk management: Risk categories, SWOT analysis, risk consequences, verification of key milestones during project execution.	2		
• Risk-response planning: Risk impact assessment, risk-analysis techniques.	2		
• Human-resource management: Management versus leadership, project-team development.	2		
• Conflict management and project communication management	2		
• Bibliographic documentation: Information technology as a research tool (Google, Google Scholar, Wiki, blogs, eBooks, virtual laboratories).	2		
• Qualitative information: Validity, source reputation, relevance to the topic; evaluating the quality of bibliographic resources; accessing online databases.	2		
• Writing a scientific paper	2		
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	Bibliography[10] 1. Blaxter, L., C. Hughes, Tight, M., How to research, Open University Press, 4th edition, 2010 2. Creswell, J. W., Research Design: Qualitative, Quantitative and Mixed Method Approaches, 4th edition, Sage Publications, 2014 3. Kahn, J. V., Best, J. W., Research in Education, 10th edition, Pearson, 2016, eBook 4. Phillips, E. M., Pugh, D. S., How to get a PhD. A Handbook for Students and their Supervisors, 4th edition, Open University Press, 2005 5. Vasiu Radu, Metodologia proiectării și cercetării, curs on-line, platforma CV UPT.

8.2 Applied activities[11]	Number of hours	Of which online	Teaching methods
• Conducting a bibliographic research study The student will carry out a bibliographic investigation on a topic of interest within a chosen research domain, using IT tools. The assignment consists of searching for, identifying, and critically analyzing (from both an academic standpoint and in terms of relevance to the chosen topic) at least 25 bibliographic sources.	14	2	Smartboard, Virtual Campus, Video Projector, PC
• Writing an academic paper The student will prepare an academic paper on one of the subjects covered in the course. This assignment will serve as the final project and will be publicly presented (written paper and accompanying PPT presentation).	14	2	
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	Bibliography[12] 1. Stephen Bailey, The Essentials of Academic Writing for International Students, Routledge , 2024 2. Mocofan Muguras, Vasiu Radu, Andone Diana, Ermalai Iasmina, Onita Mihai, Tehnici informationale si de comunicare - avansati, Academiei Oamenilor de Stiinta din Romania, Bucuresti, 2011 3. Mocofan Muguras, Vasiu Radu, Andone Diana, Introducere in tehnologii multimedia, Academiei Oamenilor de Stiinta din Romania, Bucuresti, 2011 4. Materiale de pe platforma CVUPT, Radu Vasiu

9. Evaluation

Type of activity	**9.1** Evaluation criteria[13]	**9.2** Evaluation methods	**9.3** Share of the final grade
9.4 Course	Assessment of the degree of understanding of	The evaluation of knowledge is carried out through a multiple-choice examination.	40%

	fundamental notions and concepts	The assessment is implemented electronically, using the Virtual Campus platform.	
9.5 Applied activities	**S:**		
	L: 1. Assessment of the laboratory proposal Evaluation of the laboratory proposal based on the coherence of the planned activities and the adequacy of the allocated resources. 2. Assessment of the scientific paper/article Evaluation of the scientific paper or article with respect to compliance with the minimum academic-writing requirements, following an IEEE template.	Evaluation includes the communication of individual feedback and the presentation/discussion of the completed assignments within the group.	30% 30%
	P:		
	Pr:		
	Tc-R[14]:		
9.6 Minimum performance standard (minimum amount of knowledge necessary to pass the discipline and the way in which this knowledge is verified[15]			
• Participation in the activities designated as mandatory by the regulations. • Knowledge and appropriate application of the notions and concepts studied. • Submission of the two assignments. • Obtaining the minimum score in the written evaluations and in the defense of the two assignments.			

Date of completion	**Course coordinator (signature)**	**Coordinator of applied activities (signature)**
02.10.2025	Prof.dr.ing. Radu Vasiu	Prof.dr.ing. Radu Vasiu

Head of Department (signature)	**Date of approval in the Faculty Council** [16]	**Dean (signature)**
Assoc. Prof. Dr. Eng. Mircea Babaita	7.10.2025	Dr.habil.eng. Catalin Daniel Caleanu, Professor