English version at the end of this document

Ano Letivo	2022-23
Unidade Curricular	HYDROLOGICAL ENGINEERING
Cursos	ECOHIDROLOGIA APLICADA - Erasmus Mundus (2.º Ciclo)
Unidade Orgânica	Faculdade de Ciências e Tecnologia
Código da Unidade Curricular	19311006
Área Científica	TECNOLOGIAS DE PROTEÇÃO AMBIENTAL
Sigla	
Código CNAEF (3 dígitos)	420
Contributo para os Objetivos de Desenvolvimento Sustentável - ODS (Indicar até 3 objetivos)	6,13,14
Línguas de Aprendizagem	english

Modalidade de ensino

presencial

Docente Responsável Luís Manuel Zambujal Chícharo

DOCENTE	TIPO DE AULA	TURMAS	TOTAL HORAS DE CONTACTO (*)

* Para turmas lecionadas conjuntamente, apenas é contabilizada a carga horária de uma delas.

ANO	PERÍODO DE FUNCIONAMENTO*	HORAS DE CONTACTO	HORAS TOTAIS DE TRABALHO	ECTS
1º	S2	12T; 12TP; 9PL; 6TC; 6S; 3OT	156	6

* A-Anual;S-Semestral;Q-Quadrimestral;T-Trimestral

Precedências

Sem precedências

Conhecimentos Prévios recomendados

none

Objetivos de aprendizagem (conhecimentos, aptidões e competências)

LO 1 ? Compute Hydro-meteorology: Students are able to apply equations to calculate precipitation and evaporation

LO 2 ? Model Hydrological Processes: Students understand the different runoff processes and are able to apply models to assess runoff in various climates and vegetation zones and environments for surfaces, hill-slopes and basins at different scales

LO 3 ?Measure Hydrological Components: Students are able to perform hydrometric measurements and can develop monitoring networks

LO 4 ? Analyze Hydrological Data: Students execute and select methods for hydrological data analysis with statistical, parametric and conceptual models

LO 5 ? Engineer Hydrological Solutions: Students are able to develop design for flood retention, artificial recharge of groundwater, and environmentally friendly hydro-power solutions

Conteúdos programáticos

PC 1 ? Hydrometeorology:

Rainfall statistics, correction of rainfall data,

Calculation of evaporation from lakes, rivers and soils

PC 2 ? Runoff generation:

Runoff generation by excess rainfall (Horton), and by saturation

River infiltration and exfiltration

PC 3 ? Modern Hydrometry:

Adequate hydrometry in rivers, springs, lakes with meters, ADCP

Tracers methods

PC 4 ? Hydrological data analysis:

Parametric statistical methods, conceptual models,

Drought and flood statistics

PC 5 ? Principles of hydrological engineering:

Safety and risk concepts, variant analysis

Calibration, consistency and reliability

Metodologias de ensino (avaliação incluída)

Students will acquire the basic and necessary knowledge of a program content through a theoretical introduction (step 1: knowledge acquisition script, e-learning material). The program content will be explained by applied examples to create understanding of the topic (step 2: apprehension), the understanding and apprehension is supported by exercises in class and online and by tutoring. Students will be offered online exercises for self-evaluation of the apprehension. In a third step, students will have the opportunity to apply the content to case studies to strengthen the skill of applying methods (step 3: application). In a fourth step, students will be given the opportunity to evaluate their own work and the work of others (step 4: capacity to critically evaluate).

Bibliografia principal

Brutsaert W. (2013) Hydrology. Cambridge Univ. Press.

Chicharo & Müller (2016) Ecosystem Services and River Basin Ecohydrology, Springer

Davie & Quinn (2019) Fundamentals of Hydrology, Routledge

Maliva (2019) Anthropogenic Aquifer Recharge, Springer

Academic Year	2022-23
Course unit	
Courses	Applied Ecohydrology - Erasmus Mundus (2.º Cycle)
Faculty / School	FACULTY OF SCIENCES AND TECHNOLOGY
Main Scientific Area	
Acronym	
CNAEF code (3 digits)	420
Contribution to Sustainable Development Goals - SGD (Designate up to 3 objectives)	6,13,14
Language of instruction	english
Teaching/Learning modality	presencial

Coordinating teacher Luís Manuel Zambujal Chícharo

Teaching staff	Type	Classes	Hours (*)

* For classes taught jointly, it is only accounted the workload of one.

Contact hours

T	TP	PL	TC	S	E	OT	O	Total
12	12	9	6	6	0	3	0	156

T - Theoretical; TP - Theoretical and practical ; PL - Practical and laboratorial; TC - Field Work; S - Seminar; E - Training; OT - Tutorial; O - Other

Pre-requisites

no pre-requisites

Prior knowledge and skills

none

The students intended learning outcomes (knowledge, skills and competences)

LO 1 ? Compute Hydro-meteorology: Students are able to apply equations to calculate precipitation and evaporation

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LO 5 ? Engineer Hydrological Solutions: Students are able to develop design for flood retention, artificial recharge of groundwater, and environmentally friendly hydro-power solutions

Syllabus

LO 1 ? Compute Hydro-meteorology: Students are able to apply equations to calculate precipitation and evaporation

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LO 3 ?Measure Hydrological Components: Students are able to perform hydrometric measurements and can develop monitoring networks

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LO 5 ? Engineer Hydrological Solutions: Students are able to develop design for flood retention, artificial recharge of groundwater, and environmentally friendly hydro-power solutions

Teaching methodologies (including evaluation)

Students will acquire the basic and necessary knowledge of a program content through a theoretical introduction (step 1: knowledge acquisition script, e-learning material). The program content will be explained by applied examples to create understanding of the topic (step 2: apprehension), the understanding and apprehension is supported by exercises in class and online and by tutoring. Students will be offered online exercises for self-evaluation of the apprehension. In a third step, students will have the opportunity to apply the content to case studies to strengthen the skill of applying methods (step 3: application). In a fourth step, students will be given the opportunity to evaluate their own work and the work of others (step 4: capacity to critically evaluate).

Main Bibliography

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Chicharo & Müller (2016) Ecosystem Services and River Basin Ecohydrology, Springer

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