INFORMATICS IN ROBOTICS

Faculty of Computer Science				
Study programme:	**Computer Science**		Degree level:	**Engineer's degree full-time programme**
Specialization	**---**		Diploma path:	**2026/2027W - 2026/2027S**
Module name:	**Informatics in Robotics** (Informatyka w robotyce)			
Module type:	**obligatory**	**Semester: 1**	ECTS:**3**	Module ID:**FCS-00008**
No. of hrs in semester:	Lecture (L) - **15** Classes(C) - **0** Specialization workshop (SW) - **30** Project (P) - **0** Laboratory classes (LC) - **0** Seminar (S) - **0**			
Prerequisites	-			

Aims and objectives:	Lectures: To familiarize students with the basics of robotics. Developing a broad perspective on problems related to the work of robots in real conditions. Practical classes: Implementation of navigation algorithms on real mobile constructions based on Mindstorms NXT educational robots. Designing the behavior of mobile systems.		
Forms of teching activities::	lecture, specialization workshop,	Assessment:	Evaluation must be relevant to the intended learning outcomes:
		Lecture - tests. Practical classes - work during the classes, reports from the classes.	
Module content:	Lectures: Basics of robotics: simple and inverse kinematics. Sensors and motors in robotics. PID control. Navigation algorithms. Programming mobile robots to perform navigation tasks: avoiding obstacles, location, mapping, SLAM. Intelligent Robots. Practical classes: Not eXactly C (NXC). Testing various sensors and engines. Conditions, loops, threads in parallel. Mindstorms NXT programming. Real robot control - avoiding obstacles. Covering the distance with many obstacles of unknown dimensions. Graphic information recognition. Implementation of space orientation algorithms.		
Teaching methods:	programming, lecture problem, informative lecture,		

Learning outcomes

Symbol	Specify min. 4, max. 8 learning outcomes in the following order: knowledge – skills – competence. Each learning outcome must be verifiable	Reference to the programme learning outcomes of education
LO1	understands the tasks of kinematics in robotics and can solve simple kinematics tasks	
LO2	understands and implements mobile navigation algorithms	
LO3	designs and implements two robot communications	
LO4	tests the accuracy and effectiveness of mobile systems in various conditions.	

No. of learning outcome	Methods of assessing the learning outcome	Type of teaching activities (if more than one) during which the outcome is assessed
LO1	test	L
LO2	test, reports	L, Sw
LO3	reports	Sw
LO4	reports	Sw

Student's workload (in hours)	**1** - Participation in lectures	15x1h	15
	2 - Participation in practical classes	15x2h	30
	3 - Preparation to the lecture		5
	4 - Implementation of project tasks (including preparation of presentations)		20
	5 - Participation in teachers hours		5
		TOTAL:	**75**
Quantitative indicators	Student's workload - activities that require direct teacher participation: (1)+(2)+(5)	50	**ECTS** 2.0
	Student's workload connected with practical classes (2)+(4)	50	2.0

Basic references:	1. J. J. Graig, Wprowadzenie do Robotyki, WNT, Warszawa, 1995. 2. R. Murphy, Introduction to AI robotics, The MIT Press Cambridge, Massachusetts London, England, 2000. 3. B. Siemiątkowska, A. Borkowski, R. Chojecki i in., Reprezentacja otoczenia robota mobilnego, Akademicka Oficyna Wydawnicza EXIT, 2011. 4. W. Kaczmarek, J. Panasiuk, S. Borys, Środowiska programowania robotów, PWN, 2017.

Further reading	1. K. Kozłowski, P. Dutkiewicz, W. Wróblewski, Modelowanie i sterowanie robotów, PWN, Warszawa, 2003. 2. S. Russell, P. Norvig, Artificial Intelligence: A Modern Approach, 2nd edition, Prentice Hall, 2002. 3. G. Dudek, M. Jenkin, Computational Principles of Mobile Robotics, Cambridge University Press, 2000. 4. T. Zielińska, Maszyny kroczące: podstawy, projektowanie, sterowanie i wzorce biologiczne, PWN, 2013.

Unit:	Department of Digital Media and Computer Graphics	Lecturer/ instructor	dr inż. Teodora Dimitrova-Grekow
Date of issuing the programme:	30th March 2026	Author of the programme:	dr inż. Teodora Dimitrova-Grekow

L - lecture, C - classes, LC - laboratory classes, P-project, SW - specialization workshop, S - seminar