Universitatea Naţională de Ştiinţă şi Tehnologie Politehnica Bucureşti
Facultatea de Electronică, Telecomunicaţii şi
Tehnologia Informaţiei

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	**Applied Electronics and Information Engineering**
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)				Echipamente periferice Peripheral Equipment			
2.2 Course Lecturer				Prof. Dr. Radu RĂDESCU			
2.3 Instructor for practical activities				Prof. Dr. Radu RĂDESCU			
2.4 Year of studies	4	2.5 Semester	II	2.6. Evaluation type	V	2.7 Course regime	F
2.8 Course type		S	2.9 Course code	04.S.08.L.118		2.10 Tipul de notare	Nota

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

3.1 Number of hours per week	3	Out of which: 3.2 course	2.00	3.3 seminary/laboratory	1
3.4 Total hours in the curricula	42.00	Out of which: 3.5 course	28	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					8
Examinations					10
Other activities (if any):					3

3.7 Total hours of individual study	33.00
3.8 Total hours per semester	75
3.9 Number of ECTS credit points	3

4. Prerequisites (if applicable) (where applicable)

4.1 Curriculum	• Digital integrated circuits • Microcontrollers • Architecture of microprocessors • Computer architecture
4.2 Results of learning	Accumulation of the following: • Abilities to apply general knowledge of architectural attributes of microprocessors, microcontrollers, and computing systems to various electronics projects. • Evaluation possibilities based on the performance criteria of a certain type of microprocessor/microcontroller/computing system and how it can be used in a specific situation. • Ability to analyze and design a microprocessor/microcontroller/computer system (at the level of physical principles, structure, and operation), to satisfy specific requirements.

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

5.1 Course	• The course will take place in a room equipped with a video projector and a computer. • The Teams platform will be used. • The Moodle platform will be used.
5.2 Seminary/ Laboratory/Project	• Mandatory attendance at laboratories (according to the regulation of university undergraduate studies in UNSTPB). • The laboratory will take place in a room with specific equipment, which must include: a network of computers and peripheral equipment. • Simulation, development, and testing applications are required to carry out laboratory activities.

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 is studied within the IETTI field/ELA specialization and aims to familiarize students with the main approaches, models, and explanatory theories of the field, used in solving practical applications and problems, with relevance for stimulating student learning.

The subject addresses the following basic or advanced notions, specific concepts, and principles as a specific topic, all of which contribute to the transmission/formation of students with an overview of the methodological and procedural milestones related to the field:

• Presentation of widely used peripheral equipment models.

• Study of the main types of peripheral equipment, except for those specific to a multimedia configuration: magnetic memories, input-output devices, display devices, and communication devices.

• Physical phenomena and operating principles, internal structure, design techniques, mode of operation, modern technologies, examples, and applications.

• Configuring a peripheral by establishing the main working parameters.

• Design and dimensioning of the component blocks of a peripheral.

• Establishing the interdependence relationships between the functional blocks of a peripheral.

• Applying the algorithms that govern the operation of a peripheral at all its levels.

• Presentation of how to connect and interface a peripheral to the computer system.

• Evaluation of the performance of the components of peripheral equipment.

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 basic and advanced IT knowledge. Correlate knowledge. Apply knowledge in practice. Apply standardized methods and tools, specific to the field, to carry out the evaluation and diagnosis process of a situation, depending on the identified/reported problems, and identify solutions. Use the fundamentals of electronic devices, circuits, and instrumentation. Apply in practice the sets of knowledge, concepts, and elementary methods regarding the architecture of computing systems, microcontrollers, programming languages, and techniques. Acquire the ability to make decisions to solve current or unpredictable problems that appear in the process of operating electronic devices. Form their ability to constantly inform and document themselves for personal and professional development by reading specialized literature. Acquire flexibility in using new systems and technologies within a team where members together achieve a well-defined goal while assuming different roles or tasks. Argue and analyze coherently and correctly the context of the application of the basic knowledge of the field, using key concepts of the discipline and specific methodology. Acquire methods of oral and written communication in English: they use the scientific vocabulary specific to the field, to communicate effectively, in writing and orally. Acquire methods of oral and written communication in a foreign language (English): demonstrate understanding of the vocabulary related to the field, in a foreign language.
Transversal (General) Competences	Students: Work in a team and communicates effectively, coordinating his efforts with other students, to solve problem situations of medium complexity. Acquire autonomy and critical thinking: the ability to think in scientific terms, search and analyze data independently, and draw and present conclusions or identify solutions. Have the ability to analyze and synthesize: presents the acquired knowledge synthetically, as a result of a process of systematic analysis. Respect the principles of academic ethics: in the documentation activity, correctly cite the bibliographic sources used. Put elements of emotional intelligence into practice in the appropriate social-emotional management of real-life/academic/professional situations, demonstrating self-control and objectivity in decision-making or 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 marked the development of the field. • Define domain-specific notions. • Describe and classify concepts, processes, phenomena, and structures. • Highlight consequences and relationships.
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. • Reasonably use specific principles to analyze, design, and evaluate peripheral equipment. • Work productively in a team. • Elaborate a scientific text. • Experimentally verify identified solutions. • Solve practical applications. • Adequately interpret causal relationships. • Analyze and compare various solutions for implementing the component blocks of peripheral equipment. • Identify solutions and develop solution plans and projects. • Formulate conclusions to the experiments carried out. • Argue the identified solutions and ways of solving them. • Model real problems, simple or of medium complexity, complete analysis of peripheral equipment and the specification of the design methodology necessary to solve the given requirements; • Design, evaluate, and test the operation of a specialized hardware and software solution for an imposed peripheral and interface problem and the performance characterization of the obtained equipment. • They manage to study in detail the components of peripheral equipment. • Can configure a peripheral by establishing the main working parameters. • Obtain design and dimensioning skills of storage, input-output, display, and communication devices. • Can establish the interdependence relationships between the functional blocks of a peripheral. • Can apply the algorithms that govern the operation of peripheral equipment • Can establish the connection relationship with the host computing system.

Responsability and autonomy	*The student's capacity to autonomously and responsably apply their knowledge and skills.* Students: • Select appropriate bibliographic sources and analyze them. • Respect the principles of academic ethics, correctly citing the bibliographic sources used. • Demonstrate responsiveness to new learning contexts. • Demonstrate collaboration with other colleagues and teaching staff in carrying out learning activities. • Demonstrate autonomy in organizing the situation and the learning context or the problem situation to be solved. • Demonstrate social responsibility through active involvement in student social life and involvement in academic community events. • Promote and contribute through new solutions related to the specialized field to improve the quality of social life. • Realize the value of his contribution to the field of engineering to the identification of viable and sustainable solutions to 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 specialized field. • Demonstrate real-life situation management skills (collaborative vs. conflict time management).

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 teaching process will explore teaching methods both exhibitions (lecture, exposure) and conversation-interactive, based on learning models, by discovering the acquired facilities. 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.

In the teaching activity, lectures will be used, based on PowerPoint presentations, PDFs, or various videos that will be made available to the students.

Each course will debut with the recapitulation of the chapter already (or in progress), with an emphasis on the notions presented in the last course. Presentations use images, diagrams, wave shapes, histograms, and schemes so that the information presented is easy to understand and assimilate.

The teaching is based on the use of slide presentations, covering the communication and demonstrative function. The methods of oral communication used are the exhibition method and the problematization method, used in front.

The course materials are: course notes and presentations, electronic-format handbooks, exercises, problems, simulations, and applications (theoretical and with computer resolution). All course materials are available in electronic format, on Teams, Moodle, and Easy-Learning platforms.

This discipline covers information and practical activities meant to support students in learning and development efforts of optimal collaboration and communication relationships, in a favorable climate for discovery learning.

It will be considered the practice of active listening and assertive communication skills, as well as the mechanisms of construction of the feedback, as ways of behavioral regulation in different situations and of adapting the pedagogical approach to the student learning needs.

The teamwork ability will be practiced to solve the different learning tasks, through themes and tests.

10. Contents

COURSE		
Chapter	**Content**	**No. hours**
1	Magnetic disks: structure, parameters, types, coding and modulation, geometry, formats, file systems, hybrid technologies, portable memories, SSD units, interfaces, RAID technology.	4
2	Printing equipment (printers): types, characteristics, parameters, printing technologies, standards, languages for portability, performances, 3D printers, trends.	4
3	Plotting equipment (plotters): types, characteristics, parameters, plotting technologies, modern plotters, performances, trends.	2
4	Input equipment (keyboard, mouse, joystick, trackball, gamepad, lightpen, eye-tracking, touchscreen, pointing stick, etc.), game controllers: description, types, structure, constructive and functional principles, interfaces.	4
5	Digitizing equipment (digitizers): types, construction, characteristics, parameters, production technologies, trends.	2
6	Barcode equipment: terminology, symbology, standards, marking systems, reading techniques, 2D and 3D barcodes, trends.	2
7	Display equipment (monitors): principles, construction, types, display technologies, flat monitors, hybrid technologies, 3D screens, trends.	4
8	Communication equipment and protocols: serial communications, hardware and software aspects, modems and standards (Hayes, DSL, IOC, etc.), AT and extended AT commands, software protocols, types and examples, trends.	4
9	Applications of peripheral equipment in specific fields.	2
	Total:	28

Bibliography:

1. Radu Radescu, Peripheral Equipment, electronic course support.
2. Radu Radescu, Peripheral equipment, Electra Publishing House, Bucharest, 2006.
3. Radu Rădescu, Peripheral equipment: magnetic memories and input-output equipment - practical works, UPB Publishing House, 2008 (reissue 2013).
4. Radu Radescu, Internet communication equipment, and protocols, Matrix Rom Publishing House, Bucharest, 2003.
5. Radu Radescu, The Easy-Learning Platform: Concept and Solution – An Educational Online System, Lambert Academic Publishing, Germany-USA, 2011.

LABORATORY		
Crt. no.	**Content**	**No. hours**
1	Magnetic disks and HD identification	1
2	Methods of encoding information on magnetic media	1

3	RAID technology	1
4	Printing and plotting equipment: printers	1
5	Printing and plotting equipment: plotters	1
6	Input equipment: mouse, keyboard and graphic tablet	1
7	Display equipment: digital monitors	1
8	Display equipment: display tests	1
9	Barcode standards: generation and interpretation of 1D-barcodes	1
10	Barcode standards: generation and interpretation of 2D-barcodes	1
11	Communication equipment and protocols: external modems	1
12	Communication equipment and protocols: client-server applications	1
13	Communication equipment and protocols: AT commands and extended AT commands	1
14	Final verification by laboratory test	1
	Total:	14

Bibliography:

1. Radu Radescu, Peripheral Equipment, electronic course support.
2. Radu Radescu, Peripheral equipment, Electra Publishing House, Bucharest, 2006.
3. Radu Rădescu, Peripheral equipment: magnetic memories and input-output equipment - practical works, UPB Publishing House, 2008 (reissue 2013).
4. Radu Radescu, The Easy-Learning Platform: Concept and Solution – An Educational Online System, Lambert Academic Publishing, Germany-USA, 2011.

11. Evaluation

Activity type	11.1 Evaluation criteria	11.2 Evaluation methods	11.3 Percentage of final grade
11.4 Course	Knowledge of fundamental theoretical notions and how to apply the theory in specific fields	Questions, dialogue, assignments, tests in the course	15
	Knowledge of the methods of analysis and evaluation of the component elements of peripheral equipment	Exercises and problems	15
	Knowledge of the design methods of the component elements of peripheral equipment and specific applications	Design themes	20

11.5 Seminary/laboratory/project	Knowledge of analysis methods, performance evaluation, and design of peripheral equipment	Questions and exercises	15
	Knowledge of the types of technologies and algorithms used in the construction and operation of peripheral equipment	Individual worksheets of experimental observations and assignments	15
	Knowledge of how a peripheral scheme works and how to connect/interface with the computer	Final verification by laboratory test	20
11.6 Passing conditions			
• Obtaining 50% of the total score. • Obtaining 50% of the score related to the activity during the semester (promotion of the laboratory, according to the regulation of university undergraduate studies in UNSTPB).			

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 offer solutions to problems and propose ideas to improve the situation of existence in the IT field.

• This subject tries to outline the basic lines of the structural and functional organization of a peripheral equipment, the approach assuming the highlighting of the principled, constructive, operational and relational aspects between the component blocks of a peripheral and its interface with a modern computer system. The subject marks the milestones of a fundamental field in IT, aiming to draw a bridge between software & hardware and technology, being addressed to future specialist engineers and designers in this field.

• In the development of the content of the discipline, knowledge, aspects and phenomena described in the specialized literature, in own researches published and presented at specialized scientific events were taken into account.

• The course has an equivalent content to specialized courses held by similar universities in the European Union and the United States of America. The course curriculum responds concretely to the current development and evolution requirements, subscribed to the European economy of services in the field of Electronic Engineering, Telecommunications and Information Technologies. In the context of the current technological progress of electronic devices, the targeted fields of activity are very numerous, the practical applications being particularly diverse.

• Through the course and laboratory activities, the development of the graduate's skills to manage practical situations that he may face in real life is considered in order to increase his contribution to the improvement of the socio-economic environment.

• Graduates are thus provided with skills appropriate to the needs imposed by the current qualifications and a modern, high-quality and competitive scientific and technical training, which will allow them to be employed quickly after graduation, this discipline being well within the policy of the Politehnica of Bucharest, both from the point of view of from the point of view of the content and structure, as well as from the point of view of the skills and openness on the labor market offered to students.

Date	Course lecturer	Instructor(s) for practical activities
25.09.2025	Prof. Dr. Radu RĂDESCU	Prof. Dr. Radu RĂDESCU

Date of department approval	Head of department

Date of approval in the Faculty Council	Dean
26.09.2025	Prof. Dr. Mihnea Udrea