Teaching Guide					
Identifying Data					2019/20
Subject (*)	Advanced Shiphandling			Code	631510204
Study programme	Mestrado Universitario en Náutica e Transporte Marítimo				
Descriptors					
Cycle	Period	Year		Type	Credits
Official Master's Degree	1st four-month period	First		Obligatory	6
Language	Spanish				
Teaching method	Face-to-face				
Prerequisites					
Department	Ciencias da Navegación e Enxeñaría Mariña				
Coordinador	Louro Rodríguez, Julio		E-mail	julio.louro@udc.es	
Lecturers	Louro Rodríguez, Julio Pacheco Martínez, Eliseo Antonio		E-mail	julio.louro@udc.es eliseo.pacheco@udc.es	
Web					
General description	Si bien en principio se puede considerar que la maniobra de buques es un arte más que una ciencia, el maniobrista que conoce un poco de la ciencia, será mejor en el desarrollo de su arte de maniobrar el buque. El conocimiento de la ciencia le capacitará para identificar más fácilmente las características de maniobra del buque y una rápida evaluación de la destreza necesaria para su control. Un maniobrista necesita comprender qué está sucediendo en su buque y lo más importante, que le ocurrirá en un corto período de tiempo futuro. Por este motivo, el principal objetivo que se pretende con este curso es el conocimiento de la ciencia en lo que atañe a la maniobra de los buques, haciendo especial hincapié en las competencias a nivel de gestión que debe de atesorar un Capitán de acuerdo al Convenio STCW. Al poder acceder al Máster alumnos que no estén en posesión del Grado en Náutica y Transporte Marítimo, ha resultado necesario contemplar en los contenidos un primer tema introductorio bastante amplio y generalista que pueda permitir a dichos alumnos el estudio y comprensión del contenido de los siguientes temas que conforman la Asignatura.				

Study programme competences / results	
Code	Study programme competences / results
A10	Capacidade para manobrar e gobernar o buque en todas as condicións.
A11	Capacidade para utilizar os telemandos das instalacións de propulsión e dos sistemas e servizos de maquinaria.
A19	Capacidade para a utilización das cualidades de liderado e xestión.
B2	Capacidade para resolver problemas de forma efectiva.
B7	Capacidade para uso das novas tecnoloxías TIC e de internet como medio de comunicación e como fonte de información.
B9	Capacidade de análise e síntese.
B10	Capacidade para adquirir e aplicar coñecementos.
B11	Capacidade para organizar, planificar e resolver problemas relativos ao departamento de navegación
B12	CB6 -Posuír e comprender coñecementos que aporten unha base ou oportunidade de ser originais no desenvolvemento e/ou aplicación de ideas, a miúdo nun contexto de investigación
B13	CB7-Que os estudantes saiban aplicar os coñecementos adquiridos e a súa capacidade de resolución de problemas en contornas novas ou pouco coñecidas dentro de contextos máis amplas (ou multidisciplinares) relacionados coa súa área de estudo
B14	CB8-Que os estudantes sexan capaces de integrar coñecementos e enfrontarse á complexidade de formular xuízos a partires dunha información que, sendo incompleta ou limitada, inclúa reflexións sobre as responsabilidades sociais e éticas vencelladas á aplicación dos seus coñecementos e xuízos
B15	CB9-Que os estudantes saiban comunicar as suas conclusións e os coñecementos e razóns últimas que as sustentan a públicos especializados e non especializados dun xeito claro e sin ambigüidades
C2	Capacidade para dominar a expresión e a comprensión de forma oral e escrita nun idioma estranxeiro
C6	Capacidade para valorar criticamente o coñecemento, a tecnoloxía e a información dispoñible para resolver os problemas cos que deben enfrontarse.
C9	C9-Capacidade para posuír e comprender coñecementos que acheguen unha base ou oportunidade de ser orixinais no desenvolvemento e/ou aplicación de ideas, a miúdo nun contexto de investigación

C10	C10-Capacidade para aplicar os coñecementos adquiridos e a súa capacidade de resolución de problemas en contornas novas ou pouco coñecidas dentro de contextos máis amplos (ou multidisciplinares) relacionados coa súa área de estudo

Learning outcomes			
Learning outcomes	Study programme competences / results		
Capacidad para maniobrar y gobernar el buque en todas las condiciones.	AJ10	BC7 BC12 BC14 BC15	CC9
Capacidad para utilizar los telemandos de las instalaciones de propulsión y de los sistemas y servicios de la maquinaria.	AJ11		
Capacidad para la utilización de las cualidades de liderazgo y gestión.	AJ19		
Capacidad para resolver problemas de forma efectiva.		BC2	CC2 CC10
Capacidad de análisis y síntesis.		BC9	
Capacidad para adquirir y aplicar conocimientos.		BC10	
Capacidad para organizar, planificar y resolver problemas relativos al departamento de navegación.		BC11	
Capacidad para aplicar los conocimientos adquiridos y capacidad de resolución de problemas en circunstancias nuevas o poco conocidas dentro de contextos más amplios (o multidisciplinares) relacionados con el área de estudio		BC13	
Capacidad para valorar críticamente el conocimiento, la tecnología y la información disponible para resolver los problemas con los que deben enfrentarse.			CC6
Capacidad para valorar la importancia que tiene la investigación, la innovación y el desenvolvimiento tecnológico en el avance socioeconómico y cultural de la sociedad.		BC14 BC15	CC9 CC10

Contents	
Topic	Sub-topic
I. Management and development of the ship anchoring manoeuvre.	1. Review of the manoeuvre as a whole. 2. Overview of anchoring systems. 3. Anchoring procedures. 4. Analysis of the most common incidents in anchoring operations as a means of studying their prevention. 5. Limitations of the anchoring system taking as reference criteria of the regulations of the Classification Societies. 6. Election of anchoring; anchoring with one or two anchors in restricted anchorage áreas and factors involved in determining the length of the anchor chain to be used: criteria. The anchoring theory. 7. Dragging; way to untangle anchors. 8. Particularities of anchoring of large displacement vessels
II. Use and management of the ship's mooring	1. General principles of mooring with wire lines. Conventional synthetic ropes. Latest generation synthetic HMPE ropes. The hawser of synthetic material and methods of connecting it to the main line depending on whether it is wire or HMPE. 2. To make fast mooring lines: Introduction. Bitts. Types of fairleads. Chain stopper. 3. Risk in the management of the mooring lines. Dangerous areas in case of brake lines. 4. Requirements of emergency wires in terminals. 5. The effect of the elasticity of the lines on the vessel's mooring capacity 6. Guidelines for the disposal of mooring lines. 7. Windlass: Introduction. Drum divided and not divided. Windlass brake test.

III. Basics of ice navigation.	1 Types of ice and terminology. 2 Main charactiristics of Icebreaker Ships and reinforced ice-sailing vessels. 3 Preparation to enter ice areas. 4 Practical measures to take when navigating between ices or in their vicinity in ice-accumulating conditions on board. 5. Good seafaring practices in ice zones: basic general safety rules. 6. Maneuvering ships in ice-covered waters. 7. Anchoring, berthing and towing in ice zones. 8. Ship trapped in ice.
IV. The manoeuvrability and behaviour of the vessel at sea	1. Introduction to both concepts 2. The manoeuvrability of the vessel 2.1. Definition. 2.2. Ship control devices: actives and pasives 2.3. Aspects including the manoeuvrability of a vessel 2.3.1. Inherent dynamic stability 2.3.2. Course maintenance capacity 2.3.3. Ability to start-up-change course 2.3.4. Ability to control course change. Application of constant angular velocity techniques 2.3.5. Ability to progress 2.3.6. Stop capacity 2.4. Analysis of the importance of a vessel's manoeuvrability in terms of the safety of navigation and its economic use. 3. The conduct at sea of the ship 3.1. Definition. 3.2. The response movements of the vessel to the excitation force of the waves. 3.3. Rigid movements of the ship: study of the six degrees of freedom of movement 3.4. Non-oscillating vessel dynamic responses 3.4.1. Boarding water on deck 3.4.2. The bow that emerges above the surface of the water 3.4.3. Slamming 3.4.4. The increase in propeller rpm when emerging out of water 3.4.5. Reduction of speed 3.4.6. The response movements of the vessel when running a storm when receiving the aft sea: risks of crossing into the sea and loss of stability 3.5. The ship's structural responses 3.5.1. Cutting efforts and flectoring moments 3.5.2. Torque efforts 3.5.3. Structural stresses 4. Wave theory 4.1. Concept and generation process 4.2. Energy sources 4.3. Wave parameters 4.4. Calculating the frequency of encounter of the wave 4.5. The concept of resonance in the movements of the ship and criteria of good marine practice to avoid it.

?. Standards for determining the manoeuvrability of a vessel	1. Information available on board about the manoeuvrability of ships [IMO Assembly Resolution A.601(15)]. 2. Study of IMO manoeuvrability standards: criteria for the vessel's manoeuvrability to be deemed satisfactory. Critical analysis and improvement proposals. 3. Conditions under which the IMO Standards apply. 4. Manoeuvres: the evolution curve; zig-zag manoeuvre (Kempf, 1944); modified zig-zag manoeuvre; stop test; direct spiral manoeuvre (Dieudonne, 1953); simplified spiral manoeuvre; Pull-Out manoeuvre; inertia stop test; maintenance test of the new course; parallel course manoeuvre test. 5. Stop and turn circles with various draugths and at different speeds.
VI. Management and command of ships sailing in bad weather	1. General criteria. 2. 2. Guide to Captain to avoid dangerous situations in adverse weather conditions and sea states (IMO MSC.1/Circ.1228). 2.1 General. 2.2 Precautions. 2.3 Hazardous phenomena: phenomena that usually occur with aft sea and quarter sea; synchronous balance movement; parametric balance movements; combination of various dangerous phenomena. 2.4 Operations Guidance: condition of the vessel; how to avoid dangerous conditions. Procedures and means in order to towing in case of emergency. 3. Knowledge and ability to apply decision-making techniques. 3.1 Assessment of the situation and risk. 3.2 Determination and elaboration of options 3.3 Selection of measurements; and 3.4 Assessing the effectiveness of results Preparation, implementation and supervision of standardized operational procedures. 4. Management and command of the vessel in temporary, with ability to assist an endangered vessel or aircraft, towing operations, manoeuvre a difficult-to-operate vessel so that she is not across the sea, decrease windage and make good use of bunker. 5. Importance of sailing at reduced speed to avoid damage that may be caused by the bow and stern wave of the ship.
VII. OFFSHORE OPERATIONS.	Regulations, manoeurvring, risk management: 1.- Single buoy mooring 2.- Bouy fields. 3.- FPSO/FSO/FSRU 4.- Ship to ship manoeuvring. 4.1.- Bunkering manoeuvres (oil/gas) 4.1.1.- Berthed ship 4.1.2.- Anchored ship 4.1.3.- Ships sailing 4.1.4.- Ships adrift 5.- Sailing manoeuvres

STCW COMPETENCIES ACLARATORY NOTES	1. The following 2 sub-items corresponding to A10 competence, manoeuvres and command the vessel under all conditions, are included in the competences that acquire the Subject "Maritime Safety" (631G01211) (2nd. Nautical Grade), why they are included in this Teaching Guide: .13 precautions in the handling of rescue boats or survival boats in bad weather. .14 methods for boarding survivors who are in rescue boats and survival boats. 2. The following sub-item for A10 competence is included in the competences acquired in the Subject "Nautical Simulation" (631G01402) de 4th of Nautical Grade, whose Teaching Guide is expressly stated; why it is not included in this Teaching Guide: .18 use of traffic separation scheme, manoeuvres in and around them, as well as in areas covered by maritime traffic services (MTS). 3. The following sub-item for A10 competence, are included in the competences that acquire the Subject "Hydrostatic and Stability"(4510201) Master of Nautical science, whose Teaching Guide is expressly stated; why it is not included in this Teaching Guide: .11 dry dock entry, with and without fault.

Planning				
Methodologies / tests	Competencies / Results	Teaching hours (in-person & virtual)	Student?s personal work hours	Total hours
Objective test	B15 C2	4.2	0	4.2
Introductory activities	A11 A19 B13 C6	5	5	10
Guest lecture / keynote speech	A10 B2 B7 B9 B10 B11 B12 B14 C9 C10	48	76.8	124.8
Personalized attention		11	0	11
(*)The information in the planning table is for guidance only and does not take into account the heterogeneity of the students.				

Methodologies	
Methodologies	Description
Objective test	Written learning assessment test. A final exam will be held to pass the entire subject by course (IN ALL CASE BEFORE THE JANUARY OPPORTUNITY). Only for students who have 90% class attendance. The required grade of this exam to pass the Subject will in any case be 5.0.
Introductory activities	The first classes of the academic year will be devoted to a series of initial activities in which the subject will be presented to the students, and will seek to determine the competences, interests and motivations that students possess for the attainment of the objectives to be achieved. This is intended to obtain relevant information that articulates teaching to promote effective and meaningful learning processes, based on students' prior knowledge.

Guest lecture / keynote speech	Oral exposure of the subject matter (following the contents described in the Teaching Guide) supplemented by the use of audiovisual presentations and the introduction of some questions to students, to convey knowledge and facilitate learning and knowledge building. Within this dynamic, the intervention of students will be open for the realization of questions or comments, which could lead to open discussions. Most of the themes have been prepared in .ppt presentations where many original drawings have been inserted into AutoCad in order to serve the student in the task of the study, because, in many cases, with this strategy it is a question of the images speaking for themselves. These topics also contain a lot of written information that students will need to complete with the teacher's explanations in class and, if they see suitable, with the help of the recommended literature. The Subject will be taught in Spanish, but the slides will contain most of the information preferably in English in order for the student to become acquainted with the Technical-Maritime English although of course the Professor will exhibit them in Spanish. In relation to the master classes, and those aspects expressly indicated by the Professor, students should expand the content with their personal work with the help of appropriate bibliographic and tutorials. In case of using audiovisual texts or presentations, these will be made available to students long enough that they can read it in advance. NOTE: with this Methodology, the student acquires the competences of the Master studies: A10, A11, B9, B10, B11, B13, C6 and C8.

Personalized attention	
Methodologies	**Description**
Guest lecture / keynote speech	Personalized attention in the face-to-face mode to the student, understood as a support in the teaching-learning process related to the study of the subject, will be conducted in the teacher's tutoring hours in order to provide the student with guidance, support and motivation in the learning process. Teacher will attend any questions of the students in their tutoring hours. Regarding the "Students with part-time dedication and academic attendance waiver" the Teacher makes available to the student the updated notes of the Subject in reprography room, does not require class attendance for evaluation on both occasions in January and July and with regard to the Professor's tutoring, not only will you be willing to resolve the doubts presented to these types of students in the hours established for this purpose by the Professor; but also in any other where you are in the office and the other activities you are developing allow it. As regards the content of the objective test on both occasions, this will be the one generally established in the description of it.

Assessment			
Methodologies	**Competencies / Results**	**Description**	**Qualification**

Objective test	B15 C2	Examen final de la materia, tanto en la oportunidad de enero como en la de julio, será de carácter eminentemente teórico, consistente generalmente en 6 a 8 preguntas de carácter conceptual y desarrollo corto sobre los temas explicados en clase por el Profesor. En cualquier caso, el Profesor hará constar expresamente el día del examen el valor asignado a cada una de las preguntas dentro del cómputo global de la calificación. Se hará un examen para aprobar por curso de toda la materia antes de la oportunidad de enero SOLAMENTE para aquellos alumnos que tengan un 90% de asistencia a clase. La nota mínima de esta prueba objetiva necesaria para poder superar la Asignatura será en cualquier caso de 5.0.	100

Assessment comments
STCW Convention 2010: The evaluation criteria referred to in Table A-II/2 of the STCW Code, and collected in the Quality Assurance System, will be taken into account when designing and carrying out the evaluation. Regarding the "Students with part-time dedication and academic attendance waiver" the Teacher makes available to the student the updated notes of the Subject in reprography room, does not require class attendance for evaluation on both occasions in January and July and with regard to the Professor's tutoring, not only will you be willing to resolve the doubts presented to these types of students in the hours established for this purpose by the Professor; but also in any other where you are in the office and the other activities you are developing allow it. As regards the content of the objective test on both occasions, this will be the one generally established in the description of it.

Sources of information	
Basic	CLARK, I.C. (2005). Ship Dynamics for Mariners. The Nautical Institute, London. CLARK, I.C. (2009). Mooring and Anchoring Vol 1. Principles and Practice. The Nautical Institute, London. HENSEN, HENK (2003). Tug Use in Port. A practical guide. The Nautical Institute, London. HOOYER, HENRY H. (1994). Behaviour and Handling of Ships. Cornell Maritime Press, Maryland. Ice Navigation in Canadian Waters (2012) OCIMF (1995). Single Point Mooring Maintenance and Operations Guide. Witherby, London. OCIMF (2008). Mooring Equipment Guidelines. Witherby, London. OCIMF (2010). Anchoring Systems and Procedures. Witherby, London. PAFFETT, J.A. (1990). Ships and Water. The Nautical Institute, London. PLUMMER, CARLYLE J. (1978). Ship Handling in Narrow Channels. Cornell Maritime Press, Cambridge. ROWE, R.W. (2000). The Shiphandler´s Guide.The Nautical Institute, London. The Nautical Institute (1986). Ice Seamanship. The Nautical Institute (1990). The Nautical Institute on Pilotage and Shiphandling, London. Toomey, P.; Lloyd, M.; House, D. and Dickins,D. (2010). The Ice Navigation Manual. Witherby. Seamanship International Ltd. VERVLOESEM, W. (2009). Mooring and Anchoring Vol. 2. Inspection and Maintenance. The Nautical Institute, London.
Complementary	

Recommendations
Subjects that it is recommended to have taken before
Subjects that are recommended to be taken simultaneously
Nautical meteorology in Heavy Weather/631510206
Subjects that continue the syllabus
Other comments

Knowledge relating to the subjects taught in Nautical and Maritime Transport "Maniobra I" and "Maniobra II" must be in good knowledge, for as a Professional Master, this particular subject is nothing more than a continuation particularly those relating to the level of management as provided for in the STCW Convention.