COURSE DESCRIPTION CARD - SYLLABUS

Course name

Projektowanie sieci teleinformatycznych - Telecommunication and information networks design

Course

Field of study
Teleinformatics

Year/Semester
1/1

Area of study (specialization)

Profile of study
general academic

Level of study
second-cycle studies

Course offered in
Polish

Form of study
full-time

Requirements
compulsory

Number of hours

Lecture
15

Laboratory classes
0

Other (e.g. online)

Tutorials
0

Projects/seminars
30/0

Number of credit points

3

Lecturers

Responsible for the course/lecturer:

prof. dr hab. inż. Maciej Stasiak
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Faculty of Computing and Telecommunications
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Responsible for the course/lecturer:

Prerequisites

Knowledge: Students have basic knowledge in the field of mathematics which is useful for formulating and solving ICT problems. Students understand the mechanisms and methods of traffic engineering used in TCP/IP networks. They know the basics of object-oriented programming.
Skills: Students can create computational programs in any object-oriented language. They can save a computational problem algorithmically.
Social competences: Students have the ability to work in a group.

Course objective

The aim of the course is to familiarize students with the methodology of designing and dimensioning network systems, in particular TCP / IP network systems. Students learn the basic formulas and methods of traffic engineering that are necessary for the optimization and dimensioning of network resources.

Course-related learning outcomes

Knowledge

1. Students know advanced methods of modelling, designing and optimizing resources of ICT networks, in particular TCP/IP networks.
2. Students know the methods of optimal choice of network devices parameters, that consider the influence of the following factors: access algorithms, traffic control mechanisms as well as the size and type of traffic.
3. Students know theoretical models of resource allocation, virtualization and traffic distribution in the cloud.
4. Students have an extensive vocabulary in English in the field of traffic engineering in ICT networks and data centres.

Skills

1. Students are able to educate themselves and acquire knowledge that is necessary to solve problems of optimal allocation and division of resources in ICT systems.
2. Students are able to obtain knowledge from databases storing scientific works and standardization recommendations regarding ICT systems and networks.
3. Students are able to design resources and their division for ICT networks and systems, considering wireless communications, traffic control mechanisms, traffic shaping mechanisms and virtualization mechanisms.
4. Students are able to use advanced computational algorithms, appropriate data structures and programming languages to solve problems of resource dimensioning and optimization of ICT systems.
5. Students are able to formulate and justify project assumptions based on the initial analysis of operator data.
6. Students can work in the group, actively participate in the planning and performance of a project related to resource calculation for ICT system.

Social competences

1. Students are aware of changes in techniques and mechanisms of traffic engineering, which consequently leads to the need for continuous training in the design and optimization of network systems.
2. Students are aware of their responsibility for the entire team that implements ICT system project.
3. Students are aware of the responsibility for the results of their work, that has an impact on the quality of service and the safety of users of ICT systems

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Knowledge acquired during lecture is verified on the basis of a test. The test includes 20-30 equally scored questions. Each question has 4 answers, one of which is true. Passing threshold: 50% of points (correct answers). Depending on the degree of difficulty of the test, the scoring may be changed. In the case of a small number of students, the oral exam is preferred.
Completion of the project consists in the assessment of the report (containing the documentation of the developed software, computation results and result analysis) regarding resource design for selected network systems with given traffic management mechanisms. The scoring considers student activity during classes.

Programme content

1. Basic concepts of traffic engineering. The levels of designing ICT resources.
2. Basic models of ICT resources.
3. Full availability multi-service system models.
4. Non-full availability multi-service system models. State dependent systems.
5. Models of single-service and multi-service queueing systems.
6. Designing systems with complex traffic shaping mechanisms.
7. Modelling of TCP / IP systems. Resource allocation algorithms.
8. Virtualization and resource balancing.

Teaching methods

1. Lecture: multimedia presentation illustrated with examples and supplemented with additional explanations on the blackboard.
2. Project seminar: discussion on current problems related to the implementation of projects; multimedia presentation illustrated with examples; solving problems given by the teacher with appropriate explanations on the board.

Bibliography

Basic

1. Stasiak M., Głąbowski M., Zwierzykowski P.: Modelowanie i wymiarowanie ruchomych sieci bezprzewodowych. Wydawnictwo Komunikacji i Łączności, Warszawa 2009.

2. Stasiak M, Głąbowski M., Hanczewski S., Zwierzykowski P.: Podstawy inżynierii ruchu i wymiarowania sieci teleinformatycznych, Wydawnictwo Politechniki Poznańskiej, Poznań, 2009.

Additional

1. Teaching materials for lectures and project classes made available to students in the form of pdf files.
2. Stasiak M. Głąbowski M., Zwierzykowski P.: Modeling and Dimensioning of Mobile Networks: from GSM to LTE, John Wiley and sons Ltd., January 2011.
3. Iversen V.B., ed., Teletraffic engineering and network planning, Technical University of Danmark, DTU, 2015, pp. 1-382, http://www.fotonik.dtu.dk. (publikacja dostępna bezpłatnie w sieci).
4. Moscholios I.D., Logothetis M.D., Efficient multirate teletraffic losss models beyond Erlang, John Wiley and sons Ltd., 2019.
5. Czachórski T., Modele kolejkowe w ocenie efektywności sieci I systemów komputerowych, Wydawnictwo PKJS, Gliwice 1999.
6. Bonald T., Feuillet M.: Network Performance Analysis. A John Wiley and Sons, Ltd, Publication, 2011, pp.1- 253.

Breakdown of average student's workload

	Hours	ECTS
Total workload	90	3.0
Classes requiring direct contact with the teacher	49	2.0
Student's own work (project preparation, preparation for exam, literature studies)	41	1.0