COURSE DESCRIPTION CARD - SYLLABUS

Course name

Networks and programming systems

Course

Field of study

Automatic Control and Robotics

Year/Semester

1 / 1

Area of study (specialization)

Smart Aerospace and Autonomous Systems

Profile of study

general academic

Level of study

Second-cycle studies

Course offered in

English

Form of study

full-time

Requirements

compulsory

Number of hours

Lecture

15

Laboratory classes

15

Other (e.g. online)

0

Tutorials

0

Projects/seminars

0

Number of credit points

3

Lecturers

Responsible for the course/lecturer:

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Responsible for the course/lecturer:

Prerequisites

Knowledge: Student starting this module should have basic knowledge regarding computer systems organization, algorithms and data structures, and operating systems.

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.

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.

Course objective

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.

Course-related learning outcomes

Knowledge

1. acquire specialist knowledge on remote systems, distributed systems, real-time systems and network systems - [K2_W3]

2. have well-ordered, theoretically based and detailed knowledge on analysis and design methods of control systems - [K2_W7]

3. be informed about trends and advances in automatics and robotics and allied fields of study - [K2_W12]

Skills

1. is able to analyze and interpret technical documentation of the design, and use scientific literature related to given subject. - [K2_U2]

2. is able to plan and arrange self-education process in order to improve and update his/her professional attitudes. - [K2_U6]

3. is able to evaluate usability and possibility of the use of new achievements in automatics and robotics (technique and technology). - [K2_U16]

4. is able to design and implement complex device, object or system, considering non-technical aspects. - [K2_U23]

Social competences

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. - [K2_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. - [K2_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 - [K2_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. - [K2_K4]

5. is able to think and act creatively and enterprisingly - [K2_K5]

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

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 student's continuing activities during classes,

iii. evaluation of student's knowledge and skills related to configuration task

iv. evaluation of student's 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.

Programme content

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.

Teaching methods

Lectures: multimedia presentation, presentation illustrated with examples presented on blackboard.

Labs: solving tasks, practical exercises with use of network devices, discussion, teamwork, multimedia showcase, configuration task verified during laboratory classes.

Bibliography

Basic

1. TCP/IP Protocol Suite, 4th edition, B.A. Forouzan, McGraw-Hill Education, New York, 2009

2. Computer Networks, 5th edition, A.S. Tanenbaum, D.J. Wetherall, Pearson, Boston, 2011

3. Computer Networking: A Top-Down Approach, 7th edition, J.F. Kurose, K.W. Ross, Pearson Education, Boston, 2016

4. Computer Networks: A Systems Approach, L.L. Peterson, B.S. Davie, 5th edition, Morgan Kauffmann, San Francisco, 2012

Additional

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

Breakdown of average student's workload

	Hours	ECTS
Total workload	75	3
Classes requiring direct contact with the teacher	38	1,5
Student's own work (literature studies, preparation for laboratory classes/tutorials, preparation for tests/exam, project preparation) [1]	37	1,5

[1] delete or add other activities as appropriate