
MD-2068, CHISINAU, 9/7 STUDENTILOR STR, PHONE: 022 50-99-63, www.utm.md

CLOUD APPLICATIONS

1. Course/Module information

Faculty	Computers, Informatics, and Microelectronics				
Chair/department	Informatics and Systems Engineering				
Study cycle	Cycle II, Master's degree				
Study program	Data Science				
Year of study	Semester	Evaluation type	Formative category	Optionality category	ECTS credits
I (full-time education);	2	E-exam	S – specialty course unit	O - obligatory course unit	5

2. Estimated total time

Total hours in the curriculum	Including				
	Auditory hours		Individual work		
	Lecture	Practical work	Term paper	Study of theoretical material	Application development
150	20	20	-	110	-

3. Prerequisites for access to the course/module

According to the curriculum plan	To achieve the course objectives, students must possess knowledge about: Computer networks; Computer architectures; System and network programming; Operating systems; Information systems design; IT infrastructure in the Cloud environment.
According to competencies	Acquiring theoretical and practical knowledge in the design, programming, and operation of computing systems.

4. Conditions for conducting the educational process

Lecture	A projector and computer are required for presenting theoretical material in the classroom. Student delays and phone conversations during the course will not be tolerated.
Laboratory/seminar	Computers and their devices are required for conducting laboratory work, in accordance with the topics studied. Students will complete reports according to the conditions set by the methodological guidelines. The deadline for submitting the laboratory work is 2 weeks after its completion. Late submission will result in a penalty of 1 point per week of delay.

5. Specific competencies acquired

Professional competencies	CPL 1. Designing Applications K1 Techniques for modeling requirements and techniques for needs analysis. K6 Existing applications and their corresponding architecture. S1 Identifies clients, users, and stakeholders. S4 Evaluates the use of prototypes to support requirements validation. S5 Designs, organizes, and monitors the plan for application design. S6 Establishes functional design requirements based on defined requirements. CPL 2. Designing and Developing Applications K2 Hardware components, tools, and hardware architectures. K3 Functional and technical design. K8 Integrated development environment (IDE).
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	<p>S3 Applies appropriate software and/or hardware architectures. S5 Manages and ensures a high level of quality and cohesion. CPL 4. Application Testing K1 Techniques, infrastructure, and tools used in the testing process. S2 Manages and evaluates the testing process. CPL 5. Implementing Solutions K2 Techniques related to problem management (operation, performance, compatibility). K5 Technologies and standards used during implementation/deployment. S3 Configures components at any level to ensure correct overall interoperability. S4 Identifies and engages the necessary expertise to resolve interoperability issues.</p>
Transversal competencies	<p>CTL1. Autonomy and responsibility CTL2. Social interaction CTL3. Personal and professional development</p>

6. Course/Module objectives

General objective	Analysis, design, and implementation of applications in a Cloud environment.
Specific objectives	<p>Understanding the fundamental concepts of Cloud Computing. Familiarization with service models (IaaS, PaaS, SaaS), Cloud architectures, and data storage and processing solutions. Acquiring the necessary skills for developing and implementing cloud-native applications, as well as optimizing application performance. Learning security methods and practices for protecting data and applications in the Cloud environment. Using case studies and practical projects to apply Cloud technologies in real business contexts. Improving the ability to identify and solve problems related to the implementation and management of cloud solutions.</p>

7. Course/Module content

Syllabus of teaching activities	Number of hours	
	Full-time education	Part-time education
Course topics		
T1. Introduction to Cloud Computing	2	-
T2. Architecture and Design of Applications in the Cloud Environment	4	-
T3. Storage Services and Databases in the Cloud Environment	2	-
T4. Deploying Applications in the Cloud Environment	4	-
T5. Automation of Application Deployment in the Cloud Environment	4	-
T6. Monitoring Applications	2	-
T7. Security of Applications in the Cloud Environment	2	-
Total lectures:	20	-

Syllabus of teaching activities	Number of hours	
	Full-time education	Part-time education
Practical works topics		
P1. Introduction to the Google Cloud Administration and Monitoring Console for Applications and Services	4	-
P2. Containerizing Applications Using the Docker Platform	4	-

P3. Introduction to Cloud SQL and Cloud Storage	4	-
P4. Deploying Applications in the Google Cloud Environment	4	-
P5. Automating the CI/CD Cycle Using Google Cloud Services	4	-
Total practical work:	20	-

8. Using generative AI

Permission to use	<p>The use of generative AI in assignments and projects is permitted, provided that students adhere to the following rules:</p> <ul style="list-style-type: none"> • Generative AI may be used to generate ideas, text structures, or code, but all generated materials must be reviewed and adjusted by the student to ensure that they meet academic requirements. • Any use of generative AI must be declared in the appendix section of each paper, using the phrase: "During the preparation of this paper, the author used [NAME OF TOOL / SERVICE] for the purpose of [REASON]. After using this tool / service, the author reviewed and edited the content as necessary and assumes full responsibility for the content of the paper."
Restrictions to use	<p>Students <i>MUSTN'T consider generative AI as a reliable source of information</i>, as it does not provide clear references or documented sources.</p> <ul style="list-style-type: none"> • <i>Direct citation of AI-generated content</i> in academic papers as if it were a primary source <i>isn't permitted</i>. • Activities in which the use of generative AI is prohibited are specified by the teacher and are usually <i>intermediate and final assessments</i> or that don't involve professional competence development activities.

9. Bibliographic references

Main	<ol style="list-style-type: none"> 10. B. Sosinsky CLOUD COMPUTING BIBLE, Wiley Publishing Inc., Indianapolis, Indiana, 2011. 11. R. Jennings CLOUD COMPUTING with Windows Azure Platform, Wiley Publishing Inc., Indianapolis, Indiana, 2009 12. R. Buyya, J. Broberg, A. Goscinski CLOUD COMPUTING. Principles and Paradigms, Wiley, Inc., Hoboken, New Jersey, 2011 13. T. Velte, J. Velte, R. Elsenpeter CLOUD COMPUTING: A Practical Approach, MacGrow Hill, 2010 14. Buyya, Rajkumar, Broberg, James and Goscinski, Andrej. 2011. Cloud Computing. Principles and Paradigms., Wiley, 2011. 15. Chandrasekaran, K. Essentials of CLOUD COMPUTING. s.l. : CRC Press, 2015. 16. Gendron, Michael S. Business Intelligence and the Cloud. s.l. : Wiley, 2014. 17. Marc, Farley. Rethinking enterprise storage-A hybrid cloud model. s.l. : Microsoft Press, 2013. 18. Kevin Hoffman, <i>Beyond the Twelve-Factor App</i>, Ed. O'Reilly Media, 2016, 19. John Arundel and Justin Domingus, <i>Cloud Native DevOps with Kubernetes</i>, Ed. O'Reilly Media, 2019, 20. Claudio Caldato, <i>Cloud Native for the Enterprise</i>, Ed. O'Reilly Media, 2020, 21. Microsoft Edition, <i>Cloud Application Architecture</i>, Ed. Microsoft Press 2017. 22. SUSE Special Edition, <i>Kubernetes Management For Dummies</i>, Ed. John Wiley & Sons, 2021
Supplementary	<ol style="list-style-type: none"> 23. N. Tanasseri, R., Rai. Microservices with Azure. Birmingham : Packt Publishing Ltd., 2017. Torre, Cesar de la. Containerized Docker Application Lifecycle with Microsoft

	<p>Platform and Tools. Microsoft Press, 2017.</p> <p>24. George Reese - Cloud Application Architectures: Building Applications and Infrastructure in the Cloud (Theory in Practice), 2012, O'Reilly Publishing, ISBN:978-0596156367</p> <p>25. John Roton - Cloud Computing Explained: Implementation Handbook for Enterprises, Recursive Limited, 2013, ISBN: 978-0956355607</p> <p>26. Sam Newman, <i>Building Microservices</i>, Ed. O'Reilly Media, 2015</p> <p>27. Subbu Allamaraju, <i>RESTful Web Services Cookbook</i>, Ed. O'Reilly Media, 2010</p> <p>28. Mark Massé, <i>REST API Design Rulebook</i>, Ed. O'Reilly Media, 2012</p>
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10. Evaluation

Form of study	Periodic		Current	Individual work	Final exam
	Mid-term 1	Mid-term 2			
Full-time	15%	15%	15%	15%	40%
Minimum performance standards:					
Attendance and participation in lectures and laboratory work.					
Achieving a minimum grade of "5" in each evaluation and laboratory work.					

11. Evaluation criteria

Activity	Evaluation components	Evaluation method, evaluation criteria	Weight in final grade for the Activity	Weight in course evaluation
Full-time education				
Mid term I	Theoretical content, topics 1-3	Test	100%	15%
Mid term II	Theoretical content, topics 4-5	Activities during practical work/seminar	100%	15%
Current evaluation	Practical activity	Attendance and participation in classes	50%	15%
Individual study	Classification of research by activity type	Presentation/Discussion on the topic	100%	15%
Final examination	Theoretical and practical content	Oral exam. Grading according to grading scale	100%	40%