

# GUIDELINES FOR THE MASTER'S THESIS IN THE MASTER IN COMPUTATIONAL AND APPLIED MATHEMATICS

## GENERAL FEATURES

Given that the Master in Computational and Applied Mathematics (MCAM) is a research-oriented Program, the Master's Thesis (MT) can be developed with two alternative orientations:

- i. **Type-A.** Work on original research that solves an open problem in the fields of knowledge covered by the Program.
- ii. **Type-B.** Critical revision over the state of the art in a current area of research that is related with the Program, identifying if possible novel open problems in the area, as well as potential strategies for their solution.

## STRUCTURE OF THE THESIS

The MT is composed of two parts, both of which shall employ the English language:

- i. Written memoir (approximately between 30 and 60 pages in length) in electronic format, following the instructions and recommendations at <https://uc3m.libguides.com/en/MFP>.
- ii. Public presentation and oral defense by the student in front of a Committee. The oral presentation shall take no longer than 20 minutes, after which the student will answer the questions and issues raised by the Committee members.

According to the MT type, the written memoir and the oral presentation will conform to the following structure:

- i. **Type-A.** The first part will discuss the state of the art of the research area of the chosen problem, justifying its relevance in that context. The second part will report the solution found in detail. Finally, the third part will present the conclusions and avenues for potential future work.
- ii. **Type-B.** The first part will discuss the state of the art of the chosen research area. The second part will focus on a particular line of research, reproducing some of the main results, and will identify open problems within the area, explaining their relevance and potential strategies for their solution. A third part will report the conclusions.

## SUPERVISOR(S) AND TOPIC

Each MT will be supervised by preferably one, or at most two, researchers in possession of a Ph.D. degree. At least one of them has to be affiliated with one of the Departments involved in this Master's Program, namely, Departamento de Matemáticas, Departamento de Informática, and Departamento de Teoría de la Señal y Comunicaciones.

Beyond attending their regular courses, students are expected to actively get acquainted with the research lines developed in the Departments involved in this Master's Program, by attending e.g. relevant seminars, colloquia, etc. Approximately three months after the beginning of the academic year, a list of potential supervisors and topics will be published. Students are expected to agree with one of them, who will inform the Master's Director of the eventual assignment of MT. There is also the possibility that the students develop their MT under the supervision of a member of an external institution, provided an additional supervisor is designated, who holds a Ph.D. degree and is affiliated with one of the Departments involved in this Master's Program.

In those cases in which the above process does not end up with a specific assignment of supervisor(s) and topic, the Director will propose that specific supervisor(s) are assigned to the corresponding students by the Master's Academic Commission, so as to guarantee that all students can start work in their MT's during the first academic semester.

## PERIODS FOR DEFENSE

The MT has a single call per academic year, which is divided into three alternative defense periods: March, June/July, and September. The March period is enabled for those students of previous academic years who wish to have their defense during the next year and do not wish to wait until June/July or September. The defense dates for each specific period will be advertised in due time.

## **REQUIREMENTS FOR DEFENSE**

To qualify for the MT defense, students are required to have passed all the credits of the Masters' Program (except for the 12 credits that correspond to the MT itself), having paid all tuition fees and taxes.

Enrolment in the MT course grants the student immediate access to the SIGMA web application (<https://sigma.uc3m.es/InicioAlumno.html>), see the attached guide for students. This application enables full management of the whole process, from registering the basic MT data [title and supervisor(s)] and choosing the defense period, to the submission of the written memoir.

## **COMMITTEE FOR DEFENSE**

The Committee for each MT defense will be composed of two members who are in possession of a Ph.D. degree and are affiliated with some of the Departments involved in this Master's Program. Each specific Committee will act for a maximum of 6 MT defenses.

## **REGISTRATION OF MT AND MEMOIR SUBMISSION**

As indicated above, and as soon as this can be confirmed, the supervisor of each MT will send an email to the Master's Director to confirm the agreement with a given student. No further action in terms of registration is required from the supervisor's side. Supervisors and Committee members can also access an adapted version of the SIGMA web application at <https://sigma.uc3m.es/Inicio.html> (see the attached guide), which likewise enables managing of other issues related with the MT, like report reception and submission, Committee's documentation, etc.

At least 15 days before the specific MT defense, the student will submit electronically his/her thesis memoir through the SIGMA web application. The supervisor will likewise submit his/her Thesis' assessment report, see the attached guides and template. The latter document will be taken into account by the Committee for the final grading of the MT. The title of the MT can be modified no later than 5 days prior to electronic submission of the MT memoir.

## **SCORE**

The score for the MT is over 10 points, 80% of which are given by the Committee of the defense; the remaining 20% are given by the supervisor's assessment report. Copies of the rubric employed by the Committee and a template for the supervisor's report are included at the end of this document. For the sake of orientation, two tables for the assessment of various aspects of the thesis memoir and of the oral presentation and defense are also included.

The MT Committees are not able to directly award the "Outstanding" distinction ("Matrícula de Honor") to a MT, but can propose suitable cases as candidates for it, provided their final numerical score is 9 or higher. The Master's Academic Commission will decide about this in September, once all MT defenses have taken place. The number of distinctions cannot exceed 5% of the overall number of students enrolled in the Program in the corresponding academic year.

**TABLE ON ASSESSMENT OF WRITTEN MEMOIR**

Score (qualitative)	D	C	B	A
<b>Organization/ Presentation</b>	<ul style="list-style-type: none"> <li>The text has many typos and many sentences that do not make sense.</li> <li>The discussion does not follow a line which is ordered and logical.</li> <li>The bibliographical references are missing.</li> <li>The figures are of poor quality and do not support the discussion made in the text.</li> </ul>	<ul style="list-style-type: none"> <li>The text has some typos and some sentences are not clear.</li> <li>The text has a certain structure, but some fragmented parts do not fit well into the document.</li> <li>The bibliographical references are confusing and hard to identify.</li> <li>The figures are of good quality but are incorrectly placed and just partially support the discussion in the text.</li> </ul>	<ul style="list-style-type: none"> <li>The text has no typos and reads smoothly.</li> <li>The document follows a logical and ordered structure and includes a clear introduction.</li> <li>Some references are ambiguous and hard to identify.</li> <li>The figures are of good quality and support the discussion made in the text.</li> </ul>	<ul style="list-style-type: none"> <li>The text has no typos and is well written.</li> <li>The document reads quite smoothly and efficiently identifies the key aspects of the project.</li> <li>The bibliographical references are clear and unambiguous.</li> <li>The figures are of good quality and self-explanatory, and fully support the discussion in the main text.</li> </ul>
<b>Objectives</b>	<ul style="list-style-type: none"> <li>The description of the state of the art is based on references of a marginal relevance to the topic.</li> <li>The objectives are poorly described or remain unjustified.</li> </ul>	<ul style="list-style-type: none"> <li>The description of the state of the art includes relevant references but is mixed with information which remains to be contrasted.</li> <li>The objectives are correctly formulated but their relevance is insufficiently argued for.</li> </ul>	<ul style="list-style-type: none"> <li>The description of the state of the art includes relevant references, but it leaves some important aspects out.</li> <li>The objectives are correctly formulated and their relevance is justified.</li> </ul>	<ul style="list-style-type: none"> <li>The description of the state of the art includes relevant references and includes all important aspects.</li> <li>The objectives are very well formulated and are very relevant.</li> </ul>
<b>Contribution/ Conclusions</b>	<ul style="list-style-type: none"> <li>The conclusions do not clarify which is the student's contribution.</li> <li>The contribution made does not show that basic competences and knowledge have been applied, which can be associated with the Master's Program.</li> </ul>	<ul style="list-style-type: none"> <li>The conclusions suggest that the student's contribution has a marginal interest.</li> <li>The contribution made shows that some basic competences and knowledge have been applied, which can be associated with the Master's Program.</li> </ul>	<ul style="list-style-type: none"> <li>The conclusions suggest that the student's contribution is relevant.</li> <li>The contribution made shows that many basic competences and knowledge have been applied, which can be associated with the Master's Program.</li> </ul>	<ul style="list-style-type: none"> <li>The conclusions suggest that the student's contribution is relevant and original.</li> <li>The contribution made shows that the student masters all the basic competences and knowledge which can be associated with the Master's Program.</li> </ul>

**TABLE ON ASSESSMENT OF THE ORAL PRESENTATION AND DEFENSE**

<b>Score (qualitative)</b>	<b>D</b>	<b>C</b>	<b>B</b>	<b>A</b>
<b>Defense</b>	<ul style="list-style-type: none"> <li>The student lacks adequate knowledge to answer the questions on the MT work posed by the Committee.</li> </ul>	<ul style="list-style-type: none"> <li>The student has a basic knowledge on the MT work and is not able to autonomously answer questions posed by the Committee, requiring some assistance.</li> </ul>	<ul style="list-style-type: none"> <li>The student demonstrates good acquisition of knowledge about the MT topic and can answer the Committee's questions providing additional information beyond what has been already presented.</li> </ul>	<ul style="list-style-type: none"> <li>The student demonstrates solid knowledge on the MT topic and can employ the Committee's questions to deepen into certain aspects of the work.</li> </ul>
<b>Presentation</b>	<ul style="list-style-type: none"> <li>The presentation is boring and poor and contains little relevant information. The line followed by the presentation is not adequate.</li> <li>The slides are poor: not well organized and/or relevant, ambiguous.</li> </ul>	<ul style="list-style-type: none"> <li>The presentation draws the Committee's attention occasionally for certain aspects of the work, but it lacks a continuous line.</li> <li>The slides are correct: well organized, clear, and informative.</li> </ul>	<ul style="list-style-type: none"> <li>The presentation is interesting and draws the attention of the Committee; it follows a logical structure which covers the relevant issues.</li> <li>The slides are good: well organized, clear, informative, and enhance the overall MT.</li> </ul>	<ul style="list-style-type: none"> <li>The presentation is very interesting, keeping the attention of the Committee at all times; it follows a logical structure that touches upon all the relevant issues.</li> <li>The slides are excellent: well organized, clear, informative, enhance the overall MT, and stand out for their pedagogy and elaboration.</li> </ul>

**Date of last update of this document: April 28, 2023**

### SUPERVISOR'S EVALUATION REPORT

*To be filled in by the student's tutor prior to the Master Thesis Defense*

<b>MASTER IN</b>	
<b>Supervisor's name</b>	Dr.
<b>Student's name</b>	Mr./Ms.
<b>Master Thesis title</b>	

After having reviewed the student's work and taking into consideration the plagiarism's report, I grade the student with an overall mark of,

Grade<sup>1</sup>:  
(0-10 scale)

#### COMMENTS

*Note for the Supervisor (regardless the final grade that will be given by the evaluation Panel): If you detect a possible case of plagiarism, after having seen the results and percentages given by Turnitin, please state it in here explaining the reasons for your comments.*

DATE:

Supervisor's signature:

<sup>1</sup>The grade must be an overall mark between 0 and 10, taking into consideration the development of the student's work, the ability for planning and organization of the workload, attendance to tutorials, goal achievement and/or any other relevant aspect (Art.10 Directrices para la Organización y Evaluación de las asignaturas de Trabajo Fin de Estudios, aprobada en sesión de Consejo de Gobierno de 14 de noviembre de 2019)

Master in Computational and Applied Mathematics by Universidad Carlos III de Madrid  
**Rubric for Master's Thesis**

**Student:**

**Defense date:**

MAIN ASSOCIATED COMPETENCES	Achievement level for the competence				Score by Committee (over 8 points)
	Not adequate	Adequate	Good	Excellent	
Understanding of the disciplines involved in the research project					
Adequacy of the interpretation and discussion of the results obtained					
Capacity of innovation in the field of Computational and Applied Mathematics					
Acquisition of written communication skills, as required to defend a scientific project and its results					
Acquisition of oral communication skills, as required to defend a scientific project and its results					
<b>Score by supervisor:</b> (over 2 points)					
<b>TOTAL SCORE FOR MASTER'S THESIS</b>					
Does the Committee consider this Master's Thesis as a candidate for the Honors distinction? (YES/NO) <i>(to be filled only in cases in which the total score is 9 or higher)</i>					

**Committee President**

**Committee Secretary**

**Signed by:**

**Signed by:**