COURSE DESCRIPTION CARD - SYLLABUS

Course name
Cloud computing infrastructure and service [S2Teleinf2-STRC>IU]

Course

Field of study
Teleinformatics

Year/Semester
1/2

Area of study (specialization)
ICT networks and cloud solutions

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 (e.g. online)
0

Tutorials
0

Projects/seminars
0

Number of credit points

3,00

Coordinators

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Lecturers

Prerequisites

The student has a basic knowledge of ICT networks (network topologies, ICT node architecture) and the protocols used in ICT networks. The student also knows English at a level that allows obtaining information from English literature (books, catalog data, instructions, recommendations, etc.). The student should read the technical data and guidelines needed for the proper configuration of devices in the ICT network from the English-language literature (books, recommendations, instructions, catalog data). Moreover, the student should be able to use various optimization methods to solve problems in ICT networks. The student should know the limitation of his knowledge and skills and should understand his future education.

Course objective

The course aims to familiarize students with the subject of cloud computing, its configuration, the provision of various services, the storage and processing of user data, and the security of cloud computing.

Course-related learning outcomes

Knowledge:
1. Knows simulation methods and ways of simulating traffic in communication networks [K2_W01].
2. Knows the protocols and tools used in cloud computing [K2_W05].

3. Knows the methods of storing information in the cloud, taking into account the security aspects of user data.
4. Knows the architecture of cloud computing and methods of their configuration.

Skills:
1. Can read data from books, recommendations, producer catalogs, manuals, etc. for analysis and use in server and client applications for cloud computing [K2_U01].
2. Can write console programs and object-oriented applications in programming environments to support the client and server-side for cloud computing [K2_U07].
3. Can predict the effects of improper protection of user sensitive data in cloud computing.
4. Can independently acquire new knowledge, read recommendations, and configuration guidelines [K2_U10].

Social competences:
1. He knows that he has to update his knowledge from time to time to be up to date [K2_K01].

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

The condition for passing the course is to pass its individual parts: final test from the lecture part and final test from laboratories.
A scale of grades has been adopted:
• very good (A) - 5.0;
• good plus (B) - 4.5;
• good (C) - 4.0;
• sufficient plus (D) - 3.5;
• satisfactory (E) - 3.0;
• insufficient (F) - 2.0.
Formative assessment:
• Formative assessment at lectures: oral answer or multiple-choice test passed after obtaining more than 50% of all possible points.
• Forming assessment based on laboratories: based on 5% on the student's activity during classes, 15% on submitted reports, and 80% on the final test.
Summative assessment:
• The condition for obtaining a positive final grade from the lectures is obtaining more than 50% of all possible points from the final test. The form of the test could be oral or written (depending on the number of students). In case of a written form of the test it will be multiple-choice test with optionally possible open-style questions. The final grade for the lectures depends on the total number of points obtained from the final test or from the oral answer. The percentage of obtained final number of points translates into the lecture's final grade in the following way:
◦ > 93% - 100% 5.0 (A)
◦ > 85% - 93% 4.5 (B)
◦ > 76% - 85% 4.0 (C)
◦ > 65% - 76% 3.5 (D)
◦ > 50% - 65% 3.0 (E)
◦ 0% - 50% 2.0 (F)
• The final grade from the laboratories depends on the number of points obtained from the final test and the number of points obtained from the periodic reports submitted in a relevant date. Reports submitted after a required date will have automatically negative points from the first attempt (equal half of the maximal number of possible points). All periodic reports could be corrected and submitted before a deadline given by a teacher. The positive final grade is possible only when student collects minimum 50% possible points from all activities (final test and periodic reports) separately, i.e., minimum 50% of possible points from periodic reports and minimum 50% of possible points from the final test. The final test could be oral or written (depending on the number of students). Information about final test's form is determined by a teacher during the organizational meeting (the first meeting in the semester). The final grade is as follows:
◦ > 93% - 100% 5.0 (A)
◦ > 85% - 93% 4.5 (B)
◦ > 76% - 85% 4.0 (C)
◦ > 65% - 76% 3.5 (D)

◦ > 50% - 65% 3.0 (E)
◦ 0% - 50% 2.0 (F)

Programme content

The program covers overall issues in the field of cloud computing technology. The main emphasis is placed on the infrastructure that constitutes the actual cloud (its structure, devices used, etc.). In addition, the program also discusses the services used and provided in cloud computing, types of models, and general security principles.

Course topics

1.Introduction:
Organization and schedule of classes. Conditions for obtaining a pass. Basic information on the type of ICT networks and the location of computing clouds. Historical overview. Influence of civilization development on the way of working with data, their processing, and storage. Trends and changes in the approach to working with user data and its storage.
2. Fundamental Concepts and Models:
The characteristic properties which are common to most cloud environments. Overview of different delivery and deployment models in the cloud.
3. Cloud-Enabling Technology:
Broadband Networks and Internet Architecture. Virtualization Technology. Web Technology. Multitenant Technology. Service Technology. Data Center examples.
4. Cloud Infrastructure Mechanisms:
Logical Network Perimeter. Virtual Server. Cloud Storage Device. Cloud Usage Monitor. Resource Replication. Ready-Made Environment.
5. Fundamental Cloud Security:
Basic Terms and Concepts. Threat Agents. Cloud Security Threats.
6. Cloud Security Mechanisms:
Encryption. Hashing. Digital Signature. Public Key Infrastructure. Identity and Access Management. Single Sign-On. Cloud-Based Security Groups. Hardened Virtual Server Images.

Teaching methods

Lecture: multimedia presentation, additional examples given in a web browser.
Laboratory: Introduction to the exercises, depending on the topic of the meeting, may be preceded by a multimedia presentation and/or examples provided by the tutor in a web browser. Each laboratory exercise has specially prepared instruction or a tutorial available on the software manufacturer’s website. Some laboratory instructions also include additional questions related to the study topics.

Bibliography

Basic:
1. N. K. Sehgal, P. Ch. P. Bhatt: Cloud Computing: Concept and Practices, Springer, 2018.
2. K. L. Jackson: Architecting Cloud Computing Solutions, Packt Publishing, 2018.
3. N. B. Ruparelia: Cloud Computing, The MIT Press, 2016.
4. R. Rafaels: Cloud Computing: From Beginning to End, CreateSpace Independent Publishing Platform, 2015.
5. M. J. Kavis: Architecting the Cloud, Willey, 2014.

Additional:
1. T. Erl, R. Cope, A. Naserpour: Cloud Computing Design Patterns, Prentice Hall, 2015.
2. A. Bahga, V. Madisetti: Cloud Computing: A Hands-On Approach, CreateSpace Independent Publishing Platform, 2013.

Breakdown of average student's workload

	Hours	ECTS
Total workload	78	3,00
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)	40	1,50