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	Basis of Electronics
1.4 Field of study	Electronic Engineering, Telecommunicaton and Information Technologies
1.5 Cycle of study	Bachelor of Science
1.6 Program of study / Qualification	Telecommunication Technologies and Systems / Engineer Applied Electronics / Enhineer
1.7 Form of education	Full time
1.8 Subject code	TST-32.00/EA-E32.00

2. Data about the subject

2.1 Subject name				Optoelectronics			
2.2 Subject area				Electronics and Telecommunications Engineering			
2.3 Course responsible				Assoc.Prof. Lorant Andras Szolga, PhD, Lorant.Szolga@bel.utcluj.ro			
2.4 Teacher in charge with seminar / laboratory / project				Assoc.Prof. Lorant Andras Szolga, PhD, Lorant.Szolga@bel.utcluj.ro			
2.5 Year of study	3	2.6 Semester	5	2.7 Assessment	E	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 seminar / laboratory	2
3.4 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 de curriculum	Passive Electronic Components and Circuits, Fundamental Electronic Circuits
4.2 de competenţe	No

5. Requirements (where appropriate)

5.1. for the course	Video-projector, whiteboard / blackboard
5.2. for the seminars / laboratories / projects	PCs, multimeters, power supllies

6. Specific competences

Professional competences	C1.1 Description of the operation of electronic devices and circuits and the fundamental methods of measuring electrical quantities. C1.2 Analysis of circuits and electronic systems of low/medium complexity, for the purpose of their design and measurement. C.1.4 The use of electronic tools and specific methods to characterize and evaluate the performance of electronic circuits and systems. C.1.5 The design and implementation of electronic circuits of low/medium complexity using CAD-CAM technologies and the standards in the field
Transversal competences	N / A

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

7.1 General objective	Familiarization of students with optoelectronic components and systems frequently encountered in practice.
7.2 Specific objectives	1. To understand fundamental optics that is used in the optoelectronic devices and systems. 2. To take measurements with dedicated optical fiber equipments. 3. To understand the functioning of basic optoelectronic devices (mirrors/ lenses/polarizors/optical filters/LEDs/ Laser diodes/ Photodetectors) 4. Implements basic emitter-receiver circuits with optoelectronic devices.

8. Contents

8.1 Lecture (syllabus)	Teaching methods	Notes
1. Introduction. Notions of optics.	Presentation, heuristic conversation, exemplification,	Use of .ppt presentation, projector, blackboard
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.	problem presentation, teaching exercise, case study, formative evaluation	

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.
4. Raymond Serway, John Jewett : Physics for Scientists and Engineers, 2003, ISBN-10: 0534408427
5. Stefan Nilsson-Gistvik – Optical Fiber Theory for Communication Networks, EN/LZT 199210/R1, Ericsson 2002.
6. Harry J R Dutton - Understanding Optical Communications, IBM http://www.redbooks.ibm.com.
7. Catalog Thorlabs, vol 21. Titlu : V21_Catalog_web
Site : http://www.thorlabs.com/images/Catalog/V21/V21_Catalog_web.pdf

Other materials (electronic format)

1. Szolga Lorant – fisiere cu prezentari in format PPT, pentru curs.
2. Szolga Lorant – fisiere pdf, ce contin capitole de carti sau articole de specialitate.

8.2 Seminar / laboratory / project	Teaching methods	Notes
1.Introduction – labour protection laws and lab equipment presentation. 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.	Didactic and experimental proof, didactic exercise, teamwork.	Use of laboratory instrumentation, experimental boards, computers,

12. The optical fiber. Application: fiber optic splicing.		
13. LED drivers. Liniar drivers and switch-mode to strobe the displays. Bargraph displays.		
14. Review. Assessing students.		

* Note: In the case of online laboratories, they involve the implementation and simulation of circuits involving optoelectronic devices. The following simulation environments will be used: Proteus and Arduino IDE.

Bibliography

1. Photonics Spectra Kit labwork
2. Lorant Szolga, Ramona Gălătuș, 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 exam consists of checking knowledge by solving problems and a theory part (questions).	Written exam in physical room or Teams platform for online evaluation.	90%
10.5 Seminar/Laboratory	Checking the skills and abilities acquired in each laboratory activity.	Continous evaluation during each lab.	10%
10.6 Minimum standard of performance			

1. In order to take the final exam, it is mandatory to attend all the laboratories, complete all the practical work in the laboratories and obtain a minimum grade of 4.5 in the laboratory activities. Labs are graded from 1 to 10.
2. The promotion of the discipline implies obtaining a grade of at least 4.5 in the written exam and a final grade of at least 4.5.

Data of filling in:	Responsible	Title First name SURNAME	Signature
30.06.2023	Course	Assoc. Prof. Lorant Andras SZOLGA, PhD	
	Applications	Assoc. Prof. Lorant Andras SZOLGA, PhD	
		Prof. Ramona GALATUS, PhD	
		Assist. Prof. Ioana Adriana POTARNICHE	

Date of approval in the Council in the Basis of Electronics Department 11.07.2023	Head of Basis of Electronics Department Prof.dr.ing. Sorin HINTEA
Date of approval in the Council of the Faculty of Electronics, Telecommunications and Information Technology 12.07.2023	Dean Prof. Ovidiu POP, PhD