SYLLABUS

1. Program information

1.1 Higher education institution	Technical University of Cluj-Napoca
1.2 Faculty	Faculty of Electronics, Telecommunications and Information Technology
1.3 Department	Bases of Electronics
1.4 Field of study	Electronic engineering, telecommunications and information technologies
1.5 Cycle of study	Bachelor of Science
1.6 Study program / Qualification	Electronic engineering, telecommunications and information technologies/ Engineer
1.7 Form of education	IF – full-time education

2. Course information

2.1 Course title	Graphics on computer aided design					Course code	15.00
2.2 Course coordinator	*Assoc.prof. Mihaela CÎRLUGEA, Ph.D. - mihaela.cirlugea@bel.utcluj.ro*						
2.3 Seminar/ laboratory/ project/ practical activity coordinator	*Assoc.prof. Mihaela CÎRLUGEA, Ph.D. - mihaela.cirlugea@bel.utcluj.ro* *Assoc.prof. Paul FARAGO, Ph.D.- paul.farago@bel.utcluj.ro*						
2.4 Year of study	II	2.5 Semester	1	2.6 Type of assessment			V
2.7 Course status	Formative category						DF
	Optionality						DOB

3. Estimated total time

3.1 Hours per week	4	of which:	3.2 Lecture	2	3.3 Seminar	0	3.3 Laboratory	2	3.3 Project	0	3.3 Practical training	0
3.4 Hours per semester	56	of which:	3.5 Lecture	28	3.6 Seminar	0	3.6 Laboratory	28	3.6 Project	0	3.3 Practical training	0

3.7 Time distribution (hours per semester) for individual study and assessment:	
(a) Assessment	14
(b) Study using textbook, course materials, bibliography, and notes	7
(c) Additional documentation in the library, on specialized electronic platforms, and in the field	7
(d) Preparation for seminars/laboratories, assignments, reports, portfolios and essays	10
(e) Tutoring	4
(f) Other activities	2
3.8 Total hours of individual study and assessment (sum of (3.7(a)...3.7(f))	44
3.9 Total hours per semester (3.4+3.8)	100

3.10 Number of credits	4.0

4. Prerequisites (where applicable)

4.1 curriculum	Electronic devices, Circuits and passive electronic components, Computer programming and programming languages I and II, Differential equations.
4.2 competencies	Basic knowledge regarding the computer operation.

5. Requirements (where applicable)

5.1. for the development of the lecture	Amphitheatre, Cluj-Napoca
5.2. for the development of the seminar/ laboratory/ project	Laboratory with computers and internet, Cluj-Napoca

6. Specific competencies acquired

Professional competencies	C1 Use of fundamental elements related to electronic devices, circuits, systems, instrumentation and technology C1.2 Analysis of low-/medium-complexity electronic circuits and systems for their design and measurement C1.5 Design and implementation of low-/medium-complexity electronic circuits using CAD-CAM technologies and standards in the field C3 Application of basic knowledge, concepts and methods related to computer-system architecture, microprocessors, microcontrollers, programming languages and techniques C3.5 Implementation of projects involving hardware components (processors) and software (programming) C6 Solving technological problems in the fields of applied electronics C6.1 Definition of the principles and methods underlying the manufacture, adjustment, testing and troubleshooting of devices and equipment in the fields of applied electronics C6.5 Design of manufacturing and maintenance technology (specifying the necessary components and operations) for low- and medium-complexity products in the fields of applied electronics
Transversal competencie	CT3. Adaptation to new technologies, professional and personal development, through continuous training. Use of printed documentation sources, specialized software and electronic resources in Romanian and in (at least) one language of international circulation.

7. Expected learning outcomes

Knowledge	- The student/graduate identifies and describes basic concepts, principles and methods in mathematics, physics, chemistry, technical drawing, economics and computer science. - The student/graduate explains and interprets theoretical and experimental results in mathematics, physics, chemistry, economics, technical drawing and computer science.

	- The student/graduate describes, identifies and summarizes elementary concepts and methods related to electronic devices, circuits and instrumentation, as well as their application in concrete problems.
Skills	- The student/graduate performs engineering and economic calculations of medium complexity and associates them with graphical/alphanumeric representations or with representations specific to computer-aided design. - The student/graduate applies evaluation criteria and methods for identifying, modelling, experimenting, analysing and qualitatively and quantitatively assessing phenomena and processes specific to the fundamental field, including by using digital technologies. - The student/graduate acquires and processes data and interprets theoretical and experimental results. - The student/graduate designs low/medium-complexity electronic circuits and implements them using CAD techniques.
Responsibility and autonomy	- The student/graduate applies logical reasoning, evaluation and self-assessment in decision-making. - The student/graduate carries out project management processes in electronics, telecommunications and information technologies, taking on different team roles and clearly and concisely describing the results, both orally and in writing.

8. Course objectives (based on the grid of specific competencies acquired)

8.1 General objective of the course	- Competencies development regarding the electronic circuits modeling based on mathematical equations and fundamental programming notions using the MatLab language.
8.2 Specific objectives	- Assimilation of theoretical knowledge regarding the modeling and simulation of electronic circuits using advanced software like LtSpice, OrCAD and MatLab.

9. Contents

9.1 Lecture	**No. of hours**	**Teaching methods**	**Remarks**
1. Introduction in computer graphics	2	Presentation, heuristic conversation, exemplification, problem presentation, teaching exercise, case study, formative evaluation.	Use of .ppt presentation, projector, blackboard.
2. Graphic design in electronic projects	2		
3. Electrical schemes. LTSpice environment	2		
4. Basic operations and data types in MatLab.	2		
5. Electronic circuit modeling and simulation in Matlab.	2		
6. Matlab functions. Call. Parameters.	2		
7. Arithmetic operations. Vectors and matrices.	2		
8. 2D and 3D graphical plots	2		
9. Graphical object generation and control.	2		
10. Data representing. Interpolation and aproximation.	2		
11. Data handles in MatLab	2		
12. Graphical user interfaces. Components.	2		

9.1 Lecture	No. of hours	Teaching methods	Remarks
13. Callback functions	2		
14. Creating and documenting a project.	2		

Bibliography:

1. M Cîrlugea, P Farago, MatLab for Students, Volume I, 2019, UTPRESS;
2. M Cîrlugea, P Farago, MatLab for Students, Volume II.GUI, 2023, UTPRESS;
3. LTSpice- Reference Guide;
4. www.mathworks.com - tutorial lessons;
5. J.Attia- Electronics and Circuit Analysis Using Matlab;
6. S.Ghinea- Matlab;
7. Stephen Chapman_MatLab Programming for Engineers, International student edition, 2008, Stanford, USA;
8. Stephen Chapman, MatLab Programming for Engineers,Cengage Learning, Stamnford, USA, 2016
9. Scott Smith, MatLab Advanced GUI Development, DOG Ear Publishing, 2006;
10. www.bel.utcluj.ro/IGAC

9.2 Seminar /laboratory /project /practical training	No. of hours	Teaching methods	Remarks
1. Introduction in Orcad.	2	Presentation and code run.	Using the computer, simulation software, electronic laboratory experimental setup and equipments.
2. Editing of graphical elements	2		
3. Creating the electric schemes	2		
4. Creating electronic components in LtSpice	2		
5. Introduction in Matlab. Interface and utilities	2		
6. Using functions in Matlab	2		
7. Arithmetical operations in Matlab. Vectors and matrices	2		
8. Creating GUI	2		
9. 2D and 3D graphical plots	2		
10. Graphic objects. Creation and control	2		
11. Representing data	2		
12. Nummerical integration of differential equations	2		
13. Electronic circuits modeling in GUI.	2		
14. Final test – Project defense	2		

Bibliography:

1. M Cîrlugea, P Farago, MatLab for Students, Volume I, 2019, UTPRESS;
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10. Alignment of the course contents with the expectations of the epistemic community, professional associations, and representative employers in the field related to the program

The course content and the teaching-learning-assessment methods are aligned with the current requirements of the Electronics, Telecommunications, and Information Technology Engineering field, considering the expectations of the academic and professional community, representative employers, as well as the national quality assurance standards in higher education. The course helps prepare students in line with employer expectations and the quality requirements set for engineering study programs.

11. Assessment

Activity type	11.1 Assessment criteria	11.2 Assessment methods (and type of assessment: continuous/ summative)	11.3 Weight in final grade
11.4 Lecture	Answering to 3 theoretical questions.	Oral answers after project presentation.	20%
11.5 Seminar/ Laboratory/ Project /Practical activity	Practical project presentation demonstrationg the skills and abilities gained during the semester; Project defense.	Continous assessments and 15 min final project presentation.	80%

11.6 Minimum performance standard: C ≥ 5 and E ≥ 5 and 0,8L+0,2C ≥ 5

Qualitative Level - Minimal knowledge:

✓ Mathematical models of electronic circuits, usage and constraints;

✓ Design and implementation of a graphical user interface for an application intended to simulate electronic circuits;

✓ Understanding of electronic circuits contained in the project;

✓ Knowledge of specific programming techniques;

✓ Basic knowledge of mathematical modeling constraints that describe and design an electronic circuit;

✓ Knowledge of the main steps for creating a graphical user interface in MatLab;

✓ Usage knowledge of the graphical elements of the interface.

Quantitative level:

✓ Performing all the laboratory works and the corresponding assessments;

✓ The continuous evaluation must prove the student involvement in the achievement of the laboratory tasks and the minimal grade has to be 5 in case of both, theoretical evaluation and practical evaluation.

Completion date:	**Course coordinators**	**teaching rank, title First name LAST NAME**	**Signature**
23.06.2026	Lecture	Assoc.prof. Mihaela CÎRLUGEA, Ph.D.	
	Applications	Assoc.prof. Mihaela CÎRLUGEA, Ph.D.	
		Assoc.prof. Paul FARAGO, Ph.D.	

Approval of the Head of the Department coordinating the course, only if this differs from the department organizing the study program	Head of the Department

Date of approval by the Council of the Department of Bases of Electronics 26.06.2026	Head of the Bases of Electronics Department Prof. Sorin HINTEA, Ph.D.
Date of approval by the Council of the Faculty of Electronics, Telecommunications and Information Technology 30.06.2026	Dean, Prof. Ovidiu-Aurel POP, Ph.D.