

A N N O U N C E M E N T and S C H E D U L E**Végeselem-módszer, Finite Element Method (GEMET407, GEMET407-a)**

REQUIREMENTS OF THE SUBJECT

in the Spring Semester of the Academic Year 2025/2026

Objectives

The main objective of this course is to provide students with an introduction to the Finite Element Method. A further aim is to present the fundamental concepts, principles, and methodologies with applications to modern numerical simulation with computer simulation tools.

Schedule for Weeks

- #1 Basic administration. Get to know the Requirements.
- #2 Introduction. Boundary Value Problem. Basic Notations.
- #3 Energy Methods. Simulation Software Installation.
- #4 Local Approximation and One Dimensional Finite Elements Formulation.
- #5 Beam and/or Truss Structures Simulation.
- #6 Elasticity Problems in Two Dimensions.
- #7 Finite Element Notations and Assumptions for 2D Modelling.
- #8 Solving BVPs with Plane Stress, Plane Strain, or Axisymmetric.
- #9 *Spring Holiday*.
- #10 Higher order Finite Elements.
- #11 Using Modeling Software. **Midterm exam**.
- #12 Using Modeling Software.
- #13 **Project task** presentation.
- #14 Summary. Repeating the midterm exams failed.

Getting the Signature

There are two lectures/lab classes a week during the fifteen-week term time. Regular attendance at the classes is compulsory. **One midterm exam** is to be written during the semester and **one project task** is to be done. Each lasts for 45 **minutes** and the **maximum score is 40**. Students are expected to score altogether at least 32 (40 %) to get the signature.

The midterm exam is to be held on **week 11** and the own project task is on **week 14**. Students who do not achieve the minimum prescribed score have to take a **makeup exam** on **last week**. This exam last for 45 **minutes**, the **total score is 40** and the **passing score is 16 (40 %)**.

Students who fail to get the signature in the term-time can **make-up for the signature in the examination period**. This makeup exam lasts for **45 minutes**, the **total score is 40** and the **passing score is 20 (50 %)**

Taking the Final Exam

Students with signatures have to take the final exam in the examination period to complete the course. This written exam is **45 minutes** long and the mark depends on the performance as shown in the proceeding table.

Score	0 – 19	20 – 23	24 – 27	28 – 31	32–
Mark	<i>Fail(1)</i>	<i>Pass(2)</i>	<i>Fair(3)</i>	<i>Good(4)</i>	<i>Excellent(5)</i>

To reward regular work, one-quarter of the score above 32 achieved in the term-time is added to the total score of the final exam.

Suggested Literature

- [1] J. BONET AND RD. WOOD *Nonlinear Continuum Mechanics for Finite Element Analysis*, Cambridge University Press **1997**.
- [2] J. FISH AND T. BELYTSCHKO. *A First Course in Finite Elements*, John Wiley & Sons, Ltd. **2007**.
- [3] K.J. BATHE. *Finite Element Procedures*, Prentice-Hall, Inc., New Jersey, **1996**.
- [4] PÁCZELT I., BAKSA A., SZABÓ T. *A végeselem-módszer alapjai*, Miskolci Egyetem, p. 243, **2007**.
- [5] Online Materials: <http://www.mech.uni-miskolc.hu/~abaksa/education>
- [6] ADINA, AUI Primer, ARD 10-6, **2015**.
- [7] Abaqus, ABAQUS/CAE User's Guide, **2023**.
- [8] ANSYS, Structural & Thermal Analysis Using the ANSYS Mechanical APDL **2023**

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