



RTU Course "Fibre Optic Transmission Systems"

13105 Pārāides sistēmu katedra

General data

Code	RDE419
Course title	Fibre Optic Transmission Systems
Course status in the programme	Compulsory/Courses of Limited Choice
Course level	Post-graduate Studies
Course type	Academic
Field of study	Electronics and Telecommunications
Responsible instructor	Girts Ivanovs
Academic staff	Jurgis Poriņš Vjačeslavs Bobrovs Oskars Ozoliņš
Volume of the course: parts and credits points	1 part, 5.0 Credit Points, 7.5 ECTS credits
Language of instruction	LV, EN, RU, DE
Possibility of distance learning	Not planned
Abstract	Topics covered include FOTS element classification, optical fibre, cables, manufacturing, parameter system, loss mechanism, optical connections, optical waveguide electrostatics, irradiating and receiving modules, multiplexers, demultiplexers, parameter measurements, optical sensors. International standards related to optical communication systems are discussed. Students are prepared both for practical work with optical elements and further studies at doctoral study programmes.
Goals and objectives of the course in terms of competences and skills	The goal of the course is to acquire theoretical knowledge of fibre optic communication lines (FOCS) and to develop practical skills necessary to carry out calculations for FOCS design. Objectives of the course: to enable students to make optical measurements and to assess the results competently, to draw conclusions; to acquire knowledge of optical element application in telecommunications networks, demonstrating their role in different problem-solving situations.
Structure and tasks of independent studies	Independent survey of study material and practical problem solving activities. The theoretical substantiation provided for each laboratory work, analysis of laboratory work results and writing reports. Test preparation and defence. Workshop (1 hr. per week) and independent elaboration of the paper (4 hr. per week).
Recommended literature	1. Р.Фриман. Волоконно-оптические системы связи. Учеб. пособ. для вуз-ов. Москва, 2003. 592 с. 2. E. Forestieri. Optical Communication Theory and Techniques. Springer Verlag, 2005. 216 p. (ISBN 0387231323) 3. Michael Bass. FIBER OPTICS HANDBOOK. Sponsored by the OPTICAL SOCIETY OF AMERICA. McGRAW-HILL, 2004. 615 p. 4. Гауэр Дж. Оптические системы связи. Москва, 1990. 320 с. 5. F. Mitschke. Fiber Optics Physics and Technology. Berlin, Heidelberg: Springer-Verlag, 2009. 299 p. (ISBN 978-3-642-03702-3) 6. Laboratorijas darbu apraksti. RTU, TI, 2010. 25. lpp. 7. G. Ivanovs. Izdales materiāli ŠOPS. RTU TI, 2010. 79 lpp.
Course prerequisites	Students are required to have knowledge of the theory of direct transmission systems and transmission systems, as well as in mathematics and physics at the bachelor level.

Course outline

Theme	Hours
1. Introduction. FOTS development history. Trends of development. FOTS construction characteristics and main components.	2
2. Light propagation in optical waveguides. Light propagation in optical fibre based on Maxwell's equations.	10
3. Loss on optical waveguides. Loss mechanism. Absorption, scattering - linear, nonlinear. Optimal wave regime.	6
4. Optical cable design characteristics. Fibre manufacturing technology and materials.	6
5. FOTS line passive components.	6
6. Light emission sources, parameters and characteristics.	6
7. Fotodetectors, parameters and characteristics.	6
8. Measurement of FOTS element parameters.	10
9. Fibre optic communication systems. Classification. Systems with spectral multiplexing.	8
10. Fiber optic sensors.	4
11. Laboratory works.	16

Learning outcomes and assessment

Learning outcomes	Assessment methods
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Students are able to solve all the assigned tasks using the knowledge gained, to demonstrate knowledge of optical line operating and design principles, as well as to carry out measurements of optical parameters in communication systems. Students are able to use study material and scientific literatu

Criteria: students are able to demonstrate their knowledge of different issues related to communication systems; to identify the use of FOTS in telecommunications networks, recognizing their role and importance. Exam, tests, seminars.

Study subject structure

Part	CP	ECTS	Hours per Week			Tests		
			Lectures	Practical	Lab.	Test	Exam	Work
1.	5.0	7.5	4.0	0.0	1.0		*	