Description of an Individual Course Unit

Study program	Електротехника и рачунарство		
Module	модул Микроталасна техника		
Type and level of studies	мастер академске студије		
Course title	Millimeter waves		
Professor (for lectures)	Марија Стевановић, Милан Илић		
Professor/assistant (for practice)	Марија Стевановић, Милан Илић		
Professor/assistant (for LAB)			
Number of ECTS	6	**Type of the course (mandatory/elective)**	elective
Prerequisit	Microwave engineering or Microwave electronics		
Objective of the course	Introduction to modern millimeter wave systems. Define basics of active and passive components used in generation and transmission of millimeter waves. Explain the specifics and limitations of those components at millimeter wave frequencies. Present methods for analysis and design of quasioptical systems using Gaussian beam propagation, geometrical optics and geometrical theory of diffraction.		
Learning outcomes of the course	Gain theoretical knowledge and practical experience in analysis and design of millimeter wave circuits and systems. Learn utilization of analytical and numerical methods, and modern CAD tools, as well as independent problem solving using computers. Acquire proficiency in critical evaluation of trade-offs between the design goals and in obtaining solutions that yield optimal performance.		
Course Contents			
Theoretical contents	History of millimeter waves. Modern millimeter wave systems. Devices and transmission. Waveguides. Oscillators. Nonlinear analysis and design. Mixers, modulators, and frequency multipliers. Computational analysis of high-frequency structures. Quasioptics. Gaussian beam propagation. Geometrical optics and geometrical theory of diffraction. Terahertz technology and emerging applications.		
Practical part (practices, LAB, study research work)	Design of millimeter wave circuits using modern CAD tools. Numerical analysis of millimeter wave circuit- and system-components. Student projects.		
Literature			
1	E. Carey and S. Lidholm, Millimeter-wave integrated circuits, Springer, 2005.		
2	V. E. Lyubchenko, The science and technology of millimetre waves components and devices, Taylor		
3	T. Teshirogi and T. Yoneyama, Modern millimeter-wave technologies, Ios Press, 2000.		
4	P. F. Goldsmith, Quasioptical Systems: Gaussian Beam Quasioptical Propagation and Applications,		
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Number of ECTS				
Lectures	**Practices**	**LAB**	**Study research work**	**Other activities**
30	30			

Teaching Methods	Lectures and problem solving classes with exercises in computer aided design.

Grading methods (max. number of points is 100)			
Pre-exam assesments	**points**	**Final examination**	**points**
activity during lectures		**written exam**	30
practical assesments		**oral exam**	
mid-term exams	20		
projects	50		