EE-456

Hydropower plants: generating and pumping units

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Cursus	Sem.	Type
Electrical and Electronical Engineering	MA1, MA3	Opt.
Energy Management and Sustainability	MA1, MA3	Opt.
Energy minor	H	Opt.

Language of teaching	English
Credits	2
Session	Winter
Semester	Fall
Exam	Written
Workload	60h
Weeks	14
Hours	**2 weekly**
Courses	1 weekly
Exercises	1 weekly
Number of positions	

Summary

Master Lecture on the general layout of a hydropower plant. Detailing the specification of Pelton, Francis, Kaplan and Bulb turbines, Storage pumps and Reversible pump-turbines.

Content

- Introduction to hydropower
- layout of hydropower plants. storage and run-of-the river power plant
- Electricity Data
- Integrating new renewable energy with pumped storage power plants
- Type of Machines
- Global quantities and Energy losses
- Power balance
- Velocity triangles and Euler equation
- Turbine and Pump hydraulic Characteristics
- Model Testing

Keywords

Hydropower plant, hydraulic Turbine, storage pump and pump-turbine

Learning Prerequisites

Required courses

Introduction to electrical engineering, Physics
Conversion d'énergie

Learning Outcomes

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

- Assess / Evaluate Capacity of a Hydropower Plant
- Specify the type of generating or pumping unit

Transversal skills

- Use a work methodology appropriate to the task.
- Set objectives and design an action plan to reach those objectives.

Teaching methods

ex cathedra lectures with working case studies and exercices

Expected student activities

attendance at lectures completing exercises and reading written material

Assessment methods

written exam

Resources

Ressources en bibliothèque

- Turbomachines hydrauliques / Henry
- Cavitation / Franc

Notes/Handbook

slides handout

Prerequisite for

Electromechanical conversion
master project