

**Master Thesis**

Code: 42257  
ECTS Credits: 12

Degree	Type	Year	Semester
4313136 Modelling for Science and Engineering	OB	0	2

**Contact**

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**Use of languages**

Principal working language: english (eng)

**Teachers**

Anna Cima Mollet

**Prerequisites**

None

**Objectives and Contextualisation**

The objective of the Master's Thesis is to prepare students for future work, a doctoral thesis or a project in a company. The ultimate goal is to have a public presentation and defense of the written report (Master Thesis) in some topic depending on the specialization of each one of the students: Complex Systems, Data Science, Mathematical Modelling or Modelling for Engineering, under the appropriate guidance by an expert in the field.

**Skills**

- Analyse complex systems in different fields and determine the basic structures and parameters of their workings.
- Analyse, synthesise, organise and plan projects in the field of study.
- Apply specific methodologies, techniques and resources to conduct research and produce innovative results in the area of specialisation.
- Apply techniques for solving mathematical models and their real implementation problems.
- Communicate and justify conclusions clearly and unambiguously to both specialised and non-specialised audiences.
- Formulate, analyse and validate mathematical models of practical problems in different fields.
- Integrate knowledge and use it to make judgements in complex situations, with incomplete information, while keeping in mind social and ethical responsibilities.
- Isolate the main difficulty in a complex problem from other, less important issues.
- Look for new areas to open up within the field.
- Recognise the human, economic, legal and ethical dimension in professional practice.
- Solve problems in new or little-known situations within broader (or multidisciplinary) contexts related to the field of study.

**Learning outcomes**

1. Aggregate the solutions, integrating them all into a general model.
2. Analyse the initial problem to find the best solution, breaking the problem down into easier-to-solve sub-problems.
3. Check the validity of the model with regard to the behaviour of the real system.
4. Communicate and justify conclusions clearly and unambiguously to both specialised and non-specialised audiences.
5. Design mathematical models that represent the system and its behaviour.
6. Identify the parameters that determine how a system works.
7. Implement the proposed solutions reliably and efficiently.
8. In the master's dissertation, describe the steps taken and the specific methodologies used.
9. Integrate knowledge and use it to make judgements in complex situations, with incomplete information, while keeping in mind social and ethical responsibilities.
10. Name and describe the main problems to be addressed in the study.
11. Provide novel solutions that bring added value.
12. Recognise the human, economic, legal and ethical dimension in professional practice.
13. Solve mathematical models efficiently.
14. Solve problems in new or little-known situations within broader (or multidisciplinary) contexts related to the field of study.

## **Content**

There are not theoretical contents for this module.

## **Methodology**

-Methodology: At the end of October or in November each student will meet with the Master's Coordinator in order to talk about the topic of the Thesis and also about the place to do the Internship in Companies and Institutions. At that moment it will be decided if the student wishes to follow a research program (and look for a Research Center) and/or to do a more applied project in a company (and look for the appropriate company). After, the student and the Master's Coordinator will meet again and then, they will decide the topic and the advisor of the Master Thesis. Once the student has been assigned his advisor, they will meet regularly.

### **Concerning the report and the dissertation of the Master Thesis.**

General guidelines: the report should be between 40 and 80 pages long and should contain:

- A first page with the title, author's name, director's name, date.
- Abstract
- Acknowledgements
- Contents
- List of Figures, Tables, (if necessary)
- Introduction chapter
- Other chapters.
- Conclusions
- Bibliography

**We recall that any paragraph taken from the Internet or from existing books must be written between quotation marks " " and carefully referencing the source.**

Each student will have between 25 and 30 minutes to focus the question, lay the objectives, explain and put the results in context, and present the conclusions. Afterwards the jury will have a maximum of 30 minutes to ask questions and discuss with the student.

## Calendar

Two periods of reading are proposed:

- Week from the 09<sup>th</sup> to the 13<sup>th</sup> of July
- The 05<sup>th</sup>, 06<sup>th</sup>, 07<sup>th</sup>, 12<sup>th</sup>, and 13<sup>th</sup> of September

During the last week of June each student must inform to the Master's Coordinator in which period he/she wishes to present the Master Thesis.

## Bookbinding of and delivering the Master Thesis.

The Department will provide the covers for standardized binding of the Thesis. They will be sent to each student via e-mail.

The board members shall have received a copy at least **10 days before the scheduled reading**, at least in electronic format. The student himself has to deliver the report at each one of the members of the committee.

## Activities

Title	Hours	ECTS	Learning outcomes
<b>Type: Supervised</b>			
Regular meetings with the supervisor	25	1	5, 9, 10, 11, 12, 14
<b>Type: Autonomous</b>			
Elaboration of the report	275	11	1, 2, 3, 4, 6, 7, 8, 11, 13

## Evaluation

The Master's Thesis will be evaluated by a committee of three persons created especially for each presentation. The advisor of the thesis or a member of his team, could be part of the court but should not chair it. At least one member of the board should be from UAB. Once the members have accepted to be part of the board, it is arranged the date and time of the reading, adapting it to the proposed period.

Finally, the Department requests the Academic Commission of the Master the approval of the committee to defend the thesis.

The grade will be divided as follows: 30% for the written report, 20% for the oral dissertation and 50% for the work itself.

## Evaluation activities

Title	Weighting	Hours	ECTS	Learning outcomes
Contents of the work	50%	0	0	1, 2, 3, 5, 6, 7, 9, 11, 13, 14
Oral dissertation	20%	0	0	4, 8, 9, 10, 11, 12

## Bibliography

There are no specific references.