

SYLLABUS

1. Data about the program of study

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| 1.1 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 Program of study / Qualification | Telecommunications Technologies and Systems/ Engineer Applied Electronics/Engineer |
| 1.7 Form of education | Full time |
| 1.8 Subject code | TST-E15.00/EA-E15.00 |

2. Data about the subject

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|--|---|--------------|---|----------------|---|----------------------|-------|
| 2.1 Subject name | Computer Aided Graphics | | | | | | |
| 2.2 Subject area | Theoretical area | | | | | | |
| | Methodologic area | | | | | | |
| | Analysis area | | | | | | |
| 2.3 Course responsible/lecturer | Assoc. Prof Mihaela CIRLUGEA, Ph.D., Mihaela.Cirlugea@bel.utcluj.ro | | | | | | |
| 2.4 Teachers in charge of applications | Assoc. Prof Mihaela CIRLUGEA, Ph.D., Mihaela.Cirlugea@bel.utcluj.ro | | | | | | |
| | Assist. Prof Paul FARAGO, Ph.D., Paul.Farago@bel.utcluj.ro | | | | | | |
| 2.5 Year of study | II | 2.6 Semester | 3 | 2.7 Assessment | V | 2.8 Subject category | DF/DI |

3. Estimated total time

| | | | | | |
|--|-----|----------------------|----|---------------------------|-------|
| 3.1 Number of hours per week | 4 | Of which: 3.2 course | 2 | 3.3 seminary / laboratory | 2 |
| 3.4 Total hours in the curriculum | 56 | Of which: 3.5 course | 28 | 3.6 seminary / laboratory | 28 |
| Time distribution | | | | | hours |
| Studying the manual, lecture material and notes, references | | | | | 20 |
| Supplementary study in the library, online and in the field | | | | | - |
| Preparation for seminars/laboratory works, homework, reports, portfolios, essays | | | | | 16 |
| Tutoring | | | | | 4 |
| Exams and tests | | | | | 4 |
| 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)

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| 4.1 Curriculum | Bases of electronic circuits |
| 4.2 Competencies | Elements of electronic circuits, Matlab Bases of programming |

5. Requirements (where appropriate)

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| 5.1. for the course | Amphitheatre, Cluj-Napoca |
| 5.2. for the applications | Laboratory, Cluj-Napoca |

6. Specific competences

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| Professional competences | C1. Use of the fundamental elements related to devices, circuits, systems, instrumentation and electronic technology C3. Application of the basic knowledge, concepts and methods regarding the architecture of computer systems, microprocessors, microcontrollers, languages and programming techniques C6. Solving specific problems of the broadband communications networks: propagation in different environment, circuits and equipment for high frequencies (microwaves and optical). |
| Transversal competences | N/A |

7. Discipline objectives (as results from the key competences gained)

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| 7.1 General objectives | Developing the competences regarding the use, analysis and design of electronic circuits and MatLab interfaces |
| 7.2 Specific objectives | <ol style="list-style-type: none"> 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 |
| 2. Graphic design in electronic projects | | |
| 3. Electrical schemes. LTSpice environment | | |
| 4. Basic operations and data types in MatLab | | |
| 5. Electronic circuit modeling and simulation in Matlab. | | |
| 6. Matlab functions. Call. Parameters | | |
| 7. Arithmetic operations. Vectors and matrices | | |
| 8. 2D and 3D graphical plots | | |
| 9. Graphical object generation and control | | |
| 10. Data representing. Interpolation and approximation | | |
| 11. Data handles in MatLab | | |
| 12. Graphical user interfaces. Components | | |
| 13. Callback functions | | |
| 14. Creating and documenting a project | | |

References

1. LTSpice- Reference Guide
2. MatWorks- tutorial lessons
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, Stamford, USA, 2016
7. Scott Smith, MatLab Advanced GUI Development, DOG Ear Publishing, 2006
www.bel.utcluj.ro/IGAC

| 8.2 Laboratory | Teaching methods | Notes |
|--|------------------|-------|
| 1. Introduction in Orcad. | | |
| 2. Editing of graphical elements | | |
| 3. Creating the electric schemes | | |
| 4. Creating electronic components in LtSpice | | |
| 5. Introduction in Matlab. Interface and utilities | | |
| 6. Using functions in Matlab | | |
| 7. Arithmetical operations in Matlab. Vectors and matrices | | |
| 8. Creating GUI | | |
| 9. 2D and 3D graphical plots | | |
| 10. Graphic objects. Creation and control | | |
| 11. Representing data | | |
| 12. Numerical integration of differential equations | | |
| 13. Electronic circuits modeling in GUI. | | |
| 14. Final test | | |

References

1. LTSpice- Reference Guide
2. MatWorks- tutorial lessons
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, Stamford, USA, 2016
7. Scott Smith, MatLab Advanced GUI Development, DOG Ear Publishing, 2006
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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 Competences acquired will be used in the following COR occupations (Electronics Engineer; Telecommunications Engineer; Electronics Design Engineer; System and Computer Design Engineer; Communications Design Engineer) or in the new occupations proposed to be included in COR (Sale Support Engineer; Multimedia Applications Developer; Network Engineer; Communications Systems Test Engineer; Project Manager; Traffic Engineer; Communications Systems Consultant).

10. Assessment

| Activity type | 10.1 Assessment criteria | 10.2 Assessment methods | 10.3 weight in the final grade |
|--|--|---|--------------------------------|
| 10.4 Course | The level of acquired theoretical knowledge and practical skills | - Summative evaluation written verification (theory and problems) | 20% |
| 10.5 Laboratory/Seminary | The level of acquired abilities | - Continuous formative evaluation - practical lab test | 80% |
| 10.6 Minimum standard of performance | | | |
| <p>Quality level:</p> <p>Minimum knowledge:</p> <ul style="list-style-type: none"> ✓ <i>Creating simple circuits in LTspice</i> ✓ <i>Using MatLab help for documentation</i> ✓ <i>Work with matrixes, basic and specific operations</i> ✓ <i>Plotting simple signal characteristics</i> <p>Minimum competences:</p> <ul style="list-style-type: none"> ✓ <i>Using the MatLab specific calculus for solving simple electronic circuit problems</i> ✓ <i>Recognize the basic MatLab graphics elements</i> ✓ <i>To create a graphical user interface in code, GUIDE or App designer</i> <p>Quantitative level:</p> <ul style="list-style-type: none"> ✓ <i>Participating to all laboratory classes</i> ✓ <i>Documentation and project grades to be both >5</i> <p><i>The grade is calculated with: $0,8 * Project_grade + 0,2 * Documentation_test_grade$ C ≥ 5 and E ≥ 5 and</i></p> | | | |

| Data of filling in: | Responsible | Title First name SURNAME | Signature |
|---------------------|--------------|--|-----------|
| 29.09.2020 | Course | Assoc. Prof Mihaela CIRLUGEA, Ph.D. | |
| | Applications | Assoc. Prof Mihaela CIRLUGEA, Ph.D. Assist. Prof Paul FARAGO, Ph.D. | |

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| Date of approval in the Department of Communications 30.09.2020 | Head of Communications Department Prof. Virgil DOBROTA, Ph.D. |
| Date of approval in the Council of Faculty of Electronics, Telecommunications and Information Technology 30.09.2020 | Dean Prof. Gabriel OLTEAN, Ph.D. |