

SYLLABUS

1. Information regarding the programme

1.1 Higher education institution	Babeş-Bolyai University
1.2 Faculty	Faculty of Mathematics and Computer Science
1.3 Department	Department of Computer Science
1.4 Field of study	Computer Science
1.5 Study cycle	Master
1.6 Study programme / Qualification	Cloud and network infrastructure with high performance computing

2. Information regarding the discipline

2.1 Name of the discipline (en) (ro)	Cloud Application and Infrastructure Security (Securitatea Infrastructurii și Aplicațiilor Cloud)						
2.2 Course coordinator	lect. Dr. Ing. Horea Adrian Grebla						
2.3 Seminar coordinator	lect. Dr. Ing. Horea Adrian Grebla						
2.4. Year of study	2	2.5 Semester	3	2.6. Type of evaluation	C	2.7 Type of discipline	Man dato ry
2.8 Code of the discipline	MME8202						

3. Total estimated time (hours/semester of didactic activities)

3.1 Hours per week	4	Of which: 3.2 course	2	3.3 seminar/laboratory	1 lab + 1 project
3.4 Total hours in the curriculum	56	Of which: 3.5 course	28	3.6 seminar/laboratory	28
Time allotment:					hours
Learning using manual, course support, bibliography, course notes					40
Additional documentation (in libraries, on electronic platforms, field documentation)					40
Preparation for seminars/labs, homework, papers, portfolios and essays					40
Tutorship					16
Evaluations					8
Other activities:					
3.7 Total individual study hours	144				
3.8 Total hours per semester	200				
3.9 Number of ECTS credits	8				

4. Prerequisites (if necessary)

4.1. curriculum	Computer Networks
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	• Databases • Web Programming
4.2. competencies	· Good programming skills in at least one programming language (Java, JavaScript, C#, etc).

5. Conditions (if necessary)

5.1. for the course	· Multimedia projector
5.2. for the seminar /lab activities	· Computers with internet access

6. Specific competencies acquired

Professional competencies	· Demonstrate advanced skills to analysis, design, and construction of secure software systems, using a wide range of hardware / software platforms, programming languages and environments, and modeling, verification and validation tools; · Ability to create distributed applications in the Cloud, respecting the ethical and secure policies; · Acquiring a solid theoretical foundation in communication through unsafe medium, as well as the use of secure communication protocols on the Internet; ning the role, interaction and operation patterns of software system components.
Transversal competencies	· Professional communication skills; concise and precise description, both oral and written, of professional results; · Ethic and fair behaviour, commitment to professional deontology; · Entrepreneurial skills; working with economical knowledge; continuous learning.

7. Objectives of the discipline (outcome of the acquired competencies)

7.1 General objective of the discipline	· To introduce the students to cloud computing concepts, the motivation behind migrating to the cloud and the challenges such a migration entails. · Walk through a relatable, real life use case and point out the benefits of using a public cloud provider in most commercial software endeavours; · To know the architecture of cloud applications and the security models used in such applications.
7.2 Specific objective of the discipline	· Become familiar with Amazon Web Services core offerings. · Get hands on experience in developing cloud native applications .

8. Content

8.1 Course	Teaching methods	Remarks
1. Introduction to the cloud landscape • Basic concepts, types • Motivation • Providers	Exposure: description, explanation, examples, debate	

• Pricing models • Layout and topology (regions, availability zones)		
2. The IaaS model • Virtual machines • Images • Storage mechanisms (block, file) • Backups	Exposure: description, explanation, examples, debate	
3. Cloud networking • Private cloud networks • Firewalls and access lists • Network address translation	Exposure: description, explanation, examples, debate	
4. Scalability • Vertical vs Horizontal • Load balancing • Auto-scaling	Exposure: description, explanation, examples, debate	
5. Web capabilities • Static website hosting • Content distribution • (Dynamic) Domain name servers	Exposure: description, explanation, examples, debate	
6. Availability, disaster recovery • Resilience • Multi-AZ deployments • Disaster recovery strategies	Exposure: description, explanation, examples, debate	
7. Infrastructure security • Users, roles, permissions	Exposure: description, explanation, examples, debate	
8. The PaaS model • Managed runtimes • Container basics • Docker	Exposure: description, explanation, examples, debate	
9. Managed databases • Relational • Key-value (Redis, S3) • Document (Mongo)	Exposure: description, explanation, examples, debate	
10. Application security • OAuth • Identity providers	Exposure: description, explanation, examples, debate	
11. Integration services • Queues • Pub-sub topics • Email services	Exposure: description, explanation, examples, debate	
12. Serverless • FaaS • Specific databases (Dynamo, Aurora)	Exposure: description, explanation, examples, debate	
13. API Design • REST • API Gateways	Exposure: description, explanation, examples, debate	
14. Recap and closing	Exposure: description, explanation, examples, debate	
Bibliography		

1. Thomas Erl, Ricardo Puttini, Zaigham Mahmood - Cloud Computing: Concepts, Technology & Architecture, Prentice Hall, 1st edition, 2013
2. Thomas Erl , Robert Cope, Amin Naserpour - Cloud Computing Design Patterns, Prentice Hall, 1st edition, 2015
3. Cornelia Davis - Cloud Native Patterns: Designing change-tolerant software, Manning Publications, 1st edition, 2019
4. Michael J. Kavis - Architecting the Cloud: Design Decisions for Cloud Computing Service Models, Wiley, 1st edition, 2014
5. Kief Morris - Infrastructure as Code: Managing Servers in the Cloud, O'Reilly, 1st edition, 2016
6. Christopher Barnatt - A Brief Guide to Cloud Computing, Robinson Press; 1st edition, 2010
7. Andrew S. Tanenbaum, Maarten van Steen - Distributed Systems: Principles and Paradigms, Pearson Prentice Hall, 3rd edition, 2017

8.2 Seminar / laboratory	Teaching methods	Remarks
1. Introduction to the cloud landscape • Regions • Azs • AWS Management Console	Presentation, Dialogue, Case studies	
2. IaaS basics • EC2 instances • User data • Key pairs • AMI	Presentation, Dialogue, Case studies	
3. Cloud networking • VPCs • Security groups • Auto-scaling groups • Load balancers • Website hosting	Presentation, Dialogue, Case studies	
4. PaaS basics • Docker • ECS • RDS	Presentation, Dialogue, Case studies	
5. Integration services • SQS • SNS • SES • Cognito	Presentation, Dialogue, Case studies	
6. Serverless • Lambda • API Gateway	Presentation, Dialogue, Case studies	

7. Project grading and evaluation	Presentation, Dialogue, Case studies	
Bibliography 1. Andreas Wittig, Michael Wittig - Amazon Web Services in Action, Manning Publications, 1st edition, 2015 2. Bert David - AWS: Amazon Web Services Tutorial for Beginners, Independently published, 1st edition, 2018 3. AWS Educate - https://aws.amazon.com/education/awseducate/		

9. Corroborating the content of the discipline with the expectations of the epistemic community, professional associations and representative employers within the field of the program

· Similar courses exists in the studying program of major universities in Europe and abroad. · The software organisations recognize the importance of the concepts discussed during this course
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10. Evaluation

Type of activity	10.1 Evaluation criteria	10.2 Evaluation methods	10.3 Share in the grade (%)
10.4 Course	Know the applied technologies taught during the course	Collocvium	50%
10.5 Seminar/lab activities	Be able to implement course concepts and presented technologies	Test	50%
10.6 Minimum performance standards			
☐ At least grade 5 (from a scale of 1 to 10) at both presentation and laboratory project.			

Date

Signature of course coordinator

Signature of seminar coordinator

lect. Dr. Ing. Horea Adrian Grebla lect. Dr. Ing. Horea Adrian Grebla

Date of approval

Signature of the head of department

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Assoc Prof PhD. Sterca Adrian