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	**Cyber Security**

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	**Mandatory**
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					20
Additional documentation (in libraries, on electronic platforms, field documentation)					30
Preparation for seminars/labs, homework, papers, portfolios and essays					30
Tutorship					6
Evaluations					8
Other activities:					

3.7 Total individual study hours	94
3.8 Total hours per semester	150
3.9 Number of ECTS credits	6

4. Prerequisites (if necessary)

4.1. curriculum	• Computer Networks

	· 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) • Backu ps	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 - httgs://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

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

19.05.2022   **lect. Dr. Ing. Horea Adrian Grebla**   **lect. Dr. Ing. Horea Adrian Grebla**

Date of approval   Signature of the head of department

....   **Prof. PhD. Laura Dioşan**