



Subject card

Subject name and code	Microwave Engineering, PG_00048081						
Field of study	Electronics and Telecommunications						
Date of commencement of studies	October 2021		Academic year of realisation of subject		2023/2024		
Education level	first-cycle studies		Subject group		Optional subject group Subject group related to scientific research in the field of study		
Mode of study	Full-time studies		Mode of delivery		at the university		
Year of study	3		Language of instruction		Polish		
Semester of study	6		ECTS credits		2.0		
Learning profile	general academic profile		Assessment form		assessment		
Conducting unit	Department of Microwave and Antenna Engineering -> Faculty of Electronics, Telecommunications and Informatics						
Name and surname of lecturer (lecturers)	Subject supervisor		dr hab. inż. Rafał Lech				
	Teachers		dr inż. Małgorzata Warecka dr hab. inż. Rafał Lech				
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	0.0	15.0	0.0	0.0	30
	E-learning hours included: 0.0						
Learning activity and number of study hours	Learning activity	Participation in didactic classes included in study plan		Participation in consultation hours		Self-study	SUM
	Number of study hours	30		2.0		18.0	50
Subject objectives	Student acquainted with the basic operation principles, parameters and design methods of the waveguides and microwave circuits The guides include waveguides and transmission lines with TEM wave. Procedures for microwave circuit design, including lumped elements circuits, microwavel dividers, couplers , phase shifters and non-reciprocal ferrite devices are determined on the base of their scattering matrix.						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	[K6_U05] can plan and conduct experiments related to the field of study, including computer simulations and measurements; interpret obtained results and draw conclusions		Student acquainted with the basic operation principles, parameters and design methods of the waveguides and microwave circuits The guides include waveguides and transmission lines with TEM wave. Procedures for microwave circuit design, including lumped elements circuits, microwavel dividers, couplers , phase shifters and non-reciprocal ferrite devices are determined on the base of their scattering matrix.		[SU2] Assessment of ability to analyse information [SU4] Assessment of ability to use methods and tools		
	[K6_W34] Knows the characteristics of telecommunications channels, methods of securing information, modulation systems, methods of access to the channel.		student acquainted with the basic operation principles, parameters and design methods of the waveguides and microwave circuits The guides include waveguides and transmission lines with TEM wave. Procedures for microwave circuit design, including lumped elements circuits, microwavel dividers, couplers , phase shifters and non-reciprocal ferrite devices are determined on the base of their scattering matrix.		[SW1] Assessment of factual knowledge		

Subject contents	1. Waveguides and resonators: rectangular, cylindrical, ridge the equiva-lent circuits, wave parameters, loop and electric probe fed guides and resonators 2. Strip and coaxial lines and resonators, multiconductor lines, the equiva-lent circuits, the higher TE and TM modes, connectors 3. Integrated lines and resonators; microstrip, slot line and coplanar tech-nology, the equivalent circuits and the parameters, surface waves and the higher order modes 4. The edge and broadside coupling striplines, microstrips slot lines, even and odd modes, their equivalent circuits and parameters 5. The impedance matching and tuning- single and double stub tuning. quarter wave transformers, realization technique, the parameters and design 6. Design of binomial and Chebyshev multisection matching transformers 7. Design principles of the inhomogeneous matching transformers 8. Discontinuities in waveguides, strip and microstrip lines and their equivalent circuits		
Prerequisites and co-requisites	No requirements		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Midterm colloquium	60.0%	60.0%
	Practical exercise	40.0%	40.0%
Recommended reading	Basic literature	S. Rośliniec "Liniowe obwody mikrofalowe" WKŁ 1999 2. J. Mazur" Inżynieria mikrofalowa " lecture notes, mwave .eti.pg.gda.pl 3D.Pozar" Microwave engineering" j.Willey&Sons, 1998	
	Supplementary literature	No requirements	
	eResources addresses	Adresy na platformie eNauczanie: Inżynieria Mikrofalowa - 23/24 - Moodle ID: 36738 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=36738	
Example issues/ example questions/ tasks being completed			
Work placement	Not applicable		