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	**Electronic Devices, Circuits and Architectures**
1.4 Domain of studies	Electronic Engineering, Telecommunications and Information Technology
1.5 Cycle of studies	Bachelor/Undergraduate
1.6 Programme of studies	Technologies and Telecommunications Systems

2. Date despre disciplină

2.1 Course name (ro) (en)				Informatică aplicată - Proiect Applied Informatics - Project			
2.2 Course Lecturer				As. drd. ing. Andrei-Alexandru Ulmămei			
2.3 Instructor for practical activities				As. drd. ing. Andrei-Alexandru Ulmămei			
2.4 Year of studies	1	2.5 Semester	II	2.6. Evaluation type	V	2.7 Course regime	Ob
2.8 Course type		F	2.9 Course code	04.F.02.O.015		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.					30
Tutoring					3
Examinations					3
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	Computer Programming and Programming Languages 1
4.2 Results of learning	General C/C++ programming knowledge.

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

5.1 Course	Not Applicable
5.2 Seminary/ Laboratory/Project	Room fitted with computers, ESP32 boards and soldering equipment.

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 projects aims to to deepen and apply the knowledge and abilities gained through other programming course in the form of a practical project that combines programming, hardware ocmponents and communication protocols. Students are encouraged to explore multiple functions of the ESP32 board through a wide variety of projects, as well as implementing their own hardware+software solutions.

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	Creation of abilities and competencies in the field of microcontrollers and their practical usage. Ability to evaluate (based on performance and architectural criteria) microcontroller selection and usage in response to a real life problem.
Transversal (General) Competences	Honourable, ethical, responsible behaviour, in the spirit of the law.

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.* Physical applications will be created by the students, both in hardware and in software. Proposed projects and themes are given in order to help students discover multiple areas of electronic design.
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).* Capacity to apply knowledge gained from programming courses in developing a fully functional project. Capacity to write clear and expressive documentation regarding their work. Capacity to present their work and obtained results.

Responsability and autonomy	*The student's capacity to autonomously and responsably apply their knowledge and skills.* Time and resource management, teamwork and result synthesis abilities.

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.)*

Oral, frontal presentation, the problematiozation technique. Students simulate, test and evaluate independently the proposed problems, by means of computer and software environment.

10. Contents

PROJECT		
Crt. no.	**Content**	**No. hours**
1	ESP32 board and Arduino environment presentations. Installing sodtware and libraries. A simple "Blinky" test program.	2
2	Presentation of electronical interconnection. Combining hardware and software. Selection of project theme.	2
3	Presentation of more complex projects using ESP32. Examples.	2
4	WiFi and Bluutooth communication protocols presentations, as available on the ESP32 board. Example applications using these protocols.	2
5	Design and implementation of a complete hardware+software project using previously accumulated knowledge. Examples.	2
6	Consultations regarding the main project implementations.	2
7	Final evaluation.	2
	Total:	

Bibliography:

1. Project guide found of Moodle or Teams.
2. https://www.espressif.com/sites/default/files/documentation/esp32_technical_reference_manual_en.pdf
3. Electronics Projects with the Esp8266 and Esp32: Building Web Pages, Applications, and Wifi Enabled Devices, Paperback - Neil Cameron, Ed. Apress, 2020

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	Laboratory tasks or homework	Oral evaluation	20
	Final project hardware component	Oral evaluation and practical demonstration	20
	Final project software component	Oral evaluation and practical demonstration	20
	Knowledge gained, questions answered	Oral evaluation	20
	Project documentation	Structure, conciseness, rigurosity and logic, regarding documentation and project presentation.	20
11.6 Passing conditions			
Obtaining a minimum of 50% of the total points. Obtaining a minimum of 50% of the "Knowledge gained, questions answered" category. Functional implementation of the designated project using the ESP32 board.			

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)

In order to maintain the rhythm of software and hardware product development, the industrial environment requires a constant influx of qualified engineers, trained in using microcontrollers and with a solid background of fundamental electronics.

This project's curriculum is a direct response to modern requirements regarding electronic system design. In the context of current technological progress in the field of microcontroller systems, application domains are practically limitless. It thus helps students obtain the scientific training and necessary qualifications to easily allow them to get hired in application development positions. This project is perfectly situated within the Bucharest Politechnica University, from both the content point of view, and the developed skills point of view.

Date	Course lecturer	Instructor(s) for practical activities
	As. drd. ing. Andrei-Alexandru Ulmămei	As. drd. ing. Andrei-Alexandru Ulmămei

Date of department approval	Head of department
	Prof. dr. ing. Claudius DAN

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Date of approval in the Faculty Council

Dean

Prof. dr. ing. Mihnea UDREA