COURSE DESCRIPTION CARD - SYLLABUS

Course name
Antenna Technology [S1MiKC1E>TA]

Course

Field of study
Microelectronics and Digital Communication

Year/Semester
3/5

Area of study (specialization)
–

Profile of study
general academic

Level of study
first-cycle

Course offered in
English

Form of study
full-time

Requirements
compulsory

Number of hours

Lecture
15

Laboratory classes
15

Other
0

Tutorials
0

Projects/seminars
0

Number of credit points

2,00

Coordinators

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Lecturers

Prerequisites

A student entering this course should have a basic knowledge of basic physics (electricity, magnetism, Maxwell's equations), transmission lines (including Smith's diagram), decibel scale calculus, circuit theory and electrical metrology. He or she should also have the ability to calculate simple DC and AC electrical circuits, the ability to estimate measurement uncertainty, the ability to obtain information from given sources, and be ready to cooperate in a team.

Course objective

To know and understand the parameters of antennas, to know and understand the operation of the most common types of antennas, enabling the correct selection of an antenna for a specific radio communication system; to know and understand the principles of antenna and antenna feeder measurements.

Course-related learning outcomes

Knowledge:
Upon completion of the course, the student has detailed knowledge of construction, properties and measurements of antennas and antenna feeders.

Skills:
Upon completion of the course, the student:
1. is able to design, implement and carry out measurements of antennas and antenna feeders (including preparation of test reports in accordance with PN-EN ISO/IEC 17025 standard)
2. is able to apply the principles of occupational safety and health
3. is able to acquire and analyze information from literature, databases and other sources in Polish and English
4. is able to effectively organize individual and team work and cooperate in a group, taking responsibility for the implementation of joint tasks (including planning the process of organizing measurements and making records of their results).

Social competences:
Upon completion of the course, the student:
1. knows the limitations of his own knowledge and skills, understands the need for further training
2. has a sense of responsibility for designed electronic and telecommunication systems and realizes the potential dangers to other people or society of their inappropriate use.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

1. knowledge acquired at lectures is verified during the final written and/or oral exam (duration of the written part 60-90 minutes; descriptive answer to 3-5 questions, the pass threshold of 50% points (grade 3.0) , the list of exam questions is sent by e-mail to students)
2. the knowledge and skills acquired in laboratory exercises are verified on the basis of the evaluation of the credit test (2-3 questions, duration 45-90 minutes, the pass threshold of 50% of the points - a grade of sufficient) and/or on the basis of the evaluations of the reports from laboratory exercises; the list of issues is sent by e-mail to students.

Programme content

Lecture
Sources of electromagnetic radiation, the role of the antenna in the radio path, basic parameters of antennas, the principle of reciprocity, the simplest antennas - half-wave dipole, loop dipole, antennas above the ideal and real ground, monopoles, balancing antenna and feeder, antenna arrays, MIMO, broadband antennas, aperture, reflector and microstrip antennas, antennas in radio communication systems, installation and maintenance of antennas, health, safety and environmental regulations for working in the em. field, unique features of radio communications measurements, antenna feeder measurements, radiation pattern and gain measurements.

Course topics

Laboratory
1. Measurement of radiation pattern of selected antennas
2. Measurement of SWR/RL of antenna feeder loaded with antenna (reflectometer)
3. Measurement with network analyzer
4. Em. field measurements for environmental protection purposes

Teaching methods

1. Traditional (informative) lecture: multimedia presentation supplemented by examples given on the blackboard, educational films.
2. Laboratory exercises: practical exercises performed in groups (2-4 people), based on written instructions, experimental demonstrations, educational films.

Bibliography

Basic:
1. Szóstka J., Fale i anteny (wyd. III), Wyd. Komunikacji i Łączności, Warszawa, 2006.
2. Szóstka J., Miernictwo radiokomunikacyjne, Wyd. Politechniki Poznańskiej, Poznań 2021.

Additional:

1. Szóstka J., Mikrofale. Układy i systemy, Wyd. Komunikacji i Łączności, Warszawa, 2006.
2. W. Stutzman, G. Thiele, Antenna Theory and Design, John Wiley & Sons, 2011.
3. A. Balanis, Antenna Theory and Design, John Wiley & Sons, 2006.

Breakdown of average student's workload

	Hours	ECTS
Total workload	60	2,00
Classes requiring direct contact with the teacher	30	1,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	30	1,00