Universitat de les Illes Balears

Teaching guide

Academic year	2012-13
Subject	11005 - Introduction to complex systems
Group	Group 1, 1S
Teaching guide	A
Language	English

Subject identification

Subject	11005 - Introduction to complex systems
Credits	0.75 in-class (18.75 hours) 2.25 distance (56.25 hours) 3 totals (75 hours).
Group	Group 1, 1S
Teaching period	1st semester
Teaching language	English

Lecturers

Lecturers	Timetable for student attention					
	Starting time	Finishing time	Day	Start date	Finish date	Office
Emili Hernandez Garcia			There are no defined sessions			
Maximino San Miguel Ruibal msr260@uib.es			There are no defined sessions			
ROBERTA ZAMBRINI			There are no defined sessions			

Degrees where the subject is taught

Degree	Character	Academic year	Studies
Master's Degree in Physics of Complex Systems	Optional		Postgraduate degree

Contextualisation

This is one of the compulsory courses of the Structural Module of the Master in Physics of Complex Systems. The objective is to provide an overview of different topics that will be developped in specific courses in order to give to the students a global view of the contents of the Master.

Requirements

There are not specific requirements, being an introductory course.

Skills

Date of publication: 27/09/2012

Specific

1. General understanding on key concepts of Complex Systems, such as collective phenomena, emergence, nonlinearity, thresholds, criticality, multi-scale phenomena, power laws and measures of complexity.

Generic

1. To be able to describe, both mathematically and physically, complex systems in different situations (TG1).
2. To acquire the capacity to develop a complete research plan covering from the bibliographic research and strategy to the conclusions (TG2).
3. To write and describe rigorously the research process and present the conclusions to an expert audience (TG3).
4. To acquire the ability to ask questions, read and listen critically and participate actively in seminars and discussions (TG4).
5. To acquire the ability to disseminate and present the concepts acquired at a non-expert (TG5).

Content

Theme content

1. What are complex systems'
2. Collective phenomena. Emergence
3. Networks as skeletons of complex systems
4. Nonlinearity. Thresholds. Criticality
5. Multi-scale phenomena. Power laws
6. Information, computation and measures of complexity.
7. Complexity in physical systems
8. Complexity in social systems
9. Complexity in ecology and life sciences

Teaching methodology

In-class work activities

Modality	Name	Typ.Gr.	Description
Theory classes	Lessons	Large group (G)	Presentation of all the course contents
Practical classes	Exercises and discussions	Large group (G)	Exercices and attendance to seminars

Date of publication: 27/09/2012

Modality	Name	Typ.Gr.	Description
Assessment	Presentation	Large group (G)	Presentation of a 2 pages paper on a subject of the course

Distance education work activities

Modality	Name	Description
Individual self-study	individual study	Understanding theoretical concepts
Individual self-study	writing of a paper	Preparation of a 2 pages paper on a subject of the course

Riscs especifics i mesures de protecció

Les activitats d'aprenentatge d'aquesta assignatura no comporten riscs específics per a la seguretat i salut de l'alumnat i, per tant, no cal adoptar mesures de protecció especials.

Workload estimate

Modality	Name	Hours	ECTS	%
In-class work activities		**18.75**	**0.75**	**25**
Theory classes	Lessons	11.25	0.45	15
Practical classes	Exercises and discussions	6.5	0.26	8.67
Assessment	Presentation	1	0.04	1.33
Distance education work activities		**56.25**	**2.25**	**75**
Individual self-study	individual study	28	1.12	37.33
Individual self-study	writing of a paper	28.25	1.13	37.67
	Total	**75**	**3**	**100**

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 Campus Extens platform.

Student learning assessment

Date of publication: 27/09/2012

Exercises and discussions

Modality	Practical classes
Technique	Other methods **(Non-recoverable)**
Description	Exercices and attendance to seminars
Assessment criteria	Exercices and active attendance to seminars (questions and comments)

Percentage of final qualification: 20% following path A

Presentation

Modality	Assessment
Technique	Papers and projects **(Non-recoverable)**
Description	Presentation of a 2 pages paper on a subject of the course
Assessment criteria	Quality of presentation and adequacy of answers to questions

Percentage of final qualification: 40% following path A

writing of a paper

Modality	Individual self-study
Technique	Papers and projects **(Non-recoverable)**
Description	Preparation of a 2 pages paper on a subject of the course
Assessment criteria	Deepness and conciseness of the paper

Percentage of final qualification: 40% following path A

Resources, bibliography and additional documentation

Basic bibliography

N. Boccara
Modeling Complex Systems
(Springer-Verlag, 2nd edition, New York, 2010)
M. Mitchell
Complexity: A Guided Tour
Oxford University Press, USA; First Edition edition (2009)
G. Nicolis, C. Nicolis
Foundations of Complex Systems: Nonlinear Dynamics, Statistical Physics, Information and Prediction
World Scientific (2007)

Complementary bibliography

Papers recommended during the course

Other resources

Date of publication: 27/09/2012