

ME-280

Fluid mechanics (for GM)

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Cursus	Sem.	Type
Mechanical engineering minor	E	Opt.
Mechanical engineering	BA4	Obl.

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

Summary

Basic lecture in fluid mechanics

Content

Characteristic quantities of an incompressible flow, hydrostatic, viscous stress, dimensional analysis, Navier-Stoke equations, conservation of mass and momentum in integral and differential form, trajectories and streamlines, Bernoulli's equation, lift and drag of a solid body, theory of reduced scale models, inviscid flows, potential flows, unsteady flows, introduction to boundary layer concept and of turbulence.

Keywords

Incompressible flows, Navier-Stokes equation, lift, drag

Learning Outcomes

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

- Explain and apply the concepts of mass, energy, and momentum balance, E1
- Define, describe and apply the basic flow equations, such as the Navier-Stokes equations, AH14
- Describe simplified governing equations, such as the Bernoulli or potential equations, their domain of validity and apply them in appropriate situations, AH15
- Describe flow in simple geometries, such as over a flat plate, in a tube, or around a sphere or airfoil, AH9
- Link flow behaviour with non-dimensional parameters (e.g. Reynolds and Mach numbers), AH2
- Identify similarity laws and their use for dimensioning an experimental testbed, AH23
- Describe the physical differences between laminar and turbulent flows, AH4

Transversal skills

- Use a work methodology appropriate to the task.
- Assess one's own level of skill acquisition, and plan their on-going learning goals.

Teaching methods

Lectures and sessions of exercises

Assessment methods

Written exam

Resources

Bibliography

Andrew L. Gerhart, John I. Hochstein, Philip M. Gerhart, Munson, Young and Okiishi's fundamentals of fluid mechanics : SI version, 9th Edition
or previous versions including
Gerhart, Gerhart & Hochstein, Munson's Fluid Mechanics, Global Edition, 8th Edition
Munson, Okiishi, Juebsch & Rothmayer, Fluid Mechanics, 7th Edition, SI Version

Ressources en bibliothèque

- [Find the reference at the Library](#)

Moodle Link

- <https://go.epfl.ch/ME-280>