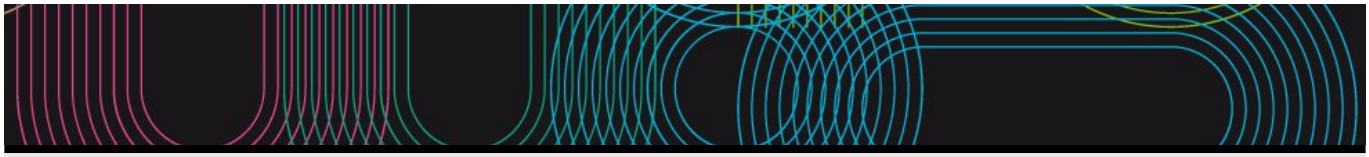

IDENTIFYING DATA				
Physical Oceanography				
Subject	Physical Oceanography			
Code	V10M153V01CF101			
Study programme	Máster Universitario en Oceanografía			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	3	Optional	1st	1st
Teaching language	Spanish			
Department				
Coordinator	Varela Benvenuto, Ramiro Alberto			
Lecturers	Costoya Noguerol, Jorge Des Villanueva, Marisela Varela Benvenuto, Ramiro Alberto			
E-mail	rvarela@uvigo.es			
Web	http://masteroceanografia.com/			
General description	Acquisition of basic knowledges for the understanding of the main physical processes that occur in the oceans, attending especially to the different scales space-temporary in which they operate said physical processes in the field of the physical oceanography.			

Training and Learning Results	
Code	
A1	Students who have demonstrated knowledge and understanding that is founded upon and extends and/or enhances that typically associated with the first cycle, and that provides a basis or opportunity for originality in developing and/or applying ideas, often within a research context
A5	Students who have the learning skills to allow them to continue to study in a manner that may be largely self-directed or autonomous.
B1	The students will understand in a detailed and based form the theoretical and practical aspects and the work methodology of the oceanography
C6	The students will be able to understand the controlling processes of the water masses, species and organisms distribution in the open ocean and in regions of special interest that capacite them for a oceanographic competitive research
C7	The students will obtain knowledge that will allow them reinforce and deepen in the physical mechanisms that control the atmosphere-ocean interactions, the climatic variability, as well as the validity and contrast of climatic models.
D1	The students will know and will be able to apply the scientific method in the academic and research fields.
D4	The students will be able to understand the need and obligation to perform a continuous training, to a large extent autonomous, for the scientific development, updating the knowledges, skills and attitudes of the professional competences along the life.

Expected results from this subject	
Expected results from this subject	Training and Learning Results
Capacity to understand the different scales space-temporary in which they operate the physical processes in the field of the physical oceanography.	A1 A5 B1 C6 C7 D1 D4
Matlab initiation level procedures	A5

Contents
Topic

Equation of state of seawater	Seawater physical properties. EOS-80 and TEOS-10 conventions.
Continuity equation Navier-Stokes equations	Boussinesq approximation, geostrophic balance, Ekman balance and transport.
Ocean vorticity	Understanding potential and total vorticity. Effects
Waves in the ocean	Main concept of wind waves. Classification of the oceanic waves. Tide origin. Tidal harmonic components Gravity waves in fluids. Deep and shallow water waves
CLIMATOLOGY	Electromagnetic radiation Simple heat balance in a water reservoir
HYDROGRAPHY	Surface distribution of salt and temperature Thermal and salt profiles in the water column Water masses. TS diagrams. Static and dynamic stability. The Richardson number
CURRENTS	Surface currents and the wind system. systems of winds. Western intensification. Geostrophic flow. Barotropic and baroclinic regimes. Dynamic topography. Ekman pumping. Convergences and divergences. Upwelling and downwelling.

Planning

	Class hours	Hours outside the classroom	Total hours
Lecturing	13	21	34
Seminars	16	20	36
Objective questions exam	0	1	1
Problem and/or exercise solving	4	0	4

*The information in the planning table is for guidance only and does not take into account the heterogeneity of the students.

Methodologies

	Description
Lecturing	Classical theoretical explanation/lecture.
Seminars	Real world examples questions and exercises to be solved with the teacher's help and by group discussion.

Personalized assistance

Methodologies	**Description**
Lecturing	Teacher's lecture on the corresponding subject, with a continuous interaction of the students to solve doubts about subjects of interest that can arise in this regard Students willing so could attend personal tutorials to solve doubts and/or uncertainties, which will mainly take place during the timetables indicated. To better optimise the procedure, the student is requested to previously contact his/her teacher with reasonable anticipation
Seminars	Resolution of exercises and problems (all they extracted from real situations)
Tests	**Description**
Problem and/or exercise solving	

Assessment

	Description	Qualification	Training and Learning Results			
Lecturing	We will value the assistance to class as well as the interventions and discussions that the student generates	20	A1 A5	B1		D1 D4
Objective questions exam	The student will be requested to do a multiple examination option (non eliminatory) in Moovi	40	A1 A5	B1	C7	
Problem and/or exercise solving	The student will be required to do a report with problems and exercises of the subjects treated during the course	40	A1 A5		C6 C7	D1 D4

Other comments on the Evaluation

In case of global evaluation is requested, the percentage of the problem and/or exercise solving exam will be increased from 40% to 60%

The oficial dates of evaluation tests will be available at: http://masteroceanografia.com/horarios/

Students are strongly requested to fulfil a honest and responsible behaviour. It is considered completely unacceptable any

alteration or fraud (i.e., copy or plagiarism) contributing to modify the level of knowledge and abilities acquired in exams, evaluations, reports or any kind of teacher□s proposed work. Fraudulent behaviour may cause failing the course for a whole academic year. An internal dossier of these activities will be built and, when reoffending, the university rectorate will be asked to open a disciplinary record

Sources of information

Basic Bibliography

VARELA R.A. y ROSÓN, G, **Métodos en Oceanografía Física**, Editorial Anthias,

PICKARD, G.L. y W. EMERY, **Descriptive Physical Oceanography**, Pergamon Press,

Periáñez, Raúl, **Fundamentos de Oceanografía Dinámica**, Univ. de Sevilla,

Malek-Madani, Reza, **Physical Oceanography: A Mathematical Introduction with MATLAB**, Chapman and Hall/CRC,

Complementary Bibliography

TOMCZCAK, M. y J. STUART GODFREY, **Regional Oceanography: an introduction**, Pergamon,

BROWN, J.,, **Ocean circulation. Open University course Team**, Pergamon press,

Stewart, Robert., **Introduction to Physical Oceanography**, Texas A&M University,

Recommendations

Subjects that continue the syllabus

Atmosphere-Ocean Interaction/V10M153V01207
Physical Processes in the Ocean/V10M153V01101

Other comments

PREVIOUS REQUIREMENTS: The Educational Commission of the Master will evaluate, for each student that do not proceed from the degree in Marine Science, the particular need of receiving this complementary course in view of his/her previous knowledge and experience.