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

# COURSE DESCRIPTION

## 1. Program identification information

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| 1.1 Higher education institution | **National University of Science and Technology Politehnica Bucharest** |
| 1.2 Faculty | **Electronics, Telecommunications and Information Technology** |
| 1.3 Department | **Electronic Devices, Circuits and Architectures** |
| 1.4 Domain of studies | Electronic Engineering, Telecommunications and Information Technology |
| 1.5 Cycle of studies | Masters |
| 1.6 Programme of studies | Micro and Nanoelectronics |

## 2. Date despre disciplină

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|---|---|---|---|---|---|---|---|
| 2.1 Course name (ro)<br>(en) | | | | Modul de cercetare ştiinţifică II | | | |
| 2.2 Course Lecturer | | | | | | | |
| 2.3 Instructor for practical activities | | | | Prof. Dr. Lidia Dobrescu | | | |
| 2.4 Year of studies | 1 | 2.5 Semester | 2 | 2.6. Evaluation type | V | 2.7 Course regime | Ob |
| 2.8 Course type | | S | 2.9 Course code | 6 | | 2.10 Tipul de notare | Nota |

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

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|---|---|---|---|---|---|
| 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<br>Supplemental documentation (library, electronic access resources, in the field, etc)<br>Preparation for practical activities, homework, essays, portfolios, etc. | | | | | 250 |
| Tutoring | | | | | 0 |
| Examinations | | | | | 0 |
| Other activities (if any): | | | | | 0 |

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| 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)

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| 4.1 Curriculum | Not applicable |
| 4.2 Results of learning | Not applicable |

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

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| 5.1 Course | Not applicable |
| 5.2 Seminary/ Laboratory/Project | The research will be carried out in the laboratories of the faculty or workplace or the student's own |

**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)*

The general objective of the discipline is:

Deepening the stages of making a scientific project, identifying research directions for the professional development of students of this study program. in order to obtain results that can be used for projects in general, with the purpose of the dissertation project. Identification of the necessary means of validation and appropriation of their use. This general objective will be achieved by identifying research perspectives and organizing and aggregating results in the form of future research reports in the coming semesters. Discussing the rules and formats for drafting scientific articles and projects.

**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.)*

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| **Specific Competences** | C1s. Use of fundamental elements relating to electronic devices, circuits, systems, instrumentation and technology<br>C2's. Design, simulation and testing of devices, integrated circuits and micro and nanoelectronic systems with modern software tools<br>C3's. Modeling and processing of integrated devices and circuits using advanced technologies<br>C4's. Design, simulation and testing of optoelectronic devices, circuits and systems with modern micro and nanoelectronic software tools and technologies |
| **Transversal (General) Competences** | CT1 Adaptation to new technologies, professional and personal development, through continuous training using printed documentation sources, specialized software and electronic resources in Romanian and at least, in a language of international circulation. |

**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.)*

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| **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.*<br>Defines the stages of a scientific project<br>Describe/classify its objectives<br>Highlights the peculiarities of the solutions found |

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| **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).*<br>Select and group relevant project information<br>Arguably uses specific principles in order to preserve or neglect some model parameters.<br>Work productively in a team with colleagues .<br>Elaborates a scientific text in the drafting of the project<br>It interprets proper causal relationships.<br>Analyze and compare the solutions found.<br>Identifies solutions and elaborates the discipline project.<br>Make conclusions .<br>Arguing the solutions identified . |
| **Responsability and autonomy** | *The student's capacity to autonomously and responsably apply their knowledge and skills.*<br>Select appropriate bibliographic sources and analyze them.<br>Respect the principles of academic ethics, correctly quoting the used bibliographic sources.<br>Demonstrate responsiveness for new learning contexts.<br>Demonstrates collaboration with other colleagues and teachers in carrying out teaching activities<br>Demonstrates autonomy in organizing the learning situation/context or problem-solving situation<br>Promotes/contributes through new solutions, related to the specialty field.<br>Awareness of the value of its contribution to the field of engineering in identifying viable/sustainable solutions<br>Apply ethical principles |

**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.)*

Teaching (definitions, demonstrations, properties) of the main theoretical notions is carried out using the classical method (on the blackboard) or MS Teams support

In order to facilitate the understanding of physical phenomena, certain properties/features are presented using the video projector, thus covering the demonstrative communication function.

Free discussions with the master program coordinator.

**10. Contents**

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| **Bibliography:**<br>https://archive.curs.upb.ro/2022/course/view.php?id=10362 |

**11. Evaluation**

| Activity type | 11.1 Evaluation criteria | 11.2 Evaluation methods | 11.3 Percentage of final grade |
|---|---|---|---|
| 11.4 Course | | | |

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|---|---|---|---|
| 11.5<br>Seminary/laboratory/project | Developing the ability to identify directions of innovation, to use simulation environments and validation tools specific to scientific research<br>Developing the ability to organize research results in the form of a scientific research report and to present them to a specialized auditorium | Oral verification | 100% |
| 11.6 Passing conditions | | | |
| Organizing the research results within the dissertation project proposal.<br><br>Compliance with the UNSTPB regulation on promotion conditions. | | | |

**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)**

The increasing complexity of electronic circuits and systems and the need to reduce costs and research-design-manufacture cycles have imposed the development of computer-aided simulation, design and optimization techniques, in the form of various software tools.

The discipline provides graduates with adequate skills with the needs of current qualifications and modern, quality and competitive scientific and technical training.

Thus, the graduates are provided with a modern, quality and competitive scientific and technical training that will allow them to be hired quickly after graduation, being perfectly framed in the politics of the university both in terms of content and structure, and in terms of skills and international openness offered to students.

| Date | Course lecturer | Instructor(s) for practical activities |
|---|---|---|
| 21.09.2026 | | Prof. Dr. Lidia Dobrescu |

| Date of department approval | Head of department |
|---|---|
| 22.09.2026 | Prof. Dr. Claudius Dan |

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