COURSE DESCRIPTION CARD - SYLLABUS

Course name
Satellite Communications [S2Teleinf2-SWxR>KS]

Course

Field of study
Teleinformatics

Year/Semester
2/3

Area of study (specialization)
xR virtual systems

Profile of study
general academic

Level of study
second-cycle

Course offered in
Polish

Form of study
full-time

Requirements
compulsory

Number of hours

Lecture
14

Laboratory classes
24

Other
0

Tutorials
0

Projects/seminars
0

Number of credit points

4,00

Coordinators

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Lecturers

Prerequisites

Basic knowledge of physics, analog and digital communication systems as awell as EM wave propagation.

Course objective

The course presents the theoretical background as well as design and practical implementation of satellite communication systems.

Course-related learning outcomes

Knowledge:
Knows the principles of the design and operation of satellite communication systems [K2_W02, K2_W03, K2_W05].
Understands the limitations of satellite systems due to the propagation effects and orbit type [K2_W02, K2_W03, K2_W05, K2_W11].
Knows the digital signall processing methods applied to satellite communications [K2_W03, K2_W05,K2_W10,K2_W11].

Skills:

Can design a satellite link, based on a link power budget and required link capacity [K2_U06, K2_U07].
Is able to select a satellite system for a specific application [K2_U01,K2_U08, K2_U14].
Can analyse the correlation between propagation conditions and link quality [K2_U01,K2_U07, K2_U16].

Social competences:
Is aware of the evolution of satellite communication systems, new services and their availability to the user [K2_K01, K2_K06, K2_U17] .

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lecture: written/oral verification consisting of 4-5 questions, based on the list of 20-25 topics shared during the course duration. 50% of the total number of points necessary to pass.
Labs: written reports, 50% of the total number of points required to pass.
Grading scale: <50% - 2.0 (ndst); 50% to 59% - 3.0 (dst); 60% to 69% - 3.5 (dst+) ; 70% to 79% - 4.0 (db); 80% to 89% - 4.5 (db+); 90% to 100% - 5.0 (bdb).

Programme content

1. Introduction. Kepler laws. Orbit types.
2. Satellite bus and payload. Satellite subsystems.
3. Satellite links. Power budget analysis. Noise temperature.
4. Link quality. Estimation of the link quality in the uplink and the downlink.
5. Interference and signal distortion. Propagation effects. Radio noise.
6. Transponders. End-to-end link quality.
7. Mobile satellite systems. INMARSAT. Globalstar. Iridium. Orbcomm. StarLink.

Course topics

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Teaching methods

Lecture: multimedia presentation, materials available online; stationary/hybrid/online forms of presentation acceptable
Laboratory classes: case study, problem solving.

Bibliography

Basic:
L. J. Ippolito, Satellite Communications Systems Engineering, Wiley 2017
D. J. Bem, Radiodyfuzja satelitarna, WKiŁ 1990

Additional:
Bruce R. Elbert, Introduction to Satellite Communication, Artech House 2008
Anil K. Maini, Varsha Agrawal, SATELLITE TECHNOLOGY PRINCIPLES AND APPLICATIONS, John Wiley &
Sons Ltd. 201

Breakdown of average student's workload

	Hours	ECTS
Total workload	103	4,00
Classes requiring direct contact with the teacher	38	1,50
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	65	2,50