SYLLABUS

1. Information about the program

1.1 Higher education institution	Universitatea Politehnica Timișoara
1.2 Faculty[1] / Department[2]	Electronică, Telecomunicații și Tehnologii Informaționale/Comunicații
1.3 Field of study (name/code[3])	Electronică, Telecomunicații și Tehnologii Informaționale / 20.20.10 /
1.4 Study cycle	Master
1.5 Study program (name/code/qualification)	Ingineria rețelelor de comunicații/Communications Networks Engineering /20.20.10

2. Information about discipline

2.1a Name of discipline/The educational classe[4]	Optical Communication Systems and Networks/DF						
2.1b Name of discipline in Romanian	Sisteme si Retele de Comunicatii Optice						
2.2 Coordinator (holder) of course activities	Miclau Nicolae						
2.3 Coordinator (holder) of applied activities[5]	Miclau Nicolae						
2.4 Year of study[6]	2	**2.5** Semester	3	**2.6** Type of evaluation	E	**2.7** Regime of discipline[7]	DOB

3. Total estimated time (direct activities (fully assisted), partially assisted activities and unassisted activities[8])

3.1 Number of hours fully assisted/week	4 ,of which:	course	2	seminar/laboratory/project			0/2/0
3.1* Total number of hours fully assisted/sem.	56 ,of which:	course	28	seminar/laboratory/project			0/28/0
3.2 Number of on-line hours fully assisted/sem	,of which:	course		seminar/laboratory/project			
3.3 Number of hours partially assisted/week	,of which:	project, research		training		hours designing M.A. dissertation	
3.3* Number of hours partially assisted/ semester	,of which:	project of research		training		hours designing M.A. dissertation	
3.4 Number of hours of unassisted activities/ week	6.7 ,of which:	Additional documentation in the library, on specialized electronic platforms, and on the field					2.14
		Study using a manual, course materials, bibliography and lecture notes					2,14
		Preparation of seminars/ laboratories, homework, assignments, portfolios, and essays					2.42
3.4* Total number of hours of unasssited asctivities/ semester	94 ,of which:	Additional documentation in the library, on specialized electronic platforms, and on the field					30
		Study using a manual, course materials, bibliography and lecture notes					30
		Preparation of seminars/ laboratories, homework, assignments, portfolios, and essays					34
3.5 Total hrs./week[9]	10.7						
3.5* Total hrs./semester	150						
3.6 No. of credits	6						

4. Prerequisites (where applicable)

4.1 Curriculum	• Optical Communications
4.2 Learning outcomes	• Optics, Physics, Lasers

5. Conditions (where applicable)

5.1 of the course	• Room equipped with video projector

5.2 to conduct practical activities	• The laboratory will be held in a room equipped with specific equipment and apparatus.

6. Learning outcomes acquired through this discipline

Knowledge	• C1 The student/graduate knows research methods, techniques and paradigms • C6 The student/graduate understands algorithms and structures for data processing • C11 The student/graduate knows communication technologies and protocols •
Skills	• A1 The student/graduate applies qualitative and quantitative methodologies. • A5 The student/graduate integrates interdisciplinary methods and perspectives. • A2 The student/graduate develops schemes and integrates hardware/software components. • A9 The student/graduate applies complementary approaches in research projects •
Responsibility and autonomy	• RA1 The student/graduate independently manages a research process and critically evaluates the results. • RA2 The student/graduate assumes responsibility for the performance and reliability of the designed system. • RA7 The student/graduate ensures the quality and compliance with academic norms • RA11 The student/graduate assumes responsibility for the correct and efficient transmission of information

7. Objectives of the discipline (based on the grid of learning outcomes acquired)

- The main objective of the course is to provide students with the ability to analyze and design optical systems and networks. The course emphasizes the physical properties and operation of some optical network devices (optical fibers, semiconductor lasers, photodetectors, optical couplers, optical amplifiers, WDM components, etc.).
- The student acquires knowledge about the physical and technological foundations of optical communications, ultimately being able to design a point-to-point transmission line on WDM optical fibers, understanding the impact of optical and electronic noise and optical amplification in a WDM optical transmission. He is also able to develop an optimal WDM network architecture for a given data traffic.

8. Content

8.1 Course	Number of hours	Of which online	Teaching methods
1. Introduction	4		Presentation at an appropriate pace, presentation of numerical examples when appropriate, asking questions and stimulating answers; PowerPoint presentation accompanied by examples on the board
2. Fiber optic lines, the basics of digital communications in optical channels (models, attenuation, dispersion, noise, etc.); optical fibers and devices (transmitters, receivers, couplers, etc.); WDM point-to-point lines (components and design).	4		
3. Self-coherent optically amplified systems	4		
4. Rare earth ions and fiber laser fundamentals	4		
5. Light-Matter interaction	4		
6. Mathematical methods for fiber laser	4		
7. Design of optical networks	4		

Bibliography[10]

1.Rajiv Ramaswami and Kumar Sivarajan, Optical Networks Second Ed., 2002, Morgan Kaufmann Publishers

2.Jun Zheng,H.T.Mouftah,Optical WDM Networks,2004,IEEE Press.

3. Paradisi and all-Optical Communications-Advanced Systems and Devices for Next Generation Networks,Sprnger 2019

4. Adrian Mihaescu ,Comunicaţii Optice,2005,Editura de Vest,Timişoara.

8.2 Applied activities[11]	Number of hours	Of which online	Teaching methods
1. Study of passive WDM networks: optical fibers, optical attenuators, splitters, WDM Mux-Demux, isolators	2		Experimental measurements , instrumental analyses , calculations
2. Study of active WDM devices: Optical amplifiers	2		
3.EDF Amplifiers modeling	4		
4. Modeling Raman amplification and integration in fiber networks systems	8		
5. Continous wave fiber laser modeling	12		

Bibliography[12]

1.Eduard Sackinger-Broadband Circuits for Optical Fiber Communication Wiley-2005.

2. Antao Chen, Edmond J. Murphy Broadband Optical Modulators, CRC Press 2012

3. Alberto Paradisi and all-Optical Communications-Advanced Systems and Devices for Next Generation Networks,Springer 2019.

4.Adrian Mihaescu, Radu Lucaciu, Nicolae Miclau- Laboratory notes

9. Evaluation

Type of activity	**9.1** Evaluation criteria[13]	**9.2** Evaluation methods	**9.3** Share of the final grade
9.4 Course	Solving theoretical topics and problems related to the courses	Exam	2/3
9.5 Applied activities	**S:**		
	L: Answering theoretical questions related to laboratories and interpreting experimental results, solving homework problems	Tests, homework correction	1/3
	P:		
	Pr:		
	Tc-R[14]:		
9.6 Minimum performance standard (minimum amount of knowledge necessary to pass the discipline and the way in which this knowledge is verified[15]			

- The minimum amount of knowledge required to pass the discipline is 50% of the amount of knowledge taught.

Date of completion 24.09. 2025	**Course coordinator (signature)**	**Coordinator of applied activities (signature)**
Head of Department (signature)	**Date of approval in the Faculty Council** [16] 07.10.2025	**Dean (signature)**