Syllabus

Subject

Subject / Group	11015 - Collective Phenomena in Social Dinamics / 1
Degree	Master's in Physics of Complex Systems
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**
Maximino San Miguel Ruibal *Responsible* msr260@uib.es	13:00	15:00	Tuesday	09/09/2019	15/07/2020	IFISC
José Javier Ramasco Sukia jramasco@ifisc.uib-csic.es	10:00	11:00	Monday	14/10/2019	31/05/2020	104 / Cientifico-Tecnico

Context

This course provides an introduction to the research area of collective social phenomena and socio-technical systems using the concepts and methods of statistical and nonlinear physics, Computational Social Sciences and Big Data analysis.

Requirements

Concepts needed in this course can be acquired in the compulsary courses of the Structural Module

Skills

Specific

* E3: Capacity for analysis and visualization of numerical data and knowledge of interactive interfaces

Generic

* TG1: To be able to describe, both mathematically and physically, complex systems in different situations
* TG3: To write and describe rigorously the research process and present the conclusions to an expert audience.

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* TG4: To acquire the ability to ask questions, read and listen critically and participate actively in seminars and discussions.
* TG6: To acquire high power computation skills and advanced numerical methods capabilities in applications to problems in the context of complex systems.
* TG7: To acquire skills making possible the dialogue and cooperation with researchers with different backgrounds, including social scientists.

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

Range of topics

1. Physics and Social Sciences. Social Consensus
2. Consensus by imitation: Voter Model
3. Language competition dynamics
4. Axelrod model for dissemination of culture
5. Schelling´s segregation model
6. Threshold´s models: Bounded confidence and Granovetter model
7. Game Theory. Cooperation
8. Minority game. El Farol problem
9. Diffusion and contagion processes
10. Sociotechnical systems. Big Data

Teaching methodology

In-class work activities (0.75 credits, 18.75 hours)

Modality	Name	Typ. Grp.	Description	Hours
Theory classes	Lectures	Large group (G)	Students will be exposed to the basic concepts and methodologies in the description and modelling of collective social phenomena.	15
Assessment	Oral presentation	Large group (G)	Oral presentations of a specific follow-up of subjects explained in the lectures	3.75

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.

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Distance education tasks (2.25 credits, 56.25 hours)

Modality	Name	Description	Hours
Group or individual self-study	assignements	Numerical simulations of results described and explained in the lectures.	20
Group or individual self-study	Preparation of oral presentation	The student will learn about a specific follow-up subject of the theoretical lectures	36.25

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 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".

Lectures

Modality	Theory classes
Technique	Other methods **(non-retrievable)**
Description	Students will be exposed to the basic concepts and methodologies in the description and modelling of collective social phenomena.
Assessment criteria	Participation and questions during the lectures

Final grade percentage: 15%

Oral presentation

Modality	Assessment
Technique	Oral tests **(non-retrievable)**
Description	Oral presentations of a specific follow-up of subjects explained in the lectures
Assessment criteria	Quality of contents
	Presentation

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Answer to questions

Final grade percentage: 40%

assignements

Modality	Group or individual self-study
Technique	Oral tests **(non-retrievable)**
Description	Numerical simulations of results described and explained in the lectures.
Assessment criteria	Quality of contents
	Presentation
	Answer to questions

Final grade percentage: 35%

Preparation of oral presentation

Modality	Group or individual self-study
Technique	Oral tests **(non-retrievable)**
Description	The student will learn about a specific follow-up subject of the theoretical lectures
Assessment criteria	Initiative and search for material in the subject

Final grade percentage: 10%

Resources, bibliography and additional documentation

Basic bibliography

-C. Castellano, S. Fortunato, V. Loretto, *Statistical Physics of social dynamics,* Rev. Mod. Phys. 81, 509 (2009)
-P. Sen and B. Chakrabarti, *Sociophysics*, Oxford Univ. Press 2014
-Journal of Statistical Physics **151**, 1-783 (2013): *Statistical Mechanics and Social Science*s
- R. Axelrod, *The complexity of cooperation: Agent based models of competition and collaboration*, Princeton Univ. Press (1997)
-N. Boccara, *Modeling Complex Systems*, Springer-Verlag 2nd ed. 2010. Ch. 6.8, 6.9
-F. Schweitzer, Sociophysics, Physics Today, 71, 2, 40 (2018)
-P. Ball:
Critical Mass: How one thing leads to the other (2004)
The physical modelling of human social systems, Complexus **1**, 190-206 (2003)
Why society is a complex matter, Springer (2012)

Complementary bibliography

https://ifisc.uib-csic.es/en/research/dynamics-and-collective-phenomena-social-systems/
https://ifisc.uib-csic.es/maxi/CollectPhenSocDyn/biblio/

Other resources

IFISC Colloquia and Seminars on complex systems:

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https://www.youtube.com/user/IFISCseminars/playlist
Noise and information in economic and financial systems IFISC Colloquium March 13, 2019
Rosario N. Mantegna, University of Palermo, Italy
Social Media and Attention IFISC Colloquium May 30, 2012, 3:30 p.m.
Bernardo Huberman , Hewlett-Packard Labs, Palo Alto, CA, USA
Modelling Disruption in Large Scale Transit Systems IFISC Colloquium Oct. 11, 2012, 3 p.m.
Michael Batty , CASA, University College London, UK
Language as a complex adaptive system IFISC Colloquium April 13, 2016, 3 p.m.
Luc Steels , Universitat Pompeu Fabra, CSIC
Contagion processes in Complex Systems IFISC Colloquium June 5, 2017, 9:30 a.m.
Alessandro Vespignani , Northeastern University, Boston, USA
Role of bilinguals in language competition IFISC Seminar Oct. 15, 2014, 2:30 p.m.
Marco Patriarca , National Institute of Chemical Physics and Biophysics, Tallinn, Estonia
Language use through the lens of Big Data IFISC Seminar Oct. 1, 2014, 2:30 p.m.
Bruno Gonçalves , Centre de Physique Théorique, Aix-Marseille Université, France

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