

## Tárgytematika / Course Description Introduction to Finite Element Methods

GKNB\_AMTA014

Tárgyfelelős neve /

Teacher's name: dr. Pere Balázs

Félév / Semester: 2024/25/2

Beszámolási forma /

Assesment: Folyamatos számonkérés

Tárgy heti óraszám /

Tárgy féléves óraszám /

Teaching hours(week): 2/2/0

Teaching hours(sem.): 0/0/0

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### OKTATÁS CÉLJA / AIM OF THE COURSE

Computer simulations play an important role in the early phases of engineering design nowadays. These can be applied in a wide range of problems in mechanics (structural analysis, dynamics, thermodynamics, etc.) and their common element is, that they solve mathematical equations - which describing a certain physical phenomenon - via approximation. The most widespread method of approximations is the Finite Element Method. In order to be able to use these methods, and to generate reliable data with them, an engineer in training must become familiar with the underlying mathematical equations solved, the modelling approaches, as well as the limitations of the methods. The goal of the course is to provide an introduction into the basics of the Finite Element Method.

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### TANTÁRGY TARTALMA / DESCRIPTION

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### SZÁMONKÉRÉSI ÉS ÉRTÉKELÉSI RENDSZERE / ASSESSMENT'S METHOD

**Conditions for signature** (to be fulfilled during the class-period and necessary for acquiring the mid-semester grade):

The **homework must be written and submitted until the deadline**. The homework will be marked on a scale of 0-20 points. Minimum 8 points shall be achieved on a homework.

Any homework written in LaTeX based text editors are worth additional max. 10 points.

A homework that was not submitted by the deadline can be submitted **within one week** after the deadline. The final deadline for the late submission of the homework is Sunday 23:59 of the last week of the class-period. These late submissions are subject to **extra process fee**. **If the homework was not submitted within one week after the deadline, then the semester cannot be validated and a signature will be refused.**

A homework that is not accepted shall be resubmitted again within one week of receipt.

A homework, which **does not fulfill the minimum requirements for the layout and content, will not be accepted.**

(Requirements for the layout and content can be downloaded from the homepage of the subject.)

Those students, whose homework verifiably proves to be the work of a third party and referred to as their own work, will be disqualified. In this case, the semester cannot be validated and signature will be refused as a consequence of their action.

**Midterm tests:**

**Two times** in the semester (somewhen in the 6-7th and 12-13th weeks) **tests will be given** from the topics of the previous lectures. Each tests are worth maximum 20 points and **valid only if at least 8 points (40% of the 20 points) are reached.**

At the end of the semester **a problem must be solved with Finite Element software in a computer room.** The flawless

solution is worth 20 points but at least 8 points (40% of the 20 points) must be reached for validity.

**Mid-semester grade:**

The sum of the points of the homework, mid-term tests and the problem solved with computer determines the midsemester

mark. The grading is as follows

0-31 points fail (1)

32-42 points pass (2)

43-52 points satisfactory (3)

53-62 points good (4)

63-80 (or more) points excellent (5)

Students must provide proof of their identity with an official card (eg. ID card, passport, driving license, etc.) at the tests.

Those students, who apply unauthorized means (book, lecture notes, infocommunication means, tools for storing and forwarding electronic information, etc.) different from those listed in the course requirement or adopted by the lecturer in charge of the course assessment will be disqualified from the exam as a consequence of their action, and the exam mark will automatically become "Fail (1)".

**Consultation:**

Each lecturer will have one hour per week for consultation. Time and place will be determined according to the needs of students.

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## KÖTELEZŐ IRODALOM / OBLIGATORY MATERIAL

Zienkierich, O. C., and L. R. Taylor. "The Basis". The Finite Element Method. Vol. 1. Butterworth - Heinemann, 2000.

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## AJÁNLOTT IRODALOM / RECOMMENDED MATERIAL