NCE/21/2100377 — Apresentação do pedido - Novo ciclo de estudos

1. Caracterização geral do ciclo de estudos

1.1.Instituição de Ensino Superior:
Universidade Do Algarve

1.1.a.Outras Instituições de Ensino Superior (em associação) (Decreto-Lei n.º 74/2006, de 24 de março, na redacção conferida pelo Decreto-Lei n.º 65/2018, de 16 de agosto, alterado pelo Decreto-Lei nº 27/2021 de 16 de abril):

1.1.b.Outras Instituições de Ensino Superior (estrangeiras, em associação) (Decreto-Lei n.º 74/2006, de 24 de março, na redacção conferida pelo Decreto-Lei n.º 65/2018, de 16 de agosto, alterado pelo Decreto-Lei nº 27/2021 de 16 de abril):
As instituições parceiras da UAlg neste mestrado financiado pelo Erasmus são: IHE Delft Institute for Water Education (Países Baixos) e a Universidad de Cantabria (Espanha). Penso que nos termos da lei (artigos 41.º a 43.º) as IES estão em associação pois todas conferem o grau.

1.1.c.Outras Instituições (em cooperação) (Lei nº 62/2007, de 10 de setembro ou Decreto-Lei n.º 74/2006, de 24 de março, na redacção conferida pelo Decreto-Lei n.º 65/2018, de 16 de agosto):
<sem resposta>

1.2.Unidade orgânica (faculdade, escola, instituto, etc.):
Faculdade de Ciências e Tecnologia (UAlg)

1.2.a.Identificação da(s) unidade(s) orgânica(s) da(s) entidade(s) parceira(s) (faculdade, escola, instituto, etc.) (proposta em associação). (Decreto-Lei n.º 74/2006, de 24 de março, na redacção conferida pelo Decreto-Lei n.º 65/2018, de 16 de agosto, alterado pelo Decreto-Lei nº 27/2021 de 16 de abril):

1.2.b.Identificação da(s) unidade(s) orgânica(s) da(s) entidade(s) parceira(s) (faculdade, escola, instituto, etc.) (proposta em associação com IES estrangeiras). (Decreto-Lei n.º 74/2006, de 24 de março, na redação conferida pelo Decreto-Lei n.º 65/2018, de 16 de agosto, alterado pelo Decreto-Lei nº 27/2021 de 16 de abril):
<sem resposta>

1.2.c.Identificação da(s) unidade(s) orgânica(s) da(s) entidade(s) parceira(s) (faculdade, escola, instituto, empresas, etc.) (proposta em cooperação). (Lei nº 62/2007, de 10 de setembro ou Decreto-Lei n.º 74/2006, de 24 de março, na redação conferida pelo Decreto-Lei n.º 65/2018, de 16 de agosto):
<sem resposta>

1.3.Designação do ciclo de estudos:
Riscos Costeiros, Impactos das Alterações Climáticas e Adaptação (COASTHazar)

1.3.Study programme:
Coastal Hazards - Risks, Climate Change Impacts and Adaption (COASTHazar)

1.4.Grau:
Mestre

1.5.Área científica predominante do ciclo de estudos:
Ciências da Terra

1.5.Main scientific area of the study programme:
Earth Sciences

1.6.1Classificação CNAEF – primeira área fundamental, de acordo com a Portaria n.º 256/2005, de 16 de Março (CNAEF-3 dígitos):
443

1.6.2Classificação CNAEF – segunda área fundamental, de acordo com a Portaria n.º 256/2005, de 16 de Março (CNAEF-3 dígitos), se aplicável:
422

1.6.3Classificação CNAEF – terceira área fundamental, de acordo com a Portaria n.º 256/2005, de 16 de Março (CNAEF-3 dígitos), se aplicável:
<sem resposta>

1.7.Número de créditos ECTS necessário à obtenção do grau:
120

1.8.Duração do ciclo de estudos (art.º 3 DL n.º 74/2006, com a redação do DL n.º 65/2018):
2 anos, 4 semestres

1.8.Duration of the study programme (article 3, DL no. 74/2006, as written in the DL no. 65/2018):
2 years, 4 semestres

1.9.Número máximo de admissões proposto:
25

1.10.Condições específicas de ingresso (art.º 3 DL-74/2006, na redação dada pelo DL-65/2018).
Licenciatura ou bacharelato com pelo menos 180 créditos, de acordo com o Sistema Europeu de Transferência de Créditos (ECTS), numa das seguintes áreas científicas: ciências do mar ou da atmosfera, climatologia, hidráulica, engenharia civil ou ambiental ou área afim.
Com exceção de candidatos com inglês como língua materna, os candidatos devem possuir uma qualificação num dos testes de inglês reconhecidos internacionalmente (ver o site da IHE: http://www.un-ihe.org/english-language-requirements). Os candidatos devem possuir um certificado oficial.
Recomenda-se o conhecimento académico base de matemática e física, comprovado pela lista de unidade curriculars realizadas durante o bacharelado, licenciatura ou programa equivalente.

1.10.Specific entry requirements (article 3, DL no. 74/2006, as written in the DL no. 65/2018).
The requirements for admission are:
A first degree of higher education equivalent to a Bachelor's degree with at least 180 credits according to the European Credit Transfer System (ECTS), in one of the following subjects: hydraulics, civil or environmental engineering, climate, atmospheric or ocean sciences, or any other similar subject.
With exception of native English speakers, applicants must hold a qualification in one of the internationally-recognised English language tests (see IHE website: http://www.un-ihe.org/english-language-requirements). Applicants must provide an official certificate.
Sufficient academic knowledge of mathematics and physics, proven by the list of subjects taken during the bachelor or equivalent programme, is strongly recommended.

1.11.Regime de funcionamento.
Diurno

1.11.1.Se outro, especifique:
<sem resposta>

1.11.1.If other, specify:
<no answer>

1.12.Local onde o ciclo de estudos será ministrado:
Universidade de Cantábria (1º semestre)
IHE Delft (2º semestre)
Universidade do Algarve (3º semestre)
Quarto semestre em qualquer destas instituições ou em instituições/empresas parceiras do consórcio. O projeto possui 34 parceiros associados (12 académicos e 22 não académicos) de todos os continentes (17 da Europa e 17 do resto do mundo).

1.12.Premises where the study programme will be lectured:
University of Cantabria (1st semester)
IHE Delft Institute for Water Education (2nd semester)
University of Algarve (3rd semester)
Fourth semester in any of these institutions or at an associated partner of the consortium. The project has 34

associated partners (12 academic and 22 non-academic) from all continents (17 from Europe and 17 from outside Europe).

1.13.Regulamento de creditação de formação académica e de experiência profissional, publicado em Diário da República (PDF, máx. 500kB):

1.13._Pub DR-Reg Creditação Formação e E Prof-UAlg-2019.pdf

1.14.Observações:

O mestrado em Coastal Hazards – Risks, Climate Change Impacts and Adaption (COASTHazar) é um mestrado Erasmus Mundus, financiado pela Comissão Europeia, que visa proporcionar conhecimentos e competências avançadas para enfrentar os desafios associados aos riscos costeiros, para avaliar e enfrentar os impactos do aumento das atividades humanas e das mudanças climáticas nas áreas costeiras e para projetar medidas de adaptação para minimizar esses impactos. O programa é multi-disciplinar e baseia-se na visão partilhada e na experiência complementar dos três principais parceiros (IHE Delft, Universidade do Algarve e Universidade da Cantábria). Inclui a participação de 34 parceiros associados (12 académicos e 22 não académicos), para estágios voluntários e realização de teses de mestrado. Esses parceiros incluem universidades de todo o mundo e algumas das principais empresas e institutos de investigação em engenharia e gestão costeira (ex. IH Cantábria, Deltares, Boskalis, Arcadis, Serviços Geológicos dos EUA). Em Portugal, são parceiros o Instituto Hidrográfico, o LNEC e o IDL, a principal agência de gestão costeira (APA) e também uma empresa especializada em dinâmica costeira (HIDROMOD). Este programa encontra-se já acreditado nos Países Baixos e em processo de acreditação em Espanha.
O programa de mestrado possui quatro semestres. Os 3 primeiros semestres têm 90 ECTS letivos, incluindo o Plano de Dissertação (9 ECTS), no terceiro semestre. O 4º semestre será dedicado à dissertação de mestrado (30 ECTS).
O 1º semestre será realizado na Universidade da Cantábria, Espanha, o segundo na IHE Delft, Países Baixos, e o terceiro na Universidade do Algarve, Portugal. Entre o primeiro e o segundo semestre, os estudantes participarão em cursos de curta duração, de oferta diversificada, incluindo "soft skills". Após o segundo semestre, os estudantes participarão numa escola de verão de uma semana. Os cursos de curta duração terão várias opções de escolha e, tal como os cursos de verão e como os estágios, não terão créditos ECTS, mas fornecerão certificados e serão incluídos no suplemento ao diploma final. Após o terceiro semestre os alunos podem seguir para estágio numa instituição parceira. O quarto semestre (dissertação) pode ser realizado em qualquer dos parceiros principais ou em qualquer parceiro associado, tendo sempre a orientação (ou co-orientação) de um membro de um dos três parceiros principais. Os estudantes participarão numa cerimónia de formatura conjunta, na IHE, em setembro. Antes da cerimónia de graduação, será organizado um workshop final, onde os estudantes terão a oportunidade de apresentar as suas dissertações. Profissionais e cientistas relevantes em riscos costeiros, principalmente dos parceiros associados, mas não exclusivamente, serão convidados a apresentar estudos de caso, melhores práticas e resultados científicos.

1.14.Observations:

The Coastal Hazards – Risks, Climate Change Impacts and Adaption (COASTHazar) is an Erasmus Mundus Joint Master Degree funded by the European Commission that aims at providing masters students with state-of-the-art knowledge, skills and competencies: to meet challenges that coastal hazards and associated risks may pose, to assess and tackle the impacts of increasing human activities and climate change in coastal areas, and to design adaptation measures to minimize those impacts. The programme is multi-disciplinary and based on the shared vision and complementary expertise of the three main partners (IHE Delft, University of Algarve and University of Cantabria). It also includes the participation of 34 (12 academic and 22 non-academic) associated partners, for voluntary internships and MSc thesis. These partners include universities from all over the world and some of the main companies and research institutes on coastal engineering and management worldwide (eg. IH Cantabria, Deltares, Boskalis, Arcadis, United States Geological Survey). In Portugal, it includes renowned institutes such as Instituto Hidrográfico, LNEC and IDL, the main coastal management agency (APA) and also a company specialised in coastal dynamics (HIDROMOD). This program is already accredited in the Netherlands and in the accreditation process in Spain.
The Master's programme has four semesters. The first 3 semesters have 90 ECTS, including the Dissertation Plan (9 ECTS), in the third semester. The 4th semester will be dedicated to the Master's dissertation (30 ECTS).
The 1st semester will be at the University of Cantabria, in Spain, the second at IHE Delft, in the Netherlands, and the third at the University of Algarve, Portugal. In between the first and second semester, the students will have short courses, with complementary background formation, including soft skills. After the second semester, the students will have a one-week summer school, again with a complementary background. The short courses and the internships will not have ECTS credits but will provide certificates and will be included in the final diploma supplement. After the 3rd semester, the students can enrol at an internship a tone of the associated partners. The fourth semester (Dissertation) can be performed at any of the main partners or at any associated partner, always having the supervision (or co-supervision) of a member from one of the 3 main partners. Students will participate, every year, at a joint graduation ceremony at IHE, around September. Prior to the graduation ceremony, a final workshop will be organized by the three partners, where students are given the opportunity to present their thesis dissertations. Practitioners and relevant scientists in coastal hazards, mostly from the associated partners, but not only, will be invited to present case studies, best practices, and scientific results from around the world.

2. Formalização do Pedido

Mapa I - Conselho Científico Faculdade de Ciências e Tecnologia

2.1.1.Órgão ouvido:

Conselho Científico Faculdade de Ciências e Tecnologia

2.1.2.Cópia de ata (ou extrato de ata) ou deliberação deste órgão assinada e datada (PDF, máx. 100kB):
2.1.2._CC-Extrato_ata_extra_4_2022_criacao_NCE_MEM_COastal_Hazard_compressed.pdf

Mapa I - Conselho Pedagógico da Faculdade de Ciências e Tecnologia

2.1.1.Órgão ouvido:
Conselho Pedagógico da Faculdade de Ciências e Tecnologia

2.1.2.Cópia de ata (ou extrato de ata) ou deliberação deste órgão assinada e datada (PDF, máx. 100kB):
2.1.2._Parecer COASTHazar - CP FCT_compressed.pdf

Mapa I - Senado Académico da Universidade do Algarve

2.1.1.Órgão ouvido:
Senado Académico da Universidade do Algarve

2.1.2.Cópia de ata (ou extrato de ata) ou deliberação deste órgão assinada e datada (PDF, máx. 100kB):
2.1.2._Senado_Mestrado Riscos Costeiros IMpactos das Alterações Climáticas e Adaptação.pdf

Mapa I - Associação Académica da Universidade do Algarve

2.1.1.Órgão ouvido:
Associação Académica da Universidade do Algarve

2.1.2.Cópia de ata (ou extrato de ata) ou deliberação deste órgão assinada e datada (PDF, máx. 100kB):
2.1.2._Parecer COASTHazar)-Assoc Estudantes.pdf

3. Âmbito e objetivos do ciclo de estudos. Adequação ao projeto educativo, científico e cultural da instituição

3.1.Objetivos gerais definidos para o ciclo de estudos:
O objetivo final deste programa de mestrado é contribuir para a redução dos riscos costeiros e minimizar os seus impactos, protegendo os cidadãos, os bens naturais e materiais, através da educação e formação.
O mestrado em Coastal Hazards – Risks, Climate Change Impacts and Adaption (COASTHazar) visa proporcionar aos estudantes de mestrado conhecimentos e competências avançadas para enfrentar os desafios que os riscos costeiros podem representar, bem como para avaliar e enfrentar os impactos do aumento das atividades humanas e das mudanças climáticas nas áreas costeiras e projetar medidas de adaptação para minimizar esses impactos. Ao promover essa formação de base, o programa COASTHazar procura minimizar uma lacuna atualmente existente no ensino superior, a nível europeu, preparando profissionais para os desafios que os riscos costeiros representam para as comunidades costeiras.

3.1.The study programme's generic objectives:
The main goal of this EMJMD programme is to contribute to the reduction of coastal risks and to minimize the impacts of coastal hazards, protecting people and reducing nature and property damages, through education and background training.
The Coastal Hazards – Risks, Climate Change Impacts and Adaption (COASTHazar) Programme aims at providing masters students with state-of-the-art knowledge, skills and competencies to meet challenges that coastal hazards and associated risks may pose, to assess and tackle the impacts of increasing human activities and climate change in coastal areas, and to design adaptation measures to minimize those impacts. By promoting this background formation, the COASTHazar programme seeks to address the current gap in higher education, preparing professionals to tackle the challenges that coastal hazards pose to coastal communities.

3.2.Objetivos de aprendizagem (conhecimentos, aptidões e competências) a desenvolver pelos estudantes:
O COASTHazar fornece formação sobre as seguintes áreas: (1) Ciências oceânicas e atmosféricas, (2) Dinâmica costeira, (3) Modelação de zonas costeiras, (4) Avaliação de riscos em áreas costeiras, (5) Proteção e recuperação de zonas costeiras, (6) Trabalho de campo e análise de dados; (7) Impactos e adaptação às alterações climáticas. As competências nas 6 primeiras áreas seguem uma curva de aprendizagem que leva às competências da área 7, incluindo: i) profundo conhecimento e compreensão das alterações globais e dos seus efeitos para as comunidades costeiras; ii) uso de uma ampla gama de ferramentas de modelação para estudos relacionados com engenharia e clima; iii) capacidade de integrar as alterações climáticas, a diferentes escalas temporais e espaciais, na gestão (de risco) em áreas costeiras; iv) compreensão abrangente das soluções de adaptação a alterações climáticas, no litoral, usando tanto soluções pesadas de engenharia costeira como baseadas na Natureza.

3.2.Intended learning outcomes (knowledge, skills and competences) to be developed by the students:
COASTHazar gives background formation on the following focal learning areas: (1) Ocean and atmospheric sciences, (2) Coastal dynamics and hazards, (3) Coastal modelling, (4) Risk assessment in coastal areas, (5) Coastal protection

and restoration, (6) Fieldwork and data analysis, (7) Climate change impacts and adaptation. The skills and competencies obtained by students within the first six focal areas, follow a learning curve that ultimately leads to the competencies of focal area 7, including i) profound knowledge and understanding of global changes and their effects on risks to coastal properties and communities; ii) use of a wide range of modelling tools for engineering and climate-related studies; iii) capacity to integrate climate change conditions at a different time and spatial scales into (risk) management in coastal areas; iv) comprehensive understanding of climate adaptation solutions at the coast, using both hard coastal engineering and nature-based solutions.

3.3.Inserção do ciclo de estudos na estratégia institucional de oferta formativa, face à missão institucional e, designadamente, ao projeto educativo, científico e cultural da instituição:

A UAlg tem uma longa tradição em trabalhar em áreas marinhas e costeiras, oferecendo duas licenciaturas nesses tópicos (Biologia Marinha; Gestão Marinha e Costeira), 4 programas de mestrado (Sistemas Marinhos e Costeiros; Water and Coastal Management; Biologia Marinha; Aquacultura e Pescas) e um programa de doutoramento (Ciências do Mar, da Terra e do Ambiente). A UAlg foi recentemente considerada por Birch et al. (2018), uma das principais instituições mundiais em investigação aplicada à gestão costeira (líder em Portugal, 6ª na Europa e 19ª no mundo). A investigação e o ensino em tópicos costeiros e marinhos são um dos principais pilares da UAlg, desde a sua fundação, sendo a UAlg reconhecida como uma instituição líder internacional nesses tópicos. Além disso, há cerca de 10 anos, a UAlg começou a desenvolver e a oferecer programas de mestrado em ciências marinhas em inglês, promovendo a internacionalização da instituição também ao nível de ensino. Esse esforço teve resultados extremamente positivos e faz parte da estratégia da UAlg promover, ainda mais, a criação de programas para o público internacional e cativar estudantes internacionais. Os programas de mestrado existentes na UAlg concentram-se em aspectos biológicos (Biologia Marinha; Aquacultura e Pescas), em processos marinhos e costeiros globais (Sistemas Marinhos e Costeiros) e em gestão ambiental (Water and Coastal Management). Atualmente, não existe um programa dedicado a riscos costeiros, impactos das alterações climáticas e sua mitigação, como propõe o mestrado COASTHazar. Este mestrado oferece um currículo multi-disciplinar que não é atualmente oferecido em Portugal ou, sequer, a nível mundial. Sendo um mestrado Erasmus Mundus, inclui conhecimentos complementares das instituições promotoras, desde os conhecimentos em engenharia costeira e teoria dos riscos na Universidade da Cantábria, ao prestigiado conhecimento em modelação e desenho de proteção costeira da IHE Delft, até à larga experiência nas ciências naturais, trabalho de campo e análise de dados, na UAlg. A UAlg também beneficiará da experiência e complementaridade do consórcio através das dissertações a realizar, do ensino e dos estágios conjuntos.

3.3.Insertion of the study programme in the institutional educational offer strategy, in light of the mission of the institution and its educational, scientific and cultural project:

UAlg has a long tradition in working in marine and coastal areas, offering two BSc degrees on these topics (Marine Biology; Marine and Coastal Management), 4 MSc programmes (Marine and Coastal Systems; Water and Coastal Management; Marine Biology; Aquaculture and Fisheries) and one main PhD program (Marine, Earth and Environmental Sciences). UAlg was recently considered by Birch et al. (2018), one of the leading world institutions in producing research related to coastal management (leading in Portugal, 6th in Europe and 19th in the world). Coastal and marine research and teaching are one of the main pillars of UAlg, since its foundation, and UAlg is recognised as an internationally leading institution in these topics. Moreover, about 10 years ago, UAlg started to develop and offer the MSc programmes related to Marine Science in English, promoting the internationalisation of the institution also at the teaching level. That effort had extremely positive results and it is part of the strategy of UAlg to further promote the creation of programmes for the international audience and further captivate international students. The existing MSc programmes at UAlg focus on biological aspects (Marine Biology; Aquaculture and Fisheries), global marine and coastal processes (Marine and Coastal Systems) and environmental-based management (Water and Coastal Management). Currently, there is not a programme devoted to coastal hazards, climate change impacts and their mitigation, as COASTHazar proposes. COASTHazar programme offers a multi-disciplinary curriculum that is currently not available elsewhere in the world. Being an Erasmus Mundus MSc includes complementary knowledge across the promoting institutions, from the coastal engineering and risk theory expertise at the University of Cantabria, to the renowned modelling and coastal protections design and engineering knowledge at IHE Delft, and to the advanced natural sciences and fieldwork and data analysis expertise at UAlg. UAlg will also profit from the expertise and complementarity of the consortium through joint thesis, joint teaching and internships.

4. Desenvolvimento curricular

4.1. Ramos, variantes, áreas de especialização, especialidades ou outras formas de organização em que o ciclo de estudos se estrutura (a preencher apenas quando aplicável)

4.1. Ramos, variantes, áreas de especialização, especialidades ou outras formas de organização em que o ciclo de estudos se estrutura (a preencher apenas quando aplicável) * / Branches, variants, specialization areas, specialties or other forms of organization (if applicable)*

Ramos, variantes, áreas de especialização, especialidades ou outras formas de organização em que o ciclo de estudos se estrutura *	Branches, variants, specialization areas, specialties or other forms of organization
<sem resposta>	

4.2. Estrutura curricular (a repetir para cada um dos percursos alternativos)

Mapa II - NA

4.2.1.Ramos, variantes, áreas de especialização, especialidades ou outras formas de organização em que o ciclo de estudos se estrutura (a preencher apenas quando aplicável)*:

NA

4.2.1.Branches, variants, specialization areas, specialties or other forms of organization (if applicable)*

NA

4.2.2. Áreas científicas e créditos necessários à obtenção do grau / Scientific areas and credits necessary for awarding the degree

Área Científica / Scientific Area	Sigla / Acronym	ECTS Obrigatórios / Mandatory ECTS	ECTS Minímos optativos** / Minimum Optional ECTS**	Observações / Observations
Ciências do Ambiente/Environmental Sciences	CAMB	5	0	
Ciências da Terra/Earth Sciences	CTER	45	0	
Ciências da Terra ou Ciências do Ambiente/ Earth Sciences, Environmental Science	CTER/CAMB	39	0	
Engenharia/Engineering	ENG	10	0	
Informática/ Informatic	INF	15	0	
Qualquer Área Científica/Any Scientific Area	QAC	0	6	
(6 Items)		**114**	**6**	

4.3 Plano de estudos

Mapa III - . - 1.º Ano/1.º Semestre - 1st Year/1st Semester

4.3.1.Ramos, variantes, áreas de especialização, especialidades ou outras formas de organização em que o ciclo de estudos se estrutura (a preencher apenas quando aplicável)*:

.

4.3.1.Branches, variants, specialization areas, specialties or other forms of organization (if applicable)*

.

4.3.2.Ano/semestre/trimestre curricular:

1.º Ano/1.º Semestre - 1st Year/1st Semester

4.3.3 Plano de Estudos / Study plan

Unidade Curricular / Curricular Unit	Área Científica / Scientific Area (1)	Duração / Duration (2)	Horas Trabalho / Working Hours (3)	Horas Contacto / Contact Hours (4)	ECTS	Opcional	Observações / Observations
Marine and atmospheric climate	CTER	Semestral/Semester	125	T-30; TP-20;	5		
Waves and water level	CTER	Semestral/Semester	125	T-30; TP-20;	5		
Theoretical and pratical bases for risk assessment	CTER	Semestral/Semester	125	T-30; TP-20;	5		
Applied computational tools in coastal engineering	INF	Semestral/Semester	125	T-20; TP-30;	5		
Introduction to management and diagnosis of coastal ecosystems	CAMB	Semestral/Semester	125	T-20; TP-30;	5		
Coastal sedimentation and erosion processes	CTER	Semestral/Semester	125	T-30; TP-20;	5		
(6 Items)							

Mapa III - . - 1.º ano/2.º Semestre - 1st year 2nd Semester

4.3.1.Ramos, variantes, áreas de especialização, especialidades ou outras formas de organização em que o ciclo de estudos se estrutura (a preencher apenas quando aplicável)*:

.

4.3.1.Branches, variants, specialization areas, specialties or other forms of organization (if applicable)*

.

4.3.2.Ano/semestre/trimestre curricular:

1.º ano/2.º Semestre - 1st year 2nd Semester

4.3.3 Plano de Estudos / Study plan

Unidade Curricular / Curricular Unit	Área Científica / Scientific Area (1)	Duração / Duration (2)	Horas Trabalho / Working Hours (3)	Horas Contacto / Contact Hours (4)	ECTS	Opcional	Observações / Observations
Coastal processes and morphology	CTER	Semestral/Semester	140	T-40; TP-20;	5		
Design of risk reduction measures in coastal areas	ENG	Semestral/Semester	140	T-40; PL-32;	5		
Modelling of coastal hazards	INF	Semestral/Semester	140	T-35; TP-35;	5		
Climate change and adaptation in lowland areas - coastal areas	CTER	Semestral/Semester	140	T-40; PL-10;	5		
Dynamic and statistical regional wave modeling	INF	Semestral/Semester	140	T-30; PL-40;	5		
Flood protection in lowland areas	ENG	Semestral/Semester	140	T-25; TP-25;	5		

(6 Items)

Mapa III - . - 2.º ano/1.º Semestre - 2nd year/1st Semester

4.3.1.Ramos, variantes, áreas de especialização, especialidades ou outras formas de organização em que o ciclo de estudos se estrutura (a preencher apenas quando aplicável)*:

.

4.3.1.Branches, variants, specialization areas, specialties or other forms of organization (if applicable)*

.

4.3.2.Ano/semestre/trimestre curricular:

2.º ano/1.º Semestre - 2nd year/1st Semester

4.3.3 Plano de Estudos / Study plan

Unidade Curricular / Curricular Unit	Área Científica / Scientific Area (1)	Duração / Duration (2)	Horas Trabalho / Working Hours (3)	Horas Contacto / Contact Hours (4)	ECTS	Opcional	Observações / Observations
Coastal evolution and risks at rocky shores	CTER	Semestral/Semester	78	PL-12; TC-8;	3		
Nature-based solutions for coastal management	CTER	Semestral/Semester	78	T-15; TC-5;	3		
Fieldwork and data analysis	CTER	Semestral/Semester	234	T-12; PL-15; TC-30;	9		
Elective	QAC	Semestral/Semester	156	T--; TP--; PL--; TC--; S--; E--; OT--;	6	1	
Dissertation plan	CTER/CAMB	Semestral/Semester	234	T-24; S-8; OT-12;	9		

(5 Items)

Mapa III - . - 2.º ano/2.º Semestre - 2nd year/2nd Semester

4.3.1.Ramos, variantes, áreas de especialização, especialidades ou outras formas de organização em que o ciclo de estudos se estrutura (a preencher apenas quando aplicável)*:

.

4.3.1.Branches, variants, specialization areas, specialties or other forms of organization (if applicable)*

.

4.3.2.Ano/semestre/trimestre curricular:

2.º ano/2.º Semestre - 2nd year/2nd Semester

4.3.3 Plano de Estudos / Study plan

Unidade Curricular / Curricular Unit	Área Científica / Scientific Area (1)	Duração / Duration (2)	Horas Trabalho / Working Hours (3)	Horas Contacto / Contact Hours (4)	ECTS	Opcional	Observações / Observations
Dissertation	CTER/CAMB	Semestral/Semester	780	S-45;	30		

(1 Item)

4.4. Unidades Curriculares

Mapa IV - Marine and atmospheric climate

4.4.1.1.Designação da unidade curricular:

Marine and atmospheric climate

4.4.1.1.Title of curricular unit:

Marine and atmospheric climate

4.4.1.2.Sigla da área científica em que se insere:

CTER

4.4.1.3.Duração (anual, semestral ou trimestral):

Semestral/Semester

4.4.1.4.Horas de trabalho (número total de horas de trabalho):

125

4.4.1.5.Horas de contacto:

30T; 20TP

4.4.1.6.Créditos ECTS:

5

4.4.1.7.Observações:

--

4.4.1.7.Observations:

--

4.4.2.Docente responsável e respetiva carga letiva na Unidade Curricular (preencher o nome completo):

Melisa Menendez - 30T; 20TP

4.4.3.Outros docentes e respetivas cargas letivas na unidade curricular:

NA

4.4.4.Objetivos de aprendizagem (conhecimentos, aptidões e competências a desenvolver pelos estudantes):

SCOPE:

Know and understand the main phenomena associated with the climate system, especially processes associated with water and energy flows in marine and coastal environments.

LEARNING OUTCOMES:
The student will be able to associate and characterise the different climatic processes associated with meteorology and oceanography and will learn the nomenclature and meaning of the different associated environmental variables.
The student will know and be able to evaluate climatic variations at different time scales of the environmental variables.
The student will know the meteo-oceanographic variables and how to combine them in a deterministic and probabilistic way for their application in problems associated with the coastal environment.
The student will understand the phenomenon of Climate Change and the specific implications associated with variables of interest in the coastal environment.

4.4.4.Intended learning outcomes (knowledge, skills and competences to be developed by the students):

SCOPE:
Know and understand the main phenomena associated with the climate system, especially processes associated with water and energy flows in marine and coastal environments.

LEARNING OUTCOMES:
The student will be able to associate and characterise the different climatic processes associated with meteorology and oceanography and will learn the nomenclature and meaning of the different associated environmental variables.
The student will know and be able to evaluate climatic variations at different time scales of the environmental variables.
The student will know the meteo-oceanographic variables and how to combine them in a deterministic and probabilistic way for their application in problems associated with the coastal environment.
The student will understand the phenomenon of Climate Change and the specific implications associated with variables of interest in the coastal environment.

4.4.5.Conteúdos programáticos:
• Topic 1. The Climate system
•Topic 2. Introduction to Meteorology
• Topic 3. Introduction to Hidroclimatology
• Topic 4. Introduction to Oceanography
• Topic 5. Climate Variability
• Topic 6. Climate Change

4.4.5.Syllabus:
• Topic 1. The Climate system
•Topic 2. Introduction to Meteorology
• Topic 3. Introduction to Hidroclimatology
• Topic 4. Introduction to Oceanography
• Topic 5. Climate Variability
• Topic 6. Climate Change

4.4.6.Demonstração da coerência dos conteúdos programáticos com os objetivos de aprendizagem da unidade curricular:
This module is aimed at graduates in civil, coastal, environmental, oceanographic and marine engineering, marine science and managers interested in maritime climate knowledge, as a basis for understanding the processes associated with coastal climate drivers. This course, together with the "Water waves and sea level" course, provides the knowledge base on the characterization of coastal marine dynamics, including waves, sea level and wind. This foundational module provides a solid theoretical background on coastal ecosystem assessment and modeling techniques that is necessary for the later modules of the program.

4.4.6.Evidence of the syllabus coherence with the curricular unit's intended learning outcomes:
This module is aimed at graduates in civil, coastal, environmental, oceanographic and marine engineering, marine science and managers interested in maritime climate knowledge, as a basis for understanding the processes associated with coastal climate drivers. This course, together with the "Water waves and sea level" course, provides the knowledge base on the characterization of coastal marine dynamics, including waves, sea level and wind. This foundational module provides a solid theoretical background on coastal ecosystem assessment and modeling techniques that is necessary for the later modules of the program.

4.4.7.Metodologias de ensino (avaliação incluída):
ASSESSMENT METHODS AND CRITERIA

Evaluation 1: Type: Written exam 15%
Evaluation 2: Type: Written exam 15%
Evaluation 3: Type: Written exam 15%
Evaluation 4: Type: Written exam 15%
Exercise 1: Type: Work 12%
Exercise 2: Type: Work 12%
Exercise 3: Type: Work 16%

Observations:

It is obligatory to attend the 80% of the classroom teaching -Only for duly justified causes (eg sanitary restrictions), the evaluations may be organized remotely.

4.4.7.Teaching methodologies (including students' assessment):
ASSESSMENT METHODS AND CRITERIA

Evaluation 1: Type: Written exam 15%
Evaluation 2: Type: Written exam 15%
Evaluation 3: Type: Written exam 15%
Evaluation 4: Type: Written exam 15%
Exercise 1: Type: Work 12%
Exercise 2: Type: Work 12%
Exercise 3: Type: Work 16%

Observations:
It is obligatory to attend the 80% of the classroom teaching -Only for duly justified causes (eg sanitary restrictions), the evaluations may be organized remotely.

4.4.8.Demonstração da coerência das metodologias de ensino com os objetivos de aprendizagem da unidade curricular:
The approach will allow students to acquire a solid basic knowledge in the characterization of maritime climate, including waves, wind and sea level, in order to subsequently, in the second and third module courses, be able to carry out diagnostics and assessment of existing coastal problems and establish the necessary corrective measures. This will allow students to learn to identify the main factors, probable effects and trends of climate change that serve as a starting point to understand the behavior of the coast, and to propose adaptation measures.

4.4.8.Evidence of the coherence between the teaching methodologies and the intended learning outcomes:
The approach will allow students to acquire a solid basic knowledge in the characterization of maritime climate, including waves, wind and sea level, in order to subsequently, in the second and third module courses, be able to carry out diagnostics and assessment of existing coastal problems and establish the necessary corrective measures. This will allow students to learn to identify the main factors, probable effects and trends of climate change that serve as a starting point to understand the behavior of the coast, and to propose adaptation measures.

4.4.9.Bibliografia de consulta/existência obrigatória:
Hartmann, D. L. (2015). Global physical climatology (Vol. 103). Newnes.
Stocker, T. F. (Ed.). (2014). Climate change 2013: the physical science basis: Working Group I contribution to the Fifth assessment report of the Intergovernmental Panel on Climate Change. Cambridge University Press

Mapa IV - Waves and water level

4.4.1.1.Designação da unidade curricular:
Waves and water level

4.4.1.1.Title of curricular unit:
Waves and water level

4.4.1.2.Sigla da área científica em que se insere:
CTER

4.4.1.3.Duração (anual, semestral ou trimestral):
Semestral/Semester

4.4.1.4.Horas de trabalho (número total de horas de trabalho):
125

4.4.1.5.Horas de contacto:
30T; 20TP

4.4.1.6.Créditos ECTS:
5

4.4.1.7.Observações:
-

4.4.1.7.Observations:
-

4.4.2.Docente responsável e respetiva carga letiva na Unidade Curricular (preencher o nome completo):
Iñigo J. Losada - 30T; 20 TP

4.4.3.Outros docentes e respetivas cargas letivas na unidade curricular:
NA

4.4.4.Objetivos de aprendizagem (conhecimentos, aptidões e competências a desenvolver pelos estudantes):
SCOPE:
The main scope of this course will be to expose the students to the fundamental characteristics and governing equations of coastal dynamics.
LEARNING OUTCOMES:
Students will be able identify the main characteristics (forcings, time and length scales) of the different coastal dynamics and their implications on other relevant coastal processes.
Students will be able to find the main sources of observations of the most relevant coastal dynamics and how to use this information to characterize both waves and sea level components.
Students will have the capacity to understand the governing equations of the different dynamics and to obtain solutions ranging from analytic solutions to numerical models in order to model and predict waves and sea level.
Students will be able to provide a critical assessment of how to used observed and modelled coastal dynamics to assess different coastal problems considering a given geographic location.

4.4.4.Intended learning outcomes (knowledge, skills and competences to be developed by the students):
SCOPE:
The main scope of this course will be to expose the students to the fundamental characteristics and governing equations of coastal dynamics.
LEARNING OUTCOMES:
Students will be able identify the main characteristics (forcings, time and length scales) of the different coastal dynamics and their implications on other relevant coastal processes.
Students will be able to find the main sources of observations of the most relevant coastal dynamics and how to use this information to characterize both waves and sea level components.
Students will have the capacity to understand the governing equations of the different dynamics and to obtain solutions ranging from analytic solutions to numerical models in order to model and predict waves and sea level.
Students will be able to provide a critical assessment of how to used observed and modelled coastal dynamics to assess different coastal problems considering a given geographic location.

4.4.5.Conteúdos programáticos:
Introduction (overall introduction to coastal dynamics: drivers, time and spatial scales)
Linear wave theory (fundamentals and applications)
Wave transformation (transformation processes, modelling)
Long wave theory (fundamentals and applications)
Other wave theories and applications (Boussinesq + Stokes higher order for offshore applications)
Mean water level (definition, datum, contributors and relevant processes, spatial variations, observations and trends, long-term changes and projections)
Astronomical tides (processes, observations and prediction/modelling)
Storm surges (processes, observations and predictions)
Extreme water level (definition, contributors, statistics and modelling)
Surf zone hydrodynamics (fundamental processes, time and length scales, governing equations, observations and modelling)
Tsunamis (fundamental processes, observations and modelling)

4.4.5.Syllabus:
Introduction (overall introduction to coastal dynamics: drivers, time and spatial scales)
Linear wave theory (fundamentals and applications)
Wave transformation (transformation processes, modelling)
Long wave theory (fundamentals and applications)
Other wave theories and applications (Boussinesq + Stokes higher order for offshore applications)
Mean water level (definition, datum, contributors and relevant processes, spatial variations, observations and trends, long-term changes and projections)
Astronomical tides (processes, observations and prediction/modelling)
Storm surges (processes, observations and predictions)
Extreme water level (definition, contributors, statistics and modelling)
Surf zone hydrodynamics (fundamental processes, time and length scales, governing equations, observations and modelling)

Tsunamis (fundamental processes, observations and modelling)

4.4.6.Demonstração da coerência dos conteúdos programáticos com os objetivos de aprendizagem da unidade curricular:
Having and understanding of the main characteristics of the coastal dynamics dominating the world coastines and the necessary skills to model their interaction with coastal morphology, ecosystems or human interventions is essential to address coastal risks and solutions.

4.4.6.Evidence of the syllabus coherence with the curricular unit's intended learning outcomes:
Having and understanding of the main characteristics of the coastal dynamics dominating the world coastines and the necessary skills to model their interaction with coastal morphology, ecosystems or human interventions is essential to address coastal risks and solutions.

4.4.7.Metodologias de ensino (avaliação incluída):
Teaching methodologies will be a combination of classroom theoretical teaching and problems solving, together with seminars for student motivation.
ASSESSMENT METHODS AND CRITERIA
1. Online exam 1: Type: test (questionnaire) 10%
2. Online exam 2: Type: test (questionnaire) 10%
3. Online exam 3: Type: test (questionnaire) 10%
4. Classroom exam 1: Type: Written exam (problems) 25%
5. Classroom exam 2: Type: Written exam (problems) 25%
6. Assignment 1: Type: Problems- Homework 10%
7. Assignment 2: Type: Paper on selected topics 10%
8. Final Exam: Type: will include those parts 1 to 6 of the evaluation not passed (max. 80%)
Paper on selected topics: 2 students per group; 3-page (not more, not less) paper and visual resources on a selected topic in English; Submission is compulsory

80% class attendance is compulsory -Only for duly justified causes (eg sanitary restrictions), the evaluations may be organized remotely.

4.4.7.Teaching methodologies (including students' assessment):
Teaching methodologies will be a combination of classroom theoretical teaching and problems solving, together with seminars for student motivation.
ASSESSMENT METHODS AND CRITERIA
1. Online exam 1: Type: test (questionnaire) 10%
2. Online exam 2: Type: test (questionnaire) 10%
3. Online exam 3: Type: test (questionnaire) 10%
4. Classroom exam 1: Type: Written exam (problems) 25%
5. Classroom exam 2: Type: Written exam (problems) 25%
6. Assignment 1: Type: Problems- Homework 10%
7. Assignment 2: Type: Paper on selected topics 10%
8. Final Exam: Type: will include those parts 1 to 6 of the evaluation not passed (max. 80%)
Paper on selected topics: 2 students per group; 3-page (not more, not less) paper and visual resources on a selected topic in English; Submission is compulsory

80% class attendance is compulsory -Only for duly justified causes (eg sanitary restrictions), the evaluations may be organized remotely.

4.4.8.Demonstração da coerência das metodologias de ensino com os objetivos de aprendizagem da unidade curricular:
The approach of the course will allow the student to acquire a solid basic knowledge that will be used in the rest of the master. This is a key subject and base in the master, since it allows the student to acquire the knowledge about the characteristics of the waves and their transformation in their propagation to the coast, and the knowledge of the dynamics in the same, which will be applied in different subjects of the second and third module of the master.

4.4.8.Evidence of the coherence between the teaching methodologies and the intended learning outcomes:
The approach of the course will allow the student to acquire a solid basic knowledge that will be used in the rest of the master. This is a key subject and base in the master, since it allows the student to acquire the knowledge about the characteristics of the waves and their transformation in their propagation to the coast, and the knowledge of the dynamics in the same, which will be applied in different subjects of the second and third module of the master.

4.4.9.Bibliografia de consulta/existência obrigatória:
Losada, I.J and Lara, J.L. Class notes
Bosboom, J. and Stive, M.J.F (2022) Coastal Dynamics. TU Delft Open.
Dean R.G., Dalrymple, R.A. (1992). Water Wave Mechanics for Engineers and Scientists. Advances Series on Ocean Engineering, Vol. 2. World Scientific.
Pugh, D. and Woodworth, P. (2014). Sea-level Science. Cambridge University Press

Mapa IV - Theoretical and pratical bases for risk assessment

4.4.1.1.Designação da unidade curricular:
Theoretical and pratical bases for risk assessment

4.4.1.1.Title of curricular unit:
Theoretical and pratical bases for risk assessment

4.4.1.2.Sigla da área científica em que se insere:
CTER

4.4.1.3.Duração (anual, semestral ou trimestral):
Semestral/Semester

4.4.1.4.Horas de trabalho (número total de horas de trabalho):
125

4.4.1.5.Horas de contacto:
30T; 20TP

4.4.1.6.Créditos ECTS:
5

4.4.1.7.Observações:
--

4.4.1.7.Observations:
--

4.4.2.Docente responsável e respetiva carga letiva na Unidade Curricular (preencher o nome completo):
Pedro Díaz Simal - 30T; 20TP

4.4.3.Outros docentes e respetivas cargas letivas na unidade curricular:
NA

4.4.4.Objetivos de aprendizagem (conhecimentos, aptidões e competências a desenvolver pelos estudantes):
To understand and be able to make an appropriate use of the fundamental concepts to be applied in risk assessment
To identify the different approaches, methods and tools to be used in risk assessment studies
To be able to assess and quantify the different risk levels
To learn the problems in decision making in a risk framework5.

4.4.4.Intended learning outcomes (knowledge, skills and competences to be developed by the students):
To understand and be able to make an appropriate use of the fundamental concepts to be applied in risk assessment
To identify the different approaches, methods and tools to be used in risk assessment studies
To be able to assess and quantify the different risk levels
To learn the problems in decision making in a risk framework5.

4.4.5.Conteúdos programáticos:
Syllabus. Alphanumeric field (1000 characters).
Content Sessions
1.- Basic notions of risk 1 week
2.- Economics of risk 2 weeks
3.- Hazard and impacts 1 week
4.- Exposure 1 week
5.- Vulnerability 1 week
6.- Risk and consequences 1 week
7.- Economics of Adaptation 2 weeks
8.- Risk Governance and communication 1 week
6. Demonstration of the coherence of the syllabus with the learning objectives of the curricular unit. Alphanumeric field (1000 characters).
The course will follow the reference pipeline for a standard risk assessment work so that the students are able to adequately fulfil the requirements at each step

4.4.5.Syllabus:

Syllabus. Alphanumeric field (1000 characters).
Content Sessions
1.- Basic notions of risk 1 week
2.- Economics of risk 2 weeks
3.- Hazard and impacts 1 week
4.- Exposure 1 week
5.- Vulnerability 1 week
6.- Risk and consequences 1 week
7.- Economics of Adaptation 2 weeks
8.- Risk Governance and communication 1 week
6. Demonstration of the coherence of the syllabus with the learning objectives of the curricular unit. Alphanumeric field (1000 characters).
The course will follow the reference pipeline for a standard risk assessment work so that the students are able to adequately fulfil the requirements at each step

4.4.6.Demonstração da coerência dos conteúdos programáticos com os objetivos de aprendizagem da unidade curricular:
TThe course will follow the reference pipeline for a standard risk assessment work so that the students are able to adequately fulfil the requirements at each step

4.4.6.Evidence of the syllabus coherence with the curricular unit's intended learning outcomes:
The course will follow the reference pipeline for a standard risk assessment work so that the students are able to adequately fulfil the requirements at each step

4.4.7.Metodologias de ensino (avaliação incluída):
For each week an introductory lesson will be presented and a working case for the students to work on it.
A Comprehensive case study will be required and the students should present a report (40%) and an oral presentation public 10% with debate on it. Weekly cases will represent 20% and a final test on concepts 30%

4.4.7.Teaching methodologies (including students' assessment):
For each week an introductory lesson will be presented and a working case for the students to work on it.
A Comprehensive case study will be required and the students should present a report (40%) and an oral presentation public 10% with debate on it. Weekly cases will represent 20% and a final test on concepts 30%

4.4.8.Demonstração da coerência das metodologias de ensino com os objetivos de aprendizagem da unidade curricular:
The practical scope of the course will incentive students apprehension of the conceptual framework presented.

4.4.8.Evidence of the coherence between the teaching methodologies and the intended learning outcomes:
The practical scope of the course will incentive students apprehension of the conceptual framework presented.

4.4.9.Bibliografia de consulta/existência obrigatória:
Risk Analysis in Engineering and Economics, 2nd Edition, Bilal M. Ayyub CRC
Environmental Hazards and Disasters Contexts, Perspectives and Management Bimal Kanti Paul, Wiley 2011
Introduction to International Disaster Management Third Edition Damon P. Coppola. Elsevier 2015

Mapa IV - Applied computational tools in coastal engineering

4.4.1.1.Designação da unidade curricular:
Applied computational tools in coastal engineering

4.4.1.1.Title of curricular unit:
Applied computational tools in coastal engineering

4.4.1.2.Sigla da área científica em que se insere:
INF

4.4.1.3.Duração (anual, semestral ou trimestral):
Semestral/Semester

4.4.1.4.Horas de trabalho (número total de horas de trabalho):
125

4.4.1.5.Horas de contacto:
20T; 30TP

4.4.1.6.Créditos ECTS:
5

4.4.1.7.Observações:
-

4.4.1.7.Observations:
-

4.4.2.Docente responsável e respetiva carga letiva na Unidade Curricular (preencher o nome completo):
María Emilia Maza Fernández - 20 T; 30 TP

4.4.3.Outros docentes e respetivas cargas letivas na unidade curricular:
NA

4.4.4.Objetivos de aprendizagem (conhecimentos, aptidões e competências a desenvolver pelos estudantes):
SCOPE:
The main scope of this course is that the students would be able to know, implement and master the general aspects of technical programming offered by MATLAB® software, applied to the resolution of problems related to the field of coastal engineering.
LEARNING OBJECTIVES:
The student will be able to acquire, manage, modify, represent and export information associated with coastal processes.
The student will be able to handle the instrumental and numerical databases in order to characterize the wave climate variables.
The student will be able to apply mathematical, numerical and statistical techniques for the characterization of hydrodynamic variables in coastal zones

4.4.4.Intended learning outcomes (knowledge, skills and competences to be developed by the students):
SCOPE:
The main scope of this course is that the students would be able to know, implement and master the general aspects of technical programming offered by MATLAB® software, applied to the resolution of problems related to the field of coastal engineering.
LEARNING OBJECTIVES:
The student will be able to acquire, manage, modify, represent and export information associated with coastal processes.
The student will be able to handle the instrumental and numerical databases in order to characterize the wave climate variables.
The student will be able to apply mathematical, numerical and statistical techniques for the characterization of hydrodynamic variables in coastal zones

4.4.5.Conteúdos programáticos:
- *Chapter 1. Introduction – The MATLAB environment*
- *Chapter 1. Introduction – Vectors and matrices*
- *Chapter 2. Matrices - Matrices functions*
- *Chapter 2. Matrices - Hypermatrices and cell arrays*
- *Chapter 3. Programming in Matlab – Part 1*
- *Chapter 3. Programming in Matlab – Part 2*
- *Chapter 4. Time domain*
- *Chapter 5. Statistics and Probability Distributions – Part 1*
- *Chapter 5. Statistics and Probability Distributions – Part 2*
- *Chapter 6. Importing, exporting and manipulating data – Part 1*
- *Chapter 6. Importing, exporting and manipulating data – Part 2*
- *Chapter 7. Graphical representation of data – Part 1*
- *Chapter 7. Graphical representation of data – Part 2*
- *Chapter 8. Solving equations and systems of equations – Part 1*
- *Chapter 8. Solving equations and systems of equations – Part 2*

4.4.5.Syllabus:
- *Chapter 1. Introduction – The MATLAB environment*
- *Chapter 1. Introduction – Vectors and matrices*
- *Chapter 2. Matrices - Matrices functions*
- *Chapter 2. Matrices - Hypermatrices and cell arrays*
- *Chapter 3. Programming in Matlab – Part 1*

• Chapter 3. Programming in Matlab – Part 2
• Chapter 4. Time domain
• Chapter 5. Statistics and Probability Distributions – Part 1
• Chapter 5. Statistics and Probability Distributions – Part 2
• Chapter 6. Importing, exporting and manipulating data – Part 1
• Chapter 6. Importing, exporting and manipulating data – Part 2
• Chapter 7. Graphical representation of data – Part 1
• Chapter 7. Graphical representation of data – Part 2
• Chapter 8. Solving equations and systems of equations – Part 1
• Chapter 8. Solving equations and systems of equations – Part 2

4.4.6.Demonstração da coerência dos conteúdos programáticos com os objetivos de aprendizagem da unidade curricular:
The different chapters included in the syllabus are defined to meet the learning objectives of the course. The student will learn the environment and operation of the tool and its application to work with mathematics and numerical schemes in chapters 1 to 5. Chapters 6 and 7 will allow students to read databases and represent the different variables of interest. Finally, chapter 8 will allow them to deal with complex equations and systems of equations of interest in coastal engineering.

4.4.6.Evidence of the syllabus coherence with the curricular unit's intended learning outcomes:
The different chapters included in the syllabus are defined to meet the learning objectives of the course. The student will learn the environment and operation of the tool and its application to work with mathematics and numerical schemes in chapters 1 to 5. Chapters 6 and 7 will allow students to read databases and represent the different variables of interest. Finally, chapter 8 will allow them to deal with complex equations and systems of equations of interest in coastal engineering.

4.4.7.Metodologias de ensino (avaliação incluída):
ASSESSMENT METHODS AND CRITERIA

Practical Exercise 1: Type: Work 30,00%
Practical Exercise 2: Type: Work 30,00%
Practical Exercise 3: Type: Work 30,00%
Class attendance and participation: 10,00%
Observations -it is mandatory to attend the 80% of the classroom teaching.

4.4.7.Teaching methodologies (including students' assessment):
ASSESSMENT METHODS AND CRITERIA

Practical Exercise 1: Type: Work 30,00%
Practical Exercise 2: Type: Work 30,00%
Practical Exercise 3: Type: Work 30,00%
Class attendance and participation: 10,00%
Observations -it is mandatory to attend the 80% of the classroom teaching.

4.4.8.Demonstração da coerência das metodologias de ensino com os objetivos de aprendizagem da unidade curricular:
The approach will allow students to acquire a solid basic knowledge in the capabilities and applications of the tool through theoretical training, the application of theoretical knowledge to practical exercises and the inclusion of examples of real cases, allowing the student to identify problems that can be solved by the application of the tool, for further consolidation and application in subsequent courses in the master. This course is clearly an initial course, which will lay the foundations for the application of the tool to the analysis of coastal processes, and the understanding of them by its analysis and representation.

4.4.8.Evidence of the coherence between the teaching methodologies and the intended learning outcomes:
The approach will allow students to acquire a solid basic knowledge in the capabilities and applications of the tool through theoretical training, the application of theoretical knowledge to practical exercises and the inclusion of examples of real cases, allowing the student to identify problems that can be solved by the application of the tool, for further consolidation and application in subsequent courses in the master. This course is clearly an initial course, which will lay the foundations for the application of the tool to the analysis of coastal processes, and the understanding of them by its analysis and representation.

4.4.9.Bibliografia de consulta/existência obrigatória:
MATLAB® Manual (http://www.mathworks.com)
Getting Started with MATLAB: A Quick Introduction for Scientists and Engineers. Oxford University Press, 2017.Rudra Patrap.
An Elementary Introduction to Statistical Learning Theory. Willey, 2011. Sanjeev Kulkarni and Gilbert Harman.
The analysis of time series. An introduction. Chapman & Hall/CRC., 2003. Chris Chatfield.

Mapa IV - Introduction to management and diagnosis of coastal ecosystems

4.4.1.1.Designação da unidade curricular:
Introduction to management and diagnosis of coastal ecosystems

4.4.1.1.Title of curricular unit:
Introduction to management and diagnosis of coastal ecosystems

4.4.1.2.Sigla da área científica em que se insere:
CAMB

4.4.1.3.Duração (anual, semestral ou trimestral):
Semestral/Semester

4.4.1.4.Horas de trabalho (número total de horas de trabalho):
125

4.4.1.5.Horas de contacto:
20 T; 30 TP

4.4.1.6.Créditos ECTS:
5

4.4.1.7.Observações:
-

4.4.1.7.Observations:
-

4.4.2.Docente responsável e respetiva carga letiva na Unidade Curricular (preencher o nome completo):
José A Juanes - 20T; 30 TP

4.4.3.Outros docentes e respetivas cargas letivas na unidade curricular:
NA

4.4.4.Objetivos de aprendizagem (conhecimentos, aptidões e competências a desenvolver pelos estudantes):
SCOPE:
The main objective of this course is that students acquire the skills to address the characterization, diagnosis and risk assessment of coastal ecosystems in different scenarios associated with climate change.
LEARNING OUTCOMES:
- Students will learn about the main coastal ecosystems, both from a structural and functional point of view, the ecosystem services they provide, the factors that determine their distribution and the pressures that may condition their state.
- Students will learn how to carry out the diagnosis and evaluation of coastal ecosystems in different scenarios of socioeconomic development, through the use of indicators, indices and the application of mathematical models.
- Students will learn the basics of the ecosystem-based management applied to coastal and marine areas in the context of the marine spatial planning process.
Students will learn about different approaches and techniques to assess the environmental risks of climate change on coastal ecosystems.

4.4.4.Intended learning outcomes (knowledge, skills and competences to be developed by the students):
SCOPE:
The main objective of this course is that students acquire the skills to address the characterization, diagnosis and risk assessment of coastal ecosystems in different scenarios associated with climate change.
LEARNING OUTCOMES:
- Students will learn about the main coastal ecosystems, both from a structural and functional point of view, the ecosystem services they provide, the factors that determine their distribution and the pressures that may condition their state.
- Students will learn how to carry out the diagnosis and evaluation of coastal ecosystems in different scenarios of socioeconomic development, through the use of indicators, indices and the application of mathematical models.
- Students will learn the basics of the ecosystem-based management applied to coastal and marine areas in the context of the marine spatial planning process.
Students will learn about different approaches and techniques to assess the environmental risks of climate change on coastal ecosystems.

4.4.5.Conteúdos programáticos:

1. Introduction to coastal ecosystems: structure, functions, ecosystem services, pressures.
2. Assessment and diagnosis of coastal ecosystems: approaches, techniques, models.
3. Ecosystem-based management and planning processes in coastal areas.
4. Climate change: effects and trends on coastal ecosystems.
5. Models for the management and planning of aquatic ecosystems
6. Environmental risk assessment to climate change on coastal ecosystems

4.4.5.Syllabus:

1. Introduction to coastal ecosystems: structure, functions, ecosystem services, pressures.
2. Assessment and diagnosis of coastal ecosystems: approaches, techniques, models.
3. Ecosystem-based management and planning processes in coastal areas.
4. Climate change: effects and trends on coastal ecosystems.
5. Models for the management and planning of aquatic ecosystems
6. Environmental risk assessment to climate change on coastal ecosystems

4.4.6.Demonstração da coerência dos conteúdos programáticos com os objetivos de aprendizagem da unidade curricular:

This module is aimed at graduates in civil, coastal, environmental, oceanographic and marine engineering, in marine sciences and managers interested in diagnosis and sustainable management of coastal ecosystems as a first step to understand their role in coastal protection in later courses. This foundational module provides a solid theoretical background on assessing and modelling techniques of coastal ecosystems that is necessary for the later modules of the program.

4.4.6.Evidence of the syllabus coherence with the curricular unit's intended learning outcomes:

This module is aimed at graduates in civil, coastal, environmental, oceanographic and marine engineering, in marine sciences and managers interested in diagnosis and sustainable management of coastal ecosystems as a first step to understand their role in coastal protection in later courses. This foundational module provides a solid theoretical background on assessing and modelling techniques of coastal ecosystems that is necessary for the later modules of the program.

4.4.7.Metodologias de ensino (avaliação incluída):

ASSESSMENT METHODS AND CRITERIA

Exercise 1: Type: Work 20,00%
Exercise 2: Type: Work 20,00%
Exercise 3: Type: Work 20,00%
Exercise 4: Type: Work 20,00%
Test: Type: Written exam 20,00%
Observations -it is obligatory to attend the 80% of the classroom teaching -Only for duly justified causes (eg sanitary restrictions), the evaluations may be organized remotely.

4.4.7.Teaching methodologies (including students' assessment):

ASSESSMENT METHODS AND CRITERIA

Exercise 1: Type: Work 20,00%
Exercise 2: Type: Work 20,00%
Exercise 3: Type: Work 20,00%
Exercise 4: Type: Work 20,00%
Test: Type: Written exam 20,00%
Observations -it is obligatory to attend the 80% of the classroom teaching -Only for duly justified causes (eg sanitary restrictions), the evaluations may be organized remotely.

4.4.8.Demonstração da coerência das metodologias de ensino com os objetivos de aprendizagem da unidade curricular:

The approach will allow students to acquire a solid basic knowledge in diagnosis and evaluation of coastal ecosystems in different scenarios of socioeconomic development, through theoretical training and the application of theoretical knowledge to practical exercises. This will allow the students to learn how to identify main drivers, likely effects and trends to climate change on coastal ecosystems for further consolidation and application in subsequent courses in the master.

4.4.8.Evidence of the coherence between the teaching methodologies and the intended learning outcomes:

The approach will allow students to acquire a solid basic knowledge in diagnosis and evaluation of coastal ecosystems in different scenarios of socioeconomic development, through theoretical training and the application of theoretical knowledge to practical exercises. This will allow the students to learn how to identify main drivers, likely effects and trends to climate change on coastal ecosystems for further consolidation and application in subsequent courses in the master.

4.4.9.Bibliografia de consulta/existência obrigatória:

Frankling, J & Miller, JA. 2010. Mapping species distributions. Cambridge University Press.
In: Kaiser et al 2011. Marine ecology: Processes, systems and impacts. Oxford University Press.
Phillips, SJ, Anderson, RP, Schapire, RE. 2006. Maximum entropy modelling of species geographic distributions. Ecological Modelling 190, 231-259.
Phillips, SJ, Anderson, RP, DudÍk, M, Schapire, RE, Blair, ME. 2017. Opening the black box: an open-source release of Maxent. Ecography 40: 887–893.
Townsed, A, Soberón, J, Pearson, RG, Anderson, RP, Martínez-Meyer, E, Nakamura, M, Araujo, MB. 2011. Ecological Niches and Geographic Distributions. Princeton University Press.
United Nations. 2005. Millennium Ecosystem Assessment. Ecosystems and Human Well-being: Synthesis. Island Press, Washington, DC.
Wolanski, E. Day, J.W., Elliot, M, Ramachandran, R. 2019. Coasts and Estuaries. The future. Elsevier.

Mapa IV - Coastal sedimentation and erosion processes

4.4.1.1.Designação da unidade curricular:
Coastal sedimentation and erosion processes

4.4.1.1.Title of curricular unit:
Coastal sedimentation and erosion processes

4.4.1.2.Sigla da área científica em que se insere:
CTER

4.4.1.3.Duração (anual, semestral ou trimestral):
Semestral/Semester

4.4.1.4.Horas de trabalho (número total de horas de trabalho):
125

4.4.1.5.Horas de contacto:
30T; 20TP

4.4.1.6.Créditos ECTS:
5

4.4.1.7.Observações:
-

4.4.1.7.Observations:
-

4.4.2.Docente responsável e respetiva carga letiva na Unidade Curricular (preencher o nome completo):
Raul Medina - 30T; 20TP

4.4.3.Outros docentes e respetivas cargas letivas na unidade curricular:
NA

4.4.4.Objetivos de aprendizagem (conhecimentos, aptidões e competências a desenvolver pelos estudantes):
SCOPE:
The main scope of this course is that the students would be able to quantify the volume of sand and sediment transport rates in coastal areas and basins.
LEARNING OUTCOMES:
The student will be able to select a sediment transport model and to apply it in studies related with basins, transitional waters (estuarine areas) and coastal areas
The Student will be able to understand the sediment transport processes under a fluid action and its application in littoral areas
The student will be able to know the hypothesis, application range and limitations for different sediment transport models, and to understand and to evaluate model results

4.4.4.Intended learning outcomes (knowledge, skills and competences to be developed by the students):
SCOPE:
The main scope of this course is that the students would be able to quantify the volume of sand and sediment transport

rates in coastal areas and basins.
LEARNING OUTCOMES:
The student will be able to select a sediment transport model and to apply it in studies related with basins, transitional waters (estuarine areas) and coastal areas
The Student will be able to understand the sediment transport processes under a fluid action and its application in littoral areas
The student will be able to know the hypothesis, application range and limitations for different sediment transport models, and to understand and to evaluate model results

4.4.5.Conteúdos programáticos:

•Introduction (overall introduction to coastal sedimentation and erosion processes: drivers, time and spatial scales)
•Properties of water and sand (density, viscosity, permeability, bed materials, settling velocity)
•Current dynamics in the vicinity of the sea bottom
•Wave dynamics in the vicinity of the sea bottom
•Combined waves and currents in the vicinity of the sea bottom
•Threshold of motion
•Bed features
•Suspended sediment
•Bedload transport
•Total load transport
•Handling the wave-current climate (design wave and tide approach, probabilistic approach, sequential approach)
•Sedimentation and erosion processes in beaches (beach morpho-dynamics, crosshore processes, longshore processes, equilibrium profile, equilibrium planform)
•Sedimentation and erosion processes in tidal inlets (tidal inlets morpho-dynamics and processes)
•Sediment balance for a coastal physiographic unit (littoral cells, sediment budget)
•Case studies

4.4.5.Syllabus:

•Introduction (overall introduction to coastal sedimentation and erosion processes: drivers, time and spatial scales)
•Properties of water and sand (density, viscosity, permeability, bed materials, settling velocity)
•Current dynamics in the vicinity of the sea bottom
•Wave dynamics in the vicinity of the sea bottom
•Combined waves and currents in the vicinity of the sea bottom
•Threshold of motion
•Bed features
•Suspended sediment
•Bedload transport
•Total load transport
•Handling the wave-current climate (design wave and tide approach, probabilistic approach, sequential approach)
•Sedimentation and erosion processes in beaches (beach morpho-dynamics, crosshore processes, longshore processes, equilibrium profile, equilibrium planform)
•Sedimentation and erosion processes in tidal inlets (tidal inlets morpho-dynamics and processes)
•Sediment balance for a coastal physiographic unit (littoral cells, sediment budget)
•Case studies

4.4.6.Demonstração da coerência dos conteúdos programáticos com os objetivos de aprendizagem da unidade curricular:

This module is aimed at graduates in civil, coastal, environmental, oceanographic and marine engineering, and managers interested in coastal sedimentation and erosion processes as a first step to understanding coastal processes and coastal engineering solutions in later courses. This is a foundational module that provides a solid theoretical background on sedimentation and erosion processes that is necessary for the later modules of the program.

4.4.6.Evidence of the syllabus coherence with the curricular unit's intended learning outcomes:

This module is aimed at graduates in civil, coastal, environmental, oceanographic and marine engineering, and managers interested in coastal sedimentation and erosion processes as a first step to understanding coastal processes and coastal engineering solutions in later courses. This is a foundational module that provides a solid theoretical background on sedimentation and erosion processes that is necessary for the later modules of the program.

4.4.7.Metodologias de ensino (avaliação incluída):

ASSESSMENT METHODS AND CRITERIA

Exercise 1: Type: Work 15,00%
Exercise 2: Type: Work 15,00%
Exercise 3: Type: Work 15,00%
Test: Type: Written exam 15,00%
Final exam: Type: Written exam 40,00%

Observations -it is obligatory to attend the 80% of the classroom teaching -Only for duly justified causes (eg sanitary restrictions), the evaluations may be organized remotely.

4.4.7.Teaching methodologies (including students' assessment):
ASSESSMENT METHODS AND CRITERIA

Exercise 1: Type: Work 15,00%
Exercise 2: Type: Work 15,00%
Exercise 3: Type: Work 15,00%
Test: Type: Written exam 15,00%
Final exam: Type: Written exam 40,00%
Observations -it is obligatory to attend the 80% of the classroom teaching -Only for duly justified causes (eg sanitary restrictions), the evaluations may be organized remotely.

4.4.8.Demonstração da coerência das metodologias de ensino com os objetivos de aprendizagem da unidade curricular:
The approach will allow students to acquire a solid basic knowledge in the processes of sedimentation and erosion, through theoretical training, the application of theoretical knowledge to practical cases and the inclusion of examples of real cases, allowing the student to identify the fundamental processes of sedimentation and erosion, for further consolidation and application in subsequent courses in the master. This course is clearly an initial course, which will lay the foundations for the analysis of coastal processes, and the understanding of them for the design of different measures on the coast.

4.4.8.Evidence of the coherence between the teaching methodologies and the intended learning outcomes:
The approach will allow students to acquire a solid basic knowledge in the processes of sedimentation and erosion, through theoretical training, the application of theoretical knowledge to practical cases and the inclusion of examples of real cases, allowing the student to identify the fundamental processes of sedimentation and erosion, for further consolidation and application in subsequent courses in the master. This course is clearly an initial course, which will lay the foundations for the analysis of coastal processes, and the understanding of them for the design of different measures on the coast.

4.4.9.Bibliografia de consulta/existência obrigatória:
Coastal Engineering Manual, CEM. (2002-2006). Part III. CHL-Coastal and Hydraulics Laboratory. USA.
Van Rijn, L. C. (1993). Principles of Sediment Transport in Rivers, Estuaries and Coastal Seas. Aqua Publications, Amsterdam.
Soulsby, R. (1997). Dynamics of Marine Sands. Ed. Thomas Telford LTD

Mapa IV - Coastal processes and morphology

4.4.1.1.Designação da unidade curricular:
Coastal processes and morphology

4.4.1.1.Title of curricular unit:
Coastal processes and morphology

4.4.1.2.Sigla da área científica em que se insere:
CTER

4.4.1.3.Duração (anual, semestral ou trimestral):
Semestral/Semester

4.4.1.4.Horas de trabalho (número total de horas de trabalho):
140

4.4.1.5.Horas de contacto:
40T;20TP

4.4.1.6.Créditos ECTS:
5

4.4.1.7.Observações:
-

4.4.1.7.Observations:
-

4.4.2.Docente responsável e respetiva carga letiva na Unidade Curricular (preencher o nome completo):
Roshanka Ranasinghe - 40T;20TP

4.4.3.Outros docentes e respetivas cargas letivas na unidade curricular:
NA

4.4.4.Objetivos de aprendizagem (conhecimentos, aptidões e competências a desenvolver pelos estudantes):
Able to explain governing processes in coastal hydrodynamics and morphodynamics;
Able to assess processes related to salt intrusion and density currents;
Able to apply in practice their understanding of hydrodynamic and morphological processes in diverse coastal environments such as reefs, mangroves and rocky coasts;
Able to describe estuarine morphological processes

4.4.4.Intended learning outcomes (knowledge, skills and competences to be developed by the students):
Able to explain governing processes in coastal hydrodynamics and morphodynamics;
Able to assess processes related to salt intrusion and density currents;
Able to apply in practice their understanding of hydrodynamic and morphological processes in diverse coastal environments such as reefs, mangroves and rocky coasts;
Able to describe estuarine morphological processes

4.4.5.Conteúdos programáticos:
• Coastal hydrodynamics
• Sediment transport and morphodynamics
• Infragravity waves and Rip currents
• Barrier island coasts
• Estuaries and tidal inlets; and
• Processes in complex environments.

4.4.5.Syllabus:
• Coastal hydrodynamics
• Sediment transport and morphodynamics
• Infragravity waves and Rip currents
• Barrier island coasts
• Estuaries and tidal inlets; and
• Processes in complex environments.

4.4.6.Demonstração da coerência dos conteúdos programáticos com os objetivos de aprendizagem da unidade curricular:
This module is targeted at graduates from civil, coastal engineering, environmental engineering, oceanography and ocean sciences, and managers interested in coastal processes and coastal engineering. It is foundational module that provides a solid theoretical background on nearshore coastal processes that is required for latter modules within the program.

4.4.6.Evidence of the syllabus coherence with the curricular unit's intended learning outcomes:
This module is targeted at graduates from civil, coastal engineering, environmental engineering, oceanography and ocean sciences, and managers interested in coastal processes and coastal engineering. It is foundational module that provides a solid theoretical background on nearshore coastal processes that is required for latter modules within the program.

4.4.7.Metodologias de ensino (avaliação incluída):
The module is worth 5 ECTS, corresponding to a total of 140 hours of work, distributed over 60 hours of contact and 80 hours of autonomous work. The contact hours are spread over 40 T and 20 TP. Theoretical classes will be based on lectures (powerpoints that include animations and images), and will also include the discussion of case studies. The autonomous work will focus on reading additional texts, writing small pieces of code for computing coastal phenomena, and completing assignments.
Assessment methods: Group report about a problem and possible solutions (30%) + individual written test (or exam) (70%)
Written exam – 60%
Assignments (2) – 40%

4.4.7.Teaching methodologies (including students' assessment):
The module is worth 5 ECTS, corresponding to a total of 140 hours of work, distributed over 60 hours of contact and 80 hours of autonomous work. The contact hours are spread over 40 T and 20 TP. Theoretical classes will be based on lectures (powerpoints that include animations and images), and will also include the discussion of case studies. The

autonomous work will focus on reading additional texts, writing small pieces of code for computing coastal phenomena, and completing assignments.
Assessment methods: Group report about a problem and possible solutions (30%) + individual written test (or exam) (70%)
Written exam – 60%
Assignments (2) – 40%

4.4.8.Demonstração da coerência das metodologias de ensino com os objetivos de aprendizagem da unidade curricular:
The above described approach will allow students to acquire a sound state of the art foundational knowledge in the topics covered in this module, through theoretical training, application of theoretical knowledge to real cases studies, from the discussion of case studies through reports and scientific papers and, finally, on example applications of different types of coastal numerical models.

4.4.8.Evidence of the coherence between the teaching methodologies and the intended learning outcomes:
The above described approach will allow students to acquire a sound state of the art foundational knowledge in the topics covered in this module, through theoretical training, application of theoretical knowledge to real cases studies, from the discussion of case studies through reports and scientific papers and, finally, on example applications of different types of coastal numerical models.

4.4.9.Bibliografia de consulta/existência obrigatória:
Roelvink and Reniers, 2011. A guide to modeling coastal morphology, World Scientific.

Mapa IV - Design of risk reduction measures in coastal areas

4.4.1.1.Designação da unidade curricular:
Design of risk reduction measures in coastal areas

4.4.1.1.Title of curricular unit:
Design of risk reduction measures in coastal areas

4.4.1.2.Sigla da área científica em que se insere:
ENG

4.4.1.3.Duração (anual, semestral ou trimestral):
Semestral/Semester

4.4.1.4.Horas de trabalho (número total de horas de trabalho):
140

4.4.1.5.Horas de contacto:
40T; 32PL

4.4.1.6.Créditos ECTS:
5

4.4.1.7.Observações:
-

4.4.1.7.Observations:
-

4.4.2.Docente responsável e respetiva carga letiva na Unidade Curricular (preencher o nome completo):
Mick van der Wegen - 40T; 32PL

4.4.3.Outros docentes e respetivas cargas letivas na unidade curricular:
NA

4.4.4.Objetivos de aprendizagem (conhecimentos, aptidões e competências a desenvolver pelos estudantes):
At the end of the module studenst should be able to
• understand the Disaster Risk Reduction (DRR) cycle and distinguish between its elements
• analyze the effectiveness of DRR intervention measures and understand their suitability.

• design a breakwater, a dyke and dyke revetments under given coastal forcing conditions
• explain Building with Nature (BwN) design concepts

4.4.4.Intended learning outcomes (knowledge, skills and competences to be developed by the students):
At the end of the module studenst should be able to
• understand the Disaster Risk Reduction (DRR) cycle and distinguish between its elements
• analyze the effectiveness of DRR intervention measures and understand their suitability.
• design a breakwater, a dyke and dyke revetments under given coastal forcing conditions
• explain Building with Nature (BwN) design concepts

4.4.5.Conteúdos programáticos:
• Introduction to Disaster Risk Reduction (DRR)
• Breakwater design
• Design of dikes and revetments

4.4.5.Syllabus:
• Introduction to Disaster Risk Reduction (DRR)
• Breakwater design
• Design of dikes and revetments

4.4.6.Demonstração da coerência dos conteúdos programáticos com os objetivos de aprendizagem da unidade curricular:
This course aims to provide students with knowledge and skills to design disaster risk reduction (DRR) measures in the coastal zone by building with nature. The Syllabus provides a sound theoretical background of DRR and BwN concepts on the one hand and traditional and concrete design skills on the other hand. Thus, classical design methodologies are compared to design concepts with a DRR and Bwn framework so that the students experience the added value. The course explicitly provides training in DRR and BWN by discussing recent publications and guidelines on tools and methodologies to design DRR measures and lectures notes on detailed DRR design procedures and guidelines.

4.4.6.Evidence of the syllabus coherence with the curricular unit's intended learning outcomes:
This course aims to provide students with knowledge and skills to design disaster risk reduction (DRR) measures in the coastal zone by building with nature. The Syllabus provides a sound theoretical background of DRR and BwN concepts on the one hand and traditional and concrete design skills on the other hand. Thus, classical design methodologies are compared to design concepts with a DRR and Bwn framework so that the students experience the added value. The course explicitly provides training in DRR and BWN by discussing recent publications and guidelines on tools and methodologies to design DRR measures and lectures notes on detailed DRR design procedures and guidelines.

4.4.7.Metodologias de ensino (avaliação incluída):
Teaching methodologies include classical classroom teaching, concrete design exercises in groups including presentations of the results, individual assignments and group discussions. Apart from training classical design knowledge and skill, the course thus stimulates thinking and acting in a complex design environment including required skills of group discussions and design.

4.4.7.Teaching methodologies (including students' assessment):
Teaching methodologies include classical classroom teaching, concrete design exercises in groups including presentations of the results, individual assignments and group discussions. Apart from training classical design knowledge and skill, the course thus stimulates thinking and acting in a complex design environment including required skills of group discussions and design.

4.4.8.Demonstração da coerência das metodologias de ensino com os objetivos de aprendizagem da unidade curricular:
The teaching methodologies focus on individual skill development design and group exercises including discussions, presentation and assignments. Thus, an atmosphere is created for knowledge exchange that pays tribute to the complexity of current design practise and requirements that include a broad environment, multi stakeholder and multi-discipline involvement and sustainable design in an ever-changing world.

4.4.8.Evidence of the coherence between the teaching methodologies and the intended learning outcomes:
The teaching methodologies focus on individual skill development design and group exercises including discussions, presentation and assignments. Thus, an atmosphere is created for knowledge exchange that pays tribute to the complexity of current design practise and requirements that include a broad environment, multi stakeholder and multi-discipline involvement and sustainable design in an ever-changing world.

4.4.9.Bibliografia de consulta/existência obrigatória:
Van Dongeren, A., Ciavola, P., Martinez, G., Viavattene, C., Bogaard, T., Ferreira, O., ... & McCall, R. (2018). Introduction to RISC-KIT: Resilience-increasing strategies for coasts. Coastal Engineering, 134, 2-9.
Van Dongeren, A., Ciavola, P., Martinez, G., Viavattene, C., DeKleermaeker, S., Ferreira, O., ... & McCall, R. (2016). RISC-KIT: resilience-increasing strategies for coasts.

Ciavola, P., Harley, M. D., & Den Heijer, C. (2018). The RISC-KIT storm impact database: A new tool in support of DRR. Coastal Engineering, 134, 24-32.
Lecture note Revetments, sea-dikes and River levees, LN0062/07/01 H.J. Verhagen
Lecture note Design of Closure Dams LN0052/02/1 H.J. Verhagen
Stability of pattern placed revetment PIANC

Mapa IV - Modelling of coastal hazards

4.4.1.1.Designação da unidade curricular:
Modelling of coastal hazards

4.4.1.1.Title of curricular unit:
Modelling of coastal hazards

4.4.1.2.Sigla da área científica em que se insere:
INF

4.4.1.3.Duração (anual, semestral ou trimestral):
Semestral/Semester

4.4.1.4.Horas de trabalho (número total de horas de trabalho):
140

4.4.1.5.Horas de contacto:
35T; 35TP

4.4.1.6.Créditos ECTS:
5

4.4.1.7.Observações:
-

4.4.1.7.Observations:
-

4.4.2.Docente responsável e respetiva carga letiva na Unidade Curricular (preencher o nome completo):
Albertus van Dongeren -35T;35TP

4.4.3.Outros docentes e respetivas cargas letivas na unidade curricular:
NA

4.4.4.Objetivos de aprendizagem (conhecimentos, aptidões e competências a desenvolver pelos estudantes):
• Solve a flow problem on a simple geometry using commonly used numerical techniques
• Select appropriate data from open source databases to support modeling setup and evaluation
• Create hydrodynamic and morphodynamic models using state-of-the-art systems in a practical situation
• Construct boundary conditions using input reduction and schematisation techniques for simulation speedup
• Build and execute the appropriate model setup for a given problem
• Critically evaluate the results of complex models
• Translate model results into practical outcomes and communicate them to stakeholders

4.4.4.Intended learning outcomes (knowledge, skills and competences to be developed by the students):
• Solve a flow problem on a simple geometry using commonly used numerical techniques
• Select appropriate data from open source databases to support modeling setup and evaluation
• Create hydrodynamic and morphodynamic models using state-of-the-art systems in a practical situation
• Construct boundary conditions using input reduction and schematisation techniques for simulation speedup
• Build and execute the appropriate model setup for a given problem
• Critically evaluate the results of complex models
• Translate model results into practical outcomes and communicate them to stakeholders

4.4.5.Conteúdos programáticos:
• Introduction to numerical methods for hydrodynamical modelling
• Data sources for modelling: tides, waves, winds, bathymetry

• Regional modelling of tides, waves and surge with Delft3D
• Compound flood and erosional hazard modelling with SFINCS and XBeach
o Long term shoreline modeling using Shorelines
• Group exercise: computing multi-hazards at Beira, Mozambique, for the case of cyclone Idai

4.4.5.Syllabus:

• Introduction to numerical methods for hydrodynamical modelling
• Data sources for modelling: tides, waves, winds, bathymetry
• Regional modelling of tides, waves and surge with Delft3D
• Compound flood and erosional hazard modelling with SFINCS and XBeach
o Long term shoreline modeling using Shorelines
• Group exercise: computing multi-hazards at Beira, Mozambique, for the case of cyclone Idai

4.4.6.Demonstração da coerência dos conteúdos programáticos com os objetivos de aprendizagem da unidade curricular:

This course aims at making students familiar with numerical models that can be used to assess coastal flooding and erosion hazards at multiple temporal and spatial scales. After getting acquainted with the numerical methods that are used to discretise the governing flow equations, students are, through practical sessions, small assignments and a group work, introduced to a typical nested modelling train that brings in large scale forcing (waves, tides, surge) to the local study area where flooding and erosion hazards are to be determined. They are required to present their outcomes to their peers in an interactive group discussion.

4.4.6.Evidence of the syllabus coherence with the curricular unit's intended learning outcomes:

This course aims at making students familiar with numerical models that can be used to assess coastal flooding and erosion hazards at multiple temporal and spatial scales. After getting acquainted with the numerical methods that are used to discretise the governing flow equations, students are, through practical sessions, small assignments and a group work, introduced to a typical nested modelling train that brings in large scale forcing (waves, tides, surge) to the local study area where flooding and erosion hazards are to be determined. They are required to present their outcomes to their peers in an interactive group discussion.

4.4.7.Metodologias de ensino (avaliação incluída):

The course has 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 35 T and 35 TP. Theoretical classes will be based on oral presentations with image support, and include demonstrations of different modelling concepts. The practical sessions allow the students to set up models and analyse the outcomes. Results are presented to their peers in short pitches. The autonomous group work will focus on the analysis and presentation of the hindcast of tropical cyclone Idai in Mozambique.
Summative assessments: Assignment Numerical Methods (25%), Group exercise Idai (75%)

4.4.7.Teaching methodologies (including students' assessment):

The course has 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 35 T and 35 TP. Theoretical classes will be based on oral presentations with image support, and include demonstrations of different modelling concepts. The practical sessions allow the students to set up models and analyse the outcomes. Results are presented to their peers in short pitches. The autonomous group work will focus on the analysis and presentation of the hindcast of tropical cyclone Idai in Mozambique.
Summative assessments: Assignment Numerical Methods (25%), Group exercise Idai (75%)

4.4.8.Demonstração da coerência das metodologias de ensino com os objetivos de aprendizagem da unidade curricular:

The above typified approach will allow students to obtain a firm foundation to independently start modeling coastal hazards, through theoretical training (acquiring knowledge), hands-on exercises in coding and modeling (apply knowledge), and from the discussion of their results (analyse results) with their peers during the final group work presentation (critically assess results).

4.4.8.Evidence of the coherence between the teaching methodologies and the intended learning outcomes:

The above typified approach will allow students to obtain a firm foundation to independently start modeling coastal hazards, through theoretical training (acquiring knowledge), hands-on exercises in coding and modeling (apply knowledge), and from the discussion of their results (analyse results) with their peers during the final group work presentation (critically assess results).

4.4.9.Bibliografia de consulta/existência obrigatória:

Roelvink, D. J., & Reniers, A. J. H. M. (2011). A Guide To Modeling Coastal Morphology (Vol. 12). World Scientific.

Mapa IV - Climate change and adaptation in lowland areas - coastal areas

4.4.1.1.Designação da unidade curricular:
Climate change and adaptation in lowland areas - coastal areas

4.4.1.1.Title of curricular unit:
Climate change and adaptation in lowland areas - coastal areas

4.4.1.2.Sigla da área científica em que se insere:
CTER

4.4.1.3.Duração (anual, semestral ou trimestral):
Semestral/Semester

4.4.1.4.Horas de trabalho (número total de horas de trabalho):
140

4.4.1.5.Horas de contacto:
40T; 10PL

4.4.1.6.Créditos ECTS:
5

4.4.1.7.Observações:
-

4.4.1.7.Observations:
-

4.4.2.Docente responsável e respetiva carga letiva na Unidade Curricular (preencher o nome completo):
Alvaro Semedo 40T;10PL

4.4.3.Outros docentes e respetivas cargas letivas na unidade curricular:
NA

4.4.4.Objetivos de aprendizagem (conhecimentos, aptidões e competências a desenvolver pelos estudantes):
Describe and categorize main impacts of climate change on river catchments, lowlands, deltas and coastal areas, and illustrate the principles of climate change projections and related IPCC scenarios.
Describe and make use of the major uncertainties in assessing climate change induced hazards in lowlands and coastal areas.
Develop a strategic advice on how to effectively adapt to changes on coastal catchments, coasts and deltas in relation to extreme events, as well as long term changes.
Summarize a risk assessment and strategic adaptation advice in a structured report including proper referencing.
Describe climate change adaptation options in the river basin context and discuss pro and cons of various options for a selected river basin.
Review and write a critical reflection on the adaptation strategies described in the Nationally Determined Contributions (NDCs) of a country.

4.4.4.Intended learning outcomes (knowledge, skills and competences to be developed by the students):
Describe and categorize main impacts of climate change on river catchments, lowlands, deltas and coastal areas, and illustrate the principles of climate change projections and related IPCC scenarios.
Describe and make use of the major uncertainties in assessing climate change induced hazards in lowlands and coastal areas.
Develop a strategic advice on how to effectively adapt to changes on coastal catchments, coasts and deltas in relation to extreme events, as well as long term changes.
Summarize a risk assessment and strategic adaptation advice in a structured report including proper referencing.
Describe climate change adaptation options in the river basin context and discuss pro and cons of various options for a selected river basin.
Review and write a critical reflection on the adaptation strategies described in the Nationally Determined Contributions (NDCs) of a country.

4.4.5.Conteúdos programáticos:
Climate drivers, stressors and hazards in river catchments, lowlands, deltas and coastal areas
Morphodynamics of lowlands and deltas
IPCC

Climate modelling and climate change projections
Risk and vulnerability assessment
Climate adaptation in deltas
Different approaches for adaption measures (hard/soft, flexible/rigid, central/decentralized)
IPCC content on adaptation-working group 2
Climate financing (Chris or Yong)
Climate diplomacy and policy making in lowland and delta countries
Climate change adaptation options in the river basin context
Climate Change adaptation and mitigation through a Water-Energy-Food nexus lens
Role of adaptation in Nationally Determined Contributions on climate change with a particular focus on developing countries)
Climate adaptation in deltas

4.4.5.Syllabus:

Climate drivers, stressors and hazards in river catchments, lowlands, deltas and coastal areas
Morphodynamics of lowlands and deltas
IPCC
Climate modelling and climate change projections
Risk and vulnerability assessment
Climate adaptation in deltas
Different approaches for adaption measures (hard/soft, flexible/rigid, central/decentralized)
IPCC content on adaptation-working group 2
Climate financing (Chris or Yong)
Climate diplomacy and policy making in lowland and delta countries
Climate change adaptation options in the river basin context
Climate Change adaptation and mitigation through a Water-Energy-Food nexus lens
Role of adaptation in Nationally Determined Contributions on climate change with a particular focus on developing countries)
Climate adaptation in deltas

4.4.6.Demonstração da coerência dos conteúdos programáticos com os objetivos de aprendizagem da unidade curricular:

Learning objectives 1. And 2. cover the first part of the course, such as notions of climate drivers and hazards in lowland areas and coastal areas, morphodynamics of deltas and lowland areas. Learning objective 3 explains the IPCC conceptual organisation, goals and reports. Learning objectives 4. and 6. 7. introduce the concepts of climate adaptation, including climate financing and diplomacy, explaining how to effectively adapt to changes on coastal catchments, coasts and deltas, and the NDCs (Nationally Determined Contributions) to climate change with a particular focus on developing countries.

4.4.6.Evidence of the syllabus coherence with the curricular unit's intended learning outcomes:

Learning objectives 1. And 2. cover the first part of the course, such as notions of climate drivers and hazards in lowland areas and coastal areas, morphodynamics of deltas and lowland areas. Learning objective 3 explains the IPCC conceptual organisation, goals and reports. Learning objectives 4. and 6. 7. introduce the concepts of climate adaptation, including climate financing and diplomacy, explaining how to effectively adapt to changes on coastal catchments, coasts and deltas, and the NDCs (Nationally Determined Contributions) to climate change with a particular focus on developing countries.

4.4.7.Metodologias de ensino (avaliação incluída):

The module is worth 5 ECTS, corresponding to a total of 140 hours of work, distributed over 50 hours of contact and 80 hours of autonomous work. The contact hours are spread over 40T and 10TP. 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 reading additional scientific papers on climate change and climate adaptation, some to be discussed in class.
• Critical review of scientific paper, including a written report (50%)
• Presentation of paper review review, with oral discussion (50%)

4.4.7.Teaching methodologies (including students' assessment):

The module is worth 5 ECTS, corresponding to a total of 140 hours of work, distributed over 50 hours of contact and 80 hours of autonomous work. The contact hours are spread over 40T and 10TP. 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 reading additional scientific papers on climate change and climate adaptation, some to be discussed in class.
• Critical review of scientific paper, including a written report (50%)
• Presentation of paper review review, with oral discussion (50%)

4.4.8.Demonstração da coerência das metodologias de ensino com os objetivos de aprendizagem da unidade curricular:

The above described approach will allow students to acquire a sound state of the art foundational knowledge in the topics covered in this module, through theoretical deliver of knowledge as well as through the application of theoretical knowledge on reading and critically reviewing scientific papers, further discussed in group discussions.

4.4.8.Evidence of the coherence between the teaching methodologies and the intended learning outcomes:
The above described approach will allow students to acquire a sound state of the art foundational knowledge in the topics covered in this module, through theoretical deliver of knowledge as well as through the application of theoretical knowledge on reading and critically reviewing scientific papers, further discussed in group discussions.

4.4.9.Bibliografia de consulta/existência obrigatória:
• Earth's climate: past and future, W. F. Ruddiman
• Physics of Climate, Jose Pinto Peixoto and Abraham H Oort
• IPCC AR6 Climate Change 2022: Impacts, Adaptation and Vulnerability report

Mapa IV - Dynamic and statistical regional wave modeling

4.4.1.1.Designação da unidade curricular:
Dynamic and statistical regional wave modeling

4.4.1.1.Title of curricular unit:
Dynamic and statistical regional wave modeling

4.4.1.2.Sigla da área científica em que se insere:
INF

4.4.1.3.Duração (anual, semestral ou trimestral):
Semestral/Semester

4.4.1.4.Horas de trabalho (número total de horas de trabalho):
140

4.4.1.5.Horas de contacto:
30T; 40PL

4.4.1.6.Créditos ECTS:
5

4.4.1.7.Observações:
-

4.4.1.7.Observations:
-

4.4.2.Docente responsável e respetiva carga letiva na Unidade Curricular (preencher o nome completo):
Alvaro Semedo - 30T;40PL

4.4.3.Outros docentes e respetivas cargas letivas na unidade curricular:
NA

4.4.4.Objetivos de aprendizagem (conhecimentos, aptidões e competências a desenvolver pelos estudantes):
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.

4.4.4.Intended learning outcomes (knowledge, skills and competences to be developed by the students):
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.

4.4.5.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*

4.4.5.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*

4.4.6.Demonstração da coerência dos conteúdos programáticos com os objetivos de aprendizagem da unidade curricular:

Learning objective 1. covers the first and introductory part of the course, such as basic notions of statistical and dynamic wave models, and their respective vantages and advantages. Learning objective 2. covers the set up of both models, leading to learning objective 4. And 5., connected to the core of the course: the downscaling of a larger scale wave field by using two different types of wave models. The comparative assessment of the skills and predictability of both models is connected to learning objective 6., that also contemplates the use of both types of models in future wave climate projections

4.4.6.Evidence of the syllabus coherence with the curricular unit's intended learning outcomes:

Learning objective 1. covers the first and introductory part of the course, such as basic notions of statistical and dynamic wave models, and their respective vantages and advantages. Learning objective 2. covers the set up of both models, leading to learning objective 4. And 5., connected to the core of the course: the downscaling of a larger scale wave field by using two different types of wave models. The comparative assessment of the skills and predictability of both models is connected to learning objective 6., that also contemplates the use of both types of models in future wave climate projections

4.4.7.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%)

4.4.7.Teaching methodologies (including students' assessment):

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%)

4.4.8.Demonstração da coerência das metodologias de ensino com os objetivos de aprendizagem da unidade curricular:

The above described approach will allow students to acquire a sound state-of-the-art foundational knowledge in the topics covered in this module, through theoretical deliver of knowledge, but mostly through practical hands on sessions, as well as through the application of theoretical knowledge on reading and critically reviewing scientific papers, further used in the final report.

4.4.8.Evidence of the coherence between the teaching methodologies and the intended learning outcomes:
The above described approach will allow students to acquire a sound state-of-the-art foundational knowledge in the topics covered in this module, through theoretical deliver of knowledge, but mostly through practical hands on sessions, as well as through the application of theoretical knowledge on reading and critically reviewing scientific papers, further used in the final report.

4.4.9.Bibliografia de consulta/existência obrigatória:
• L. H. Holthuijsen: Waves in Oceanic and Coastal Waters (Cambridge press)
• SWAN Cycle III v
• Scientific papers

Mapa IV - Flood protection in lowland areas

4.4.1.1.Designação da unidade curricular:
Flood protection in lowland areas

4.4.1.1.Title of curricular unit:
Flood protection in lowland areas

4.4.1.2.Sigla da área científica em que se insere:
ENG

4.4.1.3.Duração (anual, semestral ou trimestral):
Semestral/Semester

4.4.1.4.Horas de trabalho (número total de horas de trabalho):
140

4.4.1.5.Horas de contacto:
25T; 25TP

4.4.1.6.Créditos ECTS:
5

4.4.1.7.Observações:
-

4.4.1.7.Observations:
-

4.4.2.Docente responsável e respetiva carga letiva na Unidade Curricular (preencher o nome completo):
Jan Adriaan (‘Dano’) Roelvink - 25T; 25TP

4.4.3.Outros docentes e respetivas cargas letivas na unidade curricular:
NA

4.4.4.Objetivos de aprendizagem (conhecimentos, aptidões e competências a desenvolver pelos estudantes):
1. Explain concepts and tools for coastal flood and wave modelling and flooding forecasting.
2. Apply tools used for coastal flood modelling and flooding forecasting.
3. Understand and apply the principles of flood frequency analysis and risk-based approaches to design of flood defences.
4. Explain flood risk management with due consideration of societal aspects, including flooding in the floodplain and coastal zone, management of flood risk, planning aspects and a variety of non-structural measures.
5. Assess the impact of climate change on flood risk.
6. Develop a Disaster Risk Reduction (DRR) plan, including non-structural measures.

4.4.4.Intended learning outcomes (knowledge, skills and competences to be developed by the students):
1. Explain concepts and tools for coastal flood and wave modelling and flooding forecasting.
2. Apply tools used for coastal flood modelling and flooding forecasting.
3. Understand and apply the principles of flood frequency analysis and risk-based approaches to design of flood defences.

4. Explain flood risk management with due consideration of societal aspects, including flooding in the floodplain and coastal zone, management of flood risk, planning aspects and a variety of non-structural measures.
5. Assess the impact of climate change on flood risk.
6. Develop a Disaster Risk Reduction (DRR) plan, including non-structural measures.

4.4.5.Conteúdos programáticos:

• Hindcasting of the large-scale wave generation and storm surge generated by a major hurricane (Michael in the Gulf of Mexico) using the Deltares SFINCS model in combination with a fast version of SWAN, HurryWave, and the subsequent overtopping, morphological impact and breaching at Mexico Beach, FL), using XBeach
• Assessment of the damage to houses and infrastructure during this hurricane using Delft-FIAT
• Assessment of how various non-structural measures would have affected the damage during this extreme event.
• Application of a probabilistic framework, T CWiseto generate a statistically representative series of hurricanes and their consequences, in order to create flood risk maps as a basis for a DRR plan, where the effect of some promising solutions from 3. on the flood risk maps are simulated, both for the current situation and
• Repeating a few cases for time slices in a limited number of future scenarios under climate change.

4.4.5.Syllabus:

• Hindcasting of the large-scale wave generation and storm surge generated by a major hurricane (Michael in the Gulf of Mexico) using the Deltares SFINCS model in combination with a fast version of SWAN, HurryWave, and the subsequent overtopping, morphological impact and breaching at Mexico Beach, FL), using XBeach
• Assessment of the damage to houses and infrastructure during this hurricane using Delft-FIAT
• Assessment of how various non-structural measures would have affected the damage during this extreme event.
• Application of a probabilistic framework, T CWiseto generate a statistically representative series of hurricanes and their consequences, in order to create flood risk maps as a basis for a DRR plan, where the effect of some promising solutions from 3. on the flood risk maps are simulated, both for the current situation and
• Repeating a few cases for time slices in a limited number of future scenarios under climate change.

4.4.6.Demonstração da coerência dos conteúdos programáticos com os objetivos de aprendizagem da unidade curricular:

This course aims to provide students with knowledge and tools that allow them to design, set up, execute and report on the chain of models that is required to a) draw lessons out of observed damages due to a real major hurricane event; b) investigate the mechanisms and effects through which soft interventions may reduce the exposure or vulnerability of houses and infrastructure to these hazards, and b) draw up a DRR plan in response to these threats, in which the full range of possible hurricane events is considered, plus how these events may be exacerbated by climate change.

4.4.6.Evidence of the syllabus coherence with the curricular unit’s intended learning outcomes:

This course aims to provide students with knowledge and tools that allow them to design, set up, execute and report on the chain of models that is required to a) draw lessons out of observed damages due to a real major hurricane event; b) investigate the mechanisms and effects through which soft interventions may reduce the exposure or vulnerability of houses and infrastructure to these hazards, and b) draw up a DRR plan in response to these threats, in which the full range of possible hurricane events is considered, plus how these events may be exacerbated by climate change.

4.4.7.Metodologias de ensino (avaliação incluída):

The course has 5 ECTS, a total of 140 hours, with 50 hours of contact. Theoretical classes will be based on oral presentations with image support, including the discussion of case studies and the definition of best options for simulated situations. A large part of the module will be practical, hands-on exercise of state-of-the-art tools, applied to the full chain of models required to assess actual and potential hurricane damages and risk. The case will be based on Hurricane Michael, which had a huge impact on Mexico Beach, FL.
Assessment methods: Group reports (50%) and presentations (50%), subdivided into the following topics: a) model setup and hindcasting of large-scale surge and wave models; b) model setup and hindcasting of morphological change, inundation and damage; c) effect of interventions on morphological change, inundation and damage; d) preparation of flood risk maps for current and climate change scenarios; e) preparation of a Disaster Risk Reduction Plan.

4.4.7.Teaching methodologies (including students' assessment):

The course has 5 ECTS, a total of 140 hours, with 50 hours of contact. Theoretical classes will be based on oral presentations with image support, including the discussion of case studies and the definition of best options for simulated situations. A large part of the module will be practical, hands-on exercise of state-of-the-art tools, applied to the full chain of models required to assess actual and potential hurricane damages and risk. The case will be based on Hurricane Michael, which had a huge impact on Mexico Beach, FL.
Assessment methods: Group reports (50%) and presentations (50%), subdivided into the following topics: a) model setup and hindcasting of large-scale surge and wave models; b) model setup and hindcasting of morphological change, inundation and damage; c) effect of interventions on morphological change, inundation and damage; d) preparation of flood risk maps for current and climate change scenarios; e) preparation of a Disaster Risk Reduction

Plan.

4.4.8.Demonstração da coerência das metodologias de ensino com os objetivos de aprendizagem da unidade curricular:
The above typified approach will allow students to acquire significant base knowledge and know-how in the subjects of this course (flood protection in lowland areas), through theoretical training, hands-on exercises based on a real case, working in dedicated groups and reporting and presenting their findings.

4.4.8.Evidence of the coherence between the teaching methodologies and the intended learning outcomes:
The above typified approach will allow students to acquire significant base knowledge and know-how in the subjects of this course (flood protection in lowland areas), through theoretical training, hands-on exercises based on a real case, working in dedicated groups and reporting and presenting their findings.

4.4.9.Bibliografia de consulta/existência obrigatória:
Leijnse et al 2021a Modeling compound flooding in coastal systems using a computationally efficient reduced-physics solver: Including fluvial, pluvial, tidal, wind- and wave-driven processes. Coastal Eng,103796
Leijnse et al 2021b Generating reliable estimates of tropical cyclone induced coastal hazards along the Bay of Bengal for current and future climates using synthetic tracks. Nat Haz Earth Syst Sci 2021, 1-40
McCall et al 2010 Two-dimensional time dependent hurricane overwash and erosion modeling at Santa Rosa Island. Coast Eng 57, 668-683
Nederhoff et al. 2021 Simulating synthetic tropical cyclone tracks for statistically reliable wind and pressure estimations. Na. Haz Earth Syst Sci 21, 861-878
Roelvink et al 2017 Improving predictions of swash dynamics in XBeach: The role of groupiness and incident-band runup. Coast Eng.
Roelvink et al. 2009 Modelling storm impacts on beaches, dunes and barrier islands. Coast Eng 56, 1133-1152
Slager et al 2016 User Manual Delft-FIAT version 1

Mapa IV - Coastal evolution and risks at rocky shores

4.4.1.1.Designação da unidade curricular:
Coastal evolution and risks at rocky shores

4.4.1.1.Title of curricular unit:
Coastal evolution and risks at rocky shores

4.4.1.2.Sigla da área científica em que se insere:
CTER

4.4.1.3.Duração (anual, semestral ou trimestral):
Semestral/Semester

4.4.1.4.Horas de trabalho (número total de horas de trabalho):
78

4.4.1.5.Horas de contacto:
12PL; 8TC

4.4.1.6.Créditos ECTS:
3

4.4.1.7.Observações:
-

4.4.1.7.Observations:
-

4.4.2.Docente responsável e respetiva carga letiva na Unidade Curricular (preencher o nome completo):
Óscar Manuel Fernandes Cerveira Ferreira -12PL; 8TC

4.4.3.Outros docentes e respetivas cargas letivas na unidade curricular:
NA

4.4.4.Objetivos de aprendizagem (conhecimentos, aptidões e competências a desenvolver pelos estudantes):

This course has as main objectives: Understanding the natural processes responsible for the evolution of rocky coasts, the associated hazards and risks; Identify the temporal and spatial scales of action of these processes; Systematize indicators for coastal hazards at rocky shores; Develop representative risk mapping in rocky coasts including their occupation; Understand how to minimise risks at rocky coasts. At the end of this course, students should: Know how to determine the risk at rocky coasts for occupation located both at the toe and top of cliffs; Perform risk mapping for rocky coasts; Identify key risk reduction measures at rocky coasts and associated occupation.

4.4.4.Intended learning outcomes (knowledge, skills and competences to be developed by the students):

This course has as main objectives: Understanding the natural processes responsible for the evolution of rocky coasts, the associated hazards and risks; Identify the temporal and spatial scales of action of these processes; Systematize indicators for coastal hazards at rocky shores; Develop representative risk mapping in rocky coasts including their occupation; Understand how to minimise risks at rocky coasts. At the end of this course, students should: Know how to determine the risk at rocky coasts for occupation located both at the toe and top of cliffs; Perform risk mapping for rocky coasts; Identify key risk reduction measures at rocky coasts and associated occupation.

4.4.5.Conteúdos programáticos:

Characterisation and evolution of rocky coasts, including main drivers, processes and time-scales. Type of hazards at rocky coasts and how then can translate into risk to occupation (both at beaches beneath as for areas near the cliff top). Indicators of hazards and risk at rocky coasts. Cartography and representation of hazards and risks at rocky coasts. Solutions to minimise risks at rocky coasts, with examples from the Algarve (one-day field visit).

4.4.5.Syllabus:

Characterisation and evolution of rocky coasts, including main drivers, processes and time-scales. Type of hazards at rocky coasts and how then can translate into risk to occupation (both at beaches beneath as for areas near the cliff top). Indicators of hazards and risk at rocky coasts. Cartography and representation of hazards and risks at rocky coasts. Solutions to minimise risks at rocky coasts, with examples from the Algarve (one-day field visit).

4.4.6.Demonstração da coerência dos conteúdos programáticos com os objetivos de aprendizagem da unidade curricular:

This UC aims to provide students with knowledge to be prepared to respond in solving problems resulting from coastal Hazards at rocky shores. Students will have a solid foundation on the acting process (waves, morphodynamics, lithology, structure, etc.) as well as on the threat to human occupation near rocky coasts. These concepts will be taught in lectures exclusively composed of practical classes, supported by a short theoretical introduction and resulting on applied exercises leading to the cartography of hazards and risks. The one-day field visit to the highly occupied rocky coast of the Algarve will serve to consolidate the knowledge, to observe potential risk areas, to discuss the scope of that risk and to observe potential solutions from the point of view of coastal management.

4.4.6.Evidence of the syllabus coherence with the curricular unit's intended learning outcomes:

This UC aims to provide students with knowledge to be prepared to respond in solving problems resulting from coastal Hazards at rocky shores. Students will have a solid foundation on the acting process (waves, morphodynamics, lithology, structure, etc.) as well as on the threat to human occupation near rocky coasts. These concepts will be taught in lectures exclusively composed of practical classes, supported by a short theoretical introduction and resulting on applied exercises leading to the cartography of hazards and risks. The one-day field visit to the highly occupied rocky coast of the Algarve will serve to consolidate the knowledge, to observe potential risk areas, to discuss the scope of that risk and to observe potential solutions from the point of view of coastal management.

4.4.7.Metodologias de ensino (avaliação incluída):

The course has 3 ECTS, corresponding to a total of 78 h, spread over 20 contact h and 58 h of autonomous work. The contact hours are distributed by 12 h of practice (numerical laboratory and cartography with short theoretical introductions) and 8 h of fieldwork. The work at the classroom will follow a Problem-Based Learning approach. The autonomous work will focus on the analysis of scientific articles in mapping risks and preparing for the remaining stages of evaluation. The contact classes will include: Short oral presentations with ppt support; Practical exercises based on problems; Cartography in electronic form of hazards and risks at rocky coasts; Field visit to the Algarve coast, including discussion of case studies and management solutions. The assessment will incorporate: Presentation of a poster (group work) about a rocky coast facing hazards and risks, presenting potential solutions (30%); Exam with application of a Coastal Index to a given rocky coast (70%).

4.4.7.Teaching methodologies (including students' assessment):

The course has 3 ECTS, corresponding to a total of 78 h, spread over 20 contact h and 58 h of autonomous work. The contact hours are distributed by 12 h of practice (numerical laboratory and cartography with short theoretical introductions) and 8 h of fieldwork. The work at the classroom will follow a Problem-Based Learning approach. The autonomous work will focus on the analysis of scientific articles in mapping risks and preparing for the remaining stages of evaluation. The contact classes will include: Short oral presentations with ppt support; Practical exercises based on problems; Cartography in electronic form of hazards and risks at rocky coasts; Field visit to the Algarve coast, including discussion of case studies and management solutions. The assessment will incorporate: Presentation of a poster (group work) about a rocky coast facing hazards and risks, presenting potential solutions (30%); Exam with application of a Coastal Index to a given rocky coast (70%).

4.4.8.Demonstração da coerência das metodologias de ensino com os objetivos de aprendizagem da unidade curricular:
The methods used in class will use a Problem-Based Learning approach, for actual coastal areas facing hazards and risks. The work to be performed will allow students to put into practice the theoretical learning to actual examples, identifying risk situations and discussing management and risk mitigation solutions. The mapping will allow, based on theoretical grounds, aerial photography analysis and base mapping, to determine areas that can be affected by Hazards with a given return period and the potential consequences. The students will also be asked to define the mitigation measures. The course also includes a strong component of fieldwork, by in situ seeing those risks and analysing solutions in place, at the Algarve coast, a heavily occupied rocky shore facing a strong pressure from tourism.

4.4.8.Evidence of the coherence between the teaching methodologies and the intended learning outcomes:
The methods used in class will use a Problem-Based Learning approach, for actual coastal areas facing hazards and risks. The work to be performed will allow students to put into practice the theoretical learning to actual examples, identifying risk situations and discussing management and risk mitigation solutions. The mapping will allow, based on theoretical grounds, aerial photography analysis and base mapping, to determine areas that can be affected by Hazards with a given return period and the potential consequences. The students will also be asked to define the mitigation measures. The course also includes a strong component of fieldwork, by in situ seeing those risks and analysing solutions in place, at the Algarve coast, a heavily occupied rocky shore facing a strong pressure from tourism.

4.4.9.Bibliografia de consulta/existência obrigatória:
Del Rio, L., Gracia, F.J., 2009. Erosion risk assessment of active coastal cliffs in temperate environments. Geomorphology, 112, 82-95.
Marques, F.M., 2008. Magnitude-frequency of sea cliff instabilities. Nat Hazards Earth Syst. Sci., 8, 1161-1171
Marques, F.M. et al., 2013. Sea cliff instability and susceptibility at regional scale: a statistically based assessment in the southern Algarve, Portugal. Nat. Hazards Earth Systems Sci., 13, 3185-3203
Nunes, M. et al., 2009. Hazard assessment in rock cliffs at central Algarve (Portugal): A tool for coastal management. Ocean & Coastal Management, 52, 506-515
Teixeira, S.B., 2006. Slope mass movements on rocky sea-cliffs: A power-law distributed natural hazard on the Barlavento Coast, Algarve, Portugal. Continental Shelf Research, 26, 1077-1091
Viavattene, C. et al., 2018. Selecting coastal hotspots to storm impacts at the regional scale: a Coastal Risk Assessment Framework. Coastal Eng., 134

Mapa IV - Nature-based solutions for coastal management

4.4.1.1.Designação da unidade curricular:
Nature-based solutions for coastal management

4.4.1.1.Title of curricular unit:
Nature-based solutions for coastal management

4.4.1.2.Sigla da área científica em que se insere:
CTER

4.4.1.3.Duração (anual, semestral ou trimestral):
Semestral/Semester

4.4.1.4.Horas de trabalho (número total de horas de trabalho):
78

4.4.1.5.Horas de contacto:
15T; 5TC

4.4.1.6.Créditos ECTS:
3

4.4.1.7.Observações:
-

4.4.1.7.Observations:
-

4.4.2.Docente responsável e respetiva carga letiva na Unidade Curricular (preencher o nome completo):
Óscar Manuel Fernandes Cerveira Ferreira - 5 T; 2.5 TC

4.4.3.Outros docentes e respetivas cargas letivas na unidade curricular:

Ana Rita Zarcos Carrasco - 5 T; 2.5 TC
María Emilia Maza Fernández - 5 T

4.4.4.Objetivos de aprendizagem (conhecimentos, aptidões e competências a desenvolver pelos estudantes):

The main objective is to demonstrate the application of nature-based and eco-engineering solutions to recover and restore coastal environments and ecosystems, minimising coastal risks and the impacts of climate change. An overview of how these ecosystems attenuate the flow energy will be provided. Various methods of intervention will be demonstrated, with practical examples, such as beach nourishment, dune recovery techniques, coral reef restoration, inlet relocation and wetlands restoration, and other ecosystem-based techniques. Mixed approaches will be taught, combining rigid engineering and green solutions. Examples of applications in diverse coastal systems and climates (from temperate to tropical) will be provided. Students will learn from results from field observations and modelling. They will be able to identify the main benefits and barriers for each nature-based solutions implementation, depending on the risk and the environment and taking into account climate change.

4.4.4.Intended learning outcomes (knowledge, skills and competences to be developed by the students):

The main objective is to demonstrate the application of nature-based and eco-engineering solutions to recover and restore coastal environments and ecosystems, minimising coastal risks and the impacts of climate change. An overview of how these ecosystems attenuate the flow energy will be provided. Various methods of intervention will be demonstrated, with practical examples, such as beach nourishment, dune recovery techniques, coral reef restoration, inlet relocation and wetlands restoration, and other ecosystem-based techniques. Mixed approaches will be taught, combining rigid engineering and green solutions. Examples of applications in diverse coastal systems and climates (from temperate to tropical) will be provided. Students will learn from results from field observations and modelling. They will be able to identify the main benefits and barriers for each nature-based solutions implementation, depending on the risk and the environment and taking into account climate change.

4.4.5.Conteúdos programáticos:

Principles and general concepts in nature-based and eco-engineering solutions applied to coastal management.
Science-based evidences of NBs applications at global scale and under relevant international programs.
Attenuation of the energy flow promoted by nature based solutions. Increased resilience of coastal systems promoted by nature based solutions.
Description of intervention methods and examples of application on a global scale: beach nourishment, green nourishment, dune recovery, salt marshes and mangroves restoration, reef interventions, inlet relocation, etc.
Description of mixed approaches (coastal and nature-based engineering, including eco-engineering) and application examples.
Simulation of case studies and discussion of appropriate potential solutions (Problem-Based Learning method) in the classroom.
Field visit to observe examples of interventions carried out in the Algarve.

4.4.5.Syllabus:

Principles and general concepts in nature-based and eco-engineering solutions applied to coastal management.
Science-based evidences of NBs applications at global scale and under relevant international programs.
Attenuation of the energy flow promoted by nature based solutions. Increased resilience of coastal systems promoted by nature based solutions.
Description of intervention methods and examples of application on a global scale: beach nourishment, green nourishment, dune recovery, salt marshes and mangroves restoration, reef interventions, inlet relocation, etc.
Description of mixed approaches (coastal and nature-based engineering, including eco-engineering) and application examples.
Simulation of case studies and discussion of appropriate potential solutions (Problem-Based Learning method) in the classroom.
Field visit to observe examples of interventions carried out in the Algarve.

4.4.6.Demonstração da coerência dos conteúdos programáticos com os objetivos de aprendizagem da unidade curricular:

This course aims to provide knowledge and tools to the students allowing them to be actors prepared to intervene in the resolution of coastal management problems and climate change challenges, in a sustainable and close to nature manner, for already vulnerable areas or as a way of adapting to the impacts of climate change. To this end, students will have theoretical content on the main mechanisms of nature-based and eco-engineering coastal management approaches, including discussion of case studies in the classroom. Field classes in threatened areas, and where natural-based solutions where already implemented, will foster the in situ discussion of the technique suitability and effectiveness to face coastal hazards and the prospect of climate change.

4.4.6.Evidence of the syllabus coherence with the curricular unit's intended learning outcomes:

This course aims to provide knowledge and tools to the students allowing them to be actors prepared to intervene in the resolution of coastal management problems and climate change challenges, in a sustainable and close to nature manner, for already vulnerable areas or as a way of adapting to the impacts of climate change. To this end, students will have theoretical content on the main mechanisms of nature-based and eco-engineering coastal management approaches, including discussion of case studies in the classroom. Field classes in threatened areas, and where

natural-based solutions where already implemented, will foster the in situ discussion of the technique suitability and effectiveness to face coastal hazards and the prospect of climate change.

4.4.7.Metodologias de ensino (avaliação incluída):

The course has 3 ECTS, corresponding to a total of 78 hours of work, distributed over 20 hours of contact and 58 hours of autonomous work. The contact hours are spread over 15 T and 5 TC. Theoretical classes will be based on oral presentations with image support, but will also include the discussion of case studies and the definition of best options for simulated situations. The field visit will be used for observation and analysis of on-site management interventions. The autonomous work will focus on the analysis and presentation of case studies and Problem Based Learning so that students can build sustainable management hypotheses based on solid arguments.
Assessment methods: Group report about a problem and possible solutions (30%) + individual written test (or exam) (70%)

4.4.7.Teaching methodologies (including students' assessment):

The course has 3 ECTS, corresponding to a total of 78 hours of work, distributed over 20 hours of contact and 58 hours of autonomous work. The contact hours are spread over 15 T and 5 TC. Theoretical classes will be based on oral presentations with image support, but will also include the discussion of case studies and the definition of best options for simulated situations. The field visit will be used for observation and analysis of on-site management interventions. The autonomous work will focus on the analysis and presentation of case studies and Problem Based Learning so that students can build sustainable management hypotheses based on solid arguments.
Assessment methods: Group report about a problem and possible solutions (30%) + individual written test (or exam) (70%)

4.4.8.Demonstração da coerência das metodologias de ensino com os objetivos de aprendizagem da unidade curricular:

The employed teaching method will allow students to acquire significant base knowledge in the subjects of this course (nature-based coastal management solutions), (a) through theoretical training, (b) science-based observations and complementary information acquired from real-world case studies, (c) from the field, (d) from the discussion of case studies through literature review and discussion and, finally, (e) from the application of solutions and discussion of management scenarios, in the classroom. In this way, a whole learning cycle is fulfilled that allows understanding of information, applying acquired knowledge and having an intervention role in the search for suitable solutions in coastal zone management, in a sustainable way.

4.4.8.Evidence of the coherence between the teaching methodologies and the intended learning outcomes:

The employed teaching method will allow students to acquire significant base knowledge in the subjects of this course (nature-based coastal management solutions), (a) through theoretical training, (b) science-based observations and complementary information acquired from real-world case studies, (c) from the field, (d) from the discussion of case studies through literature review and discussion and, finally, (e) from the application of solutions and discussion of management scenarios, in the classroom. In this way, a whole learning cycle is fulfilled that allows understanding of information, applying acquired knowledge and having an intervention role in the search for suitable solutions in coastal zone management, in a sustainable way.

4.4.9.Bibliografia de consulta/existência obrigatória:

Wortley, L., et al. 2013. Evaluating ecological restoration success: a review of the literature. Restor. Ecol. 21, 537–543.
Narayan, S., et al. 2016. The effectiveness, costs and coastal protection benefits of natural and nature-based defences. PLoS ONE, 11, e0154735.
Nesshover, C., et al. 2017. The science, policy and practice of nature-based solutions: An interdisciplinary perspective. Sci.Total Env. 579, 1215–1227.
Morris, R.L., et al. 2018 From grey to green: Efficacy of eco-engineering solutions for nature-based coastal defence. Global Ch. Biology, 1827-1842.
Reed D, et al. 2018. Tidal flat-wetland systems as flood defenses : Understanding biogeomorphic controls, Estuarine, Coast. Shelf Sci. 213: 269–282.
McKinley, E., et al. (2020) Uses and management of saltmarshes: A global survey, Estuarine, Coast.Shelf Sci.
Toimil A, et al. 2020. Addressing the challenges of climate change risks and adaptation in coastal areas: A review. Coast Eng; 156.

Mapa IV - Fieldwork and data analysis

4.4.1.1.Designação da unidade curricular:

Fieldwork and data analysis

4.4.1.1.Title of curricular unit:

Fieldwork and data analysis

4.4.1.2.Sigla da área científica em que se insere:

CTER

4.4.1.3.Duração (anual, semestral ou trimestral):
Semestral/Semester

4.4.1.4.Horas de trabalho (número total de horas de trabalho):
234

4.4.1.5.Horas de contacto:
12T;15PL;30 TC

4.4.1.6.Créditos ECTS:
9

4.4.1.7.Observações:
-

4.4.1.7.Observations:
-

4.4.2.Docente responsável e respetiva carga letiva na Unidade Curricular (preencher o nome completo):
José Manuel Quintela de Brito Jacob - 4 T; 10 TC; 5 PL

4.4.3.Outros docentes e respetivas cargas letivas na unidade curricular:
Erwan Garel - 4 T; 10 TC; 5 PL
Óscar Manuel F. Cerveira Ferreira - 4 T; 10 TC; 5 PL

4.4.4.Objetivos de aprendizagem (conhecimentos, aptidões e competências a desenvolver pelos estudantes):
The course aims to plan and implement coastal fieldwork campaigns, including the establishment of sampling objectives, strategies and needs (study area, sample spacing/interval and extension/duration), experimental plan, analysis of needs and restrictions, and security issues. The fieldwork will include measurements of topo-bathymetry, waves and currents, sediment transport and sediment sampling, among others, for several defined one-day periods of fieldwork. Students will be involved in all phases of data acquisition and processing, and presentation of results, acquiring knowledge to: (1) plan and carry out an experimental campaign for data acquisition in coastal areas, (2) know how to use appropriate instrumentation and technologies for the study and observation of coastal systems and (3) define how to compile, process and present observational data from coastal areas. The study area will be in Ria Formosa.

4.4.4.Intended learning outcomes (knowledge, skills and competences to be developed by the students):
The course aims to plan and implement coastal fieldwork campaigns, including the establishment of sampling objectives, strategies and needs (study area, sample spacing/interval and extension/duration), experimental plan, analysis of needs and restrictions, and security issues. The fieldwork will include measurements of topo-bathymetry, waves and currents, sediment transport and sediment sampling, among others, for several defined one-day periods of fieldwork. Students will be involved in all phases of data acquisition and processing, and presentation of results, acquiring knowledge to: (1) plan and carry out an experimental campaign for data acquisition in coastal areas, (2) know how to use appropriate instrumentation and technologies for the study and observation of coastal systems and (3) define how to compile, process and present observational data from coastal areas. The study area will be in Ria Formosa.

4.4.5.Conteúdos programáticos:
Theoretical, practical and laboratorial planning of the field campaigns, including objectives, sampling and measurement techniques, equipment, duration, etc., resulting in campaign planning reports.
Preparation, verification and testing of all the material needed for the field campaigns.
Fieldwork (1 week) with measurements of topo-bathymetry, waves and currents, sediment transport and sediment sampling, among others.
Laboratory and numerical processing of the data obtained, with statistical analysis, validation and definition of results.
Presentation and demonstration of results, through oral presentations and technical-scientific reports.

4.4.5.Syllabus:
Theoretical, practical and laboratorial planning of the field campaigns, including objectives, sampling and measurement techniques, equipment, duration, etc., resulting in campaign planning reports.
Preparation, verification and testing of all the material needed for the field campaigns.
Fieldwork (1 week) with measurements of topo-bathymetry, waves and currents, sediment transport and sediment sampling, among others.
Laboratory and numerical processing of the data obtained, with statistical analysis, validation and definition of results.
Presentation and demonstration of results, through oral presentations and technical-scientific reports.

4.4.6.Demonstração da coerência dos conteúdos programáticos com os objetivos de aprendizagem da unidade curricular:

This course allow students to: a) understand the need to set goals and have adequate planning before carrying out fieldwork in coastal systems; b) know several sampling technologies and instrumentation; c) acquire skills in planning fieldwork, processing and analysing data and preparing technical-scientific reports. It will be taught the fundamental theoretical and practical knowledge, essential for planning fieldwork in coastal areas. Practical knowledge of the most relevant essential aspects of sampling in coastal areas will be provided. Training will be given in technical and practical knowledge about instrumentation, equipment and sensors and in sampling methods used recurrently in various topics of coastal dynamics. A relevant part of the acquired data will be analysed, interpreted and presented as technical-scientific reports.

4.4.6.Evidence of the syllabus coherence with the curricular unit's intended learning outcomes:

This course allow students to: a) understand the need to set goals and have adequate planning before carrying out fieldwork in coastal systems; b) know several sampling technologies and instrumentation; c) acquire skills in planning fieldwork, processing and analysing data and preparing technical-scientific reports. It will be taught the fundamental theoretical and practical knowledge, essential for planning fieldwork in coastal areas. Practical knowledge of the most relevant essential aspects of sampling in coastal areas will be provided. Training will be given in technical and practical knowledge about instrumentation, equipment and sensors and in sampling methods used recurrently in various topics of coastal dynamics. A relevant part of the acquired data will be analysed, interpreted and presented as technical-scientific reports.

4.4.7.Metodologias de ensino (avaliação incluída):

Each fieldwork module (topo-bathymetry; waves and currents; sediment transport and sediment sampling) includes theoretical preparatory face-to-face classes, a one-day of fieldwork and subsequent laboratory classes (numerical analysis and sample processing), complemented by the students' autonomous work, namely in the planning of the field campaign, data processing and reports' writing. Apart from the initial theoretical preparatory classes for each module, all remaining ones will be practical, either at the field or in the laboratory (testing and use of equipment; sample analysis) or at computer rooms (data processing and analysis).
The evaluation will be based on technical-scientific reports (2/3 of the total evaluation) and their presentation (1/3 of the total evaluation), including the planning, execution, analysis and data interpretation components.

4.4.7.Teaching methodologies (including students' assessment):

Each fieldwork module (topo-bathymetry; waves and currents; sediment transport and sediment sampling) includes theoretical preparatory face-to-face classes, a one-day of fieldwork and subsequent laboratory classes (numerical analysis and sample processing), complemented by the students' autonomous work, namely in the planning of the field campaign, data processing and reports' writing. Apart from the initial theoretical preparatory classes for each module, all remaining ones will be practical, either at the field or in the laboratory (testing and use of equipment; sample analysis) or at computer rooms (data processing and analysis).
The evaluation will be based on technical-scientific reports (2/3 of the total evaluation) and their presentation (1/3 of the total evaluation), including the planning, execution, analysis and data interpretation components.

4.4.8.Demonstração da coerência das metodologias de ensino com os objetivos de aprendizagem da unidade curricular:

This course has a strong practical component, including the use of instrumentation / equipment / sensors in the field and laboratory work (including numerical laboratory). The classes will be extremely practical, to consolidate the fundamental knowledge in the planning and implementation of monitoring programs in coastal systems. The transmission of knowledge will be done in the fieldwork preparation, during the fieldwork, in the data processing and within the support of reporting. As this discipline presupposes a very active participation of students and with a high level of autonomous work, it has a high number of hours dedicated to that work (177 hours). With students being in the final stage of their master's degree and immediately before completing their thesis, this is an appropriate way to assess their degree of autonomy and to increase it.

4.4.8.Evidence of the coherence between the teaching methodologies and the intended learning outcomes:

This course has a strong practical component, including the use of instrumentation / equipment / sensors in the field and laboratory work (including numerical laboratory). The classes will be extremely practical, to consolidate the fundamental knowledge in the planning and implementation of monitoring programs in coastal systems. The transmission of knowledge will be done in the fieldwork preparation, during the fieldwork, in the data processing and within the support of reporting. As this discipline presupposes a very active participation of students and with a high level of autonomous work, it has a high number of hours dedicated to that work (177 hours). With students being in the final stage of their master's degree and immediately before completing their thesis, this is an appropriate way to assess their degree of autonomy and to increase it.

4.4.9.Bibliografia de consulta/existência obrigatória:

Emery, W.J., and Thomson, R., 2001. Data Analysis Methods in Physical Oceanography, 2nd Edition, Elsevier.
Gorman, L.T., et al. 1998. Monitoring the coastal environment; Part IV: Mapping, shoreline change, and bathymetric analysis. Journal of Coastal Research, 14(1): 61–92.
Morang, A., et al. 1997b. Monitoring the coastal environment; Part I: Waves and currents. Journal of Coastal Research, 13(1): 111–133.
Morang, A., Gorman, L.T., 2019. Monitoring coastal geomorphology. In: Encyclopedia of Coastal Science. Finkl, C.W., Makowski, C. (Eds.), Springer.
National Research Council. 1989. Measuring and Understanding Coastal Processes. Washington, DC: The National

Academies Press. https://doi.org/10.17226/1445.
Talley, L. D., et al. 2011. Descriptive Physical Oceanography, 6th Edition, Academic Press.
Trembanis, A., et al. 2020. Coastal Mapping and Monitoring, in Encyclopedia of Geology, 2nd edition.

Mapa IV - Dissertation plan

4.4.1.1.Designação da unidade curricular:
Dissertation plan

4.4.1.1.Title of curricular unit:
Dissertation plan

4.4.1.2.Sigla da área científica em que se insere:
CTER/CAMB

4.4.1.3.Duração (anual, semestral ou trimestral):
Semestral/Semester

4.4.1.4.Horas de trabalho (número total de horas de trabalho):
234

4.4.1.5.Horas de contacto:
24TP;8S;12OT

4.4.1.6.Créditos ECTS:
9

4.4.1.7.Observações:
-

4.4.1.7.Observations:
-

4.4.2.Docente responsável e respetiva carga letiva na Unidade Curricular (preencher o nome completo):
Luís Miguel de Amorim Ferreira Fernandes Nunes - 8 TP; 4 OT

4.4.3.Outros docentes e respetivas cargas letivas na unidade curricular:
Ana Maria Branco Barbosa - 8 TP; 4 OT;
Ana Margarida de Almeida Matias - 8 TP; 4 OT ;
Membro da direção de curso - 4 S
Membro da direção de curso - 4 S

4.4.4.Objetivos de aprendizagem (conhecimentos, aptidões e competências a desenvolver pelos estudantes):
The goal of this course is to guide the students through the development of their dissertation plan (DP), the first stage of the master thesis. Students should formulate a specific scientific question, review the state of the art, evaluate approaches and data requirements to solve the problem, prepare a detailed planning of the dissertation activities, describe the methods and tools to be applied, identify the main expected results and challenges, prepare a contingency plan, and write and orally present the DP. Students will develop the ability to collect and properly assess scientific information, critically review and integrate concepts from different domains, evaluate and select methodological approaches and tools, and plan the implementation of scientific-technical activities. The course also promotes the development of practical, analytical, solving, and critical thinking aptitudes, along with scientific writing, oral communication, and reasoning skills.

4.4.4.Intended learning outcomes (knowledge, skills and competences to be developed by the students):
The goal of this course is to guide the students through the development of their dissertation plan (DP), the first stage of the master thesis. Students should formulate a specific scientific question, review the state of the art, evaluate approaches and data requirements to solve the problem, prepare a detailed planning of the dissertation activities, describe the methods and tools to be applied, identify the main expected results and challenges, prepare a contingency plan, and write and orally present the DP. Students will develop the ability to collect and properly assess scientific information, critically review and integrate concepts from different domains, evaluate and select methodological approaches and tools, and plan the implementation of scientific-technical activities. The course also promotes the development of practical, analytical, solving, and critical thinking aptitudes, along with scientific writing, oral communication, and reasoning skills.

4.4.5.Conteúdos programáticos:

This course includes activities and contents promoting the development of general skills, and specific contents, variable depending on the DP topic and objectives.

General course contents include the following aspects: (1) Structuring technical and scientific documents; (2) Textual elements and scientific writing style; (3) Preparation of non-textual elements (e.g., tables, figures); (4) Effective literature search and information structuring; (5) Preparation of oral presentations; (6) Ethical, deontological and legal issues.

Specific course contents, related with the development of the DP, include: (1) undertaking an effective literature review of the topic of interest; (2) identification of the research question, specific objectives and working hypotheses; (3) planning of activities and methods to be applied, including statistical tools for data analysis; (4) writing the thesis project; and (5) preparation of the oral presentation and discussion of the DP.

4.4.5.Syllabus:

This course includes activities and contents promoting the development of general skills, and specific contents, variable depending on the DP topic and objectives.

General course contents include the following aspects: (1) Structuring technical and scientific documents; (2) Textual elements and scientific writing style; (3) Preparation of non-textual elements (e.g., tables, figures); (4) Effective literature search and information structuring; (5) Preparation of oral presentations; (6) Ethical, deontological and legal issues.

Specific course contents, related with the development of the DP, include: (1) undertaking an effective literature review of the topic of interest; (2) identification of the research question, specific objectives and working hypotheses; (3) planning of activities and methods to be applied, including statistical tools for data analysis; (4) writing the thesis project; and (5) preparation of the oral presentation and discussion of the DP.

4.4.6.Demonstração da coerência dos conteúdos programáticos com os objetivos de aprendizagem da unidade curricular:

This course aims that students develop a high-quality thesis plan in the domain of the dissertation. Course addresses fundamental aspects required for dissertation development, including scientific written and oral communication, and literature review. These activities will provide the theoretical and practical support to minimize the difficulties usually met by the students when preparing academic and technical documents. The course teaching staff comes from diversified scientific areas, thus fostering a wide-ranging approach at the level of topics and styles of publication and scientific writing. The course specific contents, related with the various stages of TP, are developed under the guidance of experts in the thesis topic, the thesis project supervisors. The contents, organization, and supervision of course activities promote the development of an original high-quality DP, that can later be implemented in the dissertation.

4.4.6.Evidence of the syllabus coherence with the curricular unit's intended learning outcomes:

This course aims that students develop a high-quality thesis plan in the domain of the dissertation. Course addresses fundamental aspects required for dissertation development, including scientific written and oral communication, and literature review. These activities will provide the theoretical and practical support to minimize the difficulties usually met by the students when preparing academic and technical documents. The course teaching staff comes from diversified scientific areas, thus fostering a wide-ranging approach at the level of topics and styles of publication and scientific writing. The course specific contents, related with the various stages of TP, are developed under the guidance of experts in the thesis topic, the thesis project supervisors. The contents, organization, and supervision of course activities promote the development of an original high-quality DP, that can later be implemented in the dissertation.

4.4.7.Metodologias de ensino (avaliação incluída):

The UC includes: (a) theoretical-practical sessions with expository and practical component (24 h); (b) tutorial sessions (12 h); and (c) seminars (8 h). In the former the main subjects regarding scientific research, writing and presentation are discussed. Students are then faced with practical exercises, for which they need to propose the best solutions. Two tutorial sessions, scheduled for mid-semester, are used to supervise the development of the DP. Seminars are used for oral presentation and discussion of the DP. The activities associated with the autonomous study (81% of total workload) are developed in close collaboration with the DP supervisor(s).

Course evaluation includes a written report and an oral presentation, both mandatory, representing 70% and 30% of the grade, respectively. Final grade is assigned together by the responsible of course, a member of the direction board, and the DP supervisor. Evaluation criteria are provided in specific regulation.

4.4.7.Teaching methodologies (including students' assessment):

The UC includes: (a) theoretical-practical sessions with expository and practical component (24 h); (b) tutorial sessions (12 h); and (c) seminars (8 h). In the former the main subjects regarding scientific research, writing and presentation are discussed. Students are then faced with practical exercises, for which they need to propose the best solutions. Two tutorial sessions, scheduled for mid-semester, are used to supervise the development of the DP. Seminars are used for oral presentation and discussion of the DP. The activities associated with the autonomous study (81% of total workload) are developed in close collaboration with the DP supervisor(s).

Course evaluation includes a written report and an oral presentation, both mandatory, representing 70% and 30% of the

grade, respectively. Final grade is assigned together by the responsible of course, a member of the direction board, and the DP supervisor. Evaluation criteria are provided in specific regulation.

4.4.8.Demonstração da coerência das metodologias de ensino com os objetivos de aprendizagem da unidade curricular:

Theoretical-practical lectures are used for presenting and discussing all general knowledge required for the preparation of the thesis plan, thesis writing and oral defense, including scientific writing and oral communication techniques. Students are guided through the exploration of specialized bibliography to expand and detail lecture contents. During these activities, the methods are firstly demonstrated, and students will then have the opportunity of experimenting/exploring real case studies, and sequentially assemble the set of elements that compose technical and scientific studies. In this context, specific case studies of interest to the students and their respective DP will be used. Two tutorial sessions, scheduled for mid-semester, are used to supervise the development of the DP. Course contact activities promote the development of critical thinking aptitudes, and scientific writing, oral communication, and reasoning skills. Further, these aptitudes are used to support student autonomous study, and the development of the different stages of the thesis plan.

Given the nature of the UC, its activities and workload are predominantly associated with autonomous study, that is developed in close collaboration with the supervisor(s). Course autonomous study should be used for the development of the different stages of the DP, under the guidance of the supervisors, and support from course lecturers. This course component aims to promote student autonomy, practical, analytical, solving, reasoning, and critical thinking aptitudes, along with the development of an original high-quality master dissertation, always respecting ethical and deontological issues.
After concluding the DP written report, developed under the guidance of the supervisors, students should prepare its oral presentation and defense, using the previously acquired knowledge and appropriate technological support. The presentation and discussion (course seminars) enhance the student oral presentation skills and represent an opportunity for effectively improving the quality of thesis dissertation. Seminars are the final stage of the course, and will be also evaluated, along with the thesis plan written report. The dissertation plan is harmonized between all consortium institutions (UAlg, IHE and UC).

4.4.8.Evidence of the coherence between the teaching methodologies and the intended learning outcomes:

Theoretical-practical lectures are used for presenting and discussing all general knowledge required for the preparation of the thesis plan, thesis writing and oral defense, including scientific writing and oral communication techniques. Students are guided through the exploration of specialized bibliography to expand and detail lecture contents. During these activities, the methods are firstly demonstrated, and students will then have the opportunity of experimenting/exploring real case studies, and sequentially assemble the set of elements that compose technical and scientific studies. In this context, specific case studies of interest to the students and their respective DP will be used. Two tutorial sessions, scheduled for mid-semester, are used to supervise the development of the DP. Course contact activities promote the development of critical thinking aptitudes, and scientific writing, oral communication, and reasoning skills. Further, these aptitudes are used to support student autonomous study, and the development of the different stages of the thesis plan.

Given the nature of the UC, its activities and workload are predominantly associated with autonomous study, that is developed in close collaboration with the supervisor(s). Course autonomous study should be used for the development of the different stages of the DP, under the guidance of the supervisors, and support from course lecturers. This course component aims to promote student autonomy, practical, analytical, solving, reasoning, and critical thinking aptitudes, along with the development of an original high-quality master dissertation, always respecting ethical and deontological issues.
After concluding the DP written report, developed under the guidance of the supervisors, students should prepare its oral presentation and defense, using the previously acquired knowledge and appropriate technological support. The presentation and discussion (course seminars) enhance the student oral presentation skills and represent an opportunity for effectively improving the quality of thesis dissertation. Seminars are the final stage of the course, and will be also evaluated, along with the thesis plan written report. The dissertation plan is harmonized between all consortium institutions (UAlg, IHE and UC).

4.4.9.Bibliografia de consulta/existência obrigatória:

Day, RA, Gastel B, 2017. How to write and publish a scientific paper., 8th Ed., Greenwood Press, Westport.
Doumont, J. (ed), 2010. English communication for scientists. Cambridge, MA: NPG Education.
Frankel, FC, DePace A, 2012. Visual strategies: A practical guide to graphics for scientists and engineers. Yale U. Press.
Johnson, S, Scot J, 2019. Study & communication skills for the biosciences, 3rd Ed., Oxford U. Press.
Kalpakjian, CZ, Meade M, 2008. Writing manuscripts for peer review: your guide to not annoying reviewers and increasing your chances of success. Sex Disabil 6:229-240.
Mack, CA, 2012. How to write a good scientific paper: title, abstract, and keywords. J Micro/Nanolitho., MEMS, and MOEMS 11(2), 020101.
Schimel, J, 2011. Writing science: how to write papers that get cited and proposals that get funded. Oxford U. Press.
Thomson Reuters. Using bibliometrics: a guide to evaluating research performance with citation data. http://ips.clarivate.com/m/pdfs/325133_thomson.pdf

Mapa IV - Dissertation

4.4.1.1.Designação da unidade curricular:

Dissertation

4.4.1.1.Title of curricular unit:
Dissertation

4.4.1.2.Sigla da área científica em que se insere:
CTER/CAMB

4.4.1.3.Duração (anual, semestral ou trimestral):
Semestral/Semester

4.4.1.4.Horas de trabalho (número total de horas de trabalho):
780

4.4.1.5.Horas de contacto:
45 S

4.4.1.6.Créditos ECTS:
30

4.4.1.7.Observações:
-

4.4.1.7.Observations:
-

4.4.2.Docente responsável e respetiva carga letiva na Unidade Curricular (preencher o nome completo):
Maria da Conceição L.Videira L. Neves - 15 S

4.4.3.Outros docentes e respetivas cargas letivas na unidade curricular:
Luís Miguel de Amorim F. Fernandes Nunes - 15 S
Óscar Manuel Fernandes Cerveira Ferreira - 15 S

4.4.4.Objetivos de aprendizagem (conhecimentos, aptidões e competências a desenvolver pelos estudantes):
Development of skills necessary to autonomously carrying out relevant research or technical work. It is intended that the student develop the following knowledge and skills: 1) formulate a relevant research/technical question; 2) demonstrate in-depth knowledge of the literature relating to the area of research; 3) know and correctly use methodological procedures; 4) analyse the results; 5) interpret and discuss the results; 6) develop capacity for critical analysis and synthesis; 7) develop writing and oral communication skills.

4.4.4.Intended learning outcomes (knowledge, skills and competences to be developed by the students):
Development of skills necessary to autonomously carrying out relevant research or technical work. It is intended that the student develop the following knowledge and skills: 1) formulate a relevant research/technical question; 2) demonstrate in-depth knowledge of the literature relating to the area of research; 3) know and correctly use methodological procedures; 4) analyse the results; 5) interpret and discuss the results; 6) develop capacity for critical analysis and synthesis; 7) develop writing and oral communication skills.

4.4.5.Conteúdos programáticos:
There is no specific scientific content associated with this curricular unit as it varies according to the theme and objectives of the dissertation. In general terms, the following syllabus can be defined: 1) Execution of the empirical study (execution of the experimental/technical design, execution of experimental tasks, data collection, modelling) 2) Analysis of results (organisation and presentation of results, graphs, tables, data analysis, statistical analysis) 3) Structuring and writing the dissertation 4) Public discussion of the dissertation demonstrating communication skills for specialists and the general public.

4.4.5.Syllabus:
There is no specific scientific content associated with this curricular unit as it varies according to the theme and objectives of the dissertation. In general terms, the following syllabus can be defined: 1) Execution of the empirical study (execution of the experimental/technical design, execution of experimental tasks, data collection, modelling) 2) Analysis of results (organisation and presentation of results, graphs, tables, data analysis, statistical analysis) 3) Structuring and writing the dissertation 4) Public discussion of the dissertation demonstrating communication skills for specialists and the general public.

4.4.6.Demonstração da coerência dos conteúdos programáticos com os objetivos de aprendizagem da unidade curricular:
In this curricular unit, the student implements the research outlined, namely, the collection of data through the methodologies previously established, and the analysis, treatment and discussion of the results obtained. Finally, the student writes the research report and discusses it publicly. The methodologies vary according to the theme of the dissertation, but always with the aim of achieving the learning objectives described.

4.4.6.Evidence of the syllabus coherence with the curricular unit's intended learning outcomes:
In this curricular unit, the student implements the research outlined, namely, the collection of data through the methodologies previously established, and the analysis, treatment and discussion of the results obtained. Finally, the student writes the research report and discusses it publicly. The methodologies vary according to the theme of the dissertation, but always with the aim of achieving the learning objectives described.

4.4.7.Metodologias de ensino (avaliação incluída):
The work to be developed can be carried out in an academic environment, in research centres, in institutes or in companies, namely using the constituent partners of the COASTHazar consortium. The supervisor(s) systematically monitors all aspects of the dissertation execution and provides specific guidelines for its correct evolution. The thesis consists of the written submission of a dissertation, in English. The supervision, admission to tests, constitution of the jury, acceptance of the work and public act of defence of the dissertation are regulated in the "Regulation of 2nd and 3rd cycles of the University of Algarve" and also in accordance with the specific definitions of the COASTHazar consortium, namely in accordance with the Partnership Agreement. The evaluation includes appreciation of the written dissertation and the oral presentation.

4.4.7.Teaching methodologies (including students' assessment):
The work to be developed can be carried out in an academic environment, in research centres, in institutes or in companies, namely using the constituent partners of the COASTHazar consortium. The supervisor(s) systematically monitors all aspects of the dissertation execution and provides specific guidelines for its correct evolution. The thesis consists of the written submission of a dissertation, in English. The supervision, admission to tests, constitution of the jury, acceptance of the work and public act of defence of the dissertation are regulated in the "Regulation of 2nd and 3rd cycles of the University of Algarve" and also in accordance with the specific definitions of the COASTHazar consortium, namely in accordance with the Partnership Agreement. The evaluation includes appreciation of the written dissertation and the oral presentation.

4.4.8.Demonstração da coerência das metodologias de ensino com os objetivos de aprendizagem da unidade curricular:
The work to be developed in this curricular unit corresponds to an active learning process centred on the student under the supervision of the supervisor(s) and the methodological approach is adapted to meet the needs of each student and topic. Students are encouraged to work independently, to develop the ability to collect and critically review literature, design experiences, learn and apply methodologies, and interpret results. Students also has the opportunity to acquire knowledge and develop skills through interaction with colleagues in the place where the research is carried out and in tutorial sessions with the supervisor(s).

4.4.8.Evidence of the coherence between the teaching methodologies and the intended learning outcomes:
The work to be developed in this curricular unit corresponds to an active learning process centred on the student under the supervision of the supervisor(s) and the methodological approach is adapted to meet the needs of each student and topic. Students are encouraged to work independently, to develop the ability to collect and critically review literature, design experiences, learn and apply methodologies, and interpret results. Students also has the opportunity to acquire knowledge and develop skills through interaction with colleagues in the place where the research is carried out and in tutorial sessions with the supervisor(s).

4.4.9.Bibliografia de consulta/existência obrigatória:
Not applicable

4.5. Metodologias de ensino e aprendizagem

4.5.1.Adequação das metodologias de ensino e aprendizagem aos objetivos de aprendizagem (conhecimentos, aptidões e competências) definidos para o ciclo de estudos:
Este programa, Erasmus Mundus, possui métodos de ensino partilhados entre 3 instituições. No 1º semestre (UCantabria), os estudantes aprenderão competências em ciências oceânicas, incluindo teoria de ondas e processos costeiros, métodos numéricos e programação MATLAB, obtendo as bases para prosseguirem para cursos avançados. O 2º semestre, na IHE, fornece conhecimentos em dinâmica costeira e proteção costeira, e em ferramentas de modelação aplicada aos impactos e adaptação às alterações climáticas. No terceiro semestre, na UAlg, os estudantes terão cursos avançados em riscos costeiros e em gestão costeira com base em aproximações sustentáveis. Uma unidade curricular importante será a de "Fieldwork and data analyis", incluindo campanhas de campo nas ilhas barreira da Ria Formosa, com aprendizagem sobre instrumentos, aquisição e análise de dados. Os estudantes obterão uma sólida formação em teoria, prática e modelação em riscos costeiros e impactos das alterações climáticas.

4.5.1.Evidence of the teaching and learning methodologies coherence with the intended learning outcomes of the study programme:

This program, an Erasmus Mundus, has teaching methods shared between 3 institutions. During the 1st semester (UCantabria), students will get the fundamental skills and competencies in ocean sciences, including wave theory and nearshore processes, applied numerical methods and MATLAB programming, providing the foundations to pursue advanced courses. The 2nd semester, at IHE, provides knowledge and skills in coastal dynamics and protection, basic and applied modelling tools on climate change impacts and adaptation. In the third semester, at UAlg, students will have advanced courses in coastal and marine hazards and building with nature tools for coastal management. An important course will be the "Fieldwork and data analysis" including field campaigns at the Ria Formosa barrier islands. Students will learn about instruments, data acquisition and analysis. Students will end with a solid background in theory, practice and modelling of coastal hazards and climate change impacts.

4.5.2.Forma de verificação de que a carga média de trabalho que será necessária aos estudantes corresponde ao estimado em créditos ECTS:

Não há um método para estimar a carga de trabalho necessária ao estudante para atingir os objetivos de cada unidade curricular. Existem diferentes necessidades de estudante para estudante (de todo o mundo e com diferentes bases formativas) e de unidade curricular para unidade curricular. Dois elementos são utilizados para avaliar a carga de trabalho: 1) Observação por cada docente das competências médias dos estudantes e da relação com o esforço despendido; 2) No final de cada semestre os estudantes deverão responder a um questionário sobre Perceções do Ensino/Aprendizagem em cada unidade curricular. Uma das perguntas é: "A carga de trabalho da unidade curricular foi adequada face às unidades de crédito definidas (ECTS)?" A resposta permite obter a visão do estudante. Os desvios identificados são reportados à direção de curso para ponderação e correção. Há, nesta proposta, uma articulação dos ECTS pela carga estimada de cada unidade curricular, nas diferentes instituições.

4.5.2.Means to verify that the required students' average workload corresponds the estimated in ECTS credits:

There is no method to estimate the workload needed by the student to achieve the objectives of each course. There are disparities in needs from student to student (from all over the world and with different backgrounds) and from course to course. Two elements are used to evaluate the workload: 1) Observation by each teacher of the students' average skills and the relationship with the effort spent. 2) At the end of each semester, students must answer a questionnaire on Perceptions of Teaching / Learning in each curricular unit. One of the questions is: "Was the workload of the course adequate in relation to the defined credit units (ECTS)?" The answer to this question allows to get the student's vision. The identified deviations are reported to the course director for comparative weighting and eventual correction. There is, in this proposal, an attempt to articulate the ECTS by the estimated load of each course, at the different institutions.

4.5.3.Formas de garantia de que a avaliação da aprendizagem dos estudantes será feita em função dos objetivos de aprendizagem da unidade curricular:

Serão adotados processos de avaliação dos estudantes adequados aos objetivos de aprendizagem pretendidos, por unidade curricular. A avaliação dos estudantes é efetuada de acordo com critérios, normas e procedimentos definidos e variáveis em função de cada matéria ou conjunto de matérias, incluindo testes escritos, relatórios, apresentações, demonstração de aplicação de ferramentas (ex. modelos numéricos). Os critérios são previamente publicitados e aplicados de forma justa e consistente. A avaliação será sempre função da demonstração do cumprimento dos objetivos de aprendizagem fixados. Os estudantes recebem, ao longo do seu percurso, informação sobre o seu desempenho e aconselhamento sobre o processo de aprendizagem e melhoria. Os regulamentos de avaliação têm em consideração circunstâncias mitigadoras. Existe um procedimento formal de recurso por parte dos estudantes, bem como épocas de recurso e de finalistas.

4.5.3.Means of ensuring that the students assessment methodologies are adequate to the intended learning outcomes:

Assessment processes adequate to the intended learning objectives will be developed according to the subject of each course. Students' evaluation is carried out according to criteria, rules and procedures defined and variable depending on each subject or set of subjects, including written assessments, reports, presentations, demonstration of the application of tools (eg numerical models). The criteria are previously publicized and applied in a fair and consistent manner. The evaluation will always be a function of the demonstrated fulfilment of the established learning objectives. Students receive information about their performance and advice on the learning process and potential improvement. The evaluation regulations take into account mitigating circumstances. There is a formal appeal procedure for the students, as well as resit and final-year student exams.

4.5.4.Metodologias de ensino previstas com vista a facilitar a participação dos estudantes em atividades científicas (quando aplicável):

Um dos objetivos do COASTHazar é formar estudantes com capacidade para efetuar investigação em riscos costeiros e alterações climáticas, incluindo a escrita de uma dissertação e de artigos em revistas especializadas. Os estudantes serão integrados em equipas de investigação (de parceiros principais e associados), incluindo investigação aplicada quando em cooperação com os parceiros associados. Isso acontecerá na dissertação, mas também durante estágios nos parceiros associados. Os projetos de investigação em curso, nos parceiros principais, terão tópicos disponíveis para as teses de mestrado. Os estágios foram explicitamente incluídos como um elemento opcional para os estudantes, permitindo que eles adquiram conhecimento e experiência ao integrarem uma empresa ou grupo de investigação por 4-6 semanas. Os estudantes que desejem seguir uma carreira de investigação serão orientados sobre oportunidades de financiamento de doutoramento e sobre tópicos de investigação interessantes.

4.5.4.Teaching methodologies that promote the participation of students in scientific activities (as applicable):

One goal of COASTHazar is to form students that have the capacity to perform advanced research on scientific topics related to coastal hazards and climate change and to write a dissertation, as well as academic manuscripts for peer-review journals. Students will be integrated in already existing research teams (from main and associated partners), including applied research when in cooperation with associated partners. This will happen during the thesis but also during internships at the associated partners. The ongoing research projects at the main partners will have available topics for the MSc thesis. Internships have been explicitly included as an optional element for the students, allowing the students to gain insight and experience by joining a company or a research group for 4-6 weeks. Students who wish to pursue a career in research will be advised on existing PhD funding opportunities and potentially interesting research topics.

4.6. Fundamentação do número total de créditos ECTS do ciclo de estudos

4.6.1.Fundamentação do número total de créditos ECTS e da duração do ciclo de estudos, com base no determinado nos artigos 8.º ou 9.º (1.º ciclo), 18.º (2.º ciclo), 19.º (mestrado integrado) e 31.º (3.º ciclo) do DL-74/2006, na redação dada pelo DL-65/2018:

O COASTHazar é um ciclo de estudos conducente ao grau de mestre, com 120 créditos ECTS e uma duração de quatro semestres curriculares, com 30 ECTS cada, em conformidade com o que é praticado nas três instituições parceiras e de acordo com o processo de Bolonha. Os três primeiros semestres são, maioritariamente, de aulas (81 ECTS) e incluem, ainda, um Plano de Dissertação (9 ECTS). O último semestre (30 ECTS) é inteiramente dedicado à dissertação. Por cada ECTS são estimadas 26 h de trabalho, sendo genericamente 25-30% desse trabalho presencial (em sala de aula ou no campo) e 70-75% autónomo, ainda que com variações de acordo com as especificidades das unidades curriculares e do que é normalmente praticado em cada instituição.

4.6.1.Justification of the total number of ECTS credits and of the duration of the study programme, based on articles 8 or 9 (1st cycle), 18 (2nd cycle), 19 (integrated master) and 31 (3rd cycle) of DL no. 74/2006, republished by DL no. 65/2018:

COASTHazar is a study cycle leading to the master's degree, with 120 ECTS credits and a duration of four curricular semesters, with 30 ECTS each, in agreement with the practice at all main partners and with the Bologna Process. The first three semesters are mostly composed of classes (81 ECTS) and include a Dissertation Plan (9 ECTS). The last semester (30 ECTS) is entirely dedicated to the dissertation. For each ECTS, an estimated 26 h of individual work will be performed, with generally 25-30% of that work being face-to-face (in the classroom or in the field) and 70-75% autonomous, although with variations according to the specificities of the subjects and the practice of each institution.

4.6.2.Forma como os docentes foram consultados sobre a metodologia de cálculo do número de créditos ECTS das unidades curriculares:

Cada docente, ou grupo de docentes, definiu o número de créditos adequado às unidades curriculares em que participa, de acordo com a carga letiva esperada para cada unidade curricular e com as regras praticadas na sua instituição. Na UAlg essas regras ditam que, em média, não deverá haver mais do que 25% de horas de contacto relativamente à totalidade de horas de trabalho cada unidade curricular. Posteriormente, foram efetuados alguns ajustes, em concordância com os docentes, para garantir que todos os semestres possuíam um número total final de 30 ECTS e uma percentagem de horas de trabalho presencial equilibrado.

4.6.2.Process used to consult the teaching staff about the methodology for calculating the number of ECTS credits of the curricular units:

Each lecturer, or group of lecturers, defined the number of credits appropriate to the course units in which they participate, according to the expected teaching load for each subject and with the rules in place at each institution. At UAlg, these rules dictate that, on average, the classroom hours should not exceed 25% of the total working hours of each course unit. Subsequently, some adjustments were made, in agreement with the teachers, to ensure that all semesters had a final total number of 30 ECTS and a balanced percentage of face-to-face working hours.

4.7. Observações

4.7.Observações:

Este mestrado integra três instituições europeias, cada uma delas, com regras de funcionamento próprio. Assim, a carga letiva por ECTS é variável de instituição para instituição, variando entre 25 h por ECTS na Universidade da Cantábria até 28 h por ECTS na IHE Delft. De acordo com as recomendações do Programa Erasmus Mundus, devem manter-se as especificidades de cada instituição, não sendo necessária uma uniformização total no funcionamento. Verifica-se, também, que a percentagem de horas de contacto varia de instituição para instituição, de mínimos de 25% na Universidade do Algarve até máximos de cerca de 50% na IHE Delft. No entanto, há uma redução de carga horária presencial do 1º para o 2º ano, permitindo que os alunos cada vez mais desenvolvam trabalho autónomo, bem como o plano de dissertação e a dissertação de forma mais individual.

4.7.Observations:

This master's degree integrates three European institutions, each with its own rules of operation. Thus, the teaching load per ECTS varies from institution to institution, ranging from 25 h per ECTS at the University of Cantabria to 28 h per ECTS at IHE Delft. In accordance with the recommendations of the Erasmus Mundus Programme, the specificities of each institution must be maintained, with no need for a total standardization of operation. It can also be seen that the

percentage of contact hours varies from institution to institution, from a minimum of 25% at the University of Algarve to a maximum of around 50% at IHE Delft. However, there is a reduction in the classroom workload from the 1st to the 2nd year, allowing students to increasingly develop autonomous work, as well as the dissertation plan and the dissertation in a more individual way.

5. Corpo Docente

5.1. Docente(s) responsável(eis) pela coordenação da implementação do ciclo de estudos.

5.1.Docente(s) responsável(eis) pela coordenação da implementação do ciclo de estudos.

A coordenação internacional será efetuada por:
Álvaro Milho Semedo, IHE Delft, coordenador geral, Prof. Associado
Óscar Manuel Ferreira, Universidade do Algarve, Prof. Associado com Agregação
José A Juanes, Universidade de Cantábria, Prof. Catedrático

A direção de curso na Universidade do Algarve é da responsabilidade de:
Óscar Manuel Ferreira, Prof. Associado com Agregação
Luís Nunes, Prof. Auxiliar
Maria Conceição Neves, Prof. Auxiliar

The International coordination will be carried out by:
Álvaro Milho Semedo, IHE Delft, general coordinator, Senior Lecturer
Óscar Manuel Ferreira, University of Algarve, Prof. Associado com Agregação
José A Juanes, University of Cantábria, Full Professor

The direction board within the Univeristy of Algarve includes:
Óscar Manuel Ferreira, Prof. Associado com Agregação
Luís Nunes, Prof. Auxiliar
Maria Conceição Neves, Prof. Auxiliar

5.3 Equipa docente do ciclo de estudos (preenchimento automático)

5.3. Equipa docente do ciclo de estudos / Study programme's teaching staff

Nome / Name	Categoria / Category	Grau / Degree	Vínculo/ Link	Especialista / Specialist	Área científica / Scientific Area	Regime de tempo / Employment regime	Informação/ Information
Ana Margarida de Almeida Matias	Investigador	Doutor	Investigador de Carreira (Art. 3º, alínea l) do DL-74/2006, na redação fixada pelo DL-65/2018)	Não	Ciências do Mar	100	Ficha submetida
Ana Maria Branco Barbosa	Professor Auxiliar ou equivalente	Doutor	Docente de Carreira (Art. 3º, alínea k) do DL-74/2006, na redação fixada pelo DL-65/2018)	Não	Ciências do Mar	100	Ficha submetida
Ana Rita Zarcos Carrasco	Investigador	Doutor	Outro	Não	Ciências do Mar, da Terra e do Ambiente	100	Ficha submetida
Erwan Garel	Investigador	Doutor	Investigador de Carreira (Art. 3º, alínea l) do DL-74/2006, na redação fixada pelo DL-65/2018)	Não	Geociências Marinhas	100	Ficha submetida
José Manuel Quintela de Brito Jacob	Professor Auxiliar ou equivalente	Doutor	Docente de Carreira (Art. 3º, alínea k) do DL-74/2006, na redação fixada pelo DL-65/2018)	Não	Engenharia do Ambiente	100	Ficha submetida
Luís Miguel de Amorim Ferreira Fernandes Nunes	Professor Auxiliar ou equivalente	Doutor	Docente de Carreira (Art. 3º, alínea k) do DL-74/2006, na redação fixada pelo DL-65/2018)	Não	Engenharia	100	Ficha submetida
Maria da Conceição Lopes Videira Louro Neves	Professor Auxiliar ou equivalente	Doutor	Docente de Carreira (Art. 3º, alínea k) do DL-74/2006, na redação fixada pelo DL-65/2018)	Não	Geofísica	100	Ficha submetida

Óscar Manuel Fernandes Cerveira Ferreira	Professor Associado ou equivalente	Doutor	Docente de Carreira (Art. 3º, alínea k) do DL-74/2006, na redação fixada pelo DL-65/2018)	Não	Ciências do Mar	100	Ficha submetida
Albertus Ruben Van Dongeren	Professor Associado ou equivalente	Doutor	Outro	Não	Coastal hydrodynamics	0	Ficha submetida
Alvaro Semedo	Professor Auxiliar ou equivalente	Doutor	Outro	Não	Meteorology	0	Ficha submetida
Iñigo Losada	Professor Catedrático ou equivalente	Doutor	Outro	Não	Engenharia Civil	0	Ficha submetida
Jan Adriaan (‘Dano’) Roelvink	Professor Catedrático ou equivalente	Doutor	Outro	Não	Technical Sciences – Civil Engineering	0	Ficha submetida
José A Juanes	Professor Catedrático ou equivalente	Doutor	Outro	Não	Marine Biology	0	Ficha submetida
María Emilia Maza Fernández	Professor Auxiliar ou equivalente	Doutor	Outro	Não	Coastal Engineering	0	Ficha submetida
Melisa Menendez	Professor Associado ou equivalente	Doutor	Outro	Não	Coastal Engineering	0	Ficha submetida
Mick van der Wegen	Professor Associado ou equivalente	Doutor	Outro	Não	Estuarine morphodynamics	0	Ficha submetida
Raul Medina	Professor Catedrático ou equivalente	Doutor	Outro	Não	Civil Engineer	0	Ficha submetida
Roshanka Ranasinghe	Professor Associado ou equivalente	Doutor	Outro	Não	Coastal Engineering and Oceanography	0	Ficha submetida
Pedro Díaz Simal	Professor Catedrático ou equivalente	Doutor	Outro	Não	Civil Engineer/Economics	0	Ficha submetida
						800	

<sem resposta>

5.4. Dados quantitativos relativos à equipa docente do ciclo de estudos.

5.4.1. Total de docentes do ciclo de estudos (nº e ETI)

5.4.1.1.Número total de docentes.

19

5.4.1.2.Número total de ETI.

8

5.4.2. Corpo docente próprio – docentes do ciclo de estudos integrados na carreira docente ou de investigação (art.º 3 DL-74/2006, na redação fixada pelo DL-65/2018).

5.4.2. Corpo docente próprio – docentes do ciclo de estudos integrados na carreira docente ou de investigação (art.º 3 DL-74/2006, na redação fixada pelo DL-65/2018).* / "Career teaching staff" – teachers of the study programme integrated in the teaching or research career.*

Vínculo com a IES / Link with HEI	% em relação ao total de ETI / % of the total of FTE	
Investigador de Carreira (Art. 3º, alínea l) do DL-74/2006, na redação fixada pelo DL-65/2018)	25	100
Docente de Carreira (Art. 3º, alínea k) do DL-74/2006, na redação fixada pelo DL-65/2018)	62.5	100
Outro	12.5	100

5.4.3. Corpo docente academicamente qualificado – docentes do ciclo de estudos com o grau de doutor

5.4.3. Corpo docente academicamente qualificado – docentes do ciclo de estudos com o grau de doutor* / "Academically qualified teaching staff" – staff holding a PhD*

Corpo docente academicamente qualificado / Academically qualified teaching staff	ETI / FTE	Percentagem* / Percentage*
Docentes do ciclo de estudos com o grau de doutor (ETI) / Teaching staff holding a PhD (FTE):	8	100

5.4.4. Corpo docente especializado

5.4.4. Corpo docente especializado / Specialised teaching staff.

Corpo docente especializado / Specialized teaching staff	ETI / FTE	Percentagem* / Percentage*
Doutorados especializados na(s) área(s) fundamental(is) do CE (% total ETI) / PhDs specialised in the fundamental area(s) of the study programme (% total FTE)	5	62.5
Não doutorados, especializados nas áreas fundamentais do CE (% total ETI) / Staff specialised in the fundamental areas of the study programme not holding PhDs in these areas (% total FTE)	0	0
Não doutorados na(s) área(s) fundamental(is) do CE, com Título de Especialista (DL 206/2009) nesta(s) área(s) (% total ETI) / Specialists not holding a PhD, but with a Specialist Title (DL 206/2009) in the fundamental area(s) of the study programme (% total FTE)	0	0
% do corpo docente especializado na(s) área(s) fundamental(is) (% total ETI)		62.5
% do corpo docente doutorado especializado na(s) área(s) fundamental(is) (% docentes especializados)		100

5.4.5. Corpo Docente integrado em Unidades de Investigação da Instituição, suas subsidiárias ou polos nela integrados (art.º 29.º DL-74/2006, na redação fixada pelo DL-65/2018)

5.4.5. Corpo Docente integrado em Unidades de Investigação da Instituição, suas subsidiárias ou polos nela integrados (art.º 29.º DL-74/2006, na redação fixada pelo DL-65/2018) / Teaching Staff integrated in Research Units of the Institution, its subsidiaries or integrated centers (article 29, DL no. 74/2006, as written in the DL no. 65/2018)

Descrição	ETI / FTE	Percentagem* / Percentage*
Corpo Docente integrado em Unidades de Investigação da Instituição, suas subsidiárias ou polos nela integrados / Teaching Staff integrated in Research Units of the Institution, its subsidiaries or integrated centers	8	100

5.4.6. Estabilidade e dinâmica de formação do corpo docente.

5.4.6. Estabilidade e dinâmica de formação do corpo docente. / Stability and development dynamics of the teaching staff

Estabilidade e dinâmica de formação / Stability and tranning dynamics	ETI / FTE	Percentagem* / Percentage*	
Docentes do ciclo de estudos de carreira com uma ligação à instituição por um período superior a três anos / Career teaching staff of the study programme with a link to the institution for over 3 years	5	62.5	8
Docentes do ciclo de estudos inscritos em programas de doutoramento há mais de um ano (ETI) / FTE number of teaching staff registered in PhD programmes for over one year	0	0	8

Pergunta 5.5. e 5.6.

5.5.Procedimento de avaliação do desempenho do pessoal docente e medidas conducentes à sua permanente atualização e desenvolvimento profissional.

A avaliação de desempenho do pessoal docente decorre do estabelecido no ECDU, tendo como vetores de avaliação o ensino, a investigação, as atividades de extensão e de gestão. A operacionalização deste procedimento na FCT rege-se pelo Reg geral de avaliação de desempenho do pessoal docente da UAlg, aprovado pelo Reitor (Reg.º 4319/2019, pub DR, 2ª s, n.º 80, de 24.04. 2019) e pelo reg específico para avaliação dos docentes da FCT (Reg n.º 861/2019, pub DR, 2ª s, n.º 213, de 6.11, e, retificado pela Dec. retificação n.º 940/2019, pub no DR, 2ª s, n.º 231, de 2.12.2019).

A Coordenadora da Avaliação dos Docentes da UAlg, composta pelos diretores das UO orgânicas e pelo Reitor, acompanha todo o processo. Nas UO há uma Comissão Coordenadora de Avaliação dos Docentes, sendo os respetivos conselhos científicos a ratificar as classificações finais.

A UAlg oferece aos docentes formação para atualização, em áreas pertinentes como por exemplo conteúdos digitais, comunicação digital e outras.

5.5.Procedures for the assessment of the teaching staff performance and measures for their permanent updating and professional development.

The evaluation of the performance of the teaching staff stems from the ECDU, with teaching, research, extension and management activities as the evaluation vectors.
The operationalisation of this procedure at FCT is governed by the general reg. of performance evaluation of the teaching staff of UAlg, approved by the Rector (Reg 4319/2019, published in the DR, 2nd s, no. 80, 24.04.2019) and the specific regulation for the evaluation of FCT lecturers (Reg. 861/2019, pub in the DR, 2nd s, no. 213, of 6.11, and, as amended by the Rectification no. 940/2019, pub in the DR, 2nd s, no. 231, 02.12. 2019).
The UAlg Faculty Evaluation Coordinator, composed of the directors of the organic units and the Rector, monitors the entire process. In the faculties, there is a Coordinating Evaluation Commission, and the respective scientific councils ratify the final classifications.
UAlg offers teachers training for updating, in relevant areas such as digital content, digital communication and others.

5.6.Observações:

A IHE Delft e a Universidade da Cantábria possuem, igualmente, métodos criteriosos de avaliação dos seus docentes, de acordo com a legislação e regulamentação aplicada em cada uma das instituições parceiras, que podem ser solicitados e consultados, se necessário. Haverá, no âmbito do mestrado Erasmus Mundus, uma avaliação dos docentes e das unidades curriculares por parte dos alunos, similar para todas as disciplinas ministradas. Essa avaliação será depois verificada e analisada pela comissão de coordenação do mestrado. Caso se verifiquem problemas relativos à lecionação de alguma disciplina, a comissão de coordenação tomará medidas no sentido de minimizar ou eliminar os problemas, incluindo a proposta de substituição de docentes, quando necessário.

5.6.Observations:

IHE Delft and the University of Cantabria also have judicious methods of evaluating their professors, in accordance with the legislation and regulations applied in each of the partner institutions, which can be requested and consulted, if necessary. Within the scope of the Erasmus Mundus programme, there will be an assessment of teachers and curricular units by students, similar for all subjects taught. This evaluation will then be verified and analysed by the master's coordination committee. If there are problems related to the teaching of any subject, the coordination committee will take measures to minimise or eliminate the problems, including the proposal of teacher replacement, when necessary.

6. Pessoal Não Docente

6.1.Número e regime de tempo do pessoal não-docente afeto à lecionação do ciclo de estudos.

Para apoio geral, a Faculdade (FCT) tem o Gabinete de Apoio ao Estudante, composto por 3 trabalhadores, todos assistentes técnicos. Também tem um Gabinete de Mobilidade com 1 Técnico Superior para apoiar mobilidade (incoming e outgoing), cursos Erasmus Mundus e mestrados. Os trabalhadores para apoio ao ensino são 23 (6 Assistentes Operacionais, 5 Assistentes Técnicos e 12 Técnicos Superiores) e estão afetos aos Departamentos, órgãos que fazem a gestão das unidades curriculares. A UAlg dispõe, ainda, de um Gabinete de Relações Internacionais que dá apoio às relações e à mobilidade de docentes e estudantes entre os países do consórcio. O pessoal não docente exerce funções em regime de exclusividade.

6.1.Number and work regime of the non-academic staff allocated to the study programme.

For general support, the faculty (FCT) has the Student Support Office, with 3 technical assistants, and a Mobility Office with 1 Senior Technician to support students in the field of mobility (incoming and outgoing), Erasmus Mundus courses and master programmes. There are 23 workers for specific support (6 Operational Assistants, 5 Technical Assistants and 12 Senior Technicians). These workers are assigned to the departments, bodies that manage the curricular units. UAlg has also an International Relations Office that supports the relations and exchange of students and teachers between the countries in the consortium. Non-teaching staff carry out functions on an exclusive basis.

6.2.Qualificação do pessoal não docente de apoio à lecionação do ciclo de estudos.

Dos 23 trabalhadores não-docentes que prestam apoio ao ensino:
Mestre: 2 (1 Ciência e Tecnologia de Alimentos e 1 Arquitetura Paisagista)
Licenciado: 11 (3 Biologia Marinha; 2 Química e 1 Eng Química; 1 Eng Hortofrutícola; 1 Eng Eletrotécnica; 1 Eng Física Tecnológica, 1 Eng Ambiente, 1 Física-Química)
12º Ano: 6 (incluindo assistentes técnicos em geociências e oceanografia)
11º Ano: 1
9º Ano: 2
4º Ano: 1

6.2.Qualification of the non-academic staff supporting the study programme.

From the 23 non-teaching staff that support the teaching activities:
Master: 2 (1 Food Science and Technology; 1 Landscape Architecture);
Bachelor: 11 (3 Marine Biology; 2 Chemistry; 1 Chemical Engineering; 1 Horticultural Eng; 1 Electronic Eng; 1 Technological Physical Eng; 1 Environmental Eng; 1 Physico-chemical)
12th Grade: 6 (including technical assistants in geosciences and oceanography)

11th Grade: 1
9th Grade: 2
4th Grade: 1

6.3.Procedimento de avaliação do pessoal não-docente e medidas conducentes à sua permanente atualização e desenvolvimento profissional.

Na UAlg aplica-se o sistema integrado de gestão e avaliação do desempenho na administração pública (SIADAP), aplicado aos trabalhadores não docentes (Lei n.º 66-B/2007, de 28 de dezembro). Para os parceiros aplica-se a legislação em vigor em cada um dos países.
Tendo em vista a sua permanente atualização, a UAlg disponibiliza formação ao pessoal não docente em vários aspetos da sua intervenção como se pode ver em https://www.ualg.pt/programa-de-formacao-e-capacitacao-da-universidade-do-algarve-2020.

6.3.Assessment procedures of the non-academic staff and measures for its permanent updating and personal development

For UAlg it is applied the Integrated management system for the performance of evaluation in public administration (the SIADAP), applied to the non-teaching staff (Law No. 66-B/2007, of 28 December). For partners, the legislation in force in each country applies.
UAlg provides training to non-teaching staff in various aspects of its intervention, as can be seen at https://www.ualg.pt/programa-de-formacao-e-capacitacao-da-universidade-do-algarve-2020 .

7. Instalações e equipamentos

7.1.Instalações físicas afetas e/ou utilizadas pelo ciclo de estudos (espaços letivos, bibliotecas, laboratórios, salas de computadores, etc.):

A UAlg, além das salas de aulas e da biblioteca (com acesso online às revistas fundamentais na área), possui laboratórios de aulas para análise e processamento de amostras de biologia, química, física e geologia marinha. Alguns espaços laboratoriais foram melhorados, incluindo a compra de um número significativo de lupas, microscópios e de um espectrofotómetro. Existem várias salas de computadores a operar com VDIs (Virtual desktop infrastructure) ligadas a um cluster central permitindo rapidez e eficácia computacional. Os estudantes possuem acesso gratuito aos softwares necessários (ex. Matlab, ArcGIS). Todos os estudantes podem usar as infraesturuturas computacionais e de biblioteca remotamente, através dos seus computadores. O consórcio possui excelentes espaços letivos, adequadamente equipados. Nos parceiros, além das condições letivas de elevada qualidade, devem destacar-se os laboratórios de hidráulica da Univ. Cantábria e as excelentes condições para modelação da IHE Delft.

7.1.Facilities used by the study programme (lecturing spaces, libraries, laboratories, computer rooms, ...):

At UAlg, in addition to the classrooms and the library (with online access to the fundamental scientific journals), there are several laboratories for classes equipped for the analysis and processing of samples from biology, chemistry, physics, and marine and coastal geology. Some laboratories have been recently improved, including the purchase of binoculars, microscopes and a spectrophotometer. There are several computer rooms operating with VDIs (Virtual desktop infrastructure) connected to a central cluster allowing faster and efficient computing skills. Students have free access to the software (eg Matlab, ArcGIS). All students can also use the computer and library infrastructures remotely, through their own computers. The consortium has excellent and fully equipped teaching spaces. In the partners, in addition to having high-quality teaching conditions, the hydraulic laboratories should be highlighted for Univ. Cantabria and the excellent conditions for modelling at IHE Delft.

7.2.Principais equipamentos e materiais afetos e/ou utilizados pelo ciclo de estudos (equipamentos didáticos e científicos, materiais e TIC):

Os estudantes utilizarão, sobretudo, equipamentos e programas informáticos, mas também espaços laboratoriais apetrechados para análise sedimentológica e química. Para os trabalhos de campo e de tese serão usados DGPS, correntómetros, transdutores de pressão, veículos aéreos não tripulados, garrafas de Niskin, entre outros. Existem já os equipamentos necessários para garantir o funcionamento do curso, adstritos a centros de investigação, mas está prevista a aquisição de equipamentos complementares no âmbito do financiamento pelo programa Erasmus Mundus, adstritos à UAlg e exclusivamente dedicados a aulas.

7.2.Main equipment or materials used by the study programme (didactic and scientific equipment, materials, and ICTs):

Students will mainly use computer equipment and software, but also laboratories equipped for sedimentological and chemical analysis. DGPS, current meters, pressure transducers, unmanned aerial vehicles, Niskin bottles, among others, will be used for the fieldwork course and for the thesis. The necessary equipment already exists, guarantying the functioning of the course, being those allocated to research centres. The acquisition of complementary equipment is foreseen, in the scope of the funding by the Erasmus Mundus program allocated to the UAlg, and exclusively dedicated to classes.

8. Atividades de investigação e desenvolvimento e/ou de formação avançada e desenvolvimento profissional de alto nível.

Pergunta 8.1. a 8.4.

8.1.Unidade(s) de investigação, no ramo de conhecimento ou especialidade do ciclo de estudos, em que os docentes desenvolvem a sua atividade científica.

https://a3es.pt/si/iportal.php/cv/research-centers/formId/ba0eb826-92b9-6b0f-e24f-6239efdecec4

8.2.Mapa-resumo de publicações científicas do corpo docente do ciclo de estudos, em revistas de circulação internacional com revisão por pares, livros ou capítulos de livro, relevantes para o ciclo de estudos, nos últimos 5 anos.

https://a3es.pt/si/iportal.php/cv/scientific-publication/formId/ba0eb826-92b9-6b0f-e24f-6239efdecec4

8.3.Mapa-resumo de atividades de desenvolvimento de natureza profissional de alto nível (atividades de desenvolvimento tecnológico, prestação de serviços ou formação avançada) ou estudos artísticos, relevantes para o ciclo de estudos:

https://a3es.pt/si/iportal.php/cv/high-level-activities/formId/ba0eb826-92b9-6b0f-e24f-6239efdecec4

8.4.Lista dos principais projetos e/ou parcerias nacionais e internacionais em que se integram as atividades científicas, tecnológicas, culturais e artísticas desenvolvidas na área do ciclo de estudos.

O consórcio tem um historial relevante de investigação conjunta e de participação coletiva científica, através de projetos da União Europeia (UE Horizonte 2020, FP7 e FP6) e outros projetos internacionais, como por exemplo: RISCKIT, MICORE, COCONET, THESEUS, SWITCH, RECONECT e PEARL. Os estudantes do COASTHazar serão integrados nestas equipas de investigação, já existentes. Essa investigação, inclui:

IHE Delft

A IHE lida com a análise, projeto e gestão de sistemas naturais e artificiais em ambientes costeiros e portuários. O modelo de impacto de tempestades de código aberto XBeach foi desenvolvido por uma equipa da IHE, Deltares, TU Delft e Univ. de Miami, sendo utilizado intensamente pelas comunidades académicas e de engenharia, em todo o mundo. A IHE também tem a Cátedra da AXA em Impactos das Alterações Climáticas e Riscos Costeiros, através do Prof. Ranasinghe. A IHE também esteve fortemente envolvida no Sexto Relatório de Avaliação do IPCC (AR6; apresentado em 2021), bem como no projeto COWCLIP apoiado pelo WCRP-JCOMM, que produziu importantes resultados sobre o impacto das alterações climáticas na agitação marítima nas áreas costeiras.

Universidade do Algarve

A UAlg tem uma longa tradição em investigação em dinâmica, riscos e gestão costeira, nomeadamente através de projetos com financiamento europeu, como MICORE, RISCKIT, MONITOR (em execução), LIFE Ilhas Barreira (em execução), ou com financiamento nacional como EVREST, EWCoast (em execução), CONPRAR (em execução) ou ENLACE (em execução). Os docentes da UAlg estão sobretudo integrados no centro de investigação CIMA - Centro de Investigação Marinha e Ambiental. O CIMA tem como um dos principais objectivos o estudo de processos costeiros, incluindo evolução, risco e gestão, contribuindo para o conhecimento, prevenção e mitigação das alterações climáticas e dos seus impactos a nível regional e global.

Universidade da Cantábria

A UC tem uma vasta experiência na investigação em riscos costeiros e engenharia costeira, através de programas como o FP7 e o H2020: COCONET, NEARtoWARN, ASTARTE, THESEUS, ERANET, ECLISEA e FORESEE. Alguns deles ainda estão em execução. A UC está envolvida em várias iniciativas internacionais relacionadas com riscos costeiros, como: estudos sobre mudanças climáticas e desenvolvimento urbano em 15 cidades sustentáveis e o perfil de risco para as Bahamas (ambas financiadas pelo Banco Interamericano para o Desenvolvimento), um estudo sobre gestão integrada das zonas costeiras no Egipto (financiada pelo PNUD), um projeto de avaliação da erosão costeira e proteção costeira para Duqm (Omã) e várias iniciativas de capacitação e fortalecimento institucional (TROYO, CABARET, DESIMAR) financiadas pelo ERASMUS + e pela Rede Europeia EUROFLOW, financiada por um projeto H2020.

8.4.List of main projects and/or national and international partnerships underpinning the scientific, technologic, cultural and artistic activities developed in the area of the study programme.

The consortium has a significant history of joint research and collective share of scientific background, implicitly generated through a number of European Union (EU Horizon 2020, FP7 and FP6 projects) and international research projects, for example, RISCKIT, MICORE, COCONET, THESEUS, SWITCH, RECONECT, and PEARL or international initiatives, such as the AXA Chair in Climate Change Impacts and Coastal Risks, at IHE. The COASTHazar students will be integrated into already existing research teams. Such research includes:

IHE Delft

IHE deals mainly with the analysis, design, and management of natural and man-made systems in the coastal and port environments. The open-source storm impact model XBeach was developed by a team from IHE, Deltares, TU Delft and Univ. of Miami, and it has been used intensively by the academic and engineering communities worldwide. IHE also host the AXA Chair in Climate Change Impacts and Coastal Risks held by Prof. Ranasingjhe. IHE was also heavily involved in the IPCC Sixth Assessment Report (AR6; released in 2021) as well as in the WCRP-JCOMM supported COWCLIP project which has produced major research output in climate change impact on waves at coastal areas.

University of Algarve

UAlg has a long tradition in working on coastal dynamics, hazards, and management, which have been done at projects such as EU funded MICORE, RISCKIT, MONITOR (ongoing) and LIFE Ilhas Barreira (ongoing), or national funded ones such as EVREST, EWCoast (ongoing), CONPRAR (ongoing) or ENLACE (ongoing). Staff members from UAlg mainly belong to the research centre CIMA - Centre for Marine and Environmental Research. CIMA has a relevant focus on coastal studies, including evolution, risk and management, contributing to the understanding, prevention and mitigation of regional and global changes and associated natural risks, particularly coastal risks.

University of Cantabria

The UC has vast experience in coastal hazards and coastal engineering projects, such as the FP7 and H2020: COCONET, NEARtoWARN, ASTARTE, THESEUS, ERANET, ECLISEA, and the FORESEE. Some of them are still running. UC has also been involved in several international initiatives related to coastal hazards, such as climate change and urban development studies within 15 sustainable cities and the disaster risk profile for the Bahamas (both funded by the Inter-American Development Bank), a study on integrated coastal zone management in Egypt (funded by UNDP),

the coastal erosion assessment and coastal protection works design for the Duqm (Oman), and several capacity building and institutional strengthening initiatives (TROYO, CABARET, DESIMAR) funded by the ERASMUS+, and the European Training and Research Network for Environmental Flow Management in River Basins (EUROFLOW), funded by a H2020 ITN.

9. Enquadramento na rede de formação nacional da área (ensino superior público)

9.1.Avaliação da empregabilidade dos graduados por ciclo de estudos similares com base em dados oficiais:

Não se conhecem mestrados similares em Portugal, existindo 4 em Ciências do Mar (não biológicas) ou afins. Dos 189 mestres formados entre 2016 e 2021 nestes mestrados, 12 (6%) encontravam-se registados em centros de emprego (DGEEC). Para garantir a empregabilidade, o CoastHazar estimulará a empregabilidade dentro e fora da Europa. Os graduados serão, provavelmente, empregados por agências ambientais regionais ou nacionais, institutos de investigação, empresas de engenharia costeira ou por organizações não-governamentais. Os parceiros associados, incluindo empresas, receberão os estudantes que, ao realizarem as teses em colaboração com os empregadores, melhorarão as suas competências de resolução de problemas e tomada de decisões. Será organizado, todos os anos, um mercado de oferta de emprego, em Delft, oferecendo a oportunidade para os setores público e privado de engenharia e de gestão costeira se familiarizarem e estabelecerem relações com a população estudantil deste mestrado.

9.1.Evaluation of the employability of graduates by similar study programmes, based on official data:

Similar masters are not known in Portugal, existing 4 MSc programmes in Marine Sciences (non-biological). Of the 189 master's students who graduated between 2016 and 2021 in these masters, 12 (6%) were registered in employment centres (DGEEC). CoastHazar will stimulate employability within and outside Europe. Graduates will likely be employed by regional or national environmental agencies, agencies or coastal engineering companies, and by non-governmental organizations. Associated partners, including companies, will be involved in the MSc thesis, receiving students. By performing their thesis in collaboration with employers, students will enhance their skills in problem-solving and decision-making. A Coastal Hazards Market will be organised every year, in Delft, providing the opportunity for the private and public coastal engineering and coastal management sectors to get acquainted and build relations with the students from this programme.

9.2.Avaliação da capacidade de atrair estudantes baseada nos dados de acesso (DGES):

Os 4 cursos de mestrado na área de Ciências do Mar/Sistemas Marinhos e Costeiros, em Portugal, tinham, em 2019/20, 91 estudantes inscritos (DGEEC). O COASTHazar é dedicado a um público-alvo estrangeiro e terá 20 bolsas de estudo/ano, financiadas pela UE, para atrair os melhores estudantes, independentemente do seu país ou capacidade financeira. O consórcio usará várias redes de divulgação, incluindo a EMA (Associação de Estudantes Erasmus Mundus) e a ICA (Associação das Universidades Europeias de Ciências da Vida) ou as redes estabelecidas por cada instituição. Haverá um site dedicado ao COASTHazar, alojado no IHE. O COASTHazar será publicitado através de um panfleto e apresentado em feiras, congressos e conferências. Entre eles estão a EduExpos na América Latina, World Water Week em Estocolmo, Study in Europe Fairs no Equador, Peru, Indonésia e Filipinas. O programa será promovido nas redes sociais, através do LinkedIn, Facebook, Instagram e Twitter

9.2.Evaluation of the capability to attract students based on access data (DGES):

The 4 MSc programmes in Marine Sciences (and Marine and Coastal Systems), in Portugal, had a total of 91 students enrolled in 2019/20 (DGEEC). COASTHazar is dedicated to a foreign target audience and will have 20 EU funded scholarships/year, to attract top students, regardless of their country or financial capacity. The consortium will use a variety of networks for dissemination, including EMA (Erasmus Mundus Alumni Association) and ICA (Association for European Life Sciences Universities). Networks established by each institution will be used for dissemination. There will be a dedicated website for COASTHazar, hosted by IHE. COASTHazar will be advertised via a flyer and presented at fairs, congresses, and conferences. These include the EduExpos in Latin America, World Water Week in Stockholm, Study in Europe Fairs in Ecuador, Peru, Indonesia and the Philippines. Social media will be employed for the promotion of the programme, through LinkedIn, Facebook, Instagram and Twitter.

9.3.Lista de eventuais parcerias com outras instituições da região que lecionam ciclos de estudos similares:

Não se aplica nos casos da UAlg e da UCantabria por não existirem outras instituições na região com ciclos similares. Relativamente à IHE Delft, existe na mesma cidade a TU Delft com oferta de um mestrado em Coastal Engineering. Existem relações próximas entre docentes e investigadores das duas instituições, mas não há partilha de conteúdos entre estes dois mestrados.

9.3.List of eventual partnerships with other institutions in the region teaching similar study programmes:

It does not apply for UAlg and UCantabria because there are no other institutions in the region with similar cycles. Regarding IHE Delft, there is TU Delft in the same city offering a master's degree in Coastal Engineering. There are close relationships between teachers and researchers from the two institutions, but there is no sharing of content between these two masters.

10. Comparação com ciclos de estudos de referência no espaço europeu

10.1.Exemplos de ciclos de estudos existentes em instituições de referência do Espaço Europeu de Ensino Superior com duração e estrutura semelhantes à proposta:

Existem vários programas de mestrado nas áreas de engenharia e gestão costeira, oferecidos noutras universidades da UE e que cobrem alguns dos tópicos do COASTHazar, mas não totalmente e não dedicados às ameaças e riscos costeiros, incluindo o efeito das alterações climáticas. Os mestrados em engenharia costeira são oferecidos, na Europa, na TU Delft (Holanda), na University of Plymouth, na University of Southampton e na Brunel University London (Reino Unido). Nesses cursos, o foco é puramente em soluções de engenharia e medidas de proteção rígida. Os mestrados em Engenharia Portuária ou Engenharia Costeira e Portuária são oferecidos na Universidade da Corunha (Espanha) e na Universidade de Reading (Reino Unido), com foco em engenharia portuária e infra-estruturas portuárias. Mestrados em sistemas marinhos e costeiros, ou similares, são oferecidos no University Center of Westfjords (Islândia), University of Cork (Irlanda) e Lancaster University (Reino Unido).

10.1.Examples of study programmes with similar duration and structure offered by reference institutions in the European Higher Education Area:

There are a number of existing masters' programmes in the fields of coastal engineering, coastal management, and climate, offered at other EU universities that cover some of the topics of the proposed COASTHazar programme but are not fully and not devoted to Coastal hazards and risks under climate change. Coastal engineering master's programs are offered, in Europe, at TU Delft (Netherlands), University of Plymouth, University of Southampton, and Brunel University London (Flood and Coastal Engineering) (UK). In these courses, the focus is purely on engineering solutions and hard protection measurements. Port Engineering or Coastal and Port Engineering master´s programmes are offered at the University of Coruña (Spain) and University of Reading (UK), with a focus on port engineering and port infrastructures. Marine and coastal systems MSc, or similar areas, are offered at the University Centre of the Westfjords (Iceland), University of Cork (Ireland) and Lancaster University (UK).

10.2.Comparação com objetivos de aprendizagem de ciclos de estudos análogos existentes em instituições de referência do Espaço Europeu de Ensino Superior:

Como mencionado no ponto 10.1, não existe qualquer ciclo de estudos inteiramente dedicado às ameaças e riscos costeiros no contexto das alterações climáticas e às formas de mitigar os seus problemas. Os ciclos apontados em 10.1 são, na sua maioria, mestrados em engenharia e proteção costeira e portuária ou, mais generalistas, em sistemas marinhos e costeiros e sua dinâmica. Existem, ainda, outros mais dedicados à gestão (ex. WACOMA, Water and Coastal Management) mas nenhum possui sobreposição elevada com o que agora se propõe, quadro essencial no contexto de uma submissão Erasmus Mundus.

10.2.Comparison with the intended learning outcomes of similar study programmes offered by reference institutions in the European Higher Education Area:

As mentioned in point 10.1, there are no MSc programmes entirely devoted to coastal hazards and risks in the context of climate change and in how to mitigate the associated problems. The programmes mentioned in 10.1 are mostly MSc in coastal and port engineering and protection or, more generally, in marine and coastal systems and their dynamics. There are still others more dedicated to management (eg WACOMA, Water and Coastal Management) but none has a high overlap with what is now proposed, an essential condition in the context of an Erasmus Mundus submission.

11. Estágios e/ou Formação em Serviço

11.1. e 11.2 Estágios e/ou Formação em Serviço

Mapa VII - Protocolos de Cooperação

Mapa VII - Protocolos de Cooperação

11.1.1.Entidade onde os estudantes completam a sua formação:

<sem resposta>

11.1.2.Protocolo (PDF, máx. 150kB):

<sem resposta>

11.2. Plano de distribuição dos estudantes

11.2.Plano de distribuição dos estudantes pelos locais de estágio e/ou formação em serviço demonstrando a adequação dos recursos disponíveis.(PDF, máx. 100kB).

<sem resposta>

11.3. Recursos próprios da Instituição para acompanhamento efetivo dos seus estudantes nos estágios e/ou formação em serviço.

11.3.Recursos próprios da Instituição para o acompanhamento efetivo dos seus estudantes nos estágios e/ou formação em serviço:

<sem resposta>

11.3.Institution's own resources to effectively follow its students during the in-service training periods:

<no answer>

11.4. Orientadores cooperantes

11.4.1. Mecanismos de avaliação e seleção dos orientadores cooperantes de estágio e/ou formação em serviço, negociados entre a instituição de ensino superior e as instituições de estágio e/ou formação em serviço (PDF, máx. 100kB).

11.4.1Mecanismos de avaliação e seleção dos orientadores cooperantes de estágio e/ou formação em serviço, negociados entre a instituição de ensino superior e as instituições de estágio e/ou formação em serviço (PDF, máx. 100kB).

<sem resposta>

11.4.2. Orientadores cooperantes de estágio e/ou formação em serviço (obrigatório para ciclo de estudos com estágio obrigatório por lei)

11.4.2. Mapa X. Orientadores cooperantes de estágio e/ou formação em serviço (obrigatório para ciclo de estudos com estágio obrigatório por Lei) / External supervisors responsible for following the students' activities (mandatory for study programmes with in-service training mandatory by law)

Nome / Name	Instituição ou estabelecimento a que pertence / Institution	Categoria Profissional / Professional Title	Habilitação Profissional (1)/ Professional qualifications (1)	Nº de anos de serviço / Nº of working years

<sem resposta>

12. Análise SWOT do ciclo de estudos

12.1.Pontos fortes:

O COASTHazard é um mestrado inovador, integrador e multi-disciplinar, com base na experiência complementar dos parceiros.
A abordagem conjunta implica que os estudantes sigam o mesmo esquema de mobilidade, criando um espírito de equipa.
O COASTHazar formará profissionais altamente preparados, respondendo à procura existente por conhecimento qualificado em engenharia e gestão costeira, muito relevante no contexto das alterações climáticas, incluindo as necessidades de adaptação.
O COASTHazard formará uma nova geração de especialistas costeiros altamente treinados, beneficiando do conhecimento adquirido em vários projetos europeus.
O corpo docente é muito experiente e reconhecido na sua área de investigação.
A aprendizagem de modelos numéricos e as aplicações práticas (ex., trabalho de campo e atividades com parceiros associados) são pontos fortes do programa.
Todos os parceiros têm excelentes instalações e equipamentos de investigação e ensino no âmbito dos processos costeiros.

12.1.Strengths:

COASTHazard is an innovative, integrator and multi-disciplinary MSc based on the complementary expertise of the three main partners.
The joint approach implies that all students follow the same mobility scheme contributing to building a team spirit among students.
COASTHazar will train highly prepared professionals to respond to the demand for qualified human resources in coastal engineering and management, very relevant in the context of climate change, including adaptation.
COASTHazard will train a new generation of highly qualified coastal experts benefiting from the knowledge acquired in various European projects.
The teaching staff is highly experimented and recognised at the research topics.
The learning of numerical models and the practical applications (eg fieldwork and joint activities with associated partners) are strong points of the programme.
All partners have excellent facilities and equipment regarding coastal research/teaching.

12.2.Pontos fracos:

Numa fase inicial este ciclo de estudos apenas poderá funcionar com o financiamento Erasmus Mundus. Apenas após esse investimento inicial poderá ser possível a sua continuidade com a incorporação de mais estudantes não financiados (custos próprios ou bolsas externas).
A mobilidade, incluindo a possibilidade de efetuar estágios (voluntários) em parceiros associados (empresas ou outras instituições), sendo uma mais-valia, também pode contribuir para uma sobrecarga de trabalho que deve ser monitorizada.
A conjugação de todas as tarefas entre as três universidades proponentes obrigará a um esforço maior de gestão relativamente a outros mestrados.
Apesar de todos os parceiros terem uma larga experiência com estudantes internacionais, estes mestrados colocam sempre novos desafios aos serviços de atendimento ao estudante (vistos, alojamento, etc.).
O corpo docente da UAlg dedicado a este mestrado é relativamente envelhecido (idade média > 50 anos).

12.2.Weaknesses:

In the initial phase, this MSc programme can only work with Erasmus Mundus funding. After only this initial investment, it may be possible to continue with the incorporation of more self-funded students (own costs or external grants).
Mobility, including the possibility of carrying out internships (voluntary) in associated partners (companies or other institutions), being a benefit, can also contribute to an overload of work that must be monitored.
The combination of all tasks between the three proposing universities will require a greater management effort compared to other master's degrees.
Although all partners have a large experience with international students, these master's degrees always pose new challenges to student services (visas, accommodation, etc.).
The teaching staff members dedicated to this master's degree, at UAlg, is relatively aged (average age > 50 years).

12.3.Oportunidades:

A elevada publicidade atualmente existente para as necessidades de adaptação às alterações climáticas, nomeadamente nas zonas costeiras, será uma oportunidade para aumentar o recrutamento e para divulgar os resultados das teses resultantes deste mestrado.
A abordagem conjunta e a grande rede mundial de parceiros associados estimularão a investigação em riscos costeiros, nos impactos das alterações climáticas e na adaptação, através de dissertações de mestrado e projetos colaborativos. Estimulará, ainda, a empregabilidade na Europa e fora da Europa.
O uso de um laboratório natural, como a Ria Formosa, para demonstração e aplicação de conhecimentos é muito atractivo para os estudantes, mas também um catalisador para futura investigação e desenvolvimento de soluções, integrando outros membros/estudantes da UAlg.
O apoio financeiro da UE será uma oportunidade para aumentar ainda mais o elevado nível de equipamentos de campo e de laboratório, principalmente na UAlg.

12.3.Opportunities:

The large publicity currently existing to the needs of adaptation to climate change, namely at coastal areas, will be an opportunity to increase the recruitment and also to disseminate the results from the MSc thesis resulting from this programme.
The joint approach of the programme and the large worldwide network of associated partners will stimulate progressive research in the fields of coastal hazards, risk analysis, and climate change impacts and adaptation through MSc thesis studies and collaborative projects. It will also stimulate employability within Europe, but also outside Europe.
The use of a natural laboratory, such as Ria Formosa, for demonstration and application of knowledge, is highly attractive to students but also a catalyst for future research and solution development, integrating other UAlg members/students.
The financial support from UE will be an opportunity to further increase the high level of field and lab equipment, particularly at UAlg.

12.4.Constrangimentos:

No quadro actual, face à pandemia COVID-19, qualquer ciclo de estudos de caracter internacional pode ser severamente afetado e terá de desenvolver soluções para optimizar o seu funcionamento regular. Num curso de componente prática e aplicada, como este, esta preocupação é ainda mais premente.
Apesar de se esperar um elevado nível de candidaturas com estudantes de elevada qualidade, haverá sempre diferenças formativas que obrigarão a um esforço adicional de nivelação de conhecimentos.
Outro constrangimento frequentemente sentido por estudantes estrangeiros, é a dificuldade de arranjarem alojamento por apenas um semestre, sobretudo em áreas turísticas, como o Algarve. Acresce, ainda, que em cursos internacionais há sempre possibilidade de alguns estudantes não se adaptarem a novas culturas e formas de estar.

12.4.Threats:

In the current situation, in the face of the COVID-19 pandemic, any international study cycle may be severely affected and will have to develop solutions to optimize its regular functioning. In a practical and applied component course, like this one, this concern is even more imperious.
Although a high level of applications is expected, with high-quality students, there will always be formative differences that will require an additional effort to level the background knowledge.
Another constraint often felt by foreign students is the difficulty of finding accommodation for only one semester,

especially in tourist areas, such as the Algarve. Furthermore, in international courses, there is always the possibility that some students may not adapt to new cultures and ways of being.

12.5.Conclusões:

COASTHazar é um programa de mestrado multi-disciplinar, baseado na visão partilhada e na experiência complementar dos parceiros principais: IHE Delft (Holanda), Universidade do Algarve (Portugal) e Universidade da Cantábria (Espanha). Uma visão de que as áreas e as populações costeiras enfrentam crescentes riscos, devido às mudanças climáticas, ao crescimento populacional e económico e ao aumento da urbanização na costa, e que necessitam de conhecimentos específicos e dedicados para promover as medidas adequadas de adaptação e gestão.
O mestrado assenta em quatro semestres, com uma parte lectiva de 90 ECTS em três semestres (9 para o plano de dissertação) e um semestre dedicado à dissertação de mestrado, com 30 ECTS. As unidades curriculares incluem disciplinas já existentes, que integram mestrados acreditados e em funcionamento, bem como unidades novas e inovadoras, apoiando as metas e os resultados de aprendizagem do programa. Cada instituição será responsável pelo ensino durante um semestre, no entanto, várias unidades curriculares e cursos de verão poderão ser ministrados em conjunto.
Durante o 1º semestre, na UC, Espanha, os estudantes obterão competências fundamentais em ciências oceânicas e atmosféricas (com foco na costa), ecossistemas costeiros, teoria das ondas e processos costeiros, métodos numéricos aplicados, programação MATLAB, bem como teoria de risco.
O segundo semestre será na IHE, Holanda, onde os estudantes aprofundarão o conhecimento em processos costeiros, desenho e engenharia de proteções costeiras, em ferramentas básicas e aplicadas de modelação e em impactos das mudanças climáticas e adaptação. O semestre terminará com uma escola de verão de duas semanas, com cursos de curta duração. Antes de se mudarem para a UAlg, os estudantes têm a oportunidade de se inscrever em estágios voluntários com parceiros associados.
No terceiro semestre, os estudantes estarão em Portugal, na UAlg, onde terão formação avançada em riscos costeiros e marinhos, em monitorização de sistemas marinhos, gestão costeira sustentável e ferramentas SIG aplicadas a sistemas costeiros. Uma unidade curricular importante será "Fieldwork and data analysis", que incluirá várias campanhas de campo, nas ilhas barreira da Ria Formosa. Durante o terceiro semestre, os estudantes também desenvolverão e defenderão os planos de dissertação.
No quarto semestre, os estudantes serão distribuídos pelos parceiros principais e associados e desenvolverão as suas dissertaçõs, efetuando investigação, aplicando processos de pensamento crítico e criativo, desenvolvendo ferramentas e/ou modelos aplicados para mitigação da erosão costeira e adaptação às mudanças climáticas.
Haverá uma cerimónia anual de graduação na IHE, para apresentação da dissertação, aberta a todos os estudantes e parceiros do consórcio.
O COASTHazar é um mestrado inovador e único, a nível nacional e internacional, com claro foco na aplicação de ferramentas para a resolução de problemas em zonas costeiras.

12.5.Conclusions:

The COASTHazar programme is an integrated and multi-disciplinary master's programme based on the shared vision and complementary expertise of the main partners: IHE Delft (Netherlands), University of Algarve (Portugal) and University of Cantabria (Spain). A vision that coastal areas and coastal settlements face increasing risks, due to climate change, population and economic growth and increased urbanization along the coast, that need specific and dedicated expertise to deal with proper adaptation and management measures.
The content is delivered in four semesters, with a taught part of 90 ECTS in three semesters (9 from a dissertation plan), and an MSc thesis research semester of 30 ECTS. The COASTHazar courses offered in the taught part include both existing courses, from ongoing fully accredited master programmes, as well as new and innovative courses, supporting the goals and learning outcomes of the programme. Each institution will be responsible for the teaching during one semester, however several courses can be taught jointly.
During the 1st semester, at UC, in Spain, students will be taught the fundamental core skills and competencies in the ocean and atmospheric sciences (with a focus at the coast), coastal ecosystems, wave theory and nearshore processes, applied numerical methods and statistics, MATLAB programming, as well as risk theory.
The second semester will take place at IHE, in The Netherlands, where the taught courses will go deeper into providing students with knowledge and skills in coastal processes and dynamics, design and engineering of coastal protections, as well as in basic and applied modelling tools and climate change impacts and adaptation. The semester will end with a 2-weeks summer school, with short courses. Before moving to UAlg, students have the opportunity to enrol in voluntary internships at associate partners.
In the third semester, students move to Portugal, to UAlg, where they will face advanced courses in coastal and marine hazards and monitoring of marine systems, building with nature tools for coastal protection and management, and GIS tools for coastal systems. An important course will be "Fieldwork and data analysis", which will include several field campaigns, at the Ria Formosa barrier islands. During the third semester, the students will also develop and defend their dissertation plan and research proposal.
In the fourth semester, students will be distributed by the main and associated partners and will develop their thesis, conduct research, apply critical and creative thought processes, developing applied tools and/or models towards mitigation of coastal erosion and adaptation to climate change.
There will be a yearly graduation ceremony at IHE, for thesis presentation, open to all students and partners of the consortium.
COASTHazar is an innovative and unique master's degree, nationally and internationally, with a clear focus on the application of tools for solving problems in coastal areas.