**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 | Computers and Information Technology |
| 1.5 Cycle of studies | Bachelor/Undergraduate |
| 1.6 Programme of studies | Information Engineering |

## 2. Date despre disciplină

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|---|---|---|---|---|---|---|---|
| 2.1 Course name (ro)<br>(en) | | | | Măsurători electronice, senzori şi traductoare 1 | | | |
| 2.2 Course Lecturer | | | | Conf. Dr. Ionuţ Pirnog | | | |
| 2.3 Instructor for practical activities | | | | Conf. Dr. Ionuţ Pirnog | | | |
| 2.4 Year of studies | 1 | 2.5 Semester | II | 2.6. Evaluation type | E | 2.7 Course regime | Ob |
| 2.8 Course type | | D | 2.9 Course code | 04.D.02.O.713 | | 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 | 3.5 | Out of which: 3.2 course | 2.00 | 3.3 seminary/laboratory | 1.5 |
| 3.4 Total hours in the curricula | 49.00 | Out of which: 3.5 course | 28 | 3.6 seminary/laboratory | 21 |
| 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. | | | | | 44 |
| Tutoring | | | | | 3 |
| Examinations | | | | | 4 |
| Other activities (if any): | | | | | 0 |

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| 3.7 Total hours of individual study | 51.00 |
| 3.8 Total hours per semester | 100 |
| 3.9 Number of ECTS credit points | 4 |

## 4. Prerequisites (if applicable) (where applicable)

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| 4.1 Curriculum | Electrical Engineering Fundamentals, Part I |
| 4.2 Results of learning | |

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

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| 5.1 Course | Classroom with video projector and blackboard. |
| 5.2 Seminary/ Laboratory/Project | Laboratory room equipped with devices, electronic components and boards for making circuits. |

**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)*

Knowledge of some techniques and measuring devices used in electronics.

**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** | Knowledge of some techniques and measuring devices used in electronics. |
| **Transversal (General) Competences** | Mastering the engineering way of thinking, mainly by acquiring the skill of approximating and estimating measurement error. Acquiring skills to understand the functioning of electronic circuits in general. |

**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><br>• **Lists** the most important stages that have marked the development of the field.<br>• **Defines** notions specific to the field.<br>• **Describes/classifies** notions/processes/phenomena/structures.<br>• **Highlights** consequences and relationships.<br><br>**Program-specific knowledge:**<br><br>1. Knowledge, understanding of the basic concepts, theories and methods of the field and the area of specialization; their appropriate use in professional communication.<br>2. Use of basic knowledge to explain and interpret various types of concepts, situations, processes, projects, etc. associated with the field. |

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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><br>• **Selects and groups** relevant information in a given context.<br>• **Uses specific principles in an argumentative manner**.<br>• **Works** productively **in a team**.<br>• **Develops** a scientific text.<br>• **Experimentally verifies identified solutions**.<br>• **Solves** practical applications.<br>• **Interprets** causal relationships appropriately.<br>• **Analyzes and compares** methods.<br>• **Identifies** solutions and **develops** solution plans/projects.<br>• **Formulates conclusions** from experiments performed.<br>• **Argues** the identified solutions/solution methods.<br><br>**Program-specific skills:**<br><br>• Application of basic principles and methods for solving well-defined problems/situations, typical of the field under qualified assistance<br>• Appropriate use of standard evaluation criteria and methods to assess the quality,<br>• merits and limits of processes, programs, projects, concepts, methods and theories<br>• Development of professional projects using principles and methods established in the field. |

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| **Responsability and autonomy** | *The student's capacity to autonomously and responsably apply their knowledge and skills.*<br>Selects appropriate bibliographic sources and analyzes them.<br>· Respects the principles of academic ethics, correctly citing the bibliographic sources used.<br>· Demonstrates receptivity to 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 the problem situation to be solved<br>· Demonstrates social responsibility through active involvement in student social life/involvement in events in the academic community<br>· Promotes/contributes through new solutions related to the field of specialization to improve the quality of social life.<br>· Is aware of the value of his contribution in the field of engineering in identifying viable/sustainable solutions that solve problems in social and economic life (social responsibility).<br>· Apply principles of professional ethics/deontology in analyzing the technological impact of solutions proposed in the field of specialization on the environment.<br>· Analyzes and capitalizes on business/entrepreneurial development opportunities in the field of expertise.<br>· Demonstrates real-life situation management skills (time management, collaboration,vs. conflict).<br>Specific program capabilities:<br>· Performing calculations, demonstrations and applications to solve specific tasks in electronic engineering, telecommunications and information technologies, using advanced computer tools and associating knowledge, principles and methods from the technical and economic sciences of the field with graphical, mathematical and procedural models to solve specific tasks using established models.<br>· Organizing and adapting knowledge from the fundamental and engineering, technical and economic - managerial sciences of the field for its integration into intelligent systems.<br>· Developing knowledge, digital technologies and software applications for the creation of products, machinery, production equipment and intelligent instruments, integrated into intelligent systems using specific algorithms.<br>· Identifying roles and responsibilities in a multidisciplinary team and applying effective communication and work techniques within the team.<br>· Management of processes and activities carried out in industrial organizations with the help of intelligent IT applications and critical analysis of advanced IT problems and the ability to troubleshoot these problems efficiently and correctly and to communicate with higher hierarchical structures and with the subordinate team.<br><br>· Responsible application of the principles, norms and values of professional ethics in carrying out professional tasks and identifying the objectives to be achieved, the available resources, the work stages, the execution times, the related deadlines and the related risks.<br><br>· Respect for different cultures, customs and professional technical methods and procedures inherent to an industry<br>with many differences based on locality or region or country or continent.<br>· Identifying opportunities for continuous training and the efficient use, for one's own development, of information sources and communication resources and assisted professional training (Internet portals, specialized software applications, databases, online courses, etc.) both in English and in other internationally circulated languages.<br>· The ability to function as a leader of a team that may be made up of people with different specializations and qualification levels and the ability to identify and apply the most appropriate and relevant management strategies for the subordinate team. |

**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 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 and indirect exploration of reality (experiment, demonstration, modeling), but also on action-based methods, such as exercise, practical activities and problem solving.

Lectures will be used in the teaching activity, based on Power Point presentations or various videos that will be made available to students. Each course will begin with a recapitulation of the chapters already covered, with an emphasis on the notions covered in the last course.

The presentations use images and diagrams, so that the information presented is easy to understand and assimilate.

This discipline covers information and practical activities designed to support students in their learning efforts and in developing optimal collaborative and communication relationships in a climate favorable to discovery learning.

The practice of active listening and assertive communication skills, as well as feedback construction mechanisms, will be considered, as ways of regulating behavior in various situations and adapting the pedagogical approach to the learning needs of students.

The ability to work in a team will be practiced to solve various learning tasks.

**10. Contents**

| **COURSE** | | |
|---|---|---|
| **Chapter** | **Content** | **No. hours** |
| 1 | Introduction; measurement errors | 2 |
| 2 | The oscilloscope | 8 |
| 3 | Voltage measure | 8 |
| 4 | Measurement of the resistance and impedance | 8 |
| 5 | Frequency and time measurements | 2 |
| | **Total:** | |

**Bibliography:**

R. Stănculescu, M. Stanciu, “Măsurări Electrice şi Electronice – partea I”, litografia UPB, 1998
S. Ciochină, “Măsurări Electrice şi Electronice – partea I”, litografia UPB, 1995
B. M. Oliver, J.M. Cage, “Electronic Measurements and Instrumentation”, Mc. Graw-Hill, 1971

| **LABORATORY** | | |
|---|---|---|
| **Crt. no.** | **Content** | **No. hours** |
| 1 | Generating and viewing signals | 3 |
| 2 | Oscilloscope measurements | 3 |
| 3 | Simple resistive circuits: assembly on the protoboard, measurements | 3 |

| | | |
|---|---|---|
| 4 | Measurement of frequency characteristics of a circuit | 3 |
| 5 | Voltage measurements | 3 |
| 6 | Resistance and impedance measurement | 3 |
| 7 | Assembly and measurements of a simple IC oscillator | 3 |
| | **Total:** | |

**Bibliography:**
Laboratory plarforms.

**11. Evaluation**

| Activity type | 11.1 Evaluation criteria | 11.2 Evaluation methods | 11.3 Percentage of final grade |
|---|---|---|---|
| 11.4 Course | Clarity, coherence and conciseness of the presentation.<br>Degree of coverage of the issues required by the subjects.<br>Correct use of concepts.<br>Ability to exemplify.<br>Activity and interventions during the course. | Written test paper and final written exam. The exams mainly include problems of the type of examples presented in the course and theoretical topics. | 50 |
| 11.5 Seminary/laboratory/project | Active participation in laboratories.<br>Applying specific solution methods for given problems.<br>Using tools and explaining the results obtained. | The work during each laboratory is evaluated and there is a laboratory colloquium. | 50 |
| 11.6 Passing conditions | | | |
| Obtaining 50% of the total score.<br>Obtaining 50% of the score related to the activity during the semester (laboratory). | | | |

**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)**

Date Course lecturer Instructor(s) for practical activities

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|---|---|---|
| 21.09.2026 | Conf. Dr. Ionuț Pirnog | Conf. Dr. Ionuț Pirnog |
| Date of department approval | Head of department | |
| Date of approval in the Faculty Council | Dean | |
| 22.09.2026 | Prof. Dr. Mihnea Udrea | |