Syllabus

Subject

Subject / Group	11277 - Waves and Instability in Geophysical Fluids / 1
Degree	Master's in Advanced Physics and Applied Mathematics
Credits	3
Period	1st semester
Language of instruction	English

Professors

Lecturers	**Office hours for students**					
	Starting time	**Finishing time**	**Day**	**Start date**	**End date**	**Office / Building**
Víctor Homar Santaner victor.homar@uib.cat	16:00	18:00	Friday	02/09/2019	28/02/2020	Despatx F-329. Mateu Orfila
	15:45	17:00	Tuesday	02/09/2019	28/02/2020	Despatx F-329. Mateu Orfila
Marta Isabel Marcos Moreno marta.marcos@uib.es	15:00	16:00	Friday	21/02/2020	05/06/2020	Laboratori de fluids (Mateu Orfila)

Context

TEACHERS

Marta Marcos holds a PhD in Physics since 2004 and is acontract lecturerof Physics of the Earth at the Department of Physics at UIB.

Víctor Homar holds a PhD in Physics since 2001 and is an associate professor of Physics of theEarth at the Department of Physics at UIB. He has recognized three-five years of teaching and two six-years of research.

SUBJECT

The subject "Waves and instability in geophysical fluids" is part of theGeophysical fluids module of the Master of Advanced Physics and Applied Mathematics (FAMA) of the UIB. Like all other subjects in the study programme of this degree, this is an optional subject.

Requirements

Essential

This subject has no essential requirements.

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Recommended

As for the entire Master's Degree, The recommended access profile is that of a research-oriented student, with a previous background consisting in either a Physics or Mathematics degree, or a double degree in Physics and Mathematics.

Skills

Specific

* EFG5 - Ability to find similarities and distinguish differences in the theoretical treatment of the movement of Earth's fluids.
* CE1 - Learning skills that enable students to combine a specialized training in Astrophysics and Relativity, Geophysical Fluids, Materials Physics, Quantum Systems or Applied Mathematics, with the polyvalence provided by an open curriculum.
* CE2 - Ability to use and adapt mathematical models to describe physical phenomena of different nature.
* CE3 - Possess advanced knowledge at the frontier of knowledge and demonstrate, in the context of internationally recognized scientific research, a full understanding of theoretical and practical aspects as well as of the scientific methodology.

Generic

* CG1 - Systematic understanding of a field of study and mastery of the skills and methods of research related to that field
* CB6 - Possess and understand knowledge that provides a basis or opportunity to be original in the development and/or application of ideas, often in a research context.
* CB7 - Ability to apply their knowledge and problem-solving skills in new or poorly-known environments within broader (or multidisciplinary) contexts related to their area of study.
* CB8 - Ability to integrate knowledge and face the complexity of making judgements on the basis of information that, if incomplete or limited, includes reflections on social and ethical responsibilities linked to the application of their knowledge and judgments.
* CB4 - Ability to communicate research outcomes and the final knowledge and reasons behind them - to specialized and unskilled audiences in a clear and unambiguous manner.
* CB10 - Learning skills that will enable students to continue studying in a way that will be largely self-directed or autonomous.

Basic

* You may consult the basic competencies students will have to achieve by the end of the Master’s degree at the following address: http://estudis.uib.cat/master/comp_basiques/

Content

Ths contents of this subject are

Range of topics

1. Wave equations and Dispersion Relations
2. Oceanic waves

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3. Linear Theory of Instability
4. Barotropic and Baroclinic Instabilities
5. Energetics of Instability

Teaching methodology

In-class work activities (0.88 credits, 22 hours)

Modality	Name	Typ. Grp.	Description	Hours
Theory classes	Master classes	Large group (G)	The teacher, through master classes, presents the content in detail in order to improve the knowledge of students in the subject matter.	18
ECTS tutorials	Tutoring	Medium group (M)	Group discussion of specific aspects of the subject not developed during theoretical master classes.	2
Assessment	Short answer test	Large group (G)	Students take a test consisting of a number of short questions related to the content of the subject.	2

At the beginning of the semester a schedule of the subject will be made available to students through the UIBdigital platform. The schedule shall at least include the dates when the continuing assessment tests will be conducted and the hand-in dates for the assignments. In addition, the lecturer shall inform students as to whether the subject work plan will be carried out through the schedule or through another way included in the Aula Digital platform.

Distance education tasks (2.12 credits, 53 hours)

Modality	Name	Description	Hours
Individual self-study	Instabilities assignement	Study of the content of the subject and elaboration of a report related to instabilities to be agreed between the teacher and the student	26.5
Individual self-study	Waves assignement	Study of the content of the subject and elaboration of a report related to waves to be agreed between the teacher and the student	26.5

Specific risks and protective measures

The learning activities of this course do not entail specific health or safety risks for the students and therefore no special protective measures are needed.

Student learning assessment

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Frau en elements d'avaluació

In accordance with article 33 of Regulation of academic studies, "regardless of the disciplinary procedure that may be followed against the offending student, the demonstrably fraudulent performance of any of the evaluation elements included in the teaching guides of the subjects will lead, at the discretion of the teacher, a undervaluation in the qualification that may involve the qualification of "suspense 0" in the annual evaluation of the subject".

Short answer test

Modality	Assessment
Technique	Short-answer tests **(recoverable)**
Description	Students take a test consisting of a number of short questions related to the content of the subject.
Assessment criteria	
Final grade percentage: 40%	

Instabilities assignement

Modality	Individual self-study
Technique	Papers and projects **(recoverable)**
Description	Study of the content of the subject and elaboration of a report related to instabilities to be agreed between the teacher and the student
Assessment criteria	
Final grade percentage: 30%	

Waves assignement

Modality	Individual self-study
Technique	Papers and projects **(recoverable)**
Description	Study of the content of the subject and elaboration of a report related to waves to be agreed between the teacher and the student
Assessment criteria	
Final grade percentage: 30%	

Resources, bibliography and additional documentation

Basic bibliography

Lindzen, R.S., 1990: Dynamics in Atmospheric Physics. Cambridge University Press. Pedlosky, J., 1987: Geophysical Fluid Dynamics. Springer Verlag
Gossard, E.E., and W.H. Hooke, 1975, Waves in the atmosphere, Elsevier
Holton, J.R., 1991, An introduction to dynamic meteorology, Academic Press

Complementary bibliography

Gill, A.E., 1982: Atmosphere-Ocean Dynamics. Academic Press

Date of publication: 05/07/2019

Haltiner, G.J. y R.T. Williams, 1980: Numerical Prediction and Dynamic Meteorology. John Wiley Monserrat, S. y C. Ramis, Dynamic Stability of a three layer model with discontinous profiles of wind and temperature, J. Atmos. Sci, 47, 2108-2114
Thorpe, A.J., Mesoscale Dynamics. Lecture notes. Comunicación personal

Other resources

Slides and teacher notes.

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