

## SYLLABUS

### Course description

Course code	Course	<b>PAKIETY OPROGRAMOWANIA W MECHANICE</b>		
MB/O/I/ST/C1A.8		<b>CAE SYSTEMS IN MECHANICS</b>		
Language of instruction	English			
Academic year	2023/2024			
<b>field of study:</b>	Mechanical engineering			
<b>field of specialisation:</b>	CAE			
Educational level	first-cycle studies			
Education profile	General academic			
Mode of study	Full-time studies			
Semester(s)	5, 6			
Affiliation with a group of classes	Specialization module			
Course status	obligatory			
Types of classes, instruction hours, ECTS credits	Types of classes	Number of instruction hours	Number of ECTS credits	
	Lecture	[h]	4 ECTS	
	Classes	[h]		
	Laboratories	60 [h]		
Linkage of the course	with the education profile	related to the conducted scientific activity in the discipline to which the field of study is assigned;		4 ECTS
	with qualifications	serves the student to acquire engineering competences		4 ECTS
	with science discipline	Mechanical Engineering		4 ECTS
Form of teaching	Traditional – classes organized at the University /classes conducted using online learning methods and techniques			
Prerequisites	Knowledge and skills acquired in the subjects: mathematics, mechanics, strength of materials, basics of FEM			
Department	Faculty of Mechanical Engineering			
Coordinator	PhD Marcin Wikło			
The website of the basic organizational unit	<a href="http://www.wm.uniwersytetradom.pl">www.wm.uniwersytetradom.pl</a>			
E-mail address, phone number of the coordinator	m.wiklo@uthrad.pl, phone 361- 71-16			

**LEARNING OUTCOMES, CURRICULUM CONTENT, TEACHING CLASSES, VERIFICATION OF LEARNING OUTCOMES**

Learning Objective:	C1 – the aim of the course is to acquire the ability to use software for numerical calculations, verification obtained results with the software for the Method Finite Elements (FEA), interpretation of differences resulting from the adopted assumptions. C2 – the aim of the course is to acquire knowledge and practice in the field of various CAE programs
Curriculum Content:	The content of the classes is related to the conducted scientific research  <b>Content of laboratory exercises</b> Preliminary organizational activities: familiarization with the rules applicable in the classes, the applicable form of passing the course and a general outline of the material applicable to students. Presentation of the capabilities of the software, Ansys Mechanical and Nastran InCad including geometry modifications, mesh generation and boundary conditions. A series of exercises presenting the capabilities of the new CAE software: modeling of contact, joints, symmetry, axial symmetrical models. Presentation of the idea of creating direct and parametric modeling, advanced creation of FEM meshes and basic static and dynamic calculations. Import/export capabilities of results and co-simulations
Didactic (educational) methods:	Laboratory exercises
Course assessment type, the criteria for assessing the achieved learning outcomes, and the method of calculating the final grade:	Average obtained by the student from grades for projects and from colloquia

Learning outcomes for the course in relation to the field of study learning outcomes and the type of classes				Methods of verifying learning outcomes	
Learning outcome number	Description of the learning outcomes for the course (PEU) A student who has passed the course ( W ) knows and understands / ( U ) can / ( K ) is ready to:	Field of study learning outcome (KEU)	Types of classes	Form of verification (credits)	Methods of testing and assessment
W1	Correctly classifies the steps of calculations performed in various MES systems. It uses software to solve problems with mechanics and strength of materials.	K_WG01 K_WG04 K_WG09	laboratory	project	Made Projects Colloquia
W2	Classifies and identifies the basic elements of optimization: goal function, constraints, and decision variables.	K_WG01 K_WG06 K_WG17	laboratory	project	Made Projects Colloquia
U1	Can perform numerical calculations for member elements, interprets the obtained results, compares them with MES software.	K_UW08 K_UW14	laboratory	project	Made Projects Colloquia
U2	Can formulate an optimization task, run calculations and interpret optimization results.	K_UW02 K_UW03 K_UK16	laboratory	project	Made Projects Colloquia
K1	Is able to collaborate and act in a group and understands the non-technical aspects of the mechanical engineer's activities, including environmental impact	K_KK01 K_KO02 K_KO04	laboratory	project	Made Projects Colloquia

Literature and teaching aids
1. Ansys manual 2. Nastran in Cad manual 3. Król K., Metoda elementów skończonych w obliczeniach konstrukcji, Wydawnictwo Politechniki Radomskiej, Radom, 2006. 4. Rakowski G., Kacprzyk Z., Metoda elementów skończonych w mechanice konstrukcji, Oficyna Wydawnicza Politechniki Warszawskiej, Warszawa, 1993. 5. Łączek S. Przykłady analizy konstrukcji w systemie Mes Ansys-Workbench PKRW 2012

Student workload required to achieve the assumed learning outcomes – the balance of ECTS credits			
Attendance, participation	Student workload [h].		
	Other contact hours (IGK)	Student's self-study hours Classes without a teacher (ZBN)	Classes
Participation in laboratory classes	X	X	60[h]
Meeting with teachers during their duty hours	5 [h]	X	X
Preparation for classes, Preparation for credit	X	30[h] 5[h]	X
Total student workload	5 [h]/ 0,2 ECTS	35 [h]/1,4 ECTS	60 [h]/ 2,4 ECTS
ECTS credits for the course	100[h] / 4 ECTS		

Additional information, comments
<p>In the case of students with special needs, including disabilities, and chronic illnesses, the methods and forms of verification of learning outcomes specified above (in the syllabus) are adapted to the individual needs of these students, as appropriate.</p> <p>Detailed rules and forms of support for students with special needs, including those with disabilities and chronically ill, during classes, credits, and exams are specified in: University Regulations (Regulamin Studiów Uniwersytetu Technologiczno-Humanistycznego w Radomiu), Study Regulations (Zasady Studiowania), and Procedure for Ensuring Accessibility of the Educational Process to Students with Special Needs, Including Those with Disabilities and Chronically ill (Procedura dotycząca zapewnienia dostępności procesu kształcenia studentom ze szczególnymi potrzebami, w tym: z niepełnosprawnością, przewlekle chorych).</p>

