Guía Docente				
Datos Identificativos				2023/24
Asignatura (*)	Sistemas Intelixentes de Soporte ás Decisións		Código	730542013
Titulación				
Descriptores				
Ciclo	Período	Curso	Tipo	Créditos
Mestrado Oficial	2º cuadrimestre	Primeiro	Obrigatoria	6
Idioma	Inglés			
Modalidade docente	Presencial			
Prerrequisitos				
Departamento	Enxeñaría Naval e Industrial			
Coordinación	Santiago Caamaño, Lucía	Correo electrónico	lucia.santiago.caamano@udc.es	
Profesorado	Miguez Gonzalez, Marcos Santiago Caamaño, Lucía	Correo electrónico	marcos.miguez@udc.es lucia.santiago.caamano@udc.es	
Web	http://www.master-seas40.unina.it			
Descrición xeral	The overall aim of the course is to provide an understanding of the engineering and mathematical analyses that form the basics of monitoring and decision support systems used for onboard/navigational guidance of ships. These techniques are used by naval architects and engineers in the technical departments of ship owners, in classification societies and ship consultancies. Moreover, the student will be trained in advanced methods to evaluate ship operations with regards to the increased focus on energy consumption and emissions from ship.			

Competencias / Resultados do título	
Código	Competencias / Resultados do título

Resultados da aprendizaxe			
Resultados de aprendizaxe	Competencias / Resultados do título		
Understanding of monitoring and decision support systems used for onboard/navigational guidance of ships and capability to evaluate and optimize ship operations with regards to energy consumption and emissions and safety.	AM6	BM1 BM2 BM3 BM4 BM5 BM6 BM7 BM10 BM11 BM12	CM2 CM3 CM4 CM6 CM7

Contidos	
Temas	Subtemas
Random processes	Mathematical representation and tools for analysis of stochastic processes (time and frequency domains); ocean waves.
Modelling of dynamical systems	State space and input-output models for linear systems; response amplitude operators.
Seakeeping	Methods for computation and assessment of ship responses in waves; motions, loads and fuel consumption.
Signal processing	Methods and tools for processing of noisy signals in the time and frequency domain.
Estimation theory	Parametric methods for estimation of signals; Kalman filtering and particle filtering; sea state estimation.
Detection theory	Statistical learning; detection methods for Gaussian and non-Gaussian processes.

Decision support systems	Design of decision support systems; human factors; study cases on safe marine operations and fuel efficiency.

Planificación				
Metodoloxías / probas	Competencias / Resultados	Horas lectivas (presenciais e virtuais)	Horas traballo autónomo	Horas totais
Sesión maxistral	A6 B2 B3 B4 B7 B12 C2 C4 C6	28	42	70
Proba mixta	A6 B2 B3 B4 B6 B11 B13 C2	2	0	2
Traballos tutelados	A6 B2 B3 B4 B5 B6 B7 B8 B11 B13 C2 C3 C4 C7	5	42.5	47.5
Presentación oral	B5 B13 C2 C3 C7	1	4	5
Prácticas a través de TIC	A6 B3 B11 C3	9	13.5	22.5
Atención personalizada		3	0	3
*Os datos que aparecen na táboa de planificación son de carácter orientativo, considerando a heteroxeneidade do alumnado				

Metodoloxías	
Metodoloxías	Descrición
Sesión maxistral	Oral presentation (using audiovisual material and student interaction) designed to transmit knowledge and encourage learning. Presentations of this type are variously referred to as ?expository method?, ?guest lectures? or ?keynote speeches?. In this course, these presentations will be made by different proffessors, both from the UDC and from DTU.
Proba mixta	Mixed test consisting of essay-type and objective test questions. Essay section consists of open (extended answer) questions; objective test may contain multiple-choice, ordering and sequencing, short answer, binary, completion and/or multiple-matching questions.
Traballos tutelados	Supervised learning process aimed at helping students to work independently in a range of contexts (academic and professional). Focused primarily on learning ?how to do things? and on encouraging students to become responsible for their own learning. In this course, the supervised project will consist on a group based technical report based on an assignment done by the proffessors, and dealing about some of the topics of the course. This report may be presented in front of the rest of students. This fact will be announced in Moodle/Teams at the beggining of the course.
Presentación oral	Core component of teaching-learning process involving coordinated oral interaction between student and teacher, including proposition, explanation and dynamic exposition of facts, topics, tasks, ideas and principles. In this course, the oral presentation will consist on the presentation of the technical report in front of the rest of students and the proffessors.
Prácticas a través de TIC	Practice-based learning method for theoretical subject content using ICT resources (demonstrations, simulations, etc.) ICT is an excellent medium for practical knowledge applications and information processing, and a key aid to student learning and skills development. In this course, MATLAB will be used to implement some of the systems described during the theoretical lectures.

Atención personalizada	
Metodoloxías	Descrición

Sesión maxistral Traballos tutelados Prácticas a través de TIC	The proffessors will provide personalized attention to the students both personally and remotely using MS Teams or email. In this course, this personalized attention will consist on support while developing the supervised projects, the ICT practicals and doubts and questions related to the contents ellaborated during the lectures.

Avaliación			
Metodoloxías	**Competencias / Resultados**	**Descrición**	**Cualificación**
Traballos tutelados	A6 B2 B3 B4 B5 B6 B7 B8 B11 B13 C2 C3 C4 C7	The qualification of the group based technical report will represent a 40 % of the student´s final qualification. In case the oral presentation is not finally programmed, the percentage of the supervised projects will be 50 %.	40
Proba mixta	A6 B2 B3 B4 B6 B11 B13 C2	The qualification of the theoretical exam of this course will represent a 50 % of the student´s final qualification.	50
Presentación oral	B5 B13 C2 C3 C7	In case the oral presentation is finally programmed, the percentage of its qualification will be a 10 %, including the presentation and the answers to the questions formulated by the proffessors and other students.	10

Observacións avaliación
According to the degree regulations, the students will have the oportunity to pass this course in two oportunities (first and second oportunity). In order to pass the course, an overall mark of 5 out of 10 should be obtained by applying the percentages above to each of the methodologies, considering each of them evaluated in a scale from 0 to 10.At the beggining of the course, dates for presenting the technical reports and doing the oral presentation will be published in Moodle/ MS Teams.In the second oportunity, students will be able to repeat the exam and correct/modify the technical reports; however, in order to pass the course, both the technical report and the oral presentation should have been done in any case fullfilling the prescribed deadlines set during the course.General EMJMD Sustainable Ship and Shipping SEAS 4.0 evaluation rules:- Students will have only two oportunities to pass a course. If failing to do so, they may be forced to leave the degree.- No part time or lecture attendance exemption are allowed in this degree.

Fontes de información	
Bibliografía básica	?SimonD., ?Optimal State Estimation ? Kalman,H_infinity,and Nonlinear Approaches?, Wiley, 2006.?KayS.M., ?Fundamentals of Statistical Signal Processing ? Detection Theory?,Prentice Hall, 1998.?PapoulisA., UnnikrishnaPillai S., ?Probability, Random Variables, and Stochastic Processes?,McGraw-Hill 2002.?OchiM.K.,?Ocean Waves ? The Stochastic Approach?, Cambridge University Press, 2009.?Payer and Ratheje (2004): Shipboard Routing Assistance - Decision Making Support for Operation of Container Ships in Heavy Seas, SNAME Trans., Vol. 112, pp. 1-12, 2004.?Nielsen et al. (2006): SeaSense ? Real-time Onboard Decision Support, in Proc. World Maritime Technology Conference.?Jensen et al. (2004): Estimation of ship motions using closed-form expressions, Ocean Engineering, Vol. 31, pp. 61-85, 2004.?SimonD., ?Optimal State Estimation ? Kalman,H_infinity,and Nonlinear Approaches?, Wiley, 2006.?KayS.M., ?Fundamentals of Statistical Signal Processing ? Detection Theory?,Prentice Hall, 1998.?PapoulisA., UnnikrishnaPillai S., ?Probability, Random Variables, and Stochastic Processes?,McGraw-Hill 2002.?OchiM.K.,?Ocean Waves ? The Stochastic Approach?, Cambridge University Press, 2009.?Payer and Ratheje (2004): Shipboard Routing Assistance - Decision Making Support for Operation of Container Ships in Heavy Seas, SNAME Trans., Vol. 112, pp. 1-12, 2004.?Nielsen et al. (2006): SeaSense ? Real-time Onboard Decision Support, in Proc. World Maritime Technology Conference.?Jensen et al. (2004): Estimation of ship motions using closed-form expressions, Ocean Engineering, Vol. 31, pp. 61-85, 2004.
Bibliografía complementaria	

Recomendacións
Materias que se recomenda ter cursado previamente
Criterios de Estabilidade de Segunda Xeración/730542006 Comportamento do Buque na Mar/730542008
Materias que se recomenda cursar simultaneamente
Manobrabilidade e Hidrodinámica en Augas Someras/730542012
Materias que continúan o temario
Observacións
To help in achieving a sustainable environment and to get the objective of number 5 action of the "Ferrol Green Campus Action Plan" (Healthy and environmentaly and socially sustainable research and teaching):The assignments to be done in this course:- Will be required in digital format.- Will be delivered using Moodle, with no need to print them.In case it is necessary to print them:- Plastics won´t be used.- Two side printing will be used.- Recycled paper will be used.- Printing drafts will be avoided.A sustainable use of the resources should be done, together with the prevention of negative impacts on the environment. In this course, an effort will be pursued towards the incorporation of gender inclusion aspects: no sexist language will be allowed and the participation of students of both gender in class will be promoted.The situations of gender discrimination will be detected, and actions will be implemented to correct them.The full integration of students who for physical, sensorial, psychic, or socio-cultural reasons may have difficulties in their academic life will be promoted.