SYLLABUS

1. Data about the program of study

1.1 Institution	The 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
Applied Electronics / Engineer	Applied Electronics / Engineer
1.7 Form of education	Full time
1.8 Subject code	15.00

2. Data about the subject

2.1 Subject name	Introduction in Computer Aided Graphics						
2.2 Subject area	Theoretical area Methodologic area Analysis area						
2.3 Course responsible/lecturer	Assist. Prof Mihaela Cîrlugea, Ph.D eng., Mihaela.Cirlugea@bel.utcluj.ro						
2.4 Teachers in charge of laboratory	Assist. Prof Mihaela Cîrlugea, Ph.D eng, Mihaela.Cirlugea@bel.utcluj.ro Lecturer Paul Farago, Ph.D eng, Paul.Farago@bel.utcluj.ro						
2.5 Year of study	II	2.6 Semester	3	2.7 Assessment	Colloq	2.8 Subject category	DD

3. Estimated total time

3.1 Number of hours per week	4	Of which: 3.2 course	2	3.3 laboratory	2
3.4 Total hours in the curriculum	56	Of which: 3.5 course	28	3.6 laboratory	28

Time distribution	hours
Studying the manual, lecture material and notes, references	14
Supplementary study in the library, online and in the field	4
Preparation for seminars/laboratory works, homework, reports, portfolios, essays	22
Tutoring	2
Exams and tests	2
Other activities	-

3.7 Total hours individual study	44
3.8 Total hours per semester	100
3.9 Number of credit points	4

4. Pre-requisites (where appropriate)

4.1 Curriculum	Bases of electronic circuits

4.2 Competencies	Elements of electronic circuits, Matlab Bases of programming

5. Requirements (where appropriate)

5.1. for the course	Amphitheatre, Cluj-Napoca/Microsoft Teams
5.2. for the applications	Laboratory, Cluj-Napoca/Microsoft Teams

6. Specific competencies

Professional Competencies	C1. Use of the fundamental elements related to devices, circuits, systems, instrumentation and electronic technology C1.5 Design and implementation of electronic circuits of low/ medium complexity using CADCAM technologies and standards in the field C2. Applying the basic methods for the acquisition and processing of signals C2.3 Use of simulation media for signal analysis and processing **C4 Design and use of hardware and software applications of reduced complexity specific to applied electronics** C4.1 Defining the concepts, principles and methods used in fields like: computer programming, high level languages, CAD techniques ofr creating the electronic modules, computer systems architectures, electronic programmable systems, graphics, hardware reconfigurable architectures C4.3 Identification and optimization of hardware and software solutions of problems related to: industrial electronics, medical electronics, auto electronics, automatics, robotics, consumer goods production
Transversal Competencies	CT1 Methodical analysis of the problems encountered in the activity, identifying the elements for which there are established solutions, thus ensuring the fulfillment of professional tasks. CT2 Defining the activities in each stage and distributing them to the subordinates with the complete explanation of the duties, according to the hierarchical levels. It ensures the efficient exchange of information and inter-human communication. 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. Discipline objectives (as results from the key competences gained)

7.1 General objectives	Developing the competences regarding the use, analysis and design of electronic circuits and MatLab interfaces
7.2 Specific objectives	1. Recognizing and understanding basic concepts specific to fundamental mathematical calculus and representations in MatLab. 2. Developing skills and abilities necessary for implementing in MAtLab electronic circuits. 3. Developing skills and abilities for creating and implementing in MAtLab an active graphical user interface, applied on electronic circuits

8. Contents

8.1 Course	Teaching methods	Observations
1. Introduction in computer graphics	Presentation, heuristic conversation, exemplification, problem presentation, teaching exercise, case study, formative evaluation	Use of .ppt presentation, projector, blackboard, /Microsoft Teams
2. Electrical schemes. LTSpice environment		
3. Basic operations and data types in MatLab		
4. Arithmetic operations. Vectors and matrices		
5. Matlab functions. Call. Parameters		
6. Electronic circuit modeling and simulation in Matlab.		
7. 2D and 3D graphical plots		
8. Loop Analysis. Nodal analysis in DC circuit		
9. Numerical integration of differential equations		
10. Data handles in MatLab		
11. Graphical user interfaces. Components		
12. Callback functions		
13. Graphical user interfaces		
14. Creating and documenting a project		

References

1. LTSpice- Reference Guide
2. MathWorks- tutorial lessons (mathworks.com)
3. J.Attia- Electronics and Circuit Analysis Using Matlab
4. S.Ghinea- Matlab
5. Stephen Chapman_MatLab Programming for Engineers, International student edition, 2008, Stanford, USA
6. Stephen Chapman, MatLab Programming for Engineers,Cengage Learning, Stamnford, USA, 2016
7. Scott Smith, MatLab Advanced GUI Development, DOG Ear Publishing, 2006
8. www.bel.utcluj.ro/IGAC

8.2 Seminary / laboratory / project	Teaching methods	Notes
Laboratory	Didactic and experimental proof, didactic exercise, team work	Use of laboratory instrumentation, experimental boards, computers, white/magnetic board/Microsoft Teams
1. Introduction in LTspice.		
2. Editing of graphical elements. Creating the electric schemes		
3. Introduction in Matlab. Interface and utilities		
4. Arithmetical operations in Matlab. Vectors and matrices		
5. Functions in Matlab		
6. Control statements		
7. Graphic functions		
8. 2D plots		
9. 3D graphical plots		
10.Loop Analysis. Nodal analysis in DC circuits		

11. Nummerical integration of differential equations		
11. Graphics objects. Creation and control		
13. Creating graphical user interfaces		
14. Final test		

References

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

9. Bridging course contents with the expectations of the representatives of the community, professional associations and employers in the field

The discipline content and the acquired skills are in agreement with the expectations of the professional organizations (for instance ARIES) and the employers in the field, where the students carry out the internship stages and/or occupy a job in the field of programmers and software or circuit developers, and the expectations of the national organization for quality assurance (ARACIS).

10. Assesment

Activity type	10.1 Assesment criteria	10.2 Assesment methods	10.3 weight in the final grade
10.4 Course	The level of acquired theoretical knowledge and practical skills	- Summative evaluation written colloq (theory and project documentation)	20%
10.5 Laboratory	The level of acquired abilities	- Continuous formative evaluation, project for lab test	80%

10.6 Minimum standard of performance

Quality level:

Minimum knowledge:

- ✓ *Creating simple circuits in LTspice*
- ✓ *Using MatLab help for documentation*
- ✓ *Work with matrixes, basic and specific operations*
- ✓ *Plotting simple signal characteristics*

Minimum competences:

- ✓ *Using the MatLab specific calculus for solving simple electronic circuit problems*
- ✓ *Recognize the basic MatLab graphics elements*
- ✓ *To create a graphical user interface in code, GUIDE or App designer*

Quantitative level:

- ✓ *Participating to all laboratory classes*

- ✓ *Documentation and project grades to be both >5*

*The grade is calculated with: 0,8*Project_grade+0,2*Documentation_test_grade*

Data of filling in:	Responsible	Titlu Prenume NUME	Semnătura
01.07.2023	Course	Assist. prof M Cîrlugea, Ph.D eng.	
	Applications	Assist. prof M Cîrlugea, Ph.D eng.	
		Lecturer PhD. eng. Paul FARAGO	

Date of approval in the Bases of Electronics Department Council
11.07.2023
_____

Head Departament
Prof.PhD. eng. Sorin HINTEA

Date of approval in the Council of Faculty of Electronics, Telecommunications and Information Technology
12.07.2023
_____

Dean
Prof.PhD. eng. Ovidiu POP