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)				Sisteme electronice programabile - Proiect Programable Electronic Systems - Project			
2.2 Course Lecturer				Prof. Dr. Constantin Daniel OANCEA			
2.3 Instructor for practical activities				Prof. Dr. Constantin Daniel OANCEA			
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.A.109		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.					75
Tutoring					0
Examinations					8
Other activities (if any):					0

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	Completion and/or promotion of the following disciplines:- Architecture of microprocessors- Microcontrollers - Digital Signal Processing

4.2 Results of learning	Knowledge of HW and SW architecture of digital signal processors, implementation of digital signal processing algorithms on programmed logic systems, use of programmable automatic simulation and programming programs.

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 blackboard.
5.2 Seminary/ Laboratory/Project	The laboratory will be held in a room with specific equipment, which must include PCs with the development environment specific to programmable logic controllers. The work platforms are equipped with Schneider devices. Attendance at the laboratories is mandatory according to the regulations of POLITEHNICA Bucharest.

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 course familiarizes students with the basic concepts of hardware and software architecture of programmable systems with digital signal processors and their use for implementing digital signal processing algorithms. Applications study the implementation of algorithms in simulation mode and real implementation of logic diagrams that read signals (analog and digital) and provide numerical or analog results. The HW architecture and how to use the specific programming environment, dedicated to Schneider equipment, are studied. Students will design, implement and test algorithms such as logic structures, timers, counters and external commands.

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	Demonstrates basic knowledge in the field of digital signal processors. Implements procedures of medium complexity on signal processors. Applies basic knowledge, concepts and methods regarding the architecture of computer systems, microprocessors, microcontrollers, programming languages and techniques Explains and interprets the methods of acquisition and processing of signals and the structure and functioning of computer architectures with programmable automata for industrial use. Applies in practice and carries out projects involving hardware and software components. Argues and analyzes coherently and correctly the context of application of basic knowledge of programmable electronic systems. Oral and written communication in Romanian: uses the scientific vocabulary specific to the field, in order to communicate effectively, in writing and orally. Oral and written communication in a foreign language (English): demonstrates understanding of the vocabulary related to the field, in a foreign language.
Transversal (General) Competences	Methodical analysis of problems encountered in the activity, identifying elements for which there are established solutions, thus ensuring the fulfillment of professional tasks. Carrying out projects in a team with the implementation of project management and quality assurance for solving problem situations of medium complexity. Autonomy and critical thinking: the ability to think in scientific terms, to search and analyze data independently, as well as to extract and present conclusions / identify solutions. Capacity for analysis and synthesis: presents in a synthetic way the knowledge acquired, as a result of a systematic analysis process.

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.* Lists and characterizes types of programmable automata. Lists types of instructions used in programmable electronic systems. Defines domain-specific notions. Highlights the basic characteristics of programmable electronic systems. Applies the basic signal processing methods used in signal processors. Implements some procedures of medium complexity on signal processors. Applies the knowledge, concepts and elementary methods regarding programming languages and techniques.
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).* Select and group relevant information in a given context.Work productively in a team.Experimentally verify identified solutions.Solve practical applications.Interpret causal relationships appropriately.Identifies solutions and develops resolution/project plans.Formulate conclusions to the experiments carried out. Argue the identified solutions.
Responsability and autonomy	*The student's capacity to autonomously and responsably apply their knowledge and skills.* Demonstrates responsiveness to new learning contexts.Demonstrates collaboration with other colleagues and teaching staff in carrying out teaching activitiesDemonstrates autonomy in organizing the learning situation/context or the problem situation to be solvedPromotes/contributes through new solutions related to the specialized field to improve the quality of social life. Respect the principles of academic ethics, correctly citing the bibliographic sources used.

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.)*

Within this discipline, considering both the course hours and those of applications, both expository (lecture, exposition) and conversational-interactive teaching methods will be used, based on discovery learning models facilitated by the direct and indirect exploration of reality (experiment, demonstration, modelling), but also on action-based methods, such as exercise, practical activities and problem solving.In the teaching activity, lectures will be used, based on some Power Point presentations. Presentations use images and diagrams so that the information presented is easy to understand and assimilate.

Active listening and assertive communication skills will be considered, as well as feedback construction mechanisms. Teamwork skills will be practiced to solve different learning tasks

10. Contents

Bibliography:
. Daniel Oancea, electronic course support available on Moodle/MSTeams
. https://www.se.com/ww/en/

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 concepts.	Activity evaluation along the way	20%
	Attendance	Others activity	20%
11.5 Seminary/laboratory/project	Design, simulation and implementation of simple signal processing algorithms. PLC programming.	Final laboratory test	60%
11.6 Passing conditions			
Obtaining 50% of the total score. Obtaining 50% of the score related to the laboratory 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)

Digital signal processing systems have replaced traditional analog processing systems. Two factors contributed to this evolution: the appearance and development of microprocessors and the development of efficient algorithms for digital processing. Currently, digital systems cover a wide range of applications in fields such as: medicine, consumer electronics, telecommunications, robotics, measurement systems, command and control, transport, the military field, etc. In the "digital era" there is a great demand for qualified engineers, specialized in the design, manufacture and use of digital systems, who also possess a solid knowledge base in electronics, systems theory, information technology so that they are able to develop new hardware systems and software applications. .

The curriculum of the discipline responds concretely to these current development and evolution requirements, subscribed to the European economy of services in the field of Electronic Engineering, Telecommunications and Information Technology. In the context of the current technological progress of electronic devices, the fields of activity targeted are practically unlimited, from "consumer" applications (digital camera technologies, mobile "smart-phone" terminals), the medical field (products and technologies for analysis and medical image processing), military field (remote sensing products and satellite image processing technologies), security field (surveillance systems and biometric systems), industrial automation field (product inspection systems), robotics (systems of human-machine interface) and others.

The SEP discipline provides graduates with adequate skills to meet the needs of current qualifications and a modern, high-quality and competitive scientific and technical training, which will allow them to be employed quickly after graduation, being perfectly aligned with the policy of the Politehnica University of Bucharest, both from the point of view of content and structure, as well as from the point of view of the skills and international openness offered to students.

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Date	Course lecturer	Instructor(s) for practical activities
	Prof. Dr. Constantin Daniel OANCEA	Prof. Dr. Constantin Daniel OANCEA
Date of department approval	Head of department	
Date of approval in the Faculty Council	Dean	