Syllabus

Subject

Subject / Group	11274 - Mesoscale Circulation / 1
Degree	Master's in Advanced Physics and Applied Mathematics
Credits	3
Period	2nd 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

Context

Mesoscale Circulations subject is partof the*Geophysical Fluids*matter of the *Master in Advanced Physics and Applied Mathematics* (FAMA) at UIB. It is taught during the second semester and just ike all those included in the FAMA curriculum, it is an optional subject.

Requirements

The recommended entry profile for the FAMA Master is that of a gaduate student oriented towards research.Physics, Mathematics, or a double degree in Physics and Mathematics graduate students will enjoy and bennefit from the subject.

Skills

Specific

* EFG3 - To know the physical causes that produce atmospheric circulations of subsynoptic scale and the interpretation of said circulations in terms of the dynamic equations and of images obtained by remote sensing.
* CE1 - Learning skills that enable the student 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.

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* 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.
* 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

The subject focuses on the study of the following items: forced circulation due to thermal gradients; orographic modifications of the atmospheric flow; frontogenesis; convective cells, multicells and supercells; mesoscale convective systems: convective complexes and squall lines; tropical cyclones; polar lows; medicanes.

Range of topics

1. Thermally forced circulations
2. Orographic modifications of the atmospheric flow
3. Frontogenesis
4. Convective cells, multicells and supercells
5. Mesoscale Convective Systems: convective complexes and squall lines
6. Tropical cyclones, polar lows and medicanes

Teaching methodology

The subject consists of 3 types of in-class activities: theoretical classes mainly directed by the teacher (16 hours), practical sessions with examples of diagnostic material of cases of phenomena studied in class contributed by the students (4 hours) and a written test of theoretical development (2h). Regarding self-employment, each student will prepare a work on one of the mesoscale phenomena studied.

In-class work activities (0.72 credits, 18 hours)

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Modality	Name	Typ. Grp.	Description	Hours
Theory classes	Theory	Large group (G)	Lectures led by the teacher which will present the main aspects of the topics in the syllabus.	14
ECTS tutorials	Discussion of practical cases	Medium group (M)	Complementary aspects will be developed on the topics explained in the master classes. The protagonists will be the students who will be able to use these classes to exchange opinions and discuss the less understood points of the theory sessions. The teacher will be a participant in the discussion that will have to maintain the scientific level and solve the doubts that arise in the discussion.	2
Assessment	Written and oral exam	Large group (G)	The student will have to pass a test consisting of several questions on the topics explained and the resolution of a problem. Students will present their work assignment on a case.	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 (2.28 credits, 57 hours)

Modality	Name	Description	Hours
Individual self-study	Preparation of oral presentation	Students will have to work on a phenomenon studied which will be presented to classmates through graphic material.	40
Group or individual self-study	Theoretical study	The student will have to deepen in the subject through the consultation of the bibliography of the subject and performing small tasks commissioned during the classes and that will serve to start the successive theory sessions. The student will have to search for information sources on the Internet, in preparation for the practical exam.	17

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

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

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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".

Discussion of practical cases

Modality	ECTS tutorials
Technique	Observation techniques **(non-retrievable)**
Description	Complementary aspects will be developed on the topics explained in the master classes. The protagonists will be the students who will be able to use these classes to exchange opinions and discuss the less understood points of the theory sessions. The teacher will be a participant in the discussion that will have to maintain the scientific level and solve the doubts that arise in the discussion.
Assessment criteria	Level of participation in class

Final grade percentage: 15%with a minimum grade of 4

Written and oral exam

Modality	Assessment
Technique	Objective tests **(retrievable)**
Description	The student will have to pass a test consisting of several questions on the topics explained and the resolution of a problem. Students will present their work assignment on a case.
Assessment criteria	Correct answers and level of acquired knowledge

Final grade percentage: 42%with a minimum grade of 4

Preparation of oral presentation

Modality	Individual self-study
Technique	Oral tests **(retrievable)**
Description	Students will have to work on a phenomenon studied which will be presented to classmates through graphic material.
Assessment criteria	Quality of content, presentation and speech of oral presentation.

Final grade percentage: 43%with a minimum grade of 4

Resources, bibliography and additional documentation

Basic bibliography

Markowski P. and Y. Richardson, 2010: Mesoscale meteorology in Midlatitudes. Wiley-Blackwell
Yuh-Lang Lin, 2007: Mesoscale Dynamics.Cambridge Univ Press
Ray P. Editor, 1986: Mesoscale Meteorology and Forecasting. American Meteorol. Soc.
Carlson T. N., 1991: Mid-latitude Weather Systems. Harper-Collins
Trapp R. J., 2013: Mesoscale-Convective processes in the atmosphere. Cambridge Univ Press.
Atkinson B.W., 1981: Meso-scale Atmospheric Circularions. Academic Press.

Complementary bibliography

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Material provided by the teacher through the Digital Space in "Aula Digital".

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