

Structural mechanics

Course code: ASM1

ECTS Credits: 5

Department	: MSISI	Lectures	: 12h30
Lecturers	: L. Signor, C.Nadot, O.Smerdova	Tutorials	: 11h15
Year of study	: 1 st year	Laboratory sessions	: 12h00
Semester	: 1 st semester	Project	:
Assessment method(s)	: 1 written exam, 1 practical work test	Home works	:
Language of instruction	: English	Total hours	: 35h45
Type of courses	: Compulsory		

Objective: Study and design of structures composed of beams. Introduction to advanced problems (plates, non-linear behavior, instability...)

Prerequisites: Solid Mechanics / Elasticity (MSO1), Strength of Materials / Beam theory (RDM2)

Content:

- 1. Introduction**
 - Motivation and objectives
 - Prerequisites in elasticity
 - Prerequisites in beam theory
- 2. Beam theory - Complements**
 - Trusses
 - Composite beams
- 3. Energy methods & statically indeterminate problems**
 - Introduction
 - Castigliano's theorem
 - Menabrea's theorem
 - Statically indeterminate problems
- 4. Buckling**
 - Introduction and definitions
 - Determination of Euler buckling force
 - Energy methods
 - Lateral buckling & snap-through
- 5. Study of thin wall sections**
 - Introduction
 - Shear stress in bending
 - Shear stress in torsion
- 6. Introduction to elasto-plasticity**
 - Mechanical behaviour of materials, tensile test
 - Failure and yield criteria (Rankine, Von Mises, Tresca)
 - Bending of elastic-plastic beams
 - Limit load, plastic hinge
- 7. Plate theory**
 - Equilibrium equations
 - Kirchhoff's theory

Recommended reading: None

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