ENG-272

Fluid mechanics (for SIE)

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Cursus	Sem.	Type
Environmental Sciences and Engineering	BA4	Obl.
HES - SIE	E	Obl.
Mineur STAS Russie	E	Opt.

Language of teaching	English
Credits	5
Session	Summer
Semester	Spring
Exam	Written
Workload	150h
Weeks	14
Hours	**6 weekly**
Courses	3 weekly
Exercises	2 weekly
Project	1 weekly
Number of positions	

Summary

This course helps students acquire basic knowledge of the main concepts and equations of fluid mechanics and develop the skills necessary to work effectively in professional engineering practice.

Content

- Introduction: Continuum assumption, basic fluid properties
- Fluid statics: pressure, forces on immersed body
- Flowing fluids and pressure variation: continuity, momentum, energy equations, applications in engineering
- Dimensional analysis and similitude
- Surface resistance
- Flow in conduits
- Flow in open channels
- Flow measurement

Learning Prerequisites

Recommended courses

Physics, Mathematics, Mechanics

Learning Outcomes

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

- Describe basic fluid and flow characteristics such as density, viscosity, surface tension, shear stress, pressure and velocity.
- Apply the hydrostatic equation and the buoyancy equation to predict forces and moments.
- Apply the Bernouilli equation to calculate pressure and velocity variations in a fluid flow.
- Apply the contintuity equation to draining tanks and reservoirs.
- Apply the momentum equation to stationary and moving control volumes.
- Apply the energy equation to predict variables such as pressure drop and head loss.
- Apply the Buckingham-Pi theorem to determine dimensionless variables.

- Design pipes and pumps based on pressure drop and head loss calculations.
- Apply Manning's equation to uniform open channel flow and find the best hydraulic section.

Teaching methods

Ex cathedra, exercises, practical work

Expected student activities

Attending lectures and exercises and participation in laboratories (practical work).

Assessment methods

Exercises (10%)
Laboratories and practical work (5%)
Two written midterm tests (50%)
Written final exam (120 min) during exam session (35%)

Supervision

Office hours	Yes
Assistants	Yes
Forum	No

Resources

Bibliography

D. F. Elger et al., "Engineering Fluid mechanics", 10th ed. (Librairie la Fontaine)
Course materials in internet

Ressources en bibliothèque

- Engineering Fluid mechanics / Eiger