

Tárgytematika / Course Description Analysis and Design of Structures

EKNB_SETA030

Tárgyfelelős neve /

Teacher's name: dr. Papp Ferenc

Félév / Semester: 2023/24/1

Beszámolási forma /

Assesment: Vizsga

Tárgy heti óraszám /

Teaching hours(week): 2/1/0

Tárgy féléves óraszám /

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

OKTATÁS CÉLJA / AIM OF THE COURSE

The purpose of the course is to present the basics of the theoretical and practical structural design methods based on the modern computer analysis and the Eurocode standards. By fulfilling the course the student will be able to use the European standard system, which determines the way of checking and design structures, and to accomplish the analysis of simple structures.

TANTÁRGY TARTALMA / DESCRIPTION

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| Week 1. | Lecture: The basics of the displacement method - part 1: the terminology of bar element, bar stiffness Tutorial: Manual and computer-aided using of the method: simple models |
| Week 2. | Lecture: The basics of the displacement method - part 2: complex bar models, the terminology of degree of freedom in 2D Tutorial: Manual and computer-aided using of the method: complex models |

Lecture: The basics of the displacement method - part 3: modeling of bar structures in 2D, diagrams of design forces, influence lines

Week 3. Tutorial: computer-aided determination of diagrams of design forces and influence lines; the manual checking method

Homework 1.: computer-aided determination of diagrams of design forces and influence lines

Lecture: Modeling and analysis of bar structures - part 1: analysis in 3D

Week 4.

Tutorial: computer-aided modeling and analysis of simple bar structures (beam, column) in 3D

Lecture: Modeling and analysis of bar structures - part 2: the basics of dynamic behaviour of bar structures, eigenfrequency, eigen-shape

Week 5.

Tutorial: computer-aided dynamic analysis of simple bar structures

Homework 2: Dynamic and static analysis of simple bar structures

Lecture: The design theories and methods of structures based on the standard system of EN 1990 - part 1: the terminology of effect and resistance

Week 6.

Tutorial: computer-aided and manual elastic design method

Lecture: The design theories and methods of structures based on the standard system of EN 1990 - part 2: the terminology of safety and hazard

Week 7.

Tutorial: computer-aided and manual elastic design method

Homework 3: Computer-aided and manual design of simple bar structures

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| Week 8. | Lecture: The loads affecting of structures based on the standard system of EN 1991 - part 1: dead loads, wind loads and snow load |
| | Tutorial: Determination of loads - part 1: calculation of dead loads, wind loads and snow load |
| | Lecture: The loads affecting of structures based on the standard system of EN 1991 - part 2: seismic effect and fire effect |
| Week 9. | Tutorial: determination of loads - part 2 |
| | Homework 4: Determination of loads and effects |
| Week 10. | Lecture: The loads affecting of structures based on the standard system of EN 1991 - part 3: design situations, load combinations |
| | Tutorial: determination of load combinations |
| Week 11. | Lecture: The basic terms of stability theory - part 1: buckling modes |
| | Tutorial: determination of critical force - part 1. |
| | Lecture: The basic terms of stability theory - part 2: elastic buckling of compressed bar |
| Week 12. | Tutorial: determination of critical force - part 2. |
| | Homework 5: Calculation of elastic critical forces of compressed bars |
| Week 13. | Lecture and Tutorial in one block - part 1: special aspects of design theory |
| Week 14. | Lecture and Tutorial in one block - part 2: summary and preparation for the exam |

SZÁMONKÉRÉSI ÉS ÉRTÉKELÉSI RENDSZERE / ASSESSMENT'S METHOD

Preparation of a design work in 5 subtasks. For each task 20 points can be obtained, for the whole work maximum

100 points. Minimum 51 points are needed for the successful exam. The calculation of the final note:

0-110 points: failure

110-129 points: below average

130-149 points: average

150-169 points: above average

170-200 points: excellent

KÖTELEZŐ IRODALOM / OBLIGATORY MATERIAL

(1) www.consteelsoftware.com; www.axisvm.com

(2) Milan Holický, H. Gulvanessian: Designer's Handbook to Eurocode 1: Basis of Design, Thomas Telford, London, 1996. ISBN: 0727725246

AJÁNLOTT IRODALOM / RECOMMENDED MATERIAL