

SYLLABUS

Robot Predictive Maintenance

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		Robot Predictive Maintenance					Discipline code		MME8229		
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/pro ject	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					15
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	- Algorithms and Programming, OOP - Master programme AI4CI first semester courses
4.2. competencies	Electronics Fundamentals: Understanding basic electronics concepts such as resistance, voltage, current, and having experience with common electronic components could be essential for working with robotic hardware.

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	C3. Analyse software specifications C4. Align software with system architectures C5. Provide technical documentation C7. Develop software C9. Define technical requirements C10. Develop software prototype C13. Create data models C17. Interpret technical texts C18. Develop with cloud services C19. Implement cloud resources C21. Use software libraries C25. Identify customer requirements C26. Interpret technical requirements 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 goal of this course is to learn how to carry out and predict maintenance tasks on Robots main constituent elements, in order to define and implement a preventive maintenance plan with a robot according to the empirical test and the manufacturer's specifications.
7.2 Specific objective of the discipline	Learning the electrical-motor elements that comprise an articulated robot and understanding its operation and function, how to carry out an error diagnosis based on the robot's operation log, and hence designing AI to prevent accidents during the maintenance of robotic equipment.

8. Content

8.1 Course	Teaching methods	Remarks
1. Morphological foundations: Types of robots and movement control systems.	• Interactive exposure • Presentation • Explanation • Practical examples	
2. Composition of a robot, access, and maintenance of main constituent elements.		
3. Refresh on mathematical fundamentals of programming and calibrating a robot.		
4. Corrective maintenance of a robot. Identification of errors and correction of common incidents.		
5. Preventive and predictive maintenance. Forecast of incidents and creation of maintenance programs		
Bibliography • Craig, John J. Introduction to robotics: mechanics and control, 3/E. Pearson Education India, 2009. • Sciavicco, Lorenzo, et al. Robotics: modelling, planning and control. Springer, 2010. • Spong, Mark W., Seth Hutchinson, and M. Vidyasagar. "Robot modeling and control." John Wiley & Sons (2020). • Niku, Saeed B. Introduction to robotics: analysis, control, applications. John Wiley & Sons, 2020.		
8.2 Seminar / laboratory	Teaching methods	Remarks
1. Maintenance tasks on Robots main constituent elements, in order to define a preventive maintenance plan with a robot according to the empirical test and the manufacturer’s specifications	• Interactive exposure • Explanation • Conversation • Didactical demonstration	

2. Main predictive maintenance tools		
Bibliography · Jazar, Reza N. Theory of applied robotics. Springer Science+ Business Media, LLC, 2010. · Craig, John J. Introduction to robotics: mechanics and control, 3/E. Pearson Education India, 2009. · Sciavicco, Lorenzo, et al. Robotics: modelling, planning and control. Springer, 2010. · Spong, Mark W., Seth Hutchinson, and M. Vidyasagar. "Robot modeling and control." John Wiley & Sons (2020). · Niku, Saeed B. Introduction to robotics: analysis, control, applications. John Wiley & Sons, 2020.		

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 is included in the study programs of major universities abroad.

10. Evaluation

Activity type	10.1 Evaluation criteria	10.2 Evaluation methods	10.3 Percentage of final grade
10.4 Course	Understand the main elements of Robot Predictive Maintenance	Continuous monitoring and colloquium	100%
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)¹

No applicable.

Date:
15 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

¹ Keep only the labels that, according to the [Procedure for applying ODD labels in the academic process](#), suit the discipline and delete the others, including the general one for *Sustainable Development* – if not applicable. If no label describes the discipline, delete them all and write „Not applicable.“