ME-412

Experimental methods in engineering mechanics

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Cursus	Sem.	Type
Mechanical engineering minor	H	Opt.
Mechanical engineering	MA1, MA3	Opt.
Mechanics		Opt.

Language of teaching	English
Credits	4
Withdrawal	Unauthorized
Session	Winter
Semester	Fall
Exam	During the semester
Workload	120h
Weeks	14
Hours	**4 weekly**
Lecture	1 weekly
Practical work	3 weekly
Number of positions	**30**

It is not allowed to withdraw from this subject after the registration deadline.

Summary

The Experimental Methods in Engineering Mechanics course is intended to give an advanced view of experimental methods used to study mechanics problems by way of example. Students will construct significant components of experimental apparatus and collect & interpret the resulting data.

Content

Typically three experimental modules will be used that draw techniques from analog electronics and image processing in order to probe the mechanics of several different problems, including contact mechanics and elasticity.

Keywords

Contact mechanics
Image processing
Analog electronics

Learning Prerequisites

Required courses

ME 331, ME 201, ME 232

Recommended courses

EE 280

Learning Outcomes

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

- Analyze and design assemblies of simple mechanical elements in the framework of static and buckling, S2
- Characterize experimentally the steady-state or dynamic response of solids, fluids, S11
- Describe in scientific terms and apply the principles of tribology and contact mechanics, S13
- Analyze a linear dynamical system (both time and frequency responses), A3
- State the conserved quantities in a given flow and link them to a physical-mathematical description, AH13

Transversal skills

- Take responsibility for health and safety of self and others in a working context.
- Assess one's own level of skill acquisition, and plan their on-going learning goals.
- Continue to work through difficulties or initial failure to find optimal solutions.
- Manage priorities.
- Collect data.

Teaching methods

Students will be involved in each experimental module from the construction of the experiment through the writing of the report on the data. Students could be involved in assesssing the reports of others in a `peer-review' process.

Expected student activities

Participation in collecting, analyzing and compiling experimental data; involvement in writing the reports.

Assessment methods

During the semester, reports will be a key component of student assessment. Quality of writing, thoroughness of data collection and analysis, and clarity of presentation are key parameters.
The first report will count for 30 % of the grade; the second and third reports will count for 24 % each, while the grading of other reports of modules 2 and 3 will count for 11% of the grade each, for a total of 22 % of the grade.

Resources

Bibliography

Horowitz & Hill: the art of electronics
Lecture notes in the class
Related documentation provided with each module

Ressources en bibliothèque

- The art of electronics / Horowitz