STUDY MODULE DESCRIPTION FORM

Name of the module/subject	Code
Flight communications	**1010532131010600045**

Field of study	Profile of study (general academic, practical)	Year /Semester
Automatic Control and Robotics	**general academic**	**2 / 3**
Elective path/specialty: **Smart Aerospace and Autonomous Systems**	Subject offered in: **Polish**	Course (compulsory, elective): **obligatory**
Cycle of study: **Second-cycle studies**	Form of study (full-time,part-time): **full-time**	
No. of hours: Lecture: **15** Classes: **-** Laboratory: **-** Project/seminars: **-**		No. of credits: **3**
Status of the course in the study program (Basic, major, other): **major**	(university-wide, from another field): **from field**	
Education areas and fields of science and art		ECTS distribution (number and %)

Responsible for subject / lecturer:

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Prerequisites in terms of knowledge, skills and social competencies:

1	**Knowledge**	Student starting this module should have basic knowledge regarding signal processing.
2	**Skills**	He/she should have skills allowing solving basic problems related to communication systems and should understand the need to extend his/her competences.
3	**Social competencies**	Student should show attitudes as honesty, responsibility, perseverance, curiosity, creativity, manners, and respect for other people.

Assumptions and objectives of the course:

This course is organized in two parts. The objective of the first one is dedicated to the introduction of the basic concepts of communication theory and systems. Students learn and master techniques and principles of analog and digital modulation and demodulation for information transmission. The second part is exclusively devoted to communication means on board of an aircraft. The aim of this part is to provide students with theoretical and practical skills in different antennas used in direct radio frequency communications flight paths or via satellite.

Study outcomes and reference to the educational results for a field of study

Knowledge:

1. has extensive and in-depth knowledge in selected areas of mathematics useful for formulating and solving complex tasks as well as modelling of communication systems - [K_W1]
2. has well-established detailed theoretical knowledge of design of communication systems - [K_W7]
3. has theoretical detailed knowledge related to flight comnunication systems - [K_W11]
4. has knowledge of the development trends and most crucial new achievements in the field of telecommunication systems and its related disciplines - [K_W12]

Skills:

1. is able to acquire, integrate, interpret and evaluate information from literature, databases and www sources on flight communication systems - [K_U1]
2. is able to apply control and planning methods to solve engineering as well as scientific problems - [K_U9]
3. is able to integrate knowledge coming both from different sub-domains of computer sciences and communication systems to formulate and solve engineering tasks - [K_U10]
4. is able to formulate and test hypotheses (carry out simulations and experiments) regarding engineering problems and difficult research problems in the area of communication systems - [K_U15]
5. is able to carry out critical analysis of the operation of flight communication systems - [K_U19]
6. is able to evaluate usefulness of methods and tools for solving a communication problem; is able to use innovative and mathematical tools in the field of communication systems - [K_U22]

Social competencies:
1. is aware of responsibility for their own work, is able to collaborate and cooperate in a team, and take responsibility for the jointly performed tasks; is able to lead a team, set goals and assign priorities to realize a specific task - [K_K3]
2. is aware of the necessity to approach technical aspects professionally - [K_K4]

Assessment methods of study outcomes

Formative assessment:

a) lectures:

based on answers to question in the written exam,

b) laboratory classes:

evaluation of doing correctly assigned tasks (following provided lab. instructions).

Total assessment:

a) verification of assumed learning objectives related to lectures:

i.evaluation of acquired knowledge on the basis of the written exam,

ii.discussion of correct answers in the exam,

b) verification of assumed learning objectives related to laboratory classes:

i.evaluation of student?s knowledge necessary to prepare, and carry out the lab tasks,

ii.monitoring students? activities during classes,

iii.evaluation of lab reports (partly started during classes, finished after them),

iv.two written tests during the classes.

Additional elements cover:

i.discussing more general and related aspects of the class topic,

ii.showing how to improve the instructions and teaching materials.

Session 1: Note de contrôle continu (CC): Note CC = 50% TP + 50% DS (TP = moyenne des Travaux Pratiques et/ou Devoirs Maison; DS = un Devoir Surveillé ? mi-semestre).

Note finale de Module = 50% CC + 50% examen; en l'absence de DS: Note finale de Module = 30% TP + 70% examen.

Session 2: Note finale de Module = maximum entre 100% examen session 2 et 50% CC session 1 + 50% examen session 2 ou 30% TP session 1 + 70% examen session 2.

Course description

1. Fundamental communication systems equipment
2. Introduction to communications theory
3. Modulation and demodulation
4. Radio-frequency communications
5. Aircraft antennas
6. Aircraft satellite communications system

Learning methods:

1. Lectures: multimedia presentation, presentation illustrated with examples presented on black board, solving tasks, multimedia showcase
2. Labs: solving tasks, practical exercises, discussion, teamwork, multimedia showcase, competitions or case studies

Basic bibliography:

1. Hewlett Packard, Digital modulation in communications systems, Application note 1298
2. L. Ippolito Jr., Satellite communications systems engineering: Atmospheric effects, satellite link design and system performance, 2008
3. G. Maral, M. Bousquet, Satellite communications systems: Systems, techniques and technology, J.Wiley Ltd 2009
4. J. Seybold, Introduction to RF propagation, Wiley-Interscience 2005
5. F. Schwering, A. Oliner, Antennas on aircraft, ships, or any large, complex environment, 1993
6. C. Balanis, Antenna theory: Analysis and design, Wiley-Interscience

Additional bibliography:

Result of average student's workload	
Activity	**Time (working hours)**
1. participating in lectures	15
2. consulting issues related to the subject of the course	3
3. studying literature / learning aids, 250 pages	25
4. preparing to and participating in exams	32

Student's workload		
Source of workload	**hours**	**ECTS**
Total workload	75	3
Contact hours	20	1
Practical activities	0	0