



COURSE DESCRIPTION

Course code	full-time studies	
	part-time-studies	
Course name	Systemy Data Center	
Course name in English	Data Center	
Valid from academic year	2022/23	

PLACEMENT IN THE TEACHING PROGRAM

Field of study	Computer Science
Level of education	1st degree
Studies profile	General
Form and method of teaching classes	Full-time and part-time studies
Specialization	Information and communication technology
Organizational unit responsible for the course	Katedra Systemów Informatycznych
Course coordinator	dr inż. Mirosław Płaza
Approved by	Dean of the Faculty of Electrical Engineering, Automatic Control and Computer Science Roman Deniziak, KUT prof., DSc, PhD

GENERAL CHARACTERISTIC OF THE COURSE

Course affiliation	Speciality	
Course status	not obligatory	
Language	English	
Semester	full-time studies	Semester VII
	part-time-studies	Semester VIII
Requirements	Computer networks, Routing and Switching Essentials	
Exam (YES/NO)	NO	
ECTS	6	

Course form		lecture	classes	laboratory	project	other
Hours per semester	full-time studies	30		30	15	
	part-time-studies	18		18	9	

LEARNING RESULTS

Category	Result Symbol	Learning Results	References to the field of study results
Knowledge	W01	Students know and understand the applications of modern Data Center systems.	INF1_W30
	W02	Students know and understand network solutions used in Data Center.	INF1_W30
	W03	Students know and understand the automation and security processes of Data Center systems.	INF1_W30
Skills	U01	Students are able to configure and deploy virtual switches for Data Center system operations.	INF1_U30
	U02	Students can design and configure server resources in Data Center.	INF1_U30
	U03	Students are able to implement security mechanisms and control access to Data Center resources.	INF1_U30
Social competence	K01	Students able to assess the importance of Data Center and their impact on society.	INF1_K1 INF1_K2
	K02	Students are prepared to work in a group in the scope of Data Center.	INF1_K1 INF1_K2

COURSE CONTENT

Course Form	Content
lecture	<ol style="list-style-type: none"> Introduction to Data Center Systems (discussion of the components of the physical installation, power supply, air conditioning, security). Storage and backup systems (definitions, technologies, implementations). Network solutions in the Data Center. Limitations of network devices (number of VLANs, STP protocol limitations, port aggregation). Construction of highly scalable underlay networks, construction of overlay network. Symmetric and asymmetric routing (connections between Data Center systems). Scalable application solutions (construction of distributed applications, layer partitioning, frontend layer scaling). Selected aspects of security (in the areas of Data Center and public cloud, security systems for Web services, intelligent threat analysis systems by example).
laboratory	<ol style="list-style-type: none"> Data Center construction – introduction to the physical infrastructure. Configuration of switches at the aggregation layer. Construction and examination of the underlying network topology. Construction and examination of the overlay network topology. Configuration and examination of network device automation. Hyperconvergence class systems and backup systems. Network security and control of access to Data Center resources.

project	Topics of project assignments include: <ul style="list-style-type: none"> • Literature analysis in terms of the solutions used so far for the given engineering problem, • analysis and selection of appropriate techniques for effective implementation of the given problem with justification of the choices made, • design of the system/task under development, along with a description of the techniques and tools used, • preparation of project documentation, which describes in detail the executed project along with the project assumptions – the documentation is prepared independently by the team implementing the project, • description of how to implement the developed solution along with the user manual, • analysis of further development possibilities of the prepared solution, • presentation of the developed solution.
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LEARNING RESULTS VERIFICATION METHODS

Result Symbol	Learning results verification methods					
	Oral Exam	Written Exam	Midterm	Project	Report	Other
W01			X			
W02			X			
W03			X			
U01			X			
U02			X			
U03			X			
K01			X			
K02			X			

ASSESSMENT FORMS AND CRITERIA

Course Form	Assessment Form	Assessment Criteria
lecture	pass with a grade	Obtaining at least 50% of the points from the pass tests during the laboratory classes.
laboratory	pass with a grade	Obtaining at least 50% of the points from the pass tests during the laboratory classes.
project	pass with a grade	Defense of projects prepared.

STUDENT'S VOLUME OF WORK

ECTS Balance												
No.	Activity Type	Student Involvement										Unit
		full-time studies					part-time-studies					
		Lec	C	Lab	P	S	Lec	C	Lab	P	S	
1.	Participation in classes according to the schedule	30		30	15		18		18	9		h
2.	Other (consultations, exams)	2		2	2		2		2	2		h
3.	Total with the direct assist of an academic teacher	81					51					h
4.	Number of ECTS, that students obtains with the direct assist of an academic teacher	3,24					2,04					ECTS

5.	Hours of unassisted student work	69	99	h
6.	Number of ECTS that student obtains working unassisted	2,76	3,96	ECTS
7.	Practical classes volume of work	45	27	h
8.	Number of ECTS obtained by student at practical classes	1,80	1,08	ECTS
9.	Total student's volume of work expressed in hours	150	150	h
10.	ECTS	6		

BIBLIOGRAPHY

1. Hwaiyu Geng, **Data Center Handbook**, 2014
2. Dinesh G. Dutt, **Cloud Native Data Center Networking: Architecture, Protocols, and Tools**, 2019
3. B.A. Ayomaya, **Data Center for Beginners: A beginner's guide towards understanding Data Center Design**, 2017