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	Applied Electronics / Engineer
1.7 Form of education	Full time
1.8 Subject code	32.00

2. Data about the subject

2.1 Subject name	Optoelectronics						
2.2 Subject area	Theoretical area Methodological area Analytic area						
2.3 Course responsible	Assoc. Prof. Ramona Galatus, PhD Eng. ramona.galatus@bel.utcluj.ro						
2.4 Teacher in charge with seminar / laboratory / project	Assist. Prof. Szolga Lorant Andras, PhD Eng. – Lorant.Szolga@bel.utcluj.ro Prof. Emil VOICULESCU, PhD Eng. Emil.VOICULESCU@bel.utcluj.ro Assoc. Prof. Ramona Galatus, PhD Eng. ramona.galatus@bel.utcluj.ro Eng. Adriana POTARNICHE, PhD Stud. ioana.potarniche@bel.utcluj.ro						
2.5 Year of study	III	2.6 Semester	2	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	

5. Requirements (where appropriate)

5.1. for the course	Amphitheatre (with blackboard and video projector), Cluj-Napoca
5.2. for the seminars / laboratories / projects	Laboratory (with computers and blackboard), Cluj-Napoca

6. Specific competences

Professional competences	C1 Use of the fundamental elements related to devices, circuits, systems, instrumentation and electronic technology • C1.2 Analysis of electronic circuits and systems of low / medium complexity, for the purpose of designing and measuring them • C1.4 Use of electronic tools and specific methods to characterize and evaluate the performance of electronic circuits and systems • C1.5 Design and implementation of electronic circuits of low / medium complexity using CAD-CAM technologies and standards in the field C4 Design and use of low complexity hardware and software applications specific to the applied electronics • C4.3 Identification and optimization of hardware and software solutions of problems related to: industrial electronics, medical electronics, automotive electronics, automation, robotics, production of consumer goods C5. To apply knowledge, concepts and basic methods from power electronics, automated systems, electric energy management, electromagnetic compatibility • C5.1 Defining the specific elements that characterize the electronic devices and circuits in the fields: power electronics, automatic systems, electricity management, medical electronics, car electronics, consumer goods • C5.5 Designing, using established principles and methods of subsystems of reduced complexity, from the fields of applied electronics: power electronics, automatic systems, electricity management, medical electronics, auto electronics, consumer goods
Cross competences	N.A.

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

7.1 General objective	Familiarize students with optoelectronic components and systems commonly encountered in practice.
7.2 Specific objectives	1. Instructing students to simulate optoelectronic circuits with specific software (OptiWave, Liekki Application Designer). Students must be able to specify / choose optoelectronic devices tailored to the applications, be able to design.

	2. Training the students to the level at which they can build simple optoelectronic equipment, can measure / test optoelectronic systems.

8. Contents

8.1 Lecture (syllabus)	Teaching methods	Notes
1.Introduction. Notions of optics.	Expunere, discuţii	Tabla si Video-proiector.
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.
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
8.Lorant Szolga, Ramona Gălătuș, Emil Voiculescu - *Optoelectronics – Laboratory Guide*, UTPRESS, Cluj-Napoca, România, 2013, ISBN 978-973-662-858-0, p.113

8.2 Seminar / laboratory / project	Teaching methods	Notes
1.Introduction – labour protection laws and lab equipment presentation.	Expunere şi aplicaţii	Calculatorul, softuri de simulare avansată, montaje experimentale de laborator, echipamente specifice pentru măsurare
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. Liniar drivers and switch-mode to strobe the displays. Bargraph displays.		
14.Review. Assessing students.		

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

Online references
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.

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 and the employers in the field, where the students carry out the internship stages and/or occupy a job (in the field of optoelectronics), and the expectations of the national organization for quality assurance (ARACIS).

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	Probă scrisă	90%
10.5 Seminar/ Laboratory	The level of acquired knowledge and abilities	Verificare pe parcurs prin teste de laborator	10%
10.6 Minimum standard of performance			

Quality level:
Minimum knowledge:
- Knowledge of the main optoelectronic devices and their mode of operation

Minimum competences:

- Be able to identify an optoelectronic device and interpret its parameters in a manufacturer's catalog sheet.

Quantitative level:

- Perform all laboratory work
- The exam and laboratory notes must be at least 4.5.
- The mark for the subject is calculated with the relation: 0.9 * Exam score + 0.1 * Laboratory score

Date of filling in:	**Responsible**	**Title Surname NAME**	**Signature**
29.09.2019	Course	Assist. Prof. Szolga Lorant Andras, PhD Eng.	
	Applications	Assist. Prof. Szolga Lorant Andras, PhD Eng.	
		Prof. Emil VOICULESCU, PhD Eng.	
		Eng. Adriana POTARNICHE, PhD Stud.	
		Assoc. Prof. Ramona Galatus, PhD Eng.	

Date of approval in the Department of Bases of Electronics

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Head of Department
Prof. Sorin HINTEA, PhD Eng.

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

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Dean
Prof. Gabriel OLTEAN, PhD Eng.