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	**Telecommunications**
1.4 Domain of studies	Electronic Engineering, Telecommunications and Information Technology
1.5 Cycle of studies	Masters
1.6 Programme of studies	Services and Network Management

2. Date despre disciplină

2.1 Course name (ro) (en)				Modul de cercetare ştiinţifică I Scientific and Practical Research Module1			
2.2 Course Lecturer							
2.3 Instructor for practical activities				Prof. Dr. Roxana Zoican			
2.4 Year of studies	1	2.5 Semester	1	2.6. Evaluation type	V	2.7 Course regime	Ob
2.8 Course type		S	2.9 Course code	7		2.10 Tipul de notare	Nota

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

3.1 Number of hours per week	12	Out of which: 3.2 course	0.00	3.3 seminary/laboratory	12
3.4 Total hours in the curricula	168	Out of which: 3.5 course	0	3.6 seminary/laboratory	168
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.					240
Tutoring					0
Examinations					10
Other activities (if any):					0

3.7 Total hours of individual study	82.00
3.8 Total hours per semester	250
3.9 Number of ECTS credit points	10

4. Prerequisites (if applicable) (where applicable)

4.1 Curriculum	Completion of the following disciplines: Architectures and communications protocols, Networks and services, Mobile communication networks

4.2 Results of learning	Knowledge accumulation regarding: architecture, protocols and services of fixed and mobile networks.

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

5.1 Course	It is not necessary
5.2 Seminary/ Laboratory/Project	In laboratories equipped with network equipments and specific software

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 discipline is studied within the field of Electronic Engineering, Telecommunications and Information Technologies /specialization Telecommunications Networks and Software and aims to familiarize students with the main approaches, models and explanatory theories of the field, used in the design of telecommunication networks, with relevance for stimulating the students learning process.
Discussion of research results. Establishing the objectives of the next stage, in the context of the dissertation topic. Development on the research directions of the topic and obtaining new results. Supervision of the results presentation organization in the form of a scientific article and a power point presentation.

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	•Interpretation of results and identification of perspectives for further research •Organization of the obtained results in the form of a research report
Transversal (General) Competences	•Works in a team and communicates effectively, coordinating efforts with others to solve problem situations of medium complexity •Autonomy and critical thinking: the ability to think in scientific terms, search and analyze data independently, and draw and present conclusions / identify solutions. •Ability to analyze and synthesize: presents the acquired knowledge in a synthetic way, as a result of a process of systematic analysis •Respect the principles of academic ethics: correctly cite the bibliographic sources used in the documentation activity. •Integrates elements of emotional intelligence into practice in the appropriate social-emotional management of real-life/academic/professional situations, demonstrating self-control and objectivity

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.* •The ability to precisely define the objectives of the research project •The ability to analyze and synthesize specialized literature •Deep knowledge of design principles •The ability to establish, based on the defined objectives, the optimal hardware/software resources that will be used •Understanding the necessary context for the system to be designed •Description of common assumptions, simplifications and generalizations made in the modeling of telecommunications systems
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).* •Selects and gather relevant information in a given context. •Reasonably uses specific principles in order to solve various problems with the help of a program. •Can communicate, motivate and think creatively •Work productively in a team •Elaborate a scientific text •Experimentally verifies the solutions identified in the design of a certain network, in the use of existing protocols, algorithms and network architectures, to ensure the required performances •Adequately interpret causal relationships •Analyzes and compares various ways of solving a problem •Identifies solutions and develops resolution plans •Formulates conclusions to the solved problems •Argues the identified solutions and ways of solving them
Responsability and autonomy	*The student's capacity to autonomously and responsably apply their knowledge and skills.* •Select appropriate bibliographic sources and analyze them. •Respect the principles of academic ethics, correctly citing the bibliographic sources used. •Demonstrates responsiveness to new learning contexts. •Demonstrates collaboration with other colleagues and teaching staff in carrying out teaching activities •Demonstrates autonomy in organizing the learning situation/context or the problem situation to be solved •Demonstrates social responsibility through active involvement in student social life/involvement in academic community events •Promotes/contributes through new solutions related to the specialized field to improve the quality of social life. •Realizes the value of his contribution in the field of engineering to the identification of viable/sustainable solutions to solve problems in social and economic life (social responsibility). •Apply principles of professional ethics/deontology in the analysis of the technological impact of the proposed solutions in the specialized field on the environment. •Analyzes and capitalizes on business/entrepreneurial development opportunities in the specialized field. •Demonstrates 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 students' learning characteristics and their specific needs, the teaching process will explore both expository (lecture, exposition) and conversational-interactive teaching methods, based on discovery learning models facilitated by direct exploration and indirect of reality (experiment, demonstration, modelling), but also on action-based methods, such as exercise, practical activities and problem solving.
This discipline covers information and practical activities designed to support students in their learning efforts and the development of optimal collaborative and communicative relationships in a climate conducive to discovery learning. It will be considered the practice of active listening and assertive communication skills, as well as feedback construction mechanisms, as ways of regulating behavior in various situations and adapting the pedagogical approach to the students' learning needs. Teamwork skills will be practiced to solve different learning tasks.

10. Contents

Bibliography:

11. Evaluation

Activity type	11.1 Evaluation criteria	11.2 Evaluation methods	11.3 Percentage of final grade
11.4 Course			
11.5 Seminary/laboratory/project	- Developing the ability to identify innovation directions, to use simulation environments and validation tools specific to scientific research activity - Developing the ability to organize research results in a scientific research report and to present them in front of a specialized audience	Project evaluation	50%
11.6 Passing conditions			
Research report support and validation			

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 to propose ideas to improve the present state in the field of Electronic Engineering, Telecommunications and Information Technologies, the industrial branch Networks and Telecommunications Software
•In the development of the content of the discipline, knowledge described by specialized literature and own published and presented research were taken into account.
•The course has a similar content to the courses held by the National University of Science and Technology POLITEHNICA Bucharest.
It is intended to develop the graduate's skills to manage practical situations that he may face in real life in order to increase his contribution to the improvement of the socio-economic environment.

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Date	Course lecturer	Instructor(s) for practical activities
21.09.2026		Prof. Dr. Roxana Zoican

Date of department approval	Head of department
22.09.2026	Conf. Dr. Serban Georgica Obreja

Date of approval in the Faculty Council	Dean
22.09.2026	Prof. Dr. Mihnea Udrea