STUDY MODULE DESCRIPTION FORM

Name of the module/subject **Networks and programming systems**	Code **1010532111010519199**

Field of study **Automatic Control and Robotics**	Profile of study (general academic, practical) **general academic**	Year /Semester **1 / 1**

Elective path/specialty **Smart Aerospace and Autonomous Systems**	Subject offered in: **English**	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: **15** 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 computer systems organization, algorithms and data structures, and operating systems.
2	**Skills**	He/she should have skills allowing formulation of algorithms and their programming with the use of at least one widely used software tool. He/she should have skills that are necessary to acquire information from given sources of information. Student should understand the need to extend his/her competences and should express cooperativeness in a team.
3	**Social competencies**	In addition, in respect to the social skills the student should show attitudes as honesty, responsibility, perseverance, curiosity, creativity, manners, and respect for other people.

Assumptions and objectives of the course:

1.Provide students knowledge regarding computer networks, within the scope of using, configuration, design and programming of local area and wide area networks, and cognition of technical solutions applied in these networks. Provide students basic knowledge regarding real-time operating systems.

2.Develop students? skills in solving simple problems related to the use and configuration of computer networks.

3.Develop students? skills in team work, especially in configuration, design, and programming of technical solutions applied in computer networks.

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

Knowledge:

1. acquire specialist knowledge on remote systems, distributed systems, real-time systems and network systems - [K_W3]

2. have well-ordered, theoretically based and detailed knowledge on analysis and design methods of control systems - [K_W7]

3. be informed about trends and advances in automatics and robotics and allied fields of study - [K_W12]

Skills:

1. is able to analyze and interpret technical documentation of the design, and use scientific literature related to given subject. - [K_U2]

2. is able to plan and arrange self-education process in order to improve and update his/her professional attitudes. - [K_U6]

3. is able to evaluate usability and possibility of the use of new achievements in automatics and robotics (technique and technology). - [K_U16]

4. is able to design and implement complex device, object or system, considering non-technical aspects. - [K_U23]

Social competencies:

1. understands the needs, and knows the possibilities of supplementing one?s education ? improving of professional, personal and social attitudes, is able to inspire and organize the process of the education of other persons. - [K_K1]

2. is aware of the importance and understands the nontechnical aspects and effects of engineering activity, including its impact on environment, and corresponding responsibility of undertaken decisions. - [K_K2]

3. is aware of the responsibility of its own work, and is able to conform to the rules of team work and being responsible for commonly implemented tasks, is able to manage the team work, and is able to define the aims and assign the priorities of a task - [K_K3]

4. is aware of the necessity of a professional approach to the technical topics, detailed study of the technical documentation and environmental conditions, in which devices or their parts may function. - [K_K4]

5. is able to think and act creatively and enterprisingly. - [K_K5]

Assessment methods of study outcomes

Formative assessment:

a) lectures:

based on answers to questions on previous lectures,

b) laboratory classes:

evaluation of doing correctly assigned tasks,

Total assessment:

a) verification of assumed learning objectives related to lectures:

based on the sum of answers and the activity during lectures.

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

i. evaluation of student?s skills related to carrying out the lab tasks,

ii. monitoring students? continuing activities during classes,

iii. evaluation of students? knowledge and skills related to configuration task

iv. evaluation of students? knowledge and skills based on written test, covering from 3 to 5 questions. In order to obtain positive note, the student should obtain 50% of maximum number of points. During the test, student cannot use any lecture notes, books, etc.

Additional elements cover:

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

ii. effectiveness of the acquired knowledge during the solving of given problem

iii. ability of cooperation in a team during solving laboratory task

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

v. Indication of students? perception difficulties, allowing improvement of didactic process.

Course description

The lecture should cover the following topics

1) Fundamentals of computer networks (historical note, motivation, required properties of a network, network architecture: OSI and TCP/IP, network topologies, network types, network devices, standards).

2) Network access technologies (functions of network interface card: encoding, framing, error detection, reliable transmission, link access methods), local area networks (CSMA/CD - Ethernet, Token Ring ? FDDI, CSMA/CA ? wireless networks).

3) Delivery, forwarding and routing (packet switching, forwarding, routing ? routing algorithms, RIP and OSPF protocols, cell switching ? ATM, switching devices).

4) Internetworking (IPv4 protocol, IPv6 protocol, multicast, domain name system ? DNS).

5) Internet (structure, addressing, transport protocols: UDP, TCP, standards, applications).

6) Real-time operating systems (characteristics, applications, examples of systems).

The lab-classes should cover the following topics:

1) IPv4 addressing,

2) Configuration of Linux network

3) Network access protocols

4) Introduction to network socket interface

5) Server model using fork()

6) Server model using threads

7) Server model using events

Learning methods:

1. Lectures: multimedia presentation, presentation illustrated with examples presented on black board.

2. Labs: solving tasks, practical exercises with the use of network devices, discussion, teamwork, multimedia

showcase, configuration task verified during laboratory classes.

Basic bibliography:

1. TCP/IP Protocol Suite, Third edition, B.A. Forouzan, McGraw-Hill, Boston, 2006

2. Computer Networks, Fifth edition, A.S. Tanenbaum, D.J. Wetherall, Pearson, Boston, 2011

3. Computer Networking: A Top-Down Approach, Fifth edition, J.F. Kurose, K.W. Ross, Pearson Education, Boston, 2010

4. Computer Networks: A Systems Approach, L.L. Peterson, B.S. Davie, Fifth edition, Morgan Kauffmann, San Francisco, 2012

Additional bibliography:

1. Network Analysis and Troubleshooting, J. Scott Haugdahl, Addison-Wesley, 1999

Result of average student's workload

Activity	Time (working hours)
1. participating in laboratory classes / tutorials	15
2. preparing to laboratory classes	15
3. consulting issues related to the subject of the course; especially related to laboratory classes,	8
4. preparing to assessment test, participation in assessment test:	12
5. participating in lectures	15
6. studying literature / learning aids, 10 pages of scientific text = 1 hour,	10

Student's workload

Source of workload	hours	ECTS
Total workload	75	3
Contact hours	38	2
Practical activities	30	1