



Subject card

Subject name and code	High Frequency Technique, PG_00047918						
Field of study	Electronics and Telecommunications						
Date of commencement of studies	October 2023	Academic year of realisation of subject			2024/2025		
Education level	first-cycle studies	Subject group			Obligatory subject group in the field of study 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	2	Language of instruction			Polish		
Semester of study	4	ECTS credits			3.0		
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. Piotr Kowalczyk					
	Teachers	dr hab. inż. Piotr Kowalczyk dr hab. inż. Rafał Lech dr inż. Małgorzata Warecka					
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	15.0	15.0	0.0	0.0	45
	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	45	3.0		27.0	75	
Subject objectives	Overview of the basic problems of microwave engineering . This includes properties and parameters of the guides waveguides, integrated lines. Equivalent circuits of the transmission lines. Smith chart. Microwave multiport circuits and definition of their scattering matrix						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[K6_W02] knows and understands, to an advanced extent, selected laws of physics and physical phenomena as well as methods and theories explaining the complex relationships between them, constituting the basic general knowledge in the field of technical sciences related to the field of study	Student can explain the problems of em wave propagation. in waveguides and define their equivalent circuits	[SW1] Assessment of factual knowledge
	[K6_U03] can design, according to required specifications, and make a simple device, facility, system or carry out a process, specific to the field of study, using suitable methods, techniques, tools and materials, following engineering standards and norms, applying technologies specific to the field of study and experience gained in the professional engineering environment	Student is able to calculate and measure the wave parameters of transmission lines and waveguides	[SU2] Assessment of ability to analyse information
	[K6_W03] knows and understands, to an advanced extent, the construction and operating principles of components and systems related to the field of study, including theories, methods and complex relationships between them and selected specific issues - appropriate for the curriculum	Student is able to analyze voltage and reflected waves as well as reflection conditions in transmission lines	[SW1] Assessment of factual knowledge
	[K6_U06] can analyse the operation of components, circuits and systems related to the field of study, measure their parameters and examine technical specifications	student is able to define the principle of operation of basic waveguide and strip lines junctions	[SU1] Assessment of task fulfilment

Subject contents	<p>Lecture and exercises:</p> <p>1: Long line- introduction- reflection coefficient and standing wave coefficient- impedance transformation</p> <p>2: Smith chart</p> <p>3: Matching circuits</p> <p>4: Propagated power and lossy lines</p> <p>5: TEM wave guides</p> <p>6: Waveguides</p> <p>7: Resonant circuits</p> <p>8: Matrix description of multiport circuits</p> <p>Laboratories:</p> <p>Exercise 1: Standing wave in wave guides</p> <p>Exercise 2: Impedance transformers</p> <p>Exercise 3: Impedance measurement</p> <p>Exercise 4: Impedance matching techniques in the very high frequency range</p> <p>Exercise 5: Microstrip resonator</p>														
Prerequisites and co-requisites	<p>Knowledge from the following subjects:</p> <ul style="list-style-type: none"> • Basics of electrodynamics • Electromagnetic fields and waves 														
Assessment methods and criteria	<table border="1" data-bbox="453 1803 1485 1937"> <thead> <tr> <th data-bbox="453 1803 798 1839">Subject passing criteria</th> <th data-bbox="801 1803 1141 1839">Passing threshold</th> <th data-bbox="1144 1803 1485 1839">Percentage of the final grade</th> </tr> </thead> <tbody> <tr> <td data-bbox="453 1843 798 1872">Theory tests during the semester</td> <td data-bbox="801 1843 1141 1872">50.0%</td> <td data-bbox="1144 1843 1485 1872">30.0%</td> </tr> <tr> <td data-bbox="453 1877 798 1906">Laboratories</td> <td data-bbox="801 1877 1141 1906">50.0%</td> <td data-bbox="1144 1877 1485 1906">30.0%</td> </tr> <tr> <td data-bbox="453 1910 798 1939">Calculus tests during the semester</td> <td data-bbox="801 1910 1141 1939">50.0%</td> <td data-bbox="1144 1910 1485 1939">40.0%</td> </tr> </tbody> </table>			Subject passing criteria	Passing threshold	Percentage of the final grade	Theory tests during the semester	50.0%	30.0%	Laboratories	50.0%	30.0%	Calculus tests during the semester	50.0%	40.0%
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Recommended reading	Basic literature	<p>1. Piotr Kowalczyk, Rafał Lech, Jerzy Mazur, Technika wysokich częstotliwości w zadaniach, Wydawnictwo PG 2022</p> <p>2. M. Suski "Technika Mikrofalowa" WNT 1979</p> <p>4. Materials available in the related course on the eNauczenie platform</p>
	Supplementary literature	1. D.Pozar "Microwave engineering" Willey&Sons, 1998
	eResources addresses	<p>Podstawowe</p> <p>https://enauczenie.pg.edu.pl/moodle/course/view.php?id=43902 - Materials available in the related course on the eNauczenie platform</p> <p>Adresy na platformie eNauczenie:</p>
Example issues/ example questions/ tasks being completed	<p>1. Discuss the parameters of long lines 2. Application of the Smith chart 3. Types and applications of matching systems 4. Guiding an electromagnetic wave in waveguide structures</p>	
Work placement	Not applicable	

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