

1.	Field of study	Materials Science and Engineering
2.	Faculty	Faculty of Science and Technology
3.	Academic year of entry	2023/2024 (winter term), 2024/2025 (winter term)
4.	Level of qualifications/degree	first-cycle studies (in engineering)
5.	Degree profile	general academic
6.	Mode of study	full-time

7.	General information about the module	
Module name		Modeling and Simulation of Engineering Problems Using the Finite Element Method (FEM)
Module code		IM1A_MES
Number of the ECTS credits		4
Language of instruction		
Purpose and description of the content of education		The module Modeling and Simulation of Engineering Problems in FEM introduces students to the fundamental theoretical principles of the Finite Element Method (FEM) and focuses on the principles of operation and capabilities of modern computer systems that enable numerical calculations using this method. The aim of the module is to equip students with the ability to effectively utilize this method for solving complex engineering problems. During the classes, students will acquire practical skills in modeling and simulation, as well as in interpreting results and drawing conclusions from conducted analyses. As a result, they will gain practical skills in applying the FEM method in engineering practice, taking into account various technical, systemic, and design aspects.
List of modules that must be completed before starting this module (if necessary)		not applicable

8.	Learning outcomes of the module			
Code	Description	Learning outcomes of the programme	Level of competenc (scale 1-5)	
IM1A_MES_1	Mastery of the theoretical foundations of the Finite Element Method (FEM), its application in engineering problem modeling and simulation, and awareness of the existing limitations of this method.	IM1A_U09 IM1A_W06	3 3	
IM1A_MES_2	The ability to identify engineering problems and utilize the Finite Element Method (FEM) for their resolution, taking into account system-related and non-technical aspects, as well as conducting a preliminary economic assessment of proposed engineering solutions and actions.	IM1A_K02 IM1A_U05 IM1A_U06 IM1A_U07 IM1A_U09	3 3 3 3 3	
IM1A_MES_3	The ability to analyze obtained results, draw conclusions, and present the results of MES analyses in the form of reports, presentations, and graphical visualizations that effectively communicate relevant information related to the conducted analysis.	IM1A_U01 IM1A_U02 IM1A_U08	3 3 3	
IM1A_MES_4	Having an awareness of the necessity of collaboration among multiple specialists from various fields during the execution of an engineering project, the ability to communicate effectively, exchange knowledge, and integrate different	IM1A_K01 IM1A_K02	3 3	

	project aspects to achieve optimal results.	IM1A_U02	3
		IM1A_U03	3

9. Methods of conducting classes		
Code	Category	Name (description)
a01	Lecture methods / expository methods	Formal lecture/ course-related lecture <i>a systematic course of study involving a synthetic presentation of an academic discipline; its implementation assumes a passive reception of the information provided</i>
a05	Lecture methods / expository methods	Explanation/clarification <i>explication involving the derivation of a predetermined theorem from other, already known ones, in the number of steps specified by the person teaching the course</i>
b01	Problem-solving methods	Problem-based lecture <i>an analysis of a selected scientific or practical problem accompanied by its assessment and an attempt to provide a solution to the issues presented in the lecture as well as the indication of the consequences of the proposed solution</i>
b04	Problem-solving methods	Activating method – discussion / debate <i>an exchange of views supported by substantive arguments leading to a clash of different views, a compromise or the identification of common positions; it proceeds according to previously agreed-upon rules regarding the time, manner and turn-taking as well as the principles of civil discourse; a discussion is not a competition but aims at finding the best solutions or presenting different points of view; its varieties include brainstorming, Oxford-style debate, panel discussion, decision tree, conference discussion; a debate is an orderly dispute between supporters and opponents of a viewpoint, usually specialists in the field or pre-selected representatives of a group dealing with a common problem</i>
c06	Demonstration methods	Demonstration-imitation <i>a presentation of a model way of performing specific activities accompanied by a commentary; it aims at triggering imitation activities in an individual or in a group of participants observing the activities of the person teaching the course until the right habit is formed through regular exercise; the demonstration-imitation method is combined with a physical practice of activities/behaviours</i>
c07	Demonstration methods	Screen presentation <i>a presentation of synthetic image content using computer graphics, e.g., a series of slides or other multimedia forms, usually accompanied by a commentary; typical components of a screen presentation include text organized into bulleted points, charts, images and animations, sometimes sound effects or music; a multimedia illustration of course content presented in the form of a projected image</i>
d01	Programmed learning methods	Working with a computer <i>e.g., Webquest; implementation of educational tasks using electronic and digital devices, computer programs and Internet applications; the academic teacher acts as a consultant; students' work is carried out step by step according to the plan laid own by the person teaching the course and following his instructions, and proceeds towards producing the indicated results within the set deadline</i>

10. Forms of teaching					
Code	Name	Number of hours	Assessment of the learning outcomes of the module	Learning outcomes of the module	Methods of conducting classes
IM1A_MES_fs1	lecture	15	course work	IM1A_MES_1, IM1A_MES_4	a01, b01, b04, c07
IM1A_MES_fs2	laboratory classes	30	course work	IM1A_MES_2, IM1A_MES_3, IM1A_MES_4	a05, b04, c06, d01

11. The student's work, apart from participation in classes, includes in particular:			
Code	Category	Name (description)	Is it part of the BUNA?
a01	Preparation for classes	Search for materials and review activities necessary for class participation <i>reviewing literature, documentation, tools and materials as well as the specifics of the syllabus and the range of activities indicated in it as required for full participation in classes</i>	No
a02	Preparation for classes	Literature reading / analysis of source materials <i>reading the literature indicated in the syllabus; reviewing, organizing, analyzing and selecting source materials to be used in class</i>	No
a03	Preparation for classes	Developing practical skills <i>activities involving the repetition, refinement and consolidation of practical skills, including those developed during previous classes or new skills necessary for the implementation of subsequent elements of the curriculum (as preparation for class participation)</i>	No
a05	Preparation for classes	Production/preparation of tools, materials or documentation necessary for class participation <i>developing, preparing and assessing the usefulness of tools and materials (e.g. aids, scenarios, research tools, equipment, etc.) to be employed in class or as an aid when preparing for classes</i>	No
b01	Consulting the curriculum and the organization of classes	Getting acquainted with the syllabus content <i>reading through the syllabus and getting acquainted with its content</i>	Yes
c02	Preparation for verification of learning outcomes	Studying the literature used in and the materials produced in class <i>exploring the studied content, inquiring, considering, assimilating, interpreting it, or organizing knowledge obtained from the literature, documentation, instructions, scenarios, etc., used in class as well as from the notes or other materials/artifacts made in class</i>	No
d01	Consulting the results of the verification of learning outcomes	Analysis of the corrective feedback provided by the academic teacher on the results of the verification of learning outcomes <i>reading through the academic teacher's comments, assessments and opinions on the implementation of the task aimed at checking the level of the achieved learning outcomes</i>	Yes
d02	Consulting the results of the verification of learning outcomes	Development of a corrective action plan as well as supplementary/corrective tasks <i>reviewing and selecting tasks and activities enabling the elimination of errors indicated by the academic teacher, their verification or correction resulting in completing the task with at least the minimum passing grade</i>	Yes

Information on the details of the module implementation in a given academic year can be found in the syllabus available in the USOS system: <https://usosweb.us.edu.pl>.