COURSE GUIDE
2019-2020

Dean, Prof. dr. ing. Daniela Tărniceriu

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1. Program info

1.1 Higher education institution	"Gheorghe Asachi" Technical University of Iaşi
1.2 Faculty	Electronics, Telecommunications and Information Technology
1.3 Department	Telecommunications and Information Theory
1.4 Field	Electronics and Telecommunications Engineering
1.5 Study level	Bachelor
1.6 Study program / Qualification	Telecommunication Technologies and Systems

2. Course info

2.1 Course name: Computer Aided Graphics						**EDIF 105**	
2.2 Course organizer (lecturer)		Asist. dr. ing. Barabaşa Constantin					
2.3 Teaching assistants		Asist. dr. ing. Barabaşa Constantin					
2.4 Year of study	1	2.5 Semester	2	2.6 Assessment	Exam	2.7 Category	MD

3. Estimated total time (hours per semester for teaching activities)

3.1 Number of hours per week	3	3.2 lecture	1	3.3b laboratory	2
3.4 Total number of hours in curricula	42	3.5 lecture	14	3.6b laboratory	28
Time distribution					hours
Textbook, course support, references and course notes study					7
Library, electronic platforms and on site documentation					14
Seminar/laboratory preparation, homework, reports, portfolios and essays					7
Tutoring					1
Assessment					1
Other activities					-

3.7 Total individual study hours	**30**
3.8 Total hours per semester	**72**
3.9 Number of credit points	**3**

4. Prerequisites (where applicable)

4.1 curricula type	N/A
4.2 competence type	N/A

5. Infrastructure (where applicable)

5.1. for lectures	Projector
5.2. for laboratories	Laboratory with a minimum of 10 PC workstations

6. Specific competences

	Number of credits **3**	Credits per competence
Professional competences	To know and adequately use the PCB specific terminology;	0.8
	To know and correctly analyze the elements of a PCB;	0.8
	To understand the key issues that occur in PCB design;	0.8
Transversal competences	Efficiently use all available computer assisted communication and information methods;	0.2
	Prove a real concern for continuous professional perfection through critical analysis;	0.2
	Develop team working skills;	0.2

7. Course targets (as resulting from Specific competences table)

7.1 Course main target	- Acquiring the principles of PCB manufacturing processes, PCB design flow and CAD software; - Have a clear view on the importance and role of the discipline in the formation of future specialists;
7.2 Course specific targets	Create complete low complexity PCB designs

8. Contents

8. 1 Lectures	**Teaching methods**	**Notes**
Introduction to PCB manufacturing processes;	Presentation, discussions, case study	Video Projector, whiteboard
The OrCAD design platform: Schematic editor;	Presentation, discussions, case study	Video Projector, whiteboard
The OrCAD design platform: part and library editor, Schematic utilities;	Presentation, discussions, case study	Video Projector, whiteboard
The OrCAD design platform: PCB editor, general overview, layers, PCB technology files, schematic transfer to layout;	Presentation, discussions, case study	Video Projector, whiteboard
The OrCAD design platform: PCB editor – creating board outlines, adding mounting holes, component placement, routing;	Presentation, discussions, case study	Video Projector, whiteboard
The OrCAD design platform: PCB editor – footprints and the footprint editor;	Presentation, discussions, case study	Video Projector, whiteboard
The OrCAD design platform: PCB editor – post processing and Gerber files;	Presentation, discussions, case study	Video Projector, whiteboard

References

1. Kraig Mitzner – "Complete PCB Design Using OrCAD Capture and Layout", Newnes/Elsevier 2007
2. T. Goraş, "Software pentru birotică", ed. Performantica, Iaşi, 2005
3. OrCAD – User's Guide, Hillsboro, USA
4. Vlad Cehan, Tecla Goras – "Introducere in tehnologia subansamblelor electronice", Editura MATRIX 1998

8. 2 Laboratory	**Teaching methods**	**Notes**
Presentation of the laboratory and general rules of conduct. Initiation in the OrCAD environment;	Oral discussions, practical OrCAD exercises and designs	N/A
The Capture schematic editor; Working with components, power symbols, nets and libraries;		
Working with buses, multiple page projects, hierarchical blocks;		
Creating low to medium complexity schematic designs		
Creating low to medium complexity schematic designs		
Crating new components and component libraries, editing components		

Capture utilities, DRC, netlist generation, BOM generation, netlist transfer to Layout	Oral discussions, practicall OrCAD excercises and designs	N/A
Introduction to the Layout PCB design tool. Importing a netlist and creating a new design. Footprint allocation for components.	Oral discussions, practicall OrCAD excercises and designs	N/A
Layout configuration: grids, layers, spacing. Board Outlines, mounting holes, component placement	Oral discussions, practicall OrCAD excercises and designs	N/A
Manual and automatic routing, trace width settings, via settings, Copper pours, ground planes, power supply routing, decoupling techniques	Oral discussions, practicall OrCAD excercises and designs	N/A
Creating low complexity PCB designs	Oral discussions, practicall OrCAD excercises and designs	N/A
Creating low complexity PCB designs	Oral discussions, practicall OrCAD excercises and designs	N/A
Creating footprints and footprint libraries	Oral discussions, practicall OrCAD excercises and designs	N/A
Creating/modifying footprints and footprint libraries	Oral discussions, practicall OrCAD excercises and designs	N/A
References 1. Kraig Mitzner – "Complete PCB Design Using OrCAD Capture and Layout", Newnes/Elsevier 2007		

9. Course contents corroboration with the expectations of the epistemic community representatives, professional associations and relevant employers in the field of the program

Various curriculae used throughout other national and international university centres have been consulted for the development of the course guide. The objectives of this discipline are in accordance with the educational plan, and are designed to transmit information and develop skills that are vital to the formation of the future electronics specialists in all areas, especially for engineers working in the field of interconnection techniques.

10. Evaluation

Activity type	**10.1** Evaluation criteria	**10.2 Evaluation methods**	**10.3 Percentage of final grade**
10.4 Lectures	N/A	N/A	N/A
10.5b Laboratory	- Quality of the given assignments - Frequency and pertinence of oral interventions	Continuous evaluation	20 % (minimum grade of 5)
10.7 Exam	- Quality of the given solution to the presented problem;	Practical exam: solving a set of PCB design requirements	80 % (minimum grade of 5)
10.7 Minimum performance standard			
Obtaining a minimum exam grade and laboratory evaluation of **5**.			

Completion date
05.09.2019

Course organizer,
S.l. dr.ing. Constantin Barabaşa

Teaching assistant,
S.l. dr.ing. Constantin Barabaşa

Department approval date
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Department director,
Conf. dr. ing. Luminița Scripcariu

COURSE GUIDE

Dean,
Prof. dr. ing. Daniela Tărniceriu

1. Program info

1.1 Higher education institution	"Gheorghe Asachi" Technical University of Iaşi
1.2 Faculty / Department	Electronics, Telecommunications and Information Technology
1.3 Department	Applied Electronics and Inteligent Systems
1.4 Field	Automotive Electronic Control Systems Engineering
1.5 Study level	Master Program
1.6 Study program / Qualification	Automotive Electronic Control Systems

2. Course info

2.1 Course name: Hardware Development of Automotive Electronic Systems							
2.2 Course organizer (lecturer)		S.l. dr. ing. Barabaşa Constantin					
2.3 Teaching assistants							
2.4 Year of study	1	2.5 Semester	2	2.6 Assessement	Exam	2.7 Category	DI

3. Estimated total time (hours per semester for teaching activities)

3.1 Number of hours per week	3	3.2 lecture	1	3.3 seminar/laboratory	2
3.4 Total number of hours in curricula	42	3.5 lecture	14	3.6 seminar/laboratory	28
Time distribution					hours
Textbook, course support, references and course notes study					38
Library, electronic platforms and on site documentation					28
Seminar/laboratory preparation, homework, reports, portfolios and essays					28
Tutoring					4
Assessment					4
Other activities					-
3.7 Total individual study hours	102				
3.9 Total hours per semester	144				
3. 10 Number of credit points	6				

4. Prerequisites (where applicable)

4.1 curricula type	N/A
4.2 competence type	N/A

5. Infrastructure (where applicable)

5.1. for lectures	Projector
5.2. for laboratories	Laboratory with a minimum of 10 PC workstations, CAD software

6. Specific competences

Professional competences	• Forging the abilities needed in order to approach the design and implementation of the technologies used in automotive hardware. • To know and adequately use the PCB specific terminology; • To know and correctly analyze the elements of a PCB; • To understand the key issues that occur in PCB design;
Transversal competences	• Efficiently use all available computer assisted communication and information methods; • Prove a real concern for continuous professional perfection through critical analysis; • Develop team working skills;

7. Course targets (as resulting from **6. Specific competences** table)

7.1 Course main target	- Acquiring the principles of PCB manufacturing processes, PCB design flow and CAD software; - Integrate theoretical priinciples into hardware design flow;
7.2 Course specific targets	- Create complete mid complexity PCB designs;

8. Contents

8. 1 Lectures	**Teaching methods**	**Notes**
1. Basic concepts in schematic and PCB design	Presentation, discussions, case study	
2. PCB manufacturing technology	Presentation, discussions, case study	
3. Power integrity in PCB design	Presentation, discussions, case study	
4. Signal integrity in PCB design	Presentation, discussions, case study	
5. Thermal modelling and design	Presentation, discussions, case study	
6. DFM in PCB design	Presentation, discussions, case study	
7. Post processing in PCB design	Presentation, discussions, case study	
References		
8. 2 Laboratory	**Teaching methods**	**Notes**
1. Overview of schematic design. Schematic post processing.	Solving laboratory application Exercises; Discussions; Case studies	
2. Assigning and creating component land patterns.	Solving laboratory application Exercises; Discussions; Case studies	
3. Defining PCB fabrication constraints and project global constraints.	Solving laboratory application Exercises; Discussions; Case studies	
4. Defining board outline, mounting holes, placement constraints.	Solving laboratory application Exercises; Discussions; Case studies	
5. Study of component placement strategies	Solving laboratory application Exercises; Discussions; Case studies	
6. Routing techniques for power supplies	Solving laboratory application Exercises; Discussions; Case studies	
7. Signal integrity aspects in power supply routing	Solving laboratory application Exercises; Discussions; Case studies	
8. Decoupling techniques	Solving laboratory application Exercises; Discussions; Case studies	
9. Routing techniques for special signals. Controlled impedance, differential routing, length matching.	Solving laboratory application Exercises; Discussions; Case studies	
10. Signal integrity aspects in special signals.	Solving laboratory application Exercises; Discussions; Case studies	
11. Thermal modeling aspects in PCB design.	Solving laboratory application Exercises; Discussions; Case studies	
12. DFM aspects in PCB design.	Solving laboratory application Exercises; Discussions; Case studies	
13. IPC standards and their importance in PCB design	Solving laboratory application Exercises; Discussions; Case studies	
14. Post processing.	Solving laboratory application Exercises; Discussions; Case studies	
References		

1. Kraig Mitzner – "Complete PCB Design Using OrCAD Capture and PCB Editor", Newnes/Elsevier 2009

9. Course contents corroboration with the expectations of the epistemic community representatives, professional associations and relevant employers in the field of the program

Various curriculae used throughout other national and international university centres have been consulted for the development of the course guide. The objectives of this discipline are in accordance with the educational plan, and are designed to transmit information and develop skills that are vital to the formation of the future electronics specialists in all areas, especially for engineers working in automotive hardware design.

10. Assessment

Activity type	10.1 Assessment criteria	10.2 Assessment methods	10.3 Percentage of final grade
10.4 Lectures	N/A	N/A	N/A
10.5 Seminar/laboratory	- Quality of the given assignments - Frequency and pertinence of oral interventions	Continuous evaluation	20 % (minimum grade of 5)
	- Quality of the given solution to the presented problem;	Practical exam: solving a set of PCB design requirements	80% (minimum grade of 5)
10.6 Minimum performance standard			
• Obtaining a minimum exam grade and laboratory evaluation of 5.			

Completion date
05-09-2019

Course organizer signature,

Teaching assistant signature,

Department approval date

Department director signature