



## Learn about some of the advantages you have as a UIB student

### Tuition

**Compatibility:** we offer different class times. You can also register as a part-time student, so that you can reconcile your studies with your personal or professional life. We make it as easy as possible for you to study!

**Tutorials:** tutorials are available for each of our courses. Additionally, your own personal tutor will provide academic counselling throughout your stay with us. If you have any doubt, just ask!

**Internships:** Internships are available so that you can successfully access the labour market. Make the most of them!

**Campus Extens, your virtual UIB:** this is a flexible distance learning service that incorporates the use of telematics into higher education. Tune into the new technologies!

**Mobility:** with our exchange and mobility programmes you can broaden your education at another university. Take part in this!

**Job bank:** we have a renowned Career Guidance and Employability Department. They will help you enter the labour market. Sign up!

**Languages:** learn modern languages and get your level certified. Further your training with us!

### Facilities

**Computer labs and Wi-Fi:** we have 21 computer labs. Additionally, there is free Wi-Fi on campus and at our off-campus centres. Stay connected!

**Libraries:** you will also have available to you a large bibliographic collection divided between the seven libraries on campus or the library at each external centre. Get to know them!

**Sports:** we promote a healthy life on campus. Practise a wide range of sports at our sports facilities!

**Dorm:** if you need accommodation, why not stay at the university dorm on campus? Enjoy the best university atmosphere!

### And much more...

**Culture:** you will have access to a wide range of cultural events. Enjoy them!

**Personalised attention:** we help you get answers for all your academic doubts as they arise, from day one. Find out about it!

**Grants and prizes:** databases are available with the current calls for applications for all sorts of grants and prizes. Check them out!

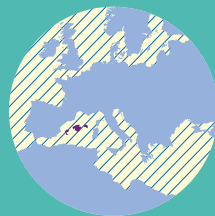
**Social media:** Stay tuned to university life through the social media. Follow us!

**Student associations:** you can take part in the running of the University. Join us!

Additionally, the UIB campus also offers the following services and facilities

- Support for people with special needs
- Medical service and pharmacy
- Book shop
- Photocopying service
- Restaurants and canteens
- Banks

## University of the Balearic Islands



The University of the Balearic Islands (UIB) is at once firmly rooted in our archipelago and open to the world.

Our philosophy is based on the provision of services and collaboration with social and business stakeholders, while we are deeply committed to sustainability and environmental protection.

We are key to the future and territorial integration of the Balearic Islands, as we are a driving force in social, cultural and economic progress.

We have four main aims: to constantly improve our educational offer (both on campus and through distant learning); to remain at the forefront of research excellence; to have a cultural and social impact on all the Balearic Islands; and to internationalise all aspects of university life, including teaching, research, innovation and administrative services.

The UIB offers students all-round training resources to ensure the acquisition of knowledge, values and skills in an educational setting in which the University works with and for the people, because WE ARE ALL UIB.

[www.uib.es](http://www.uib.es)



### Research

The UIB is one of the Top five Spanish universities in terms of innovation and technological development. It also makes the Top 5 in terms of its research output in animal and vegetal biology, and the world's Top 10 in tourism research. It also stands out thanks to its research projects in fields like chemistry, physics, psychology or geography and urbanism, among others.

### Teaching

We have heavily invested

in teaching quality, fostering not only a close relationship between students and their lecturers but also the latter's solid training with interdisciplinary teacher training projects.

### Knowledge transfer

The UIB has fully embraced its mission to create and disseminate knowledge, and performs an important role in the promotion and launch of business initiatives, including corporate spin-offs, patent registration (we have around 50)

and the development of projects with important companies.

### Mobility

We are a university which is open and linked to the rest of the world through a great many agreements with institutions and international centres. Exchange programmes are also available to both undergraduate and postgraduate students, who can also apply for international volunteer programmes and internships in impoverished countries.

### The CEP

All of the UIB's official Master's programmes are coordinated and managed by our Centre for Postgraduate Studies (CEP), providing support and information to students, Faculty and the different Master's academic commissions. It thus promotes the UIB's progressive adaptation to the directives of the European Higher Education Area. The CEP processes the admission of postgraduate students with foreign qualifications. The CEP has also signed agreements for Master's internships with numerous institutions, and companies, both public and private. Moreover, the CEP channels numerous calls for grants and bursaries for UIB Master's students. This provides monetary awards to those who cannot afford to pay full tuition fees and facilitates international student mobility.

Currently, the CEP manages over 30 official Master's degrees. Some of these are offered in cooperation with other universities, and some dual or joint Master's programmes are also available with foreign universities. These programmes offer internationally-renowned, specialised training to 1,300 students from 30 countries from all over the world. The UIB's Master's programmes cover the following branches:

- Arts and Humanities
- Sciences
- Health Sciences
- Social and Legal Sciences
- Engineering and Architecture



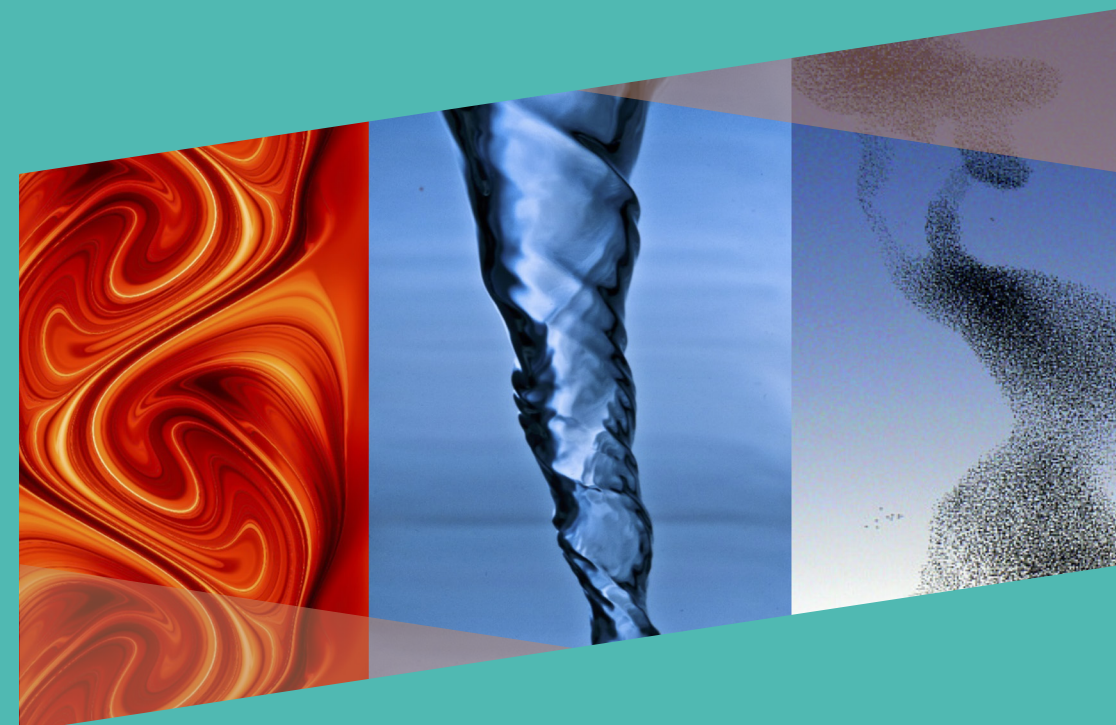
Universitat  
de les Illes Balears

#SOM  
UIB



MASTER'S DEGREE

## PHYSICS OF COMPLEX SYSTEMS



# MASTER

OFFICIAL

in collaboration with the CSIC



CENTER FOR POSTGRADUATE STUDIES - UIB

<http://cep.uib.cat/en/>

Crta. de Valldemossa, km 7.5 07122 Palma (Illes Balears)

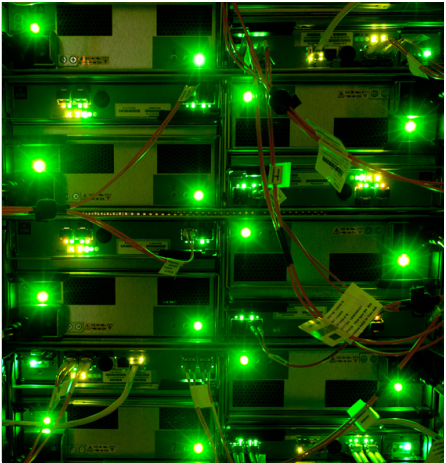
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CSIC



What is it about?



Along the last century scientific research was characterized by a progressive specialization and a knowledge compartmentalization, leading to an increasing difficulty in being an expert in more than one scientific ambit. Despite the success of this program based on a reductionist approach, new scientific challenges require a broader view and the establishment of synergies between different disciplines to go beyond the traditional borders of knowledge. Complex systems, characterized by the existence of collective emergent properties generated by the interaction of a large number of elements, are prototypical systems in which this cross-disciplinary approach is being successfully applied.

Complex phenomena are ubiquitously present around us. Examples include emergence of memory and conscience in the brain,

formation of consensus in social opinions, stock market collapses, sudden traffic jams, chaotic dynamics in lasers, turbulence in fluids, vegetation patterns in savannas, etc.. Complex system methodologies are also helpful in speech and image recognition, big data analysis, human mobility understanding or quantum cryptography, among other examples. In this context the postgraduate training offered by this Master, open to students world-wide, provides the necessary tools to address complex problems from an interdisciplinary perspective with a solid mathematical background.

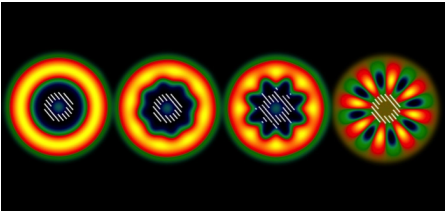
What skills will I acquire?



Students who pursue the Master in Physics of Complex Systems will acquire a solid interdisciplinary background, which includes, on one hand, fundamental and methodology aspects in the areas of complex networks, critical phenomena, dynamical systems and stochastic processes and, on the other, its application to many areas where complex systems play an important role, including social dynamics, economics, information theory, biological processes (cell signaling networks, metabolic or neural, ecology and evolution), or optoelectronic systems.

The Master syllabus also emphasizes the ability to synthesize and publicly expose scientific ideas and results, by including an specific course on Scientific Presentation and Communication. Furthermore, students are encouraged to embrace scientific research by studying relevant original articles as well as attending weekly IFISC seminars. Owing to its international character, the Master is fully taught in English which the student has to use as working language.

What job opportunities will I have?



communication technologies, finance and urban planning as well as in companies in the energy, environmental and pharmaceutical sectors.

Owing to the predominant scientific orientation of the Master, students acquire an excellent training to face a PhD in any related subject. In particular IFISC is highly involved in the PhD Program in Physics of the UIB with an average of 4 PhD graduations annually. Furthermore, the skills and competences acquired by the students are of great interest and relevances in different professional fields such as computer science, information and

Specific data

Master's convenor	Dr. Raúl Toral
Administrative centre	Center for Postgraduate Studies
New student admissions	20
Modality	On site
Scope	Professional and Researcher profiles
Pre-registration	<a href="http://cep.uib.es/en/master/MFS2/">http://cep.uib.es/en/master/MFS2/</a>
Conditions for enrolment	<a href="http://cep.uib.es/en/master/MFS2/accesiAdmissio.html">http://cep.uib.es/en/master/MFS2/accesiAdmissio.html</a>
Grants	<a href="http://cep.uib.es/en/Alumnat/Beques/">http://cep.uib.es/en/Alumnat/Beques/</a>
Enrolment fees	1,950 € *

\*Approximate amount. Exact fees approved yearly by the Govern de les Illes Balears. It is possible to pay by installments.

Structure of the degree

The Master on Physics of Complex Systems is structured in two modules. A first module with 39 ECTS credits composed of 9 compulsory courses and a second module offering a total of 36 credits in 11 optional courses and out of which the student has to select courses for a total of 9 credits. The Master also includes a compulsory master thesis which represents 12 credits.

Compulsory Module (39 ECTS)

- Introduction to complex systems
- Stochastic simulation methods
- Cooperative and critical phenomena
- Dynamical systems and chaos
- Quantum physics for complex systems
- Stochastic processes
- Complex networks
- Pattern formation
- Scientific presentation and visualization

Optative Module (9 ECTS)

- Non-equilibrium collective phenomena
- Spatiotemporal dynamics
- Systems biology
- Statistical physics in biological systems
- Modeling and dynamics of neuronal systems
- Nonlinear photonics
- Quantum and nonlinear optics
- Collective phenomena in social dynamics
- Quantum transport and quantum noise
- Information theory
- Turbulence and nonlinear phenomena in fluids

Master thesis (12 ECTS)

Notable specificities

**UIB-CSIC synergies.** This master is part of the official postgraduate program of the UIB and in collaboration with the Consejo Superior de Investigaciones Científicas (CSIC), the main research institution in Spain, and is offered by IFISC (Institute for cross-disciplinary physics and complex systems), a joint research institute of UIB and CSIC. The synergy with CSIC allows to provide an specific and high level training, appealing to world wide students. The master faculty is composed by a balanced mix of CSIC researchers and UIB professors, both with extensive experience in scientific research and in advising research students.

**International character.** Essential elements contributing to the master's appeal is the highly regarded scientific research carried out at IFISC and the large number of international collaborations. The international presence is beneficial to attract students from different countries to the Master and PhD programs as well as to offer Master graduates a wide range of institutions where continuing the education in a PhD program or joining the business world. At present there are 20 PhD students and 19 postdocs at IFISC from 10 countries, both European and non-European. IFISC staff has also a high degree of internationalization, with scientists from 14 different countries and English being the working language. Owing to this international character and to the relevance of English in scientific communication the Master is fully taught in English.

**IFISC environment.** IFISC proudly offers a stimulating environment for scientific research, encouraging collaboration among staff and with research visitors (about 10 visitors staying over a month and over 30 for a shorter period per year). A key element to promote this interaction is the IFISC Seminar Series with at least one weekly talk by an IFISC researcher or by a visitor. IFISC seminars are broadcast live from ifisc.uib-csic.es/seminars and from the IFISC channel at YouTube. Seminars can also be viewed on demand at IFISC web page which includes a repository with the seminars recorded in the last 6 years.

**Research.** Resulting from the research activities of its members IFISC has a high publication rate with over 70 publications in international journals per year. IFISC researchers are responsible of several national and european research projects which allow to support the stay of visitors, postdocs and students at IFISC as well as the visits of IFISC researchers to other institutions.

**Resources.** The interdisciplinary approach to complex systems makes use of different techniques among which numerical computer simulations play an essential role. Master students receive a comprehensive training in the development and implementation of computer algorithms for the simulation of complex systems. The master's syllabus emphasizes practical know-how such as, for instance, the simulation of stochastic processes to model the random elements inherent to complex systems, the generation of networks with specific topologies such as those observed in socioeconomic systems (small world, scale free, etc) and the modeling of spatially extended systems. IFISC resources include a high throughput computer cluster with 576 cores for intensive numerical simulations as well as a cluster for data analysis and virtualization with 544 cores. These computer resources, used by IFISC researchers, are accessible to Master students in order to carry out specific assignments.

**Scholarships.** Recognizing the difficulties that may represent moving to Mallorca to enroll the master, we offer a mobility program to support students with a good academic record. Detailed information about mobility scholarships is available at [ifisc.uib-csic.es/master/fellowships/](http://ifisc.uib-csic.es/master/fellowships/)

FURTHER INFORMATION

Center for Postgraduate Studies  
University of the Balearic Islands



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