INSTITUTO POLITÉCNICO DE BRAGANÇA

Course Unit	Hydro and Wind Technology			Field of study	Energy		
Bachelor in	Renewable Energy Engineering			School	School of Technology and Management		
Academic Year	2023/2024	Year of study	2	Level	1-2	ECTS credits	6.0
Type	Semestral	Semester	2	Code	9910-743-2204-00-23		

Workload (hours)	162	Contact hours	T	TP	PL	TC	S	E	OT	O
			30	-	10	10	10	-	-	-

T - Lectures; TP - Lectures and problem-solving; PL - Problem-solving, project or laboratory; TC - Fieldwork; S - Seminar; E - Placement; OT - Tutorial; O - Other

Name(s) of lecturer(s): Jorge Henrique de Carvalho Santos, Luís Manuel Frolen Ribeiro, Tomás de Aquino Freitas Rosa Figueiredo

Learning outcomes and competences

At the end of the course unit the learner is expected to be able to:
1. Master the main hydro and wind technologies.
2. Aplly hydro and wind resource evaluation methods.
3. Dimension mechanical energy conversion systems.

Prerequisites

Before the course unit the learner is expected to be able to:
1. understand differential and integral calculus.
2. understand Newtonian physics.
3. understand fluid flow dynamics.

Course contents

Wind and Hydro-power technologies

Course contents (extended version)

1. Hydro-power
   - Available technologies;
   - classification;
   - hydric regime and resource assessment;
   - basic project criteria;
   - main type of turbines and application;
   - converted energy.
2. Wind technology
   - Origin, general circulation and local effects;
   - wind regime characterization;
   - wind resource potential;
   - principles of convertion;
   - wind turbine aerodynamics;
   - main features of a wind turbine;
   - energy converted by a wind turbine.

Recommended reading

1. "Renewable Energy, A Power for a Sustainable Future", Boyle, G. Oxford University Press, 2004.
2. "Wind Energy Handbook", T. Burton, D. Sharpe, N. Jenkins e E. Bossanyi, John Willey & Sons, 2001.
3. "Wind Power Plants", R. Gash, J. Twele. James & James, 2002.
4. "Minicentrales Hidroeléctricas", Manuais de Energias Renovaveis do IDAE
5. "Uma Introdução às Energias Renováveis", R. Castro. IST Press, Lisboa, 2011.

Teaching and learning methods

Classes bases on problem solving methodology followed by critical analysis of the results. Seminars and field trips.

Assessment methods

1. Alternative 1 - (Regular, Student Worker) (Final)
   - Practical Work - 75% (Assessment of student's performance during practicals (involvement in exercises and lab work))
   - Intermediate Written Test - 25%
2. Alternative 2 - (Regular, Student Worker) (Supplementary, Special)
   - Final Written Exam - 100%

Language of instruction

1. Portuguese, with additional English support for foreign students.
2. English
3. Spanish

Electronic validation

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20-02-2024	27-02-2024	11-03-2024	16-03-2024