English version at the end of this document

Ano Letivo	2022-23
Unidade Curricular	MODELAÇÃO DINÂMICA E ESTATÍSTICA DA AGITAÇÃO
Cursos	RISCOS COSTEIROS, IMPACTOS DAS ALTERAÇÕES CLIMÁTICAS E ADAPTAÇÃO - COASTHazar (2º CICLO) ERASMUS MUNDUS
Unidade Orgânica	Faculdade de Ciências e Tecnologia
Código da Unidade Curricular	19391010
Área Científica	INFORMÁTICA
Sigla	
Código CNAEF (3 dígitos)	480
Contributo para os Objetivos de Desenvolvimento Sustentável - ODS (Indicar até 3 objetivos)	13
Línguas de Aprendizagem	English

Modalidade de ensino

Face to face

Docente Responsável

Óscar Manuel Fernandes Cerveira Ferreira

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	30T; 40PL	140	5

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

Precedências

Sem precedências

Conhecimentos Prévios recomendados

N/A

Objetivos de aprendizagem (conhecimentos, aptidões e competências)

1. Explain the theory and comparative elements behind dynamical and statistical wave modelling, as well as their respective goals.
2. Apply and set-up both statistical and dynamic wave models,
3. Apply downscaling solutions and methods using dynamic and statistical wave model approaches, by retrieving boundary and initial conditions from a global or lower resolution data set.
4. Critical assess the added value of the downscaling by predictability evaluation against observations.
5. Produce wave boundary conditions for higher resolution coastal hazards models, for climate studies, practical coastal management solutions and engineering studies.
6. Critically assess the skills and predictability differences between dynamic and statistical wave modelling strategies, their results, and applicability, trough comparison with observational data.

Conteúdos programáticos

- Statistical wave model principles
- Dynamic wave model principles
- Comparative advantages of statistical and dynamic wave modelling, and applicability
- Setting up of SWAN wave model for a case study
- Setting up of statistical wave model for a case study
- Reanalysis and hindcasts as boundary information
- Statistical and regional downscaling using SWAN and statistical modelling
- Evaluate output data by comparison against in situ wave data
- Use of dynamic and statistical wave model for wave climate change projections

Metodologias de ensino (avaliação incluída)

The module is worth 5 ECTS, corresponding to a total of 140 hours of work, distributed over 70 hours of contact and 70 hours of autonomous work. The contact hours are spread over 30T and 40TP, where students will learn in practical sessions how to run the models. Theoretical classes will be based on lectures, using power-point and videos, case study discussions, and scientific papers discussions. The autonomous work will focus on practice the wave model runs, analysing wave models? outputs, and writing a detailed report.

- Final report, based on the practical work and data generated, backed by the scientific paper handed in class (100%)

Bibliografia principal

- L. H. Holthuijsen: Waves in Oceanic and Coastal Waters (Cambridge press)
- SWAN Cycle III v
- Scientific papers

Academic Year	2022-23
Course unit	
Courses	Coastal Hazards - Risks, Climate Change Impacts and Adaption (COASTHazar)
Faculty / School	FACULTY OF SCIENCES AND TECHNOLOGY
Main Scientific Area	
Acronym	
CNAEF code (3 digits)	480
Contribution to Sustainable Development Goals - SGD (Designate up to 3 objectives)	13
Language of instruction	English
Teaching/Learning modality	Face to face

Coordinating teacher Óscar Manuel Fernandes Cerveira Ferreira

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
30	0	40	0	0	0	0	0	140

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

N/A

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

1. Explain the theory and comparative elements behind dynamical and statistical wave modelling, as well as their respective goals.
2. Apply and set-up both statistical and dynamic wave models,
3. Apply downscaling solutions and methods using dynamic and statistical wave model approaches, by retrieving boundary and initial conditions from a global or lower resolution data set.
4. Critical assess the added value of the downscaling by predictability evaluation against observations.
5. Produce wave boundary conditions for higher resolution coastal hazards models, for climate studies, practical coastal management solutions and engineering studies.
6. Critically assess the skills and predictability differences between dynamic and statistical wave modelling strategies, their results, and applicability, trough comparison with observational data.

Syllabus

- Statistical wave model principles
- Dynamic wave model principles
- Comparative advantages of statistical and dynamic wave modelling, and applicability
- Setting up of SWAN wave model for a case study
- Setting up of statistical wave model for a case study
- Reanalysis and hindcasts as boundary information
- Statistical and regional downscaling using SWAN and statistical modelling
- Evaluate output data by comparison against in situ wave data
- Use of dynamic and statistical wave model for wave climate change projections

Teaching methodologies (including evaluation)

The module is worth 5 ECTS, corresponding to a total of 140 hours of work, distributed over 70 hours of contact and 70 hours of autonomous work. The contact hours are spread over 30T and 40TP, where students will learn in practical sessions how to run the models. Theoretical classes will be based on lectures, using power-point and videos, case study discussions, and scientific papers discussions. The autonomous work will focus on practice the wave model runs, analysing wave models? outputs, and writing a detailed report.

- Final report, based on the practical work and data generated, backed by the scientific paper handed in class (100%)

Main Bibliography

- L. H. Holthuijsen: Waves in Oceanic and Coastal Waters (Cambridge press)
- SWAN Cycle III v

Scientific papers