SYLLABUS

1. Data about the program of study

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-E32.00/EA-E32.00

2. Data about the subject

2.1 Subject name	Optoelectronics						
2.2 Subject area	Theoretical area Methodological area Analytic area						
2.3 Course responsible	Prof. Ramona GALATUS, Ph.D – Ramona.Galatus@bel.utcluj.ro						
2.4 Teacher in charge with laboratory	Assist. Prof. Lorant Andras SZOLGA, Ph.D. – Lorant.Szolga@bel.utcluj.ro						
2.5 Year of study	III	2.6 Semester	5	2.7 Assessment	E	2.8 Subject category	DD/DI

3. Estimated total time

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

Distribution of time	hours
Manual, lecture material and notes, bibliography	28
Supplementary study in the library, online specialized platforms and in the field	5
Preparation for seminars / laboratories, homework, reports, portfolios and essays	28
Tutoring	3
Exams and tests	5
Other activities:	0

3.7 Total hours of individual study	69
3.8 Total hours per semester	125
3.9 Number of credit points	5

4. Pre-requisites (where appropriate)

4.1 curriculum	Analog integrated circuits, Digital integrated circuits
4.2 competence	N/A

5. Requirements (where appropriate)

5.1. for the course	
5.2. for the seminars / laboratories / projects	

6. Specific competences

Professional competences	C1. Use of the fundamental elements related to devices, circuits, systems, instrumentation and electronic technology C4. Design, implementation and operation of data, voice, video and multimedia services. This is based on the understanding and the application of fundamental concepts in telecommunications and transmission of information C5. Selecting, installing, configuring and operating fixed or mobile telecommunications equipment. Equipping a site with usual telecommunications networks
Transversal competences	N/A

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

7.1 General objective	Knowing some optoelectronic components and systems commonly encountered in practice.
7.2 Specific objectives	1. Training to simulate optoelectronic circuits with specific software (OptiWave, Liekki Application Designer). Students must be able to specify/ choose optoelectronic devices suitable for the applications and to be able to design them. 1. Training students to the level at which they can build simple optoelectronic equipment and they can measure / test optoelectronic systems.

8. Contents

8.1 Lecture (syllabus)	Teaching methods	Notes
1.Introduction. Notions of optics.	Presentation, discussions	Video-projector White board
2.Mirrors.		
3.Lenses.		
4.Systems with lenses.		
5.Interference and Diffraction of light.		
6.Photometry, radiometry and colorimetry.		
7.Light emitting diodes (LED).		
8.Lasers. Semiconductor lasers (LD).		
9.Optical guides. Fiber optics.		
10.Optical detectors: photocells.		
11.Optical detectors: photodiodes and phototransistors.		
12.Solar cells.		
13.Circuits with optoelectronic devices.		
14.Optical sensors.		

Bibliography
1. Edited by Robert G . W . Brown and John P Dakin - Handbook of Optoelectronics - Taylor & Francis, 2006, Print ISBN: 978-0-7503-0646-1, eBook ISBN: 978-1-4822-6066-3
2. Emil Voiculescu, Tiberiu Mariţa - "Optoelectronică", Editura Microinformatica (Albastra), 2001, ISBN 973-9443-96-6.
3. Safa O Kasap - Optoelectronics Devices and Photonics: Principles and Practices. Prentice Hall ISBN 0-201-61087-6, Kasap Book Images.
2. Raymond Serway, John Jewett : Physics for Scientists and Engineers, 2003, ISBN-10: 0534408427
3. Stefan Nilsson-Gistvik – Optical Fiber Theory for Communication Networks, EN/LZT 199210/R1, Ericsson 2002.
4. Harry J R Dutton - Understanding Optical Communications, IBM http://www.redbooks.ibm.com.
5. Catalog Thorlabs, vol 21. Titlu : V21_Catalog_web
6. http://www.thorlabs.com/images/Catalog/V21/V21_Catalog_web.pdf

8.2 Laboratory	Teaching methods	Notes
1. Introduction – labour protection laws and lab equipment presentation.	Presentation, applications	Computer, advanced simulation software, experimental laboratory assemblies, specific measuring equipment
2. Reflection and refraction of light: optical transmission on POF.		
3. Lenses and telescopes.		
4. Polarization of light. Semiconductor laser diodes.		
5. Light as wave: interference.		
6. Light as wave: diffraction, interference.		
7. Light as wave: the colours from the white light.		
8. LEDs – Light emitting diodes		
9. Voltage and current response of the photodiode and phototransistor to various IR light.		
10. The photoresistance response to various wavelengths.		
11. Measuring the characteristic of directivity for photosensitive devices.		
12. The optical fiber. Application: fiber optic splicing.		
13. LED drivers. Linear drivers and switch-mode to strobe the displays. Bargraph displays.		
14. Review. Assessing students.		

Bibliography
1. Lorant Szolga, Ramona Galatus, Emil Voiculescu - Optoelectronics – Laboratory Guide, UTPRESS, Cluj-Napoca, România, 2013, ISBN 978-973-662-858-0, p.113

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. Evaluation

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	Written test	90%
10.5 Seminar/ Laboratory	The level of acquired knowledge and abilities	Verification during semester through laboratory tests	10%
10.6 Minimum standard of performance			

Qualitative point of view

Minimal theoretical and practical knowledge:

- ✓ *Knowledge of the main optoelectronic devices and their mode of operation.*

Minimal acquired competences:

- ✓ *Ability to identify an optoelectronic device and to understand its parameters in a manufacturer's catalog*

Quantitative point of view

- ✓ *Perform all laboratory work*
- ✓ *Exam and laboratory marks at least 4.5.*
- ✓ *The mark for the discipline is calculated with the relation: 0.9 * Exam score + 0.1 * Laboratory work*

Data of filling in:	**Responsible**	**Title First name SURNAME**	**Signature**
28.09.2020	Course	Prof. Ramona GALATUS, Ph.D.	
	Applications	Assist. Prof. Lorant Andras SZOLGA, Ph.D.	

Date of approval in the Department of Communications
28.09.2020

Head of Communications Department
Prof. Virgil DOBROTA, Ph.D.

Date of approval in the Council of Faculty of Electronics, Telecommunications and Information Technology
29.09.2020

Dean
Prof. Gabriel OLTEAN, Ph.D.