ME-231(a)

Structural mechanics (for MT)

Briand Danick, Villanueva Guillermo

Cursus	Sem.	Type
Microtechnics	BA3	Obl.

Language of teaching	English
Credits	4
Session	Winter
Semester	Fall
Exam	Written
Workload	120h
Weeks	14
Hours	**4 weekly**
Courses	3 weekly
Exercises	1 weekly
Number of positions	

Summary

This course aims to provide a concise understanding of how materials and structures react to loads. It covers the basics of stress and strain in multi dimensions, deformation and failure criteria. The course is tailored to problems students from micro-engineering might encounter.

Content

- Review of equilibrium rigid body mechanics
- Stress and strain in one dimension
- Stress and strain in higher dimensions
- Stress concentrations
- Torsion
- Transformation of stress and strain
- Stress and strain in beams (shear and bending moments)
- Beam bending
- Indeterminate beams
- Beam buckling

Keywords

stress, strain, axial deformation, torsion, beam bending, buckling

Learning Prerequisites

Required courses

Statique et Dynamique - BA2 - MICRO-102

Learning Outcomes

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

- Contextualise typical problems involving loads, pressures and torques

- Compute the stress and strain state of a structure in 3D
- Compute load limits and best geometries given a design problem
- Demonstrate a thorough understanding of the relationships between stresses and strains in 3D

Teaching methods

3 hours lecture and one hour exercises per week

Expected student activities

To work at solving the exercises given in the course

Assessment methods

Written exams: Midterm (30% of the grade) and Final (70% of the grade)

Supervision

Office hours	Yes
Assistants	Yes
Forum	No

Resources

Bibliography

Mechanics of Materials from James Gere and Barry Goodno

Ressources en bibliothèque

- Mechanics of Materials / Gere

Notes/Handbook

The course will follow different textbooks that will be provided through moodle to the class attendees.

Moodle Link

- http://moodle.epfl.ch/course/view.php?id=13763