

SYLLABUS

Next-Generation IEEE 802.11 Standards

University year 2025-2026

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
1.7. Form of education	Full time

2. Information regarding the discipline

2.1. Name of the discipline		Next-Generation IEEE 802.11 Standards					Discipline code		MME8226		
2.2. Course coordinator					Univ. Lect. PhD. Mihoc Tudor Dan						
2.3. Seminar coordinator					Univ. Lect. PhD. Mihoc Tudor Dan						
2.4. Year of study		1	2.5. Semester		2	2.6. Type of evaluation		C	2.7. Discipline regime		Optional

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

3.1. Hours per week	2	of which: 3.2 course	1	3.3 seminar/ laboratory/project	0/0/1
3.4. Total hours in the curriculum	28	of which: 3.5 course	14	3.6 seminar/ laboratory/project	0/0/14
Time allotment for individual study (ID) and self-study activities (SA)					hours
Learning using manual, course support, bibliography, course notes (SA)					12
Additional documentation (in libraries, on electronic platforms, field documentation)					12
Preparation for seminars/labs, homework, papers, portfolios and essays					16
Tutorship					5
Evaluations					2
Other activities:					0
3.7. Total individual study hours	47				
3.8. Total hours per semester	75				
3.9. Number of ECTS credits	3				

4. Prerequisites (if necessary)

4.1. curriculum	· Master programme AI4CI first semester courses
4.2. competencies	· Basic knowledge of wireless communications, including radio-wave propagation, modulation/coding, MIMO, multiplexing, and multiple access techniques.

5. Conditions (if necessary)

5.1. for the course	Projector
5.2. for the seminar /lab activities	Computers

6. Specific competencies acquired

Professional/essential competencies	C2. Oversee development of software C3. Analyse software specifications C5. Provide technical documentation C9. Define technical requirements C10. Develop software prototype C28. Manage engineering projects
Transversal competencies	CT1. think analytically CT2. apply knowledge of science, technology and engineering CT3. work in teams CT4. solve problems CT5. show entrepreneurial spirit

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

7.1 General objective of the discipline	The course presents the fundamental characteristics of recently released and forthcoming new IEEE 802.11 standards. It starts with an introduction to the IEEE standardization procedure, followed by a review of the 802.11 MAC layer basics and a brief description of current 802.11 amendments (PHY and MAC). Next, it focuses on the most significant new amendments, their features, and the corresponding use cases in future wireless communications.
7.2 Specific objective of the discipline	The purpose of this course is to bridge the gap between the widely adopted IEEE 802.11 variants and the recently developed or under-development amendments, focusing on three major technical aspects, i.e., the Physical layer (PHY), the Medium Access Control (MAC) layer, and the new usage models and applications in the coming years.

8. Content

8.1 Course	Teaching methods	Remarks
1. Introduction to IEEE 802.11.	• Interactive exposure • Presentation • Explanation • Practical examples	
2. IEEE 802.11 basics.		
3. IEEE 802.11be – Enhancements for Extremely High Throughput (Wi-Fi 7).		
4. IEEE 802.11bn – Ultra High Reliability (Wi-Fi 8).		
5. IEEE 802.11bd – Enhancements for Next Generation V2X.		
6. IEEE 802.11bb – Light Communications.		
7. IEEE 802.11bf – Enhancements for Wireless LAN Sensing.		
8. Future directions and conclusion.		
Bibliography		
1. Next Generation Wireless LANs (Second Edition) by Perahia and Stacey For IEEE 802.11be.		
2. IEEE 802.11be: Wi-Fi 7 Strikes Back - Garcia-Rodriguez, Lopez-Perez, Galati-Giordano, and Geraci.		
For IEEE 802.11bn:		
3. What Will Wi-Fi 8 Be? A Primer on IEEE 802.11bn Ultra High Reliability - Galati-Giordano, Geraci, Carrascosa and Bellalta (doi.org/10.48550/arXiv.2303.10442).		
For IEEE 802.11bb:		
4. Current Status and Challenges of Li-Fi - IEEE 802.11bb by Khorov and Levitsky (doi.org/10.1109/MCOMSTD.0001.2100104).		
For IEEE 802.11bf:		
5. Toward Integrated Sensing and Communications in IEEE 802.11bf Wi-Fi Networks - Meneghello, Cordeiro and Restuccia (doi.org/10.1109/MCOM.001.2200806).		
8.2 Seminar / laboratory	Teaching methods	Remarks
1. IEEE 802.11 basics.	• Interactive exposure • Explanation • Conversation • Didactical demonstration	
2. IEEE 802.11be – Enhancements for Extremely High Throughput (Wi-Fi 7).		
3. IEEE 802.11bn – Ultra High Reliability (Wi-Fi 8).		

4. IEEE 802.11bd – Enhancements for Next Generation V2X.		
5. IEEE 802.11bb – Light Communications.		
6. IEEE 802.11bf – Enhancements for Wireless LAN Sensing.		
Bibliography 1. Next Generation Wireless LANs (Second Edition) by Perahia and Stacey For IEEE 802.11be. 2. IEEE 802.11be: Wi-Fi 7 Strikes Back - Garcia-Rodriguez, Lopez-Perez, Galati-Giordano, and Geraci. For IEEE 802.11bn: 3. What Will Wi-Fi 8 Be? A Primer on IEEE 802.11bn Ultra High Reliability - Galati-Giordano, Geraci, Carrascosa and Bellalta (doi.org/10.48550/arXiv.2303.10442). For IEEE 802.11bb: 4. Current Status and Challenges of Li-Fi - IEEE 802.11bb by Khorov and Levitsky (doi.org/10.1109/MCOMSTD.0001.2100104). For IEEE 802.11bf: 5. Toward Integrated Sensing and Communications in IEEE 802.11bf Wi-Fi Networks - Meneghello, Cordeiro and Restuccia (doi.org/10.1109/MCOM.001.2200806).		

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 exists in the studying program of all major universities abroad;

10. Evaluation

Activity type	10.1 Evaluation criteria	10.2 Evaluation methods	10.3 Percentage of final grade
10.4 Course	How well the students understand the main elements of next-generation IEEE 802.11 standards.	Written exams, project/lab reports, and short in-class quizzes.	100%
	Develop a project.	A project assignment will also be evaluated.	
10.5 Seminar/laboratory			
10.6 Minimum standard of performance			
Each student should obtain a minimum of 5 for the final grade.			

11. Labels ODD (Sustainable Development Goals)

Not applicable.

Date:
11 April 2025

Signature of course coordinator

Univ. Lecturer PhD. Tudor Mihoc

Signature of seminar coordinator

Univ. Lecturer PhD. Tudor Mihoc

Date of approval:
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Signature of the head of department

Assoc. Prof. PhD. Adrian STERCA

