GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Cloud Computing, PG_00068084		
Field of study	Automatic Control, Cybernetics and Robotics		
Date of commencement of studies	October 2026	Academic year of realisation of subject	2028/2029
Education level	first-cycle studies	Subject group	Optional subject group Subject group related to scientific research in the field of study
Mode of study	Full-time studies	Mode of delivery	at the university
Year of study	3	Language of instruction	English
Semester of study	6	ECTS credits	4.0
Learning profile	general academic profile	Assessment form	assessment
Conducting unit	Department of Decision Systems and Robotics -> Faculty of Electronics Telecommunications and Informatics -> Faculties of Gdańsk University of Technology		
Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Jakub Wszołek	
	Teachers	dr inż. Jakub Wszołek	

Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	0.0	15.0	0.0	15.0	45
	E-learning hours included: 0.0						

Learning activity and number of study hours	Learning activity	Participation in didactic classes included in study plan	Participation in consultation hours	Self-study	SUM
	Number of study hours	45	6.0	49.0	100

Subject objectives	The objective of the course is to familiarize students with the concepts, architecture, and practical aspects of cloud computing. Students will learn about service models (IaaS, PaaS, SaaS), deployment models (public, private, hybrid clouds), as well as key topics such as virtualization, containerization, security, scalability, and resource management in cloud environments. During the course, students will develop skills in designing and deploying applications using leading cloud platforms such as AWS, Azure, and Google Cloud.

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[K6_W04] knows and understands, to an advanced extent, the principles, methods and techniques of programming and the principles of computer software development or programming devices or controllers using microprocessors or programmable elements or systems specific to the field of study, and organisation of systems using computers or such devices	Knows and understands advanced principles, methods, and techniques of developing software operating in cloud environments, including virtualization, containerization, and distributed file systems. Understands the organization and operation of systems based on cloud service models (IaaS, PaaS, SaaS).	[SW3] Assessment of knowledge contained in written work and projects
	[K6_U07] can apply methods of process and function support, specific to the field of study	Is able to apply methods and tools supporting the design, deployment, and management processes of information systems in cloud environments, including automation, container orchestration, and service monitoring techniques.	[SU5] Assessment of ability to present the results of task [SU4] Assessment of ability to use methods and tools
	[K6_U08] while identifying and formulating specifications of engineering tasks related to the field of study and solving these tasks, can:n- apply analytical, simulation and experimental methods,n- notice their systemic and non-technical aspects,n- make a preliminary economic assessment of suggested solutions and engineering work n	is able to analyze and define engineering tasks related to the design and implementation of cloud computing solutions. Applies analytical, simulation, and experimental methods to evaluate the performance, scalability, and security of cloud systems. Recognizes system, organizational, and economic aspects of cloud deployments and performs preliminary assessments of the effectiveness of proposed solutions.	[SU5] Assessment of ability to present the results of task [SU4] Assessment of ability to use methods and tools

Subject contents	Course content – lecture 1. Introduction to cloud computing definitions, history, service and deployment models (IaaS, PaaS, SaaS; public, private, hybrid clouds). 2. Cloud infrastructure and architecture data centers, virtualization, containerization, microservices. 3. Automation and orchestration in the cloud Infrastructure as Code (IaC), tools such as Terraform and CloudFormation. 4. Security and identity management in the cloud IAM, encryption, access control, compliance. 5. Scalability and high availability load balancing, auto-scaling, monitoring, cost management. 6. Data processing in the cloud data storage (S3, GCS, Azure Blob), batch and streaming processing. 7. Overview of major cloud platforms and tools AWS, Azure, GCP, Databricks. 8. Future trends in cloud computing serverless architectures, edge computing, AI/ML in the cloud. Course content – laboratory 1. Configuring a cloud environment account setup and resource management using AWS Educate or Google Cloud. 2. Deploying virtual machines, containers, and serverless functions. 3. Creating and configuring data storage solutions (S3, BigQuery, Azure Blob). 4. Developing and deploying simple web applications using PaaS model. 5. Using IaC tools (Terraform, AWS CLI) for automated deployments. 6. Monitoring, logging, and cost analysis in cloud environments. 7. Laboratory project: design and deployment of a cloud-based application including automation and security aspects. 8. Preparation for AWS Educate / Databricks Academy certification. Course content – seminar 1. Analysis of current trends in cloud technology serverless computing, edge computing, AI in the cloud. 2. Case studies of cloud adoption across industries: finance, education, manufacturing, and public sector. 3. Discussion of cloud architecture patterns comparison of AWS, Azure, GCP, and Databricks approaches. 4. Presentations of team projects developed during laboratory classes analysis of architecture, cost, security, and scalability. 5. Review and discussion of technical documentation and cloud provider whitepapers. 6. Preparation for industry certifications (AWS Certified Cloud Practitioner, Databricks Lakehouse Fundamentals). 7. Reflection on ethical and environmental aspects of cloud computing sustainability and data center energy efficiency.
Prerequisites and co-requisites	The student should have basic knowledge of operating systems, computer networks, and programming. Familiarity with fundamentals of virtualization, databases, and information system architecture is required. It is also helpful to have experience working in a Linux environment and basic knowledge of automation and version control tools (e.g., Git, Docker).
Assessment methods and criteria	

Subject passing criteria	Passing threshold	Percentage of the final grade
lab	50.0%	20.0%
project	50.0%	20.0%
lecture	50.0%	60.0%

<table>
<tr><td rowspan="3">Recommended reading</td><td>Basic literature</td><td>1. Rajkumar Buyya, James Broberg, Andrzej Goscinski, Cloud Computing: Principles and Paradigms, Wiley, 2011.
2. Thomas Erl, Ricardo Puttini, Zaigham Mahmood, Cloud Computing: Concepts, Technology & Architecture, Prentice Hall, 2013.
3. AWS Training & Certification, AWS Cloud Practitioner Essentials, Amazon Web Services, online materials: https://aws.amazon.com/training
4. Databricks Academy, Introduction to Databricks Lakehouse Platform, online course: https://academy.databricks.com
5. Official documentation and whitepapers of AWS, Azure, and Google Cloud current online resources.</td></tr>
<tr><td>Supplementary literature</td><td>1. Kelsey Hightower, Brendan Burns, Joe Beda, Kubernetes: Up and Running. Dive into the Future of Infrastructure, OReilly Media, 2023.
2. Yvonne Wilson, Mastering AWS CloudFormation: Infrastructure as Code, Packt Publishing, 2022.
3. Matei Zaharia, Reynold Xin, Patrick Wendell, Learning Spark: Lightning-Fast Big Data Analysis, OReilly Media, 2020.</td></tr>
<tr><td>eResources addresses</td><td></td></tr>
<tr><td>Example issues/ example questions/ tasks being completed</td><td colspan="2">As part of the course, students are encouraged to participate in additional learning activities that support the educational objectives:

Online workshops and training sessions under the AWS Educate program, focused on building and managing cloud infrastructure.
Participation in Databricks Academy certification courses, covering data processing and analytics on the Databricks Lakehouse Platform.
Attendance at cloud computing webinars and industry conferences, organized by academic and partner communities (e.g., AWS re:Invent, DataMass Summit).

These activities are optional but recommended, as they enhance the practical understanding and application of cloud technologies.</td></tr>
<tr><td>Practical activites within the subject</td><td colspan="2">Not applicable</td></tr>
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