COURSE SYLLABUS

Academic year 2024-2025

1. Programme Information

1.1. Higher education institution	**Lucian Blaga University of Sibiu**
1.2. Faculty	Faculty of Engineering
1.3. Department	Department of Computer Science and Electrical and Electronics Engineering
1.4. Field of study	Computer Science and Information Technology
1.5. Level of study[1]	Master
1.6. Programme of study/qualification	ADVANCED COMPUTING SYSTEMS

2. Course Information

2.1. Name of course	Cloud computing			Code	ACS.205.ZA
2.2. Course coordinator	Lecturer Alexandru DOROBANȚIU, PhD				
2.3. Seminar/laboratory coordinator					
2.4. Year of study[2]	1	2.5. Semester[3]	2	2.6. Evaluation form[4]	E
2.7. Course type[5]	A	2.8. The formative category of the course[6]			Z

3. Estimated Total Time

3.1. Course Extension within the Curriculum – Number of Hours per Week					
3.1.a. Lecture	3.1.b. Seminar	3.1.c. Laboratory	3.1.d. Project	3.1.e. Other	Total
2		1	1	0	**4**
3.2. Course Extension within the Curriculum – Total Number of Hours within the Curriculum					
3.2.a. Lecture	3.2.b. Seminar	3.2.c. Laboratory	3.2.d. Project	3.2.e. Other	Total[7]
28		14	14	0	**56**

Time Distribution for Individual Study[8]	**Hours**
Learning by using course materials, references and personal notes	20
Additional learning by using library facilities, electronic databases and on-site information	5
Preparing seminars / laboratories, homework, portfolios and essays	56
Tutorial activities[9]	10
Exams[10]	3
3.3. Total Individual Study Hours[11] *($NOSI_{sem}$)*	**94**
3.4. Total Hours in the Curriculum *($NOAD_{sem}$)*	**56**
3.5. Total Hours per Semester[12] *($NOAD_{sem}$ + $NOSI_{sem}$)*	**150**
3.6. No. of Hours / ECTS	**25**
3.7. Number of credits[13]	**6**

4. Prerequisites (if needed)

4.1. Courses that must be successfully completed first (from the curriculum)[14]	Advances in Software Engineering
4.2. Competencies	knowledge in at least one programming language

5. Conditions (where applicable)

5.1. For course/lectures[15]	lecture + discussion, video-projector, whiteboard
5.2. For practical activities (lab/sem/pr/app) [16]	Develop and support the planned labs, internet access

6. Specific competencies acquired[17]

Number of credits assigned to the discipline[18]		6	Credits distribution by competencies[19]
6.1. Professional competencies	PC7	conceives product design	1
	PC33	develop cloud computing services	1
	PC34	performs modification and transfer of applications to the cloud	1
	PC4	applies IT security policies	1
6.2. Transversal competencies	TC3	takes responsibility	1
	TC4	works in teams	1

7. Course objectives (resulted from developed competencies)

7.1. Main course objective	Understanding the main concepts of Cloud Computing. Deploying applications across networks. Scalability in computing systems.
7.2. Specific course objectives	Lifecycle of complex software systems. Cloud systems security. Software business models using Cloud Computing.

8. Content

8.1 Lectures[20]		**Teaching methods[21]**	**Hours**
Lecture 1	Introduction to cloud and cloud computing. Similar concepts.	Exposition, board, discussions with students	2
Lecture 2	Case studies	Exposition, board, discussions with students	2
Lecture 3	Cloud services and business models	Exposition, board, discussions	2

		with students	
Lecture 4	Business models and deployment models	Exposition, board, discussions with students	2
Lecture 5	Containerizing and orchestration	Exposition, board, discussions with students	2
Lecture 6	Scalability and elasticity	Exposition, board, discussions with students	2
Lecture 7	Resource sharing - multitenancy	Exposition, board, discussions with students	2
Lecture 8	DevOps	Exposition, board, discussions with students	2
Lecture 9	Performance and productivity	Exposition, board, discussions with students	2
Lecture 10	Distributed databases	Exposition, board, discussions with students	2
Lecture 11	Cloud applications design patterns	Exposition, board, discussions with students	2
Lecture 12	Cloud applications design patterns	Exposition, board, discussions with students	2
Lecture 13	Security and privacy	Exposition, board, discussions	2

		with students	
Lecture 14	Criticism and the future of cloud computing	Exposition, board, discussions with students	2
		Total lecture hours:	

8.2 Practical activities

8.2.b. Laboratory		**Teaching methods**[22]	**Hours**
Laboratory 1	Accessing cloud platforms	Exercise	2
Laboratory 2	Containerizing methods	Exercise	2
Laboratory 3	Composing containers	Exercise	2
Laboratory 4	Container orchestration	Exercise	2
Laboratory 5	Resources and Elasticity	Exercise	2
Laboratory 6	DevOps	Exercise	2
Laboratory 7	Cluster administration	Exercise	2
		Total laboratory hours:	14

8.2.c. Project		**Teaching methods**[23]	**Hours**
Project 1	Creating a simple cloud app	Practical demonstration	2
Project 2	Using docker	Practical demonstration	2
Project 3	Using docker compose	Practical demonstration	2
Project 4	Kubernetes application	Practical demonstration	2
Project 5	Configuring workloads (pods and containers)	Practical demonstration	2
Project 6	Deployment in Kubernetes	Practical demonstration	2
Project 7	Managing and securing a cluster	Practical demonstration	2
		Total project hours:	14

9. Bibliography

9.1. Recommended Bibliography	Michale J. Kavis *Architecting the Cloud: Design Decisions for Cloud Computing Service Models* (SaaS, PaaS, and IaaS), Wiley, ISBN: 9781118617618, 2014
	John W. Rittinghouse, James F. Ransome, *Cloud Computing Implementation, Management, and Security,* CRC Press Taylor & Francis Group, 2010
	Li, X., Qiu, J., *Cloud Computing for Data-Intensive Applications*, Springer, 2014
	Mahmood, Z., *Cloud Computing: Challenges, Limitations and R&D Solutions*, Springer, 2014

	Fehling, C., Leymann, F., Retter, R., Schupeck, W., Arbitter, P., *Cloud Computing Patterns: Fundamentals to Design, Build, and Manage Cloud Applications*, Springer Science & Business Media, 2014
	Thomas Erl *Cloud Computing: Concepts, Technology & Architecture (The Pearson Service Technology Series from Thomas Erl)*, Pearson; 1st edition (23 May 2013), ISBN-10: 9780133387520, ISBN-13: 978-0133387520
9.2. Additional Bibliography	Microsoft Azure - https://azure.microsoft.com/en-us/
	Amazon Web Services - https://aws.amazon.com/
	Google Cloud - https://cloud.google.com/

10. Conjunction of the discipline's content with the expectations of the epistemic community, professional associations and significant employers of the specific study program[24]

Approaching scalable systems with regular discussions held in a formal and informal setting with the representatives of the profile companies.
Informal discussions with alumni working as specialists in Cloud Computing.

11. Evaluation

Activity Type	11.1 Evaluation Criteria	11.2 Evaluation Methods		11.3 Percentage in the Final Grade	Obs.[25]
11.4a Exam / Colloquy	• Theoretical and practical knowledge acquired (quantity, correctness, accuracy)	Tests during the semester[26]:	20%	60%	N/A
		Homework:	0%		
		Other activities[27]:	0%		
		Final evaluation:	40%		
11.4c Laboratory	• Knowledge of the equipment, how to use specific tools; evaluation of tools, processing and interpretation of results	• Written questionnaire • Oral response • Laboratory notebook, experimental works, reports, etc. • Practical demonstration		10%	CPE
11.4d Project	• The quality of the project, the correctness of the project documentation, the appropriate justification of the chosen solutions	• Self-evaluation, project presentation • Critical evaluation of a project		30%	CPE
11.5 Minimum performance standard[28] Minimum of 45 points out of 100.					

The Course Syllabus will encompass components adapted to persons with special educational needs (SEN – people with disabilities and people with high potential), depending on their type and degree, at the level of all curricular elements (skills, objectives, contents, teaching methods, alternative assessment), in order to ensure fair opportunities in the academic training of all students, paying close attention to individual learning needs.

Filling Date: 10.09.2024

Department Acceptance Date: 16.09.2024

	Academic Rank, Title, First Name, Last Name	Signature
Course Teacher	Lecturer Alexandru DOROBANȚIU, PhD	

Study Program Coordinator	Prof. Adrian FLOREA, PhD	
Head of Department	Assoc. Prof. Radu George CREȚULESCU, PhD	
Dean	Prof. Maria VINȚAN, PhD	

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[1] *Bachelor / Master*
[2] *1-4 for bachelor, 1-2 for master*
[3] *1-8 for bachelor, 1-3 for master*
[4] *Exam, colloquium or VP A/R - from the curriculum*
[5] *Course type: R = Compulsory course; E = Elective course; O = Optional course*
[6] *Formative category: S = Specialty; F = Fundamental; C = Complementary; I = Fully assisted; P = Partially assisted; N = Unassisted*
[7] *Equal to 14 weeks x number of hours from point 3.1 (similar to 3.2.a.b.c.)*
[8] *The following lines refer to individual study; the total is completed at point 3.37.*
[9] *Between 7 and 14 hours*
[10] *Between 2 and 6 hours*
[11] *The sum of the values from the previous lines, which refer to individual study.*
[12] *The sum (3.5.) between the number of hours of direct teaching activity (NOAD) and the number of hours of individual study (NOSI) must be equal to the number of credits assigned to the discipline (point 3.7) x no. hours per credit (3.6.)*
[13] *The credit number is computed according to the following formula, being rounded to whole neighbouring values (either by subtraction or addition*

$$No.credits = \frac{NOCpSpD \times C_C + NOApSpD \times C_A}{TOCpSdP \times C_C + TOApSdP \times C_A} \times 30\ credits$$

Where:

- NOCpSpD = Number of lecture hours / week / discipline for which the credits are calculated
- NOApSpD = Number of application hours (sem./lab./pro.) / week / discipline for which the credits are calculated
- TOCpSdP = Total number of course hours / week in the Curriculum
- TOApSdP = Total number of application hours (sem./lab./pro.) / week in the Curriculum
- C_C/C_A = Course coefficients / applications calculated according to the table

Coefficients	**Course**	**Applications (S/L/P)**
Bachelor	2	1
Master	2,5	1,5
Bachelor - foreign language	2,5	1,25

[14] *The courses that should have been previously completed or equivalent will be mentioned*
[15] *Board, video projector, flipchart, specific teaching materials, online platforms, etc.*
[16] *Computing technology, software packages, experimental stands, online platforms, etc.*
[17] *Competences from the Grids related to the description of the study program, adapted to the specifics of the discipline*
[18] *From the curriculum*
[19] *The credits allocated to the course are distributed across professional and transversal competences according to the specifics of the discipline*
[20] *Chapter and paragraph titles*
[21] *Exposition, lecture, board presentation of the studied topic, use of video projector, discussions with students (for each chapter, if applicable)*
[22] *Practical demonstration, exercise, experiment*
[23] *Case study, demonstration, exercise, error analysis, etc.*
[24] *The relationship with other disciplines, the usefulness of the discipline on the labour market*
[25] *CPE – Conditions Exam Participation; nCPE – Does Not Condition Exam Participation; CEF - Conditions Final Evaluation; N/A – not applicable*
[26] *The number of tests and the weeks in which they will be taken will be specified*
[27] *Scientific circles, professional competitions, etc.*
[28] *The minimum performance standard in the competence grid of the study program is customized to the specifics of the discipline, if applicable*