EPFL

ME-280	**Fluid mechanics (for GM)**		
	Schneider Tobias		

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

Gerhart, Gerhart & Hochstein, Munson's Fluid Mechanics, Global Edition, 8th Edition

or previous versions including

Munson, Okiishi, Juebsch & Rothmayer, Fluid Mechanics, 7th Edition, SI Version

Ressources en bibliothèque

- Gerhart, Gerhart & Hochstein, Munson's Fluid Mechanics
- Munson, Okiishi, Juebsch & Rothmayer, Fluid Mechanics

Moodle Link

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