COURSE DESCRIPTION CARD - SYLLABUS

Course name
FEM Simulations [S2ETI1>SymKompMES]

Course

Field of study
Education in Technology and Informatics

Year/Semester
1/1

Area of study (specialization)
–

Profile of study
general academic

Level of study
second-cycle

Course offered in
Polish

Form of study
full-time

Requirements
compulsory

Number of hours

Lecture
15

Laboratory classes
30

Other (e.g. online)
0

Tutorials
0

Projects/seminars
0

Number of credit points

3,00

Coordinators

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Lecturers

Prerequisites

Knowledge of linear algebra, in particular concepts such as space, transformation. Knowledge of analysis, including numerical analysis. Knowledge of mechanics and strength of materials, heat transfer and differential equations. Ability to use a mathematical apparatus to the degree required from an engineer. Understanding the essence of higher education. The ability to effectively search for valuable information on the Internet.

Course objective

The aim of the course is to present the Finite Element Method against a wider background of numerical methods as an effective tool for solving differential equations of physics. The method is based on the problems of mechanics, which is justified for historical and educational reasons.

Course-related learning outcomes

Knowledge:
1. has an extended and deepened knowledge of mathematics, useful for modeling and computer simulation of the course of processes, as well as the operation of devices and systems
2. knows the current state of research and development in the field of selected issues related to

functional materials, their potential applications in industry

Skills:
1. is able to use mathematical knowledge as well as analytical and simulation methods to quantify the parameters of devices and model their operation, as well as to analyze selected processes;
2. is able to choose a programming language suitable for a given programming task

Social competences:
1. can think and act in a creative and entrepreneurial way.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Learning outcomes presented above are verified as follows:
Passing the laboratories on the basis of developing a selected engineering problem using the finite element method
Passing the lecture on the basis of a test.

Programme content

1. Przestrzenie liniowe, transformacje układów współrzędnych. Algebra tensorów. Elementy opisu mechaniki ośrodków ciągłych.
2. Wprowadzenie do MES – koncepcja, metoda residuów ważonych, rozwiązywanie układów równań algebraicznych. Zasada prac wirtualnych,
3. Dyskretyzacja geometrii. Formaty danych służące do reprezentowania geometrii w programach CAD oraz MES
4.Analiza MES zagadnień dwuwymiarowych mechaniki
5. Analiza MES dla zagadnień trójwymiarowych mechaniki
6. Wstęp do analizy nieliniowej.

Course topics

none

Teaching methods

none

Bibliography

Basic
Additional

Breakdown of average student's workload

	Hours	ECTS
Total workload	80	3,00
Classes requiring direct contact with the teacher	45	2,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	35	1,00