



COURSE DESCRIPTION CARD - SYLLABUS

Course name

Line-of-Sight Radio Systems

Course

Field of study

Electronics and Telecommunications

Area of study (specialization)

Level of study

Second-cycle studies

Form of study

full-time

Year/Semester

II/IV

Profile of study

general academic

Course offered in

English

Requirements

elective

Number of hours

Lecture

30

Laboratory classes

0

Other (e.g. online)

Tutorials

0

Projects/seminars

15/0

Number of credit points

4

Lecturers

Responsible for the course/lecturer:

Jarosław Szóstka, Ph.D.

Responsible for the course/lecturer:

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Prerequisites

A student should have a basic knowledge on electronics, circuit theory, transmission lines, antennas, radio wave propagation, and electric metrology. He should also be able to perform calculations of simple DC and AC circuits, to acquire information from suggested literature sources, and should be ready for teamwork.

Course objective

Learning and understanding the principle of operation of microwave line-of-sight links which allows a student to design, deploy, and maintenance of LOS links; learning typical engineer activities in a company (preparation of technical documentation, exhibitions, fairs, patent applications, accredited testing labs).

Course-related learning outcomes

Knowledge

After completing the course a student:



1. has a systematic knowledge, together with necessary mathematical background, of the microwave propagation, of antennas, and of design, deployment and maintenance of LOS links and equipment; understands the meaning of the ITU-R recommendations in the design process
2. has a systematic knowledge, together with the mathematical background, of electromagnetic compatibility of LOS microwave links
3. has a basic knowledge how to prepare technical documentation; knows the social and economical aspects of engineering activities.

Skills

After completing the course a student:

1. is capable of studying autonomously; is able to extract information from English language literature, databases and other sources, is able to synthesize gathered information, draw conclusions, and justify opinions
2. is able to use proper methods and models in the design of LOS links having in mind non-technical aspects (law, environment protection, etc.)
3. can prepare a detailed list of design steps and document them, can assess the costs of design and deployment, and is able to choose and compare equipment and solutions in terms of performance criteria and economy
4. knows the national and international standardization bodies (ITU, ETSI, ISO).

Social competences

After completing the course a student:

1. is aware of the limitations of his/her current knowledge and personal, professional and social skills; is committed to further self-study
2. demonstrates responsibility and professionalism in solving technical problems, is able to participate in collaborative projects and has teamwork skills.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

- lecture knowledge - written and/or oral exam (60-90 minutes, 3-5 questions, 50% threshold - grade 3.0, the list with the exam problems is available as an e-mail)
- project skills - a group of 2-3 students prepares a project of a simple LOS link based on the coordinates of 2 sites, given operational frequency, availability, reliability, and climate zone.



Programme content

Digital microwave links - pros and cons, management of radio spectrum, microwave network planning, customer requirements and needs, site survey, path clearance, frequency considerations, reliability and performance, radio link equipment, microwave propagation and antennas, link budget, fading, interference analysis and frequency planning, margin planning, flat and selective fading, space and frequency diversity, link planning examples.

Teaching methods

1. Lectures - multimedia presentations, board examples, educational movies.
2. Project classes - solving simple design problems on the board, discussion of possible solutions, analysis of technical documents.

Bibliography

Basic

1. Szóstka J., Line-of-Sight Radio Systems, lecture materials, Poznań 2019 (each student obtains a personal copy).

Additional

1. Freeman R. L., Radio System Design for Telecommunications (1 – 100 GHz)., New York, John Wiley & Sons 1997.
2. ITU-R Recommendation P.530-16, Propagation data and prediction methods required for the design terrestrial line-of-sight systems , Geneva, ITU 2015.
3. Manning T., Microwave Radio Transmission Design Guide, London, Artech House 1999.

Breakdown of average student's workload

	Hours	ECTS
Total workload	100	4,0
Classes requiring direct contact with the teacher	58	2,0
Student's own work (literature studies, preparation for exam, project preparation) ¹	42	2,0

¹ delete or add other activities as appropriate