

Degree	Type	Year
2503740 Computational Mathematics and Data Analytics	OT	4

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Teachers

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Teaching groups languages

You can view this information at the [end](#) of this document.

Prerequisites

There are no prerequisites.

It is recommended, however, a certain familiarity with the computer environment since many of the activities will be done virtually through the Moodle classroom and the virtual campus, in particular basic knowledge of mathematical text processing programs, creation of graphics, generation of documents in PDF etc. is advised.

Objectives and Contextualisation

This subject is taught simultaneously as a first-year subject (compulsory) in the Mathematics and Physics degrees, and as a fourth year subject (optional) in the Degrees of Computational Mathematics and Analytical Data of Chemistry, Environmental Sciences, Nanoscience and Nanotechnology (of the faculty of Sciences) and in the degrees of Biology, Microbiology and Genetics (of the Faculty of Biosciences).

The training objectives are the same, but there will be aspects of the subject (type of work, assessments ...) that may be different depending on the course (wether is the first or the fourth) and the degree followed by the student.

Training objectives:

Expand the vision and interest of the student towards different fields of science, beyond the specialty they are studying.

Acquire an interdisciplinary vision of science.

Be able to analyze and reflect on the relationships between science, gender, culture and society.

Provide the student basic understanding of frontier topics in current science, presented in a pedagogical and accessible manner.

Be able realize some simple but relevant exercises outside the expertise of student's degree

Acquire transversal competences.

Be able to complete simple exercises on topics outside student's degree

Learn how to write a scientific work that complies with formal quality standards and know how to expose it in public.

Reflect on the nature of science.

Raise awareness of the gender perspective in science and society.

Raise awareness about environmental and sustainability issues from a scientific perspective

Learning Outcomes

1. CM49 (Competence) Write an ethically responsible scientific paper that meets quality standards.
2. CM49 (Competence) Write an ethically responsible scientific paper that meets quality standards.
3. CM50 (Competence) Explain key ideas for understanding current science projects in an informative way.
4. CM51 (Competence) Critically assess the relationship between science, gender, culture and society.
5. CM51 (Competence) Critically assess the relationship between science, gender, culture and society.
6. CM52 (Competence) Publicly present a scientific work.
7. KM39 (Knowledge) Identify an interdisciplinary view of science.
8. SM48 (Skill) Broaden the student's vision and interest to different fields of science, encouraging an interdisciplinary perspective.
9. SM48 (Skill) Broaden the student's vision and interest to different fields of science, encouraging an interdisciplinary perspective.

Content

The subject is structured around a series of conferences given by renowned specialists in different subjects.

The topics of the conferences are

- Lise Meitner and Robert Oppenheimer: Science and Society
- Habitable planets beyond the Solar System
- Genomics and climate change
- Mathematical models of epidemics
- Blockchain and cryptocurrencies
- Circular Economy
- Epigenetics
- Artificial intelligence
- Science and gender
- Ultracold atoms and quantum simulators
- Biosensor nanotechnology

Gender perspective

The course is designed so that the cast of speakers is gender balanced with a proportion of female speakers of over 45%. At least two of topics directly address the role of women in science.

Sustainability

At least two of the conferences focus on the issues of climate change and sustainability

Activities and Methodology

Title	Hours	ECTS	Learning Outcomes
Type: Directed			
Conferences	24	0.96	
Final project	40	1.6	
Seminars	24	0.96	
Type: Supervised			
Portfolio	12	0.48	
Type: Autonomous			
Autonomous work	50	2	

Presential learning activities

- Conferences (master classes). They are usually held in the Main Conference room of the faculty by a guest specialist. Attendance is mandatory, except in cases justified detailed in the section on evaluation. In the latter case, since the lectures will be recorded in video, they can be viewed from the Moodle classroom. The materials of the conference (PowerPoint files, links ...) will also be accessible via Moodle where they can be consulted by all students. For non-presential students attendance to the lectures is optional.
- Seminars (complementary sessions for discussion and preparation of work). They will be open sessions of discussion and / or debate that will be held the week after the conference. The professor will also present the bibliography and proposals for topics for the preparation of the final work. Attendance at the seminars is highly recommended, since it will facilitate the preparation of the student's portfolio, and in any case, at least, at least, the attendance at the session on which the student will have chosen to do will be compulsory the final work Exceptionally, the non-attendance students who are unable to attend them can arrange a personal interview with the teachers to prepare the final work in schedule to be agreed. These sessions may also be registered and available in the campus virtual.

Supervised learning activities

Preparation of a portfolio. Throughout the course, students will have to periodically deliver a series of activities and / or exercises and problems about the subjects covered in the conferences during the Moodle classroom. These deliveries (obligatory in all cases) will constitute the student's portfolio, a collection of the evidence of the student's learning. These tasks may be different for the first and fourth year students, adapting to their level

of knowledge.

Final work

The student will have to prepare a final work, compulsorily made in a group (of 3 or 4 people), on one of the topics proposed in the seminars of the conferences. The work will be supervised by the lecturer and the teachers of the subject. In the case of fourth year students, the work can not be done on the subjects directly related to the degree that the student is studying, and must be drafted and presented in English. All the works will be presented in a public session in front of a committee of professors. In especial cases of students abroad remote presentation can be considered. This course all papers will be presented at the end of the lectures during the Wednesdays of May. The presentation schedules will try to accommodate the preferences of the students, but given the organizational complexity, the proposal of the teaching team will prevail over other considerations. The dates of presentations are made public at the beginning of the course, and take into account that they do not coincide with examination periods. It is therefore the responsibility of the students to ensure that the presentation can be made during this period or otherwise inform the teachers well in advance. At the beginning of the course there will be a session where instructions will be given on how to prepare the work. A brief practical guide will also be available on the Virtual Campus.

Autonomous learning activities

The student will consult bibliography (books, scientific journals) and conduct information searches via the Internet in order to do the tasks of the student's portfolio and the final work. There will be a schedule for the tutorials in which the students will be able to contact the professors of their subject of interest to solve doubts and to keep track of the preparation of the portfolio and of the final work. Some tutorials will also focus on ICT resources for the writing of scientific texts.

Gender perspective

The gender distribution of lecturers is intended to be balanced. Female speakers are more than 45% of the total. There are two conferences that directly address gender aspects in science and society.

Other

15 minutes of a session will be reserved for students to answer the UAB institutional surveys.

Annotation: Within the schedule set by the centre or degree programme, 15 minutes of one class will be reserved for students to evaluate their lecturers and their courses or modules through questionnaires.

Assessment

Continous Assessment Activities

Title	Weighting	Hours	ECTS	Learning Outcomes
Final Project	0,45	0	0	CM49, CM50, CM51, CM52, KM39, SM48
Portfolio	0,35	0	0	CM51, KM39, SM48
Review tests	0,2	0	0	CM51, KM39, SM48

Since all the training and assessment activities are around the topics of the conferences, attendance (or viiewing) to those is, in general mandatory and it is monitored throughout the course. The timetable is organised so that the first year students of the degrees of physics and mathematics (for which the subject is compulsory) can attend the lectures without incompatibilities. 4th year students (for which the subject is

optional) and all the students in second or higher enrollment that document at the beginning of the course their incompatibility to attend the lectures, will be considered as non-presencial students and will have mechanisms of differentiated evaluation.

There are three types of assessment activities:

A) Individual short objective tests (20% of the final grade). They are test type tests that will be done telematically after each conference. These tests will assess the degree of attention and understanding of the subject. Assistance to the conferences will give access to the realization of these tests. Failure to realize the tests of three or more conferences, will automatically lead to the "no-show" qualification. In case of duly justified absences (up to a maximum of three), the corresponding activity will be authorized in the same way as non-face-to-face students as detailed below.

Remote students must follow lectures via the recordings and materials of the Virtual Campus and perform a specific test about them for the Moodle classroom. Students must follow all the lectures and answer all the tests. The non-completion of three or more tests will automatically lead to the "no-show" qualification for both face-to-face and remote students.

B) Student portfolio (35% of the final grade). Students will have to update a virtual portfolio in the Moodle classroom, where they will receive the deliveries of the exercises and compulsory activities that will be proposed during the course. There will also be a selection of materials that will show your involvement in the discussion sessions of the conferences, where your personal opinions and searches are reflected. Depending on the type of exercise proposed, cross-curricular skills such as critical thinking, autonomous learning, the ability to analyze and synthesize, etc. will be valued. and may be different for first and fourth year students, adapting to their level of studies.

C) Final project (45% of the final mark) Each student will have to participate in the preparation of a compulsory final project in groups of 3-4 members. The topic will be chosen among those that will be proposed by the specialists of the different sessions. The work must be submitted to the Moodle classroom within the marked periods and must conform to the formal and content characteristics of a scientific work, fulfilling the criteria that will be presented at the beginning of the course in a specific informational session. In the case of fourth year students, it must be written in English, with the structure of a scientific research article and can not be done on the subjects directly related to the degree that the student is studying.

Throughout the course there will be several public sessions for the oral presentations, on dates that will be announced in the calendar of sessions. All the members of the group have to present a part of the work. This presentation is strictly compulsory. The evaluation will be done by a committee of professors that will evaluate the quality of the presentation, the capacity of communication and organization, etc. If possible, the timetable of the presentations will take into account the students constraints. For students abroad there is the possibility of doing their part of the presentation by videoconference.

In any case, it is the student's obligation to reserve the presentation dates, which will be known at the beginning of the course. In case of incompatibility with any of the dates, it must be notified enough in advance to the professor's team of TCA to facilitate making adjustments if possible.

The qualification of the final work will take into account both the submitted text and the presentation. The mark can not be less than 4 to be able to pass the course. If this grade is not passed, a modification of the work may be suggested.

AI tools.

Naturally, they are not prohibited, but excessive use of AI will be penalized, if there are serious errors or if, for example, the style and language of the written work is very far from the style and language used in the presentation oral

Single assessment:

Students with compulsory attendance who wish to take the single assessment option can request to be considered non-face-to-face. Thus, all activities will be done remotely (and are already scheduled with

sufficient time flexibility). The presentation of the final work, however, is mandatory in the terms indicated in section C). For students who are already assessed non-face-to-face by default, the subject incorporates the single assessment naturally. In very exceptional cases of severe incompatibility, the subject team may consider adapting the schedule of remote activities.

Bibliography

The bibliography of each specific subject will be given in the complementary or seminar session of the corresponding conference.

The talks, complementary sessions, overheads as well as any additional materials will be available at the Virtual Campus.

For advice on the writing of scientific articles see (for example): Cargill, Margaret and O'Connor, Patrick. Writing scientific research articles: strategy and steps. Wiley-Blackwell, 2009

Software

For the writing of the memory project of some of the course topics, it may be convenient to use the word processor LaTeX.

Some final work may need specific software that, naturally, will be made available to students.

Language list

Name	Group	Language	Semester	Turn
(SEM) Seminars	1	Catalan	annual	morning-mixed
(SEM) Seminars	2	Catalan	annual	morning-mixed
(SEM) Seminars	3	Catalan	annual	morning-mixed
(SEM) Seminars	4	Catalan	annual	morning-mixed
(SEM) Seminars	5	Catalan	annual	morning-mixed
(SEM) Seminars	6	Catalan	annual	morning-mixed
(SEM) Seminars	7	Catalan	annual	morning-mixed
(SEM) Seminars	8	Catalan	annual	morning-mixed
(SEM) Seminars	9	Spanish	annual	morning-mixed
(SEM) Seminars	10	English	annual	morning-mixed
(TE) Theory	1	Catalan	annual	morning-mixed
(TE) Theory	2	Catalan	annual	morning-mixed