

CIVIL-238

**Structural mechanics (for GC)**

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Cursus	Sem.	Type
Civil Engineering	BA3	Obl.
HES - GC	H	Obl.

Language of teaching	English
Credits	4
Session	Winter
Semester	Fall
Exam	Written
Workload	120h
Weeks	14
<b>Hours</b>	<b>5 weekly</b>
Courses	3 weekly
Exercises	2 weekly
<b>Number of positions</b>	

**Summary**

Introduction to structural mechanics; bending, shear and torsion in structures; analysis of stress and strain; deflections of beams; principle of virtual work; composite sections; plastic analysis; introduction to stability

**Content**

- Week 1: Introduction and review of key principles
- Week 2: Tension, compression and shear
- Week 3: Axially loaded members
- Week 4: Shear forces and bending moments
- Week 5: Torsion
- Week 6: Stresses in beams
- Week 7: Stresses in composite sections
- Week 8: Analysis of stress and strain
- Week 9: Plastic cross-sectional analysis
- Week 10: Deflections of beams
- Week 11: Principle of virtual work
- Week 12: Statically indeterminate beams
- Week 13: Introduction to stability of columns
- Week 14: Case studies from civil engineering projects

**Keywords**

Mechanics of materials; Stress and strain; Elastic and nonlinear behaviour; Torsion, shear and bending; Beam theory; Curvature; Deflection of beams ; Principle of virtual work; Stability

**Learning Prerequisites****Required courses**

- Statics
- Mechanics of materials

**Important concepts to start the course**

- Statics
- Mechanics of materials

### Learning Outcomes

By the end of the course, the student must be able to:

- Assess / Evaluate
- Analyze
- Apply
- Compute
- Examine
- Visualize
- Establish
- Identify

### Transversal skills

- Assess progress against the plan, and adapt the plan as appropriate.
- Plan and carry out activities in a way which makes optimal use of available time and other resources.
- Set objectives and design an action plan to reach those objectives.
- Use a work methodology appropriate to the task.

### Teaching methods

3-hour lectures, 2-hour exercises

Use of:

- Power point
- Online reading
- Computational tools to facilitate learning and computational thinking
- In-class exercises
- Problem sets

### Expected student activities

- Weekly in-class exercises

### Assessment methods

- Graded assignments (30% of the total grade)
- Final written exam (70% of the total grade)

### Supervision

Office hours	No
Assistants	Yes
Forum	Yes

### Resources

**Bibliography**

- Popov E. Mechanics of Materials
- Gere, JM., and Timoshenko, SP. Mechanics of Materials

**Ressources en bibliothèque**

- [Popov E. Mechanics of Materials](#)
- [Gere, JM., and Timoshenko, SP. Mechanics of Materials](#)

**Notes/Handbook**

- The course lectures, list of in-class exercise problems, problem sets and exams are based on lecture notes that are provided weekly through Moodle.
- The course does not follow a specific textbook.

**Prerequisite for**

- Design of steel structures
- Design of concrete structures
- Geotechnical engineering
- Structural analysis
- Advanced steel design
- Structural stability
- Structural dynamics
- Seismic engineering
- Continuum mechanics

**"Le contenu de cette fiche de cours est susceptible d'être modifié en raison du covid-19"**