



Università di Camerino

Master

Mathematics and Applications

International Agreement with University of Technology of Clausthal (Germany)

Classes are held in English

LM 40 **2 years**

Location: **Camerino**

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

WEB SITE <http://www.mat.unicam.it>

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.

Classes are divided in the following Tables 1 to 4.



Table 1: Advanced Theoretical Mathematics

Algebra and Logic 2, Term 1: Algebra (*) Term 2: Logic	12 ECTS
Advanced Geometry Term 1: Differential Geometry Term 2: Knot Theory	12 ECTS
Mathematical Analysis 4 Term 1: Partial Differential Equations Term 2: Functional Analysis	12 ECTS

(*) Algebra proposes on alternate years 2 topics
a) Numbers and Cryptography, b) Galois Theory.
The 2015-16 topic is Galois Theory.
Algebra and Logic 2 requires two separate exams of 6 ECTS, the former of Algebra, and the latter of Logic. The other courses consist of a unique final exam of 12 ECTS.

Table 2: Applied and Engineering oriented Mathematics

Probability Theory and Stochastic Processes Term 1: Probability Theory 2 Term 2: Stochastic Processes	12 ECTS
Applied Mathematics Term 1: Nonlinear Optimization Term 2: Numerical Methods for Differential Equations	12 ECTS
Systems Analysis and Control Systems Term 1: Systems Analysis Term 2: Control systems	12 ECTS

Applied Mathematics consists of two separate exams of 6 ECTS each: Nonlinear Optimizations and Numerical Methods for Differential Equations. Systems Analysis and Control Systems consists of two separate exams of 6 ECTS each.

Table 3: Additional courses on Theoretical and Didactic Mathematics, 6 ECTS each

Computability and Complexity, Term 1, (non-MAT)
History and Didactics of Mathematics, Term 1 (MAT)
Quantum Computation and Quantum Information (**), Term 1 (non-MAT)
Theoretical Physics, Term 1 (non-MAT)
Dynamical Systems, Term 1 (MAT)
Advanced Geometry I, Term 2, (MAT)
Advanced Geometry II, Term 2 (MAT)
Advanced Algebra, Team I (MAT)

(**) Quantum Computation and Quantum Information proposes on alternate years 2 topics a) Quantum Computation, b) Quantum Information. The 2015-16 topic is Quantum Information.

Table 4: Additional courses on Applied and Engineering oriented Mathematics, 6 ECTS each

Computational Graphics, Term 1, (non-MAT)
Optimization in Finance and Economics, Term 1, (non MAT)
Inverse Problems, Term 1, (MAT)
Neural Network, Term 1, (MAT)
Nonlinear Control Theory, Term 2, (non-MAT)
Advanced Mechanical Design, Term 2, (non-MAT)
Optimal control, Term 2, (non-MAT)
Computational Fluid Dynamics, Term 2, (MAT)
Computational Methods for Finance, Term 2, (MAT)

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

The knowledge of the Italian language is strongly recommended. For any information please ask well in advance prof. Pierluigi Maponi (pierluigi.maponi@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/master or ask prof. Pierluigi Maponi pierluigi.maponi@unicam.it .

- Students interested in scientific research are invited to consider the PhD program in Mathematics 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**COURSE COORDINATOR AND DELEGATES**
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