



Università di Camerino  
Scienze e Tecnologie

# MATHEMATICS AND APPLICATIONS

## MASTER DEGREE

LM-40

### duration 2 years

Total number of credits: **120 ECTS credits**  
(1 Credito Formativo Universitario CFU = 1 ECTS)

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*Sezione Matematica*  
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### Course Director

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### Guidance

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[www.mat.unicam.it](http://www.mat.unicam.it)

### Delegates

### Stage and Placement

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### Students Study Plans

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Classes are held in English

Location: Camerino

### Introducing the master

The Master Degree Course in Mathematics and Applications

- strengthens the knowledge of Pure Mathematics,
- proposes two different curricula introducing students to research and didactics in Mathematics, or applications to Economics and Finance, or applications to Technology and Engineering,
- through the High Apprenticeship or teaching experiences, prepares students for the world of work

The master benefits of a longstanding and well appreciated didactical expertise, a friendly and skillful teaching staff, and reliable supporting structures (such as study and work rooms, computer facilities, libraries) in addition to dedicated tutorship services. Among the research programs currently developed in Mathematics in Camerino and related to our Master let us recall design of electric cars and racing cars, applications to earth and sea sciences, economics and finance, health (medical diagnostic), disability problems (exoskeleton) and much more.

### Admittance conditions

To enroll in the Master Degree Course in Mathematics and Applications it is necessary:

- an Italian first level 3 years degree, or an equivalent undergraduate diploma earned out of Italy,
- at least 30 ETCS in Mathematics,
- knowledge of English language (level B1, or at least 3 ETCS).

### Course Structure

The Master Degree Course in Mathematics and Applications is organized into two different curricula: one on Theoretical and Didactic Mathematics and the second on Applied and Engineering oriented Mathematics.

Classes are held in two different terms, from the beginning of October to the end of January, and then from the beginning of March to the middle of June. The February break is devoted to the Winter Exam Session.

Study plan is organized according to the following Tables:

#### Table 1 Theoretical and Didactic Mathematics

Advanced Algebra, term I	6 ECTS
Advanced Mathematical Logic, term II	6 ECTS
<b>Advanced Geometry</b>	12 ECTS
Differential Geometry, term I	
Differential Topology, term II	
<b>Advanced Mathematical Analysis</b>	12 ECTS
Partial Differential Equations, term I	
Functional Analysis, term II	

#### Table 2 Applied and Engineering oriented Mathematics

<b>Advanced Probability and Stochastic Processes</b>	12 ECTS
Advanced Probability, term I	
Stochastic Processes, term II	
<b>Advanced Applied Mathematics</b>	12 ECTS
Nonlinear Optimization, term I	6 ECTS
Numerical Methods for Differential Equations, term II	6 ECTS
<b>System Analysis and Control Theory</b>	12 ECTS
System Analysis, 6 CFU, term I	
Control Theory, 6 CFU, term II	

#### Table 3 Additional courses on Theoretical and Didactic Mathematics, 6 ETCS each

<b>Computability and Complexity</b> , term I, INF/01
<b>History and Didactics of Mathematics</b> , term I, MAT/04
<b>Quantum Computation</b> , term I, FIS/02 (**)
<b>Theoretical Physics</b> , term I, FIS/02
<b>Dynamical Systems</b> , term I, MAT/07
<b>Geometrical Riemann Surfaces</b> , term II, MAT/03
<b>Knots Theory</b> , term II, MAT/03
<b>Algebraic Number Theory</b> , term I, MAT/02
<b>Model Theory</b> , term II, MAT/01

#### Table 4 Additional courses on Applied and Engineering oriented Mathematics, 6 ETCS each

<b>Computational Graphics</b> , term I, INF/01
<b>Dynamic and Stochastic Optimization in Finance and Economics</b> , term I, SECS/06
<b>Inverse Problems</b> , term I, MAT/05
<b>Neural Networks</b> , term I, MAT/09
<b>Nonlinear Control Theory</b> , term II, ING-INF/04
<b>Advanced Mechanical Design</b> , term II, ING-IND/14
<b>Optimal Control</b> , term II, ING-INF/04
<b>Computational Methods for Finance</b> , term II, MAT/08

Students are strongly encouraged to choose the course from Table 1 and 2 in their first year of enrollment.

Students are also recommended to check every year with the Course Coordinator the classes from Table 3 and 4 and their terms.

#### Description of the two curricula

##### Theoretical and Didactic Mathematics

- All courses from Table 1 (36 ECTS)
- The first 2 courses of 12 ECTS in the Table 2 (24 ECTS).
- 3 courses of 6 ECTS each from Table 3, at least one MAT course and at least one non-MAT course (18 ECTS).
- Optional courses chosen by the student (12 ECTS).
- Final thesis (30 ECTS) corresponding to 750 work hours.

##### Applied and Engineering Oriented Mathematics

- All courses from Table 2 (36 ECTS).
- 2 out of 3 courses from Table 1 (24 ECTS).
- 3 courses of 6 ECTS each from Table 4, at least one MAT course and at least one non-MAT course (18 ECTS).
- Optional courses chosen by the student (12 ECTS).
- Final thesis (30 ECTS), corresponding to 750 work hours.

##### Optional courses chosen by the student

The 12 ETCS reserved for these activities can include

- Additional courses in Mathematics,
- courses in Physics, Computer Science, and so on,
- courses of Advanced English, or other languages,
- seminars on Mathematics and its Applications (in Italian),
- High Apprenticeship (see below).

Students with an undergraduate degree not in Mathematics are strongly recommended to utilize the optional courses to complete their preparation in basic Mathematics. Moreover, they are warmly invited to contact as soon as possible the Course Coordinator and discuss with him the best solutions.

#### High Apprenticeship

It is a 1 year job training experience. To this end, students may utilize

- the 12 ETCS devoted to optional courses,
- the 30 ETCS of the final thesis.

The knowledge of the Italian language is strongly recommended. For any information please ask well in advance prof. Pierluigi Maconi (pierluigi.maconi@unicam.it), also in order to define a specific study plan. Note that only a restricted number of fellowships is available each year.

#### Final thesis

The final thesis (30 ECTS, corresponding to 750 hours of work) is prepared under the supervision of a professor. Students are asked to contact with due advance their advisor to define the topic of the thesis.

#### After completing the Master degree

- Italian students can consider a teaching experience, please ask prof. Renato De Leone (renato.deleone@unicam.it) about TFA (Tirocini Formativi Attivi, 1 year post-master course introducing to the Italian education world) and similar perspectives.
- Students interested in a job in industry (constructing and applying mathematical models in economical and industrial settings, in public departments or managements) are invited to visit [www.unicam.it/](http://www.unicam.it/) master or ask prof. Pierluigi Maconi (pierluigi.maconi@unicam.it).
- Students interested in scientific research are invited to consider the PhD program in Mathematics [www.unicam.it/laureati/dottorato](http://www.unicam.it/laureati/dottorato), ask the thesis advisor or prof. Roberto Giambò (roberto.giambò@unicam.it).

#### Information for admissions, courses and other services

at [www.unicam.it/international](http://www.unicam.it/international)

#### Didactic Manager

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