Universitatea Națională de Știință și Tehnologie Politehnica București
Facultatea de Electronică, Telecomunicații și
Tehnologia Informației

COURSE DESCRIPTION

1. Program identification information

1.1 Higher education institution	**National University of Science and Technology Politehnica Bucharest**
1.2 Faculty	**Electronics, Telecommunications and Information Technology**
1.3 Department	**Telecommunications**
1.4 Domain of studies	Electronic Engineering, Telecommunications and Information Technology
1.5 Cycle of studies	Bachelor/Undergraduate
1.6 Programme of studies	Applied Electronics

2. Date despre disciplină

2.1 Course name (ro) (en)				Proiect 3 - Electronică aplicată Project 3 - Applied Electronics			
2.2 Course Lecturer				No course			
2.3 Instructor for practical activities				Prof. Dr. Radu RĂDESCU			
2.4 Year of studies	4	2.5 Semester	I	2.6. Evaluation type	V	2.7 Course regime	Op
2.8 Course type		S	2.9 Course code	04.S.07.O.507		2.10 Tipul de notare	Nota

3. Total estimated time (hours per semester for academic activities)

3.1 Number of hours per week	1	Out of which: 3.2 course	0.00	3.3 seminary/laboratory	1
3.4 Total hours in the curricula	14.00	Out of which: 3.5 course	0	3.6 seminary/laboratory	14
Distribution of time:					hours
Study according to the manual, course support, bibliography and hand notes Supplemental documentation (library, electronic access resources, in the field, etc) Preparation for practical activities, homework, essays, portfolios, etc.					12
Tutoring					12
Examinations					4
Other activities (if any):					8

3.7 Total hours of individual study	36.00
3.8 Total hours per semester	50
3.9 Number of ECTS credit points	2

4. Prerequisites (if applicable) (where applicable)

4.1 Curriculum	Computer architecture Microcontrollers Microprocessors architecture

4.2 Results of learning	Accumulation of the following knowledge: Skills to apply general hardware knowledge in various projects in electronics. Evaluation possibilities based on performance criteria of hardware projects. Skills for analyzing hardware design requirements.

5. Necessary conditions for the optimal development of teaching activities (where applicable)

5.1 Course	No course
5.2 Seminary/ Laboratory/Project	Presence at project meetings (according to the Regulations of bachelor's degree studies in UNSTPB).

6. General objective *(Reffering to the teachers' intentions for students and to what the students will be thought during the course. It offers an idea on the position of course in the scientific domain, as well as the role it has for the study programme. The course topics, the justification of including the course in the currcula of the study programme, etc. will be described in a general manner)*

This subject aims to familiarize students with the main approaches, models, and practical implementations in the field, used to solve applications and problems, with relevance to stimulate the learning process.
The subject addresses as a specific theme the following basic or advanced notions, specific concepts, and principles, all contributing to the transmission/training to students of an overall vision of the methodological and procedural landmarks:
The acquisition, deepening, and understanding of the importance of practical applications with specialized notions of designing the architecture of computer computers and equipment.
Knowing and practicing the latest technologies in the IT field.
Designing and making complex hardware systems for advanced information processing.

7. Competences *(Proven capacity to use knowledge, aptitudes and personal, social and/or methodological abilities in work or study situations and for personal and proffesional growth. They refflect the empolyers requirements.)*

Specific Competences	Students: Demonstrate that they have basic and advanced knowledge in the IT field. Correlate knowledge. Apply knowledge in practice. Apply standardized methods and instruments, specific to the field, to carry out the evaluation and diagnosis process of a situation, depending on the problems identified/reported, and identify solutions. Use fundamental elements regarding electronic devices, circuits, and instrumentation. Apply in practice the sets of knowledge, concepts, and elementary methods regarding the architecture of the calculation systems, microcontrollers, languages, and programming techniques. Acquire the ability to make decisions to solve the current or unpredictable problems, which appear in the process of operating electronic appliances. Form their ability to inform and permanently document for personal and professional development by reading the specialized literature. Learn flexibility in the use of new systems and technologies Work within a team in which members together reach a well-defined objective while assuming different roles or tasks. Argue and analyze coherently and correctly the context of applying the basic knowledge of the field, using key concepts of the discipline and the specific methodology. Acquire oral and writing methods in English: Use the scientific vocabulary specific to the field, for effective communication, in writing and oral. Acquire methods of oral communication and writing in a foreign (English) language: they demonstrates the understanding of the vocabulary for the domain, in a foreign language.
Transversal (General) Competences	Students: Works in the team and communicates effectively, coordinating their efforts with other students, to solve medium complexity problem Have critical autonomy and thinking: the ability to think in scientific terms, to seek and analyze given independently, as well as to detach and present conclusions or to identify solutions. Have the ability to analyze and synthesize: it synthetically presents the acquired knowledge, as a result of a systematic analysis process. Respects the principles of academic ethics: in the documentation activity the bibliographic sources are used correctly. Put into practice elements of emotional intelligence in the adequate socio-emotional management of some situations in real/academic/professional life, demonstrating self-control and objectivity in making decisions or in stressful situations.

8. Learning outcomes *(Synthetic descriptions for what a student will be capable of doing or showing at the completion of a course. The learning outcomes reflect the student's acomplishments and to a lesser extent the teachers' intentions. The learning outcomes inform the students of what is expected from them with respect to performance and to obtain the desired grades and ECTS points. They are defined in concise terms, using verbs similar to the examples below and indicate what will be required for evaluation. The learning outcomes will be formulated so that the correlation with the competences defined in section 7 is highlighted.)*

Knowledge	*The result of knowledge aquisition through learning. The knowledge represents the totality of facts, priciples, theories and practices for a given work or study field. They can be theoretical and/or factual.* Students: List the most important stages that have marked the development of the domain. · Define domain-specific notions. Describe and classify notions, processes, phenomena, and structures. Highlight consequences and relationships. Shape real, simple, or medium design problems, specifying the methodology necessary to solve the given requirements. Elaborate, evaluate, and test the results of the design for a problem from a specialized field, specifically formulated by the initial design data.
Skills	*The capacity to apply the knowledge and use the know-how for completing tasks and solving problems. The skills are described as being cognitive (requiring the use of logical, intuitive and creative thinking) or practical (implying manual dexterity and the use of methods, materials, tools and intrumentation).* Students: Select and group relevant information in a given context. Use specific principles for analysis, design, and evaluation of a hardware system. Work productively in a team. Elaborate scientific texts. Experimentally verify identified solutions. Solve practical applications. Adequately interpret causal relationships. Analyze and compare various hardware implementation solutions. Identify solutions and elaborate solving plans and projects. Formulate conclusions in the experiments. Argue the identified solutions and the ways of solving them. Shape real, simple, or medium complex problems, complete analysis of projects, and specifying the design methodology necessary to solve the given requirements; Design, evaluate, and test the functioning of a specialized hardware solution for the imposed problem and the performance characterization of the practical result obtained. Manage to study in detail the components of a hardware project. Have the ability to configure a project by establishing the main working parameters. Obtain skills for designing and dimensioning hardware systems. Have the ability to establish interdependent relationships between the components of a hardware project. Manage to apply the algorithms that govern the operation of a designed system. Have the ability to establish connection relationships in the combined software-hardware design. Acquire the ability to put into practice the general knowledge regarding hardware technologies in the most popular applications implementation solutions. Form their abilities to apply the specific knowledge regarding the computing architects and the peripheral teams, by implementing some case studies and practical examples. Create their skills to use hardware modeling languages, as well as to optimize an application made in a hardware design utility.

Responsability and autonomy	*The student's capacity to autonomously and responsably apply their knowledge and skills.* Students: Acquire the ability to apply their knowledge and skills responsibly and responsibly. Select the right bibliographic sources and analyze them. Respect the principles of academic ethics, correctly citing the bibliographic sources used. Demonstrate receptivity to new learning contexts. Manifest a spirit of collaboration with the other colleagues and with the teachers in carrying out the design activities. Demonstrate autonomy in organizing the situation and context of learning or the problem to solve. Manifest social responsibility by active involvement in student social life and involvement in events in the academic community. Promote and contribute through new solutions, related to the specialized field, to improve the quality of social life. Prove awareness of the value of their contributions in the field of engineering when identifying viable and sustainable solutions, which solve problems in social and economic life (social responsibility). Apply principles of ethics and professional deontology in the analysis of the technological impact of the solutions proposed in the specialized field on the environment. Analyze and capitalize on business and entrepreneurial development opportunities in the specialty field. Demonstrate skills in the management of real-life situations (managing time collaboration vs. conflict).

9. Teaching techniques *(Student centric techniques will be considered. The means for students to participate in defining their own study path, the identification of eventual fallbacks and the remedial measures that will be adopted in those cases will be described.)*

Starting from the analysis of the learning characteristics of the students and their specific needs, the process of management and coordination of the design activities will explore methods of conversative-interactive exposure, based on models of analysis, conception and implementation, by discovering the facilities of Direct and indirect exploration of reality, such as experiment, demonstration and modeling, but also on action -based methods, such as exercise, practical activities and problem solving.

All the reference materials, which base the activity of bibliographic research preceding the design,

They are available in electronic format, on Teams and Moodle platforms. The registration for individual or team project themes is managed in the Easy-Learning platform. The project sessions are held in laboratories with computing technique and multimedia facilities. The project materials are the presentations of themes and the descriptions of the specifications.

This discipline covers information and practical activities meant to support students in learning and development efforts of optimal collaboration and communication relationships, in a climate favorable to learning and designing. It will be considered the practice of assertive communication skills, as well as the mechanisms of construction of feedback, as ways of behavioral regulation in different situations and of adapting the pedagogical approach to the learning needs of the students. The individual work or team will be practiced to solve the different design tasks.

The project theme is of choice between three groups of software and hardware.

10. Contents

PROJECT		
Crt. no.	**Content**	**No. hours**
1	Project meeting no. 1: Presentation of themes of your choice and their specificity	2
2	Project meeting no. 2: Presentation of individual or team project requirements	2
3	Project meeting no. 3: Student enrollment on project themes	2
4	Project meeting no. 4: Verification of intermediate results from the bibliographic research stage	2
5	Project meeting no. 5: Checking intermediate results from the conception stage	2
6	Project meeting no. 6: Checking intermediate results from the implementation stage	2
7	Project meeting no. 7: Verification of the final results of the project	2
	Total:	14

Bibliography:

1. Radu Rădescu, Bogdan Cristian Florea, Valentin Pupezescu, Documentation for Project 3 , electronic project support
2. Radu Rădescu, Computer Architecture, Politehnica Press, Bucureşti, 2021.
3. Radu Rădescu, The Easy-Learning Platform: Concept and Solution – An Educational OnlineSystem, Lambert Academic Publishing, Germany-USA, 2011.
4. Andrew Tanenbaum, Todd Austin Structured Computer Organization, 6th edition, Pearson Education Inc., Prentice Hall, 2013.
5. John Shen, Modern Processor Design: Fundamentals of Superscalar Processors, 1st edition,McGraw-Hill Series in Electrical and Computer Engineering, 2015.

11. Evaluation

Activity type	11.1 Evaluation criteria	11.2 Evaluation methods	11.3 Percentage of final grade
11.4 Course	No course		

11.5 Seminary/laboratory/project	- Quality and consistency of bibliographic research; - Logical and coherent organization of the material; - Originality of approach and personal contributions.	Intermediate verification	30
	- Novelty and impact of the exposed in the project; - Scientific level of the work; - Presentation mode; - Mode of written expression.	Intermediate verification	40
	- Diversity of technologies and working methods; - Quality of individual or teamwork; - Mode of answering the questions.	Final verification: delivering the project by presenting the work and the practical demonstration.	30
11.6 Passing conditions			
Obtaining 50% of the total score related to the project activity.			

12. Corroborate the content of the course with the expectations of representatives of employers and representative professional associations in the field of the program, as well as with the current state of knowledge in the scientific field approached and practices in higher education institutions in the European Higher Education Area (EHEA)

Through the activities carried out, students develop skills to provide solutions to design problems and to propose ideas to improve the situation in the IT field.

This subject tries to outline the basic lines of electronics design, combining and correlating the knowledge already acquired to a series of disciplines, with hardware, the approach assuming the practical, applicative, and design aspects. The matter points to the landmarks of a fundamental area in IT, following the drawing of a bridge between hardware and technology, being addressed to future specialist engineers and designers in this field.

In the development of the content of the subject, knowledge, aspects, and phenomena described in the specialized literature were considered, in their studies published and presented at specialized scientific events.

The project has an equivalent content to the specialized practical disciplines carried out by similar universities in the European Union and the United States.

The program of the project responds concretely to the current requirements of development and evolution, subscribed to the European economy of the applied electronic specialization of the field of Electronic Engineering, Telecommunications, and Information Technologies.

In the context of the current technological progress of electronic devices and devices, the fields of activity concerned are very numerous, the practical applications being particularly different.

Through the design activities, it is considered the development of the graduate's abilities to manage practical situations that he may face in real life to increase his contribution to improving the socio-economic environment.

Thus, the graduates are provided with the appropriate competencies for the needs imposed by the current qualifications and modern, quality, and competitive scientific and technical training, which will allow them to engage quickly after graduation, this discipline is well included in the Politehnica policy, both from the point of view of the content and structure, as well as from the point of view of the skills and opening on the labor market offered to the students.

Date	Course lecturer	Instructor(s) for practical activities
25.09.2024	No course	Prof. Dr. Radu RĂDESCU

Date of department approval	Head of department
16.10.2024	Conf. Dr. Bogdan Cristian FLOREA

Date of approval in the Faculty Council	Dean
25.10.2024	Prof. Dr. Mihnea Udrea