Universitatea Națională de Știință și Tehnologie Politehnica București
Facultatea de Electronică, Telecomunicații și
Tehnologia Informației

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	Advanced Wireless Communications

2. Date despre disciplină

2.1 Course name (ro) (en)				Aplicații software pentru terminale mobile Software Applications for Mobile Terminals			
2.2 Course Lecturer				Conf. Dr. Alexandru Vulpe			
2.3 Instructor for practical activities				Conf. Dr. Alexandru Vulpe			
2.4 Year of studies	1	2.5 Semester	I	2.6. Evaluation type	E	2.7 Course regime	Ob
2.8 Course type		DS	2.9 Course code	UPB.04.M1.O.21-01		2.10 Tipul de notare	Nota

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

3.1 Number of hours per week	2	Out of which: 3.2 course	1.00	3.3 seminary/laboratory	1
3.4 Total hours in the curricula	28.00	Out of which: 3.5 course	14	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.					43
Tutoring					0
Examinations					4
Other activities (if any):					0

3.7 Total hours of individual study	47.00
3.8 Total hours per semester	75
3.9 Number of ECTS credit points	3

4. Prerequisites (if applicable) (where applicable)

4.1 Curriculum	• Computer programming • Data structures and algorithms • Object-oriented programming
4.2 Results of learning	General knowledge of programming, working with data structures, pointers, objects, classes, writing object-oriented programs

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

5.1 Course	The lectures will take place in a room equipped with video projector and computer
5.2 Seminary/ Laboratory/Project	The laboratory/project will take place in a room with specific equipment, which must include: computer, mouse, keyboard, mobile terminal, 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)*

The aim of the discipline is to familiarize students with programming technologies widely used in the development of applications for mobile devices (with emphasis on the Android operating system), access to databases, using different programming languages: Java, Kotlin, C/C#, XML, SQL , HTML. The objective of the laboratory applications is for the students to acquire the skills and learn some techniques necessary for the use of programming technologies. Concrete applications will be made in which students will use various programming technologies.

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/advanced knowledge of software application development specific to mobile operating systems. • Applies standardized methods and tools, specific to software development, to carry out the evaluation and diagnosis of a situation, depending on the identified/reported problems, and identifies solutions. • Argues and analyzes coherently and correctly the context of application of the basic knowledge of software application development, using key concepts from software development and a specific methodology. • Oral and written communication in a foreign language (English): demonstrates understanding of subject-related vocabulary in a foreign language.

Transversal (General) Competences	• Works in a team and communicates effectively, coordinating efforts with others to solve problems 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. • Respects the principles of academic ethics: correctly cites the bibliographic sources used in the documentation activity. • Puts elements of emotional intelligence into practice in the appropriate socio-emotional management of real-life/academic/professional situations, demonstrating self-control and objectivity in decision-making or stressful situations.

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 the most important milestones that marked the development of mobile applications and operating systems. • Defines concepts specific to software development, with an emphasis on mobile applications • Describes/classifies processes in software development • Highlights consequences and relationships.
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).* • Works productively in a team. • Solves practical applications. • Interprets causal relationships appropriately. • Analyzes and compares architectures and solutions for mobile software applications. • Identifies solutions and develops resolution/project plans. • Formulates conclusions to the experiments carried out. • Argues the identified solutions/workarounds.

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 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 to new mobile software solutions to improve the quality of social life. • Realizes the value of his/her contribution in the field of engineering to the identification of viable/sustainable solutions to solve problems in social and economic life (social responsibility). • Applies principles of professional ethics/deontology in the analysis of the technological impact of the developed applications on the environment. • Analyzes and capitalizes on business/entrepreneurial development opportunities in mobile application development. • 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 and indirect exploration of reality (experiment, demonstration, modelling), but also on action-based methods, such as exercise, practical activities and problem solving.
The presentation of the course lessons is combined, being based both on the use of the video projector (for communicating the theoretical foundations, for demonstrations, descriptions of schemes, etc.), but also on the use of the blackboard (for examples, justifications or checks, with the direct participation of students)
The 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 learning through discovery.
The dialogue with the students is open, with questions and answers whenever necessary.
The materials used are: course notes, scientific papers, technical notes written by different actors in the field of applications for mobile terminals but also of mobile cellular networks (software development companies, manufacturers of mobile operating systems, operators, equipment manufacturers, professional associations)

10. Contents

COURSE		
Chapter	**Content**	**No. hours**
1	Introduction to software applications for mobile terminals 1.1. The history of software platforms and applications for mobile terminals 1.2. Operating systems for mobile terminals 1.3. Examples of software platforms for mobile terminals	1

2	Introduction to the Android platform 2.1 Installation of the programming environment 2.2 Basics of programming on the Android platform 2.3 Android platform architecture	3
3	Software applications on the Android platform 3.1 First Android application 3.2 Basics of the Kotlin programming language 3.3 Activity Lifecycle. Fragments 3.4 User Interface. Jetpack Compose	5
4	Thematic software applications 4.1 Troubleshooting Applications 4.2 Applications that use databases 4.3 Applications that use location-based services 4.4 Applications using the Firebase platform	5
	Total:	14

Bibliography:

"Android Developers," *Android Developer*, [Online]. Available: https://developer.android.com/.
G. Socorro Rodríguez, *Thriving in Android Development using Kotlin*, Birmingham, UK: PacktPublishing, 2023.
A. Forrester, E. Boudjnah, and A. Dumbravan, *How to Build Android Apps with Kotlin - Second Edition:APractical Guide to Developing, Testing, and Publishing Your First Android Apps*, 2nd ed., Birmingham,UK: Packt Publishing, 2023.
C. Ghita, *Kickstart Modern Android Development with Jetpack and Kotlin: Enhance Your Applications byIntegrating Jetpack and Applying Modern App Architectural Concepts*, Birmingham, UK: PacktPublishing, 2022.

LABORATORY

Crt. no.	Content	No. hours
1	First Android application	2
2	Designing the user interface of an application	2
3	Display lists and using Material Design	2
4	Navigation and architectures of complex applications	2
5	Connecting to the Internet. Using HTTP and REST to retrieve data	2
6	Data Persistence	2
7	Using the WorkManager API for background work	2
	Total:	14

Bibliography:

"Android Developers," *Android Developer*, [Online]. Available: https://developer.android.com/.
Packt Publishing, *Thriving in Android Development using Kotlin*, GitHub repository, 2023. [Online].Available:https://github.com/PacktPublishing/Thriving-in-Android-Development-using-Kotlin

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 notions; - knowledge of how to apply the theory	- computer-based testing covering the main concepts taught - final exam	50
11.5 Seminary/laboratory/project	- knowing how to design a program; - demonstration of the operation of an implemented program	- evaluation based on a mini-project created based on laboratory examples and external tutorials.	50
11.6 Passing conditions			
• Obtaining 50% of the total score. • Obtaining 50% of the score related to the activity during the semester			

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 curriculum is designed to meet the dynamic job market demand for skilled mobile app developers with a solid understanding of the Android platform and relevant programming languages such as Java, Kotlin but also C#, XML, SQL and HTML. Through close collaborations with the IT industry and professional associations, the discipline ensures that its content remains up-to-date with the latest trends and technologies, as well as best practices in mobile software development. Teaching materials and lab activities are constantly revised and updated to reflect technological innovations and rapid developments in the field of mobile application development, allowing students to work with the latest tools and frameworks. Students are encouraged to explore and innovate through hands-on projects that allow them to apply theoretical knowledge to real-world scenarios, thereby stimulating critical thinking and creativity. The discipline adopts a student-centered learning methodology with an emphasis on practical skills development and project-based learning. This prepares students for real industry challenges and fosters a deep understanding of the subject matter. Participation in exchange programs and international research projects is promoted, giving students the opportunity to gain global perspectives and enrich their educational experience through interaction with diverse academic and professional cultures.

Date	Course lecturer	Instructor(s) for practical activities
03.10.2024	Conf. Dr. Alexandru Vulpe	Conf. Dr. Alexandru Vulpe

Date of department approval	Head of department

Universitatea Națională de Știință și Tehnologie Politehnica București

Facultatea de Electronică, Telecomunicații și

Tehnologia Informației

27.10.2024

Conf. Dr. Serban Georgica Obreja

Date of approval in the Faculty Council

25.10.2024

Dean

Prof. Dr. Mihnea Udrea