Tárgytematika / Course Description
Analysis and Design of Structures
EKNB_SETA030

Tárgyfelelős neve /
Teacher's name: dr. Papp Ferenc

Félév / Semester: 2022/23/1

Beszámolási forma /
Assesment: Vizsga

Tárgy heti óraszáma /
Teaching hours(week):   2/1/0

Tárgy féléves óraszáma /
Teaching hours(sem.):   0/0/0

OKTATÁS CÉLJA / AIM OF THE COURSE

The purpose of the course is to present the basics of the therotecial 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 Europian standard system, which determines the way of checking and design structures, and to accomplish the analysis of simple structures.

TANTÁRGY TARTALMA / DESCRIPTION

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

Week 3.

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

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 infulence lines

Week 4.

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

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

Week 5.

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

Tutorial: computer-aided dynamic analysis of simple bar structures

Homework 2: Dynamic and static analysis of simple bar structures

Week 6.

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

Tutorial: computer-aided and manual elastic design method

Week 7.

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

Tutorial: computer-aided and manual elastic design method

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

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

Week 9.

Lecture: The loads affecting of structures based on the standard system of EN 1991 - part 2:seismic effect and fire effect

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 theroy - part 1: buckling modes
	Tutorial: determination of critical force - part 1.
Week 12.	Lecture: The basic terms of stability theroy - part 2: elastic buckling of compressed bar
	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 / ASSESMENT'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 successfull 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