

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	Artificial Intelligence for connected industries

2. Information regarding the discipline

2.1 Name of the discipline (en) (ro)	Network virtualization and automation Virtualizarea si automatizarea retelelor						
2.2 Course coordinator	Assoc.Prof. Phd. Adrian Sterca						
2.3 Seminar coordinator	Assoc.Prof. Phd. Adrian Sterca						
2.4. Year of study	2	2.5 Semester	3	2.6. Type of evaluation	E	2.7 Type of discipline	Optional
2.8 Code of the discipline	MME8247						

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 sem + 1 pr
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					30
Additional documentation (in libraries, on electronic platforms, field documentation)					30
Preparation for seminars/labs, homework, papers, portfolios and essays					25
Tutorship					20
Evaluations					14
Other activities:					0
3.7 Total individual study hours	119				
3.8 Total hours per semester	175				
3.9 Number of ECTS credits	7				

4. Prerequisites (if necessary)

4.1. curriculum	<ul style="list-style-type: none"> Distributed operating systems, Concurrent and distributed programming, networking
4.2. competencies	<ul style="list-style-type: none"> Concurrent and distributed programming, networking

5. Conditions (if necessary)

5.1. for the course	<ul style="list-style-type: none"> • Class room with a video projector device
5.2. for the seminar /lab activities	<ul style="list-style-type: none"> •

6. Specific competencies acquired

Professional competencies	Network traffic engineering, network virtualization, cloud network administration
Transversal competencies	<p>Ability to understand and analyse (from a performance point of view) a network</p> <p>Advanced knowledge on network design</p>

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

7.1 General objective of the discipline	<ul style="list-style-type: none"> • The course's objective is to present and study concepts related to modern networks in cloud and Internet
7.2 Specific objective of the discipline	<ul style="list-style-type: none"> • Knowing the functioning principles of modern networks • Knowing the functioning principles of operating systems for cloud and computer clusters

8. Content

8.1 Course	Teaching methods	Remarks
1. Basics of IP network. OSI reference model and TCP/IP network model.	Exposure:description, explanation,examples, discussion of case studies	
2. Internet routing. BGP.	Exposure:description, explanation,examples, discussion of case studies	
3. Traffic engineering.	Exposure:description, explanation,examples, discussion of case studies	
4. Concepts of network virtualization.	Exposure:description, explanation,examples, discussion of case studies	
5. Network virtualization.Virtual LANs.	Exposure:description, explanation,examples, discussion of case studies	
6. Network virtualization.Virtual Private Networks.	Exposure:description, explanation,examples,	

	discussion of case studies	
7. NFV (Network Function Virtualization)	Exposure:description, explanation,examples, discussion of case studies	
8. Virtual network overlay protocols.	Exposure:description, explanation,examples, discussion of case studies	
9. SDN (Software Defined Networking).	Exposure:description, explanation,examples, discussion of case studies	
10. Network operating systems.	Exposure:description, explanation,examples, discussion of case studies	
11. Data-center and cluster network architecture	Exposure:description, explanation,examples, discussion of case studies	
12. Kubernetes networking	Exposure:description, explanation,examples, discussion of case studies	
13. Network traffic optimization (in Internet and data centers)	Exposure:description, explanation,examples, discussion of case studies	
14. Final review	Exposure:description, explanation,examples, discussion of case studies	

Bibliography

1. William Stallings, Foundations of Modern Networking: SDN, NFV, QoE, IoT, and Cloud, Addison-Wesley Professional, 2015.
2. Olivier Bonaventure, Computer Networking : Principles, Protocols and Practice, 2011.
3. Ken Gray, Thomas D. Nadeau, Network Function Virtualization, Morgan Kaufmann, 2016.
4. Kurose, Ross, Computer networking: a top-down approach, eighth edition, 2021.
5. Internet Engineering Task Force, <https://ietf.org>.

8.2 Seminar / laboratory	Teaching methods	Remarks
1. Report and project presentations.	Dialog, debate, case studies, examples	
2. Report and project presentations.	Dialog, debate, case studies, examples	
3. Report and project presentations.	Dialog, debate, case studies, examples	
4. Report and project presentations.	Dialog, debate, case studies, examples	
5. Report and project presentations.	Dialog, debate, case studies, examples	

6. Report and project presentations.	Dialog, debate, case studies, examples	
7. Report and project presentations.	Dialog, debate, case studies, examples	
Bibliography Recent articles from ACM Digital Library and IEEE Xplore		

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

- The course respects the IEEE and ACM Curricula Recommendations for Computer Science studies;
- The course's contents is in the curricula of major universities from abroad for master programs

10. Evaluation

Type of activity	10.1 Evaluation criteria	10.2 Evaluation methods	10.3 Share in the grade (%)
10.4 Course	Knowing the theoretical concepts presented during the course	Examination	40%
10.5 Seminar/lab activities	Ability to understand and implement concepts of modern networks	Project Research report	30% 30%
10.6 Minimum performance standards			
➤ In order to successfully pass this course, students must get at least 5 at each of the 3 examination tasks.			

Date

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Date of approval

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Signature of course coordinator

Assoc.Prof.PhD. Adrian Sterca

Signature of seminar coordinator

Assoc.Prof.PhD. Adrian Sterca

Signature of the head of department

Assoc.Prof. PhD. Adrian Sterca