DESCRIPTION OF THE CURRICULUM
(TEACHING REGULATIONS OF THE COURSE)
MASTER'S DEGREE COURSE IN MATHEMATICS
(LM-40R)
academic year 2025/26

Sommario

Art. 1 - General characteristics and organization

The Master's Degree Course in Mathematics, class LM-40, is activated according to the educational regulations of the academic year 2025/2026.

The course in brief

The study of Mathematics builds and strengthens the mechanisms of abstract thinking, which enables the development of flexible work tools, allowing future graduates to adapt to an ever-changing world, learn new techniques and respond to new challenges. Mathematicians can analyze problems, construct models, look for connections between concepts, and imagine unexpected and unconventional solutions. The goal of the program is to provide solid preparation at an advanced level in the main areas of mathematics, developing an understanding and familiarity with the mathematical method. The proposed curriculum aims at introducing students to key aspects of modern mathematics and its applications to other disciplines, primarily Physics and Computer Science, but also to Economics, Biology and Social Sciences. The Master's degree program is also characterized by its international vocation, which is achieved both through internationalization programs and through the teaching of courses in English. Access to the course is open but a three-year degree or equivalent is required, as well as curricular requirements consisting of having obtained at least 48 CFU in the MAT/* sectors, at least 9 in the FIS/* sectors and at least 6 in the INF/01-ING/INF sectors.

The admission to the program is also subject to passing an interview to assess the entry-level knowledge of the main areas of basic mathematics. Given the program international orientation, this interview will also assess the English proficiency at least at level B2 or equivalent. The program includes several elective courses. Teaching methods are predominantly traditional, with lectures and exercises. To enhance presentation and communication skills, as well as autonomy and the ability to summarize, students will participate in seminars, both in groups and individually under the direct supervision of the teachers.

Erasmus+ international mobility projects allow students to spend periods of study at a foreign partner university, taking courses and taking the relevant exams. Details of this project can be found on this webpage: https://www.uninsubria.it/servizi/erasmus-studio

Starting from the 2015/16 academic year, there is a double degree agreement with the Linnaeus University in Vaxjo Kalmar, Sweden, which allows students to obtain a Master's Degree in Mathematics from the University of Insubria and a Master's Degree in Mathematics and Modelling from Linnaeus University. Participation in the dual degree program is based on a comparative selection process organized by the Degree Program; applicants are then required to spend at least one semester at the partner university and earn at least 30 ECTS credits.

Information on the double degree program is available at the link: https://www.uninsubria.it/servizi/doppi-titoli-di-laurea

The degree program is taught entirely in English.

The Department of Science and High Technology is responsible for the program. The Program Coordinator is Prof. Giovanni Bazzoni.

The Didactic Secretariat receives by appointment in via Valleggio 11 (4th floor) and replies to emails through

INFOSTUDENTI. More information about this can be found at the following link: https://www.uninsubria.it/servizi/tutti-i-servizi/infostudenti-servizio-informazioni-gli-studenti

Art. 2 - Teaching calendar of the course

Educational activities take place in Como. The internet address of the course is the following: https://www.uninsubria.it/formazione/offerta-formativa/corsi-di-laurea/matematica

The lesson calendar is published under the page **LESSON TIMETABLE:**
https://www.uninsubria.it/formazione/offerta-formativa/corsi-di-laurea/matematica

The teaching calendar is divided into semesters:
I semester from **22 September 2025 to 16 January 2025**
II semester from **23 February 2026 to 12 June 2026**

Exams

There are at least 6 sessions for each course during the period of lessons suspension. The calendar of the exams is published on the page https://uninsubria.esse3.cineca.it/ListaAppelliOfferta.do

Art. 3 - Education goals, expected learning outcomes and career opportunities

The primary educational goal of the master's degree program in Mathematics is to provide solid preparation at an advanced level in the main areas of mathematics, developing an understanding and familiarity with the mathematical method.
The degree program in Mathematics aims at:

- providing advanced knowledge in one or more areas of modern pure and applied mathematics, including in the context of other sciences.
- Providing advanced tools for the analysis and mathematical modeling of problems in various scientific fields.
- Providing adequate computational and computer skills.

The teaching method is mainly traditional, based on lectures and exercise classes.
A key aspect of the training program is the preparation of the final exam, which involves writing a thesis on an advanced topic.

ADVANCED THEORETICAL TRAINING AREA

Courses in this area provide advanced skills in pure mathematics.

Knowledge and understanding

Master's degree graduates in Mathematics:

1. understand the fundamentals of analysis (differential and integral calculus in one and more variables), algebra (fundamental algebraic structures and linear algebra), geometry (topology, and geometry of curves and surfaces) and probability. They also possess adequate knowledge of ordinary differential equations and partial differential equations.
2. Are able to read and understand advanced mathematics texts in English.

Ability to apply knowledge and understanding

Master's degree graduates in Mathematics:

1. are able to produce rigorous proofs of mathematical results that are not identical to those already known but are clearly related to them.
2. Are able to solve problems of moderate difficulty in various fields of Mathematics.

The knowledge and skills listed above are acquired within the individual courses, many of which include exercises in which students independently address problems of increasing difficulty. The ability of reading and understanding scientific texts are initially developed through the study of the relevant texts for each course, in English, and are further developed during the preparation period for the final exam.

The listed skills are assessed through exams, which often consist of a written and oral test, allowing students to assess their level of autonomy. This assessment also includes seminars performed by students within the individual courses under the supervision of the teacher.

ADVANCED MODELING AND APPLICATION TRAINING AREA

The courses in this area provide advanced skills for the analysis and modeling of problems originating in various scientific and applied fields, and the computer science and numerical tools for their solution.

Knowledge and understanding

Master's degree graduates in Mathematics

1. have a solid understanding of the deep relationships with non-mathematical disciplines, both in terms of the motivations for mathematical research and the practical implications of the results of such investigations
2. have adequate computational and computer skills.

Ability to apply knowledge and understanding

Master's degree graduates in Mathematics

1. are able to mathematically formalize problems originating from other scientific disciplines, and to use this formalization to highlight their essential aspects and contribute to their resolution, also by referencing the mathematical literature.
2. Are able to easily use computer and computational tools to support mathematical processes and to acquire further information.

JOB OPPORTUNITIES

Graduates in Mathematics can operate in universities, public and private research institutions, companies operating in the industrial, insurance, financial, IT, and environmental sectors, public and private consulting, training, and service companies, and public administration.

Mathematicians perform research in pure and applied mathematics, provide support for the mathematical modeling of complex problems originating in the physical, computer and economic sciences, and identify advanced mathematical methods and tools to facilitate their solution. They use advanced probabilistic statistical methods for data analysis and predicting the behavior of complex systems. Other key roles include the transfer of mathematical knowledge to scientific research, popularization, industry, and the production of goods and services.

Art. 4 - Admission to the course

The admission to the course is open.

Graduates of the Mathematical Sciences (L-35) degree class and the corresponding class in Ministerial Decree 509/99 are eligible for admission to the Master's Degree in Mathematics. Those possessing a degree from another class obtained from a national university, as well as those having another qualification obtained abroad and recognized as suitable, are also eligible, provided they demonstrate the necessary skills to successfully complete the studies. The curricular requirements for admission to the Master's Degree program are defined as follows in terms of the number of credits in the scientific-disciplinary fields:

- at least 48 CFU in mathematical area (from MAT/01 to 09);
- at least 9 CFU in physical area (form FIS/01 to 08);
- at least 6 CFU in INF/01.

For the admission to the master's degree program, the graduates' personal preparation is assessed, subject to their fulfillment of curricular requirements, through an interview on topics related to the core courses of the Bachelor's Degree in Mathematics. The interview is performed by a committee of professors appointed by the Degree Program Council and covers basic knowledge of algebra, geometry, analysis, probability, mathematical physics and numerical analysis. The interview also assesses the English language proficiency at a B2 level. If additional training in specific scientific-disciplinary areas is needed, these additional training is quantified in credits (CFU) that must be acquired prior to the admission to the master's degree program.

Requests for the recognition of exams taken in previous studies will be evaluated by the Degree Programme Council. The maximum number of credits that can be recognized is 12.

Art. 5 - Education Path

The program does not include curricula and allows students considerable flexibility in developing their study plan. In particular, students:

- must acquire at least 18 credits in elective subjects.

- May acquire 3 credits for internships, which can be completed either internally or at companies/schools.

Teaching is performed in a conventional way. Attendance is not compulsory.

Upon presentation of proven documentation, students with disabilities may request that teachers provide lesson recordings and dedicated teaching materials.

CFU/hours correspondence for each type of activity

University Educational Credits (CFU) are a measurement of the amount of learning, including individual study, required to a student with an adequate initial preparation to acquire knowledge and skills in the educational activities required by the degree program.

Any educational activity (teaching, laboratory, internship, thesis, etc.) within the degree program corresponds to a specific number of educational credits (CFU).

Each CFU corresponds to 25 hours of commitment, given by the hours of lectures and laboratory and the ones of independent study necessary to complete the student's preparation.

The CFU number corresponding to each educational activity is acquired by the student upon passing the exam or any other form of assessment defined in the degree program rules.

Educational Activities / CFU:

- 8 hours of lectures with 17 hours of individual study.
- 12 hours of practical exercises with 13 hours of individual study.
- 16 hours of laboratory work with 9 hours of individual study.
- 20 hours for seminars.
- 25 hours for an internship.
- 25 hours the thesis.

Assessment Methods for Educational Activities

The assessment and evaluation methods are detailed in the course syllabi.

The teachers of the various courses identify the methods to assess the educational activities. These include written tests, oral tests, laboratory reports, and in-depth study/project activities.

You can register for exams through ESSE3 starting one month before the exam date and up to 5 days before it. To register for an exam, you must have completed the attendance to the relevant course.

Exams are held during the suspension of teaching activities, typically from mid-January to the end of February and from mid-June to the end of September. Individual students may request special exam sessions if they need to graduate.

Possible Prerequisites and/or Exclusions

There are no prerequisites.

Art. 6 - Rules for submitting study plans

Students must submit their study plans in their first year according to the annual deadlines published at https://www.uninsubria.it/servizi/presentazione-piano-di-studio.

Students may modify their study plans in subsequent years, if they are regularly enrolled.

To submit the study plan, students have to access their personal area in ESSE3 and indicate:

- which courses they choose from the different lists, indicating the year in which they will be attended.
- Related/complementary courses (TAF C), for at least 18 credits, indicating the year in which they will be attended.
- Elective courses (TAF D), for at least 18 credits, indicating the year in which they will be attended.

It is possible to submit the study plan in paper format.

Student Elective Courses (letter D)

As part of the "Student Elective Courses" program, students may choose, starting in their first year, from:

- courses offered by the Master's Degree Program in Mathematics, if not already chosen (courses that substantially overlap with those already included in the Bachelor's Degree program are excluded from the choice).
- Courses from other programs offered by the Department or the University, provided they are consistent with the curriculum and subject to approval by the Degree Program Council. In this case, the study plan must be submitted in paper format by requesting the form from the Student Office via INFOSTUDENTI.

Courses offered by limited number University degree programs cannot be chosen.

Further language skills, IT and interpersonal skills, internships and other (letter F)

Students may choose, subject to approval by the Degree Program Council, starting in their first year, between:

- "Advanced Scientific English", offered by the master program, for language skills.
- Part of the "Scientific Python" program, offered by the Physics program, where not already chosen as a related/complementary program, for IT skills.
- Internships.

Internships/traineeships must be approved by the Degree Programme before they begin and must involve the presence of an internal supervisor. Activities that may be eligible for credits include:

i. Mathematical internships at external companies and institutions.
ii. In-house internships, under the supervision of a faculty member, on topics not covered in class and not included in the thesis. In this case, credits are awarded subject to the presentation of a seminar.
iii. Active participation in orientation activities, particularly the Scientific Degrees project, the Mathematics High School activities, the summer mathematics internship, and the PCTO (transversal skills and orientation projects) offered by the faculty.
iv. Tutoring activities within student collaborations to support teaching. Completing these activities for

a total of at least 10 hours allows the student to earn 1 CFU. As a general rule, tutoring activities can result in the recognition of up to 2 credits. Requests for the allocation of more than 2 credits must be adequately justified.

Other useful knowledge for entering the world of work (TAF F)

2 credits for "Other skills useful for entering the world of work" can be earned through:

- Knowledge of a foreign language, certified by an official document, at least level C1 for English and B2 for other languages. A C1 level or equivalent in a language is considered acquired if students have attended at least two semesters at foreign universities or higher education programs taught in that language.
- Certified IT skills that are qualifying and relevant to the study program.
- Certified work experience that is qualifying and relevant to the study program.
- All the activities i.-iv. in the "Internships/Trainees" list.

The student can change the study plan in subsequent years, if regularly enrolled.

Art. 7 - Opportunities offered during the training path

The program promotes several initiatives that complement and enrich the academic experience. In particular, it is possible to participate in mobility and internationalization programs:

- **Mobility abroad – Erasmus and other opportunities**
  https://www.uninsubria.it/internazionale/mobilita-allestero/programma-erasmus

University	**Country**	**Maximum number of places**	**Maximum period (in months)**
Katholieke Universiteit Leuven	Belgium	2	12
Université d'Orléans	France	3	6
Friedrich Schiller Universität Jena	Germany	2	6
Bergische Universität Wuppertal	Germany	4	12
Panepistimio Ioanninon	Greece	2	6
Universitatea Babes Bolyai	Romania	2	6
Universidad UNIE S.L.	Spain	1	6
Kafkas Universitesi	Turkey	1	6

- **Erasmus with an Italian university:** One agreement is about to be activated for the 2025/26 academic year with the University of Salerno. Further information will be available on the Master's Degree program website.
- **Double degree:** Students interested in the Double Degree Program with the Linnaeus University of Kalmar-Vaxjo (Sweden) must apply during their first year to a selection process that will typically be published at the beginning of each calendar year. The call for applications will be issued and managed by the International Relations Office and the Department of Science and High Technology. At most 4 selected students will be included in the Erasmus University rankings (they will therefore have the Erasmus student status) and will benefit from a scholarship funded by European and University funds. For information on the Call for Applications or for further information on participating in the program, please visit the following link: https://www.uninsubria.it/servizi/tutti-i-servizi/doppi-titoli-di-laurea
- **Tutoring service** (https://www.uninsubria.it/servizi/tutti-i-servizi/tutorato)
  The program annually identifies discipline tutors, i.e., teachers that can be contacted by students on topics regarding international mobility, information on the double degree, the compilation of the study plan, etc.

Contacting the "Diritto allo Studio" office, it is possible to apply for student collaborations: https://www.uninsubria.it/servizi/tutti-i-servizi/collaborazioni-studentesche-200-ore

Art. 8 - Graduation

The final exam consists of the presentation and defense of a thesis before a committee. The thesis must be an original work performed by the student under the guidance of a supervisor and written in English. The thesis may be a thorough critical reworking of results found in the mathematical literature, or it may be an original investigation of research topics. It may be undertaken either at the university or within research groups, institutions or companies.

The final exam, which corresponds to 31 credits (CFU), will be assessed with a score that generally ranges from 0 to 7, which can be increased to 8 upon motivated request by the supervisor to the commission and which takes into account both the quality and originality of the final paper, as well as its presentation.

If V is the final exam score and M is the weighted average of the grades obtained in the exams expressed in 110, the degree grade, in 110, is given by

$\min\{110, M + V\}$

If the achieved score is 110, the President must discuss the possibility of awarding honors, for which the unanimous approval of the committee members is required.

Upon graduation, a **Diploma Supplement** is issued. The Diploma Supplement is an informative report accompanying the official qualification awarded at the end of the study program. It describes the nature, level, context, content, and status of the studies undertaken and completed by the student. It is issued in both Italian and English. The purpose of the document is to provide independent data for the international transparency of qualifications (diplomas, degrees, certificates, etc.) and to enable equitable academic and

professional recognition, promoting student mobility. The Diploma Supplement complies with the Europass standard.

APPENDIX 1 - Study plan

***** **Activity (TAF)**
A Basic mathematics/physics/computer science training
B Characterizing activity
C Related or complementary activity
D Elective activity
E Final exam and foreign language
F other activities (letter D)

****** **hours and activity type**
L Lesson
ESE Exercise
LAB Laboratory

YEAR I and II - Two activities among							
Year	**SEM**	**Name**	**Sector 2015**	**Sector 2024**	**TAF***	**CFU**	**Hours/type (**)**
2025/26	II	Topics in Advanced Algebra A	MAT/02	MATH-02/A	B	9	L: 72
2026/27	II	Topics in Advanced Algebra B	MAT/02	MATH-02/A	B	9	L: 72
2025/26	II	Topics in Advanced Geometry A	MAT/03	MATH-02/B	B	9	L: 72
2026/27	I	Topics in Advanced Geometry B	MAT/03	MATH-02/B	B	9	L: 72
2025/26	II	Topics in Advanced Analysis A	MAT/05	MATH-03/A	B	9	L: 72
2026/27	II	Topics in Advanced Analysis B	MAT/05	MATH-03/A	B	9	L: 72

YEAR I and II - Two activities among							
Year	**SEM**	**Name**	**Sector 2015**	**Sector 2024**	**TAF***	**CFU**	**Hours/type (**)**
2025/26 2026/27	I	Topics in Advanced Probability	MAT/07	MATH-04/A	B	9	L: 72
2025/26	I	Dynamical Systems A	MAT/07	MATH-04/A	B	9	L: 72
2026/27	I	Dynamical Systems B	MAT/07	MATH-04/A	B	9	L: 72
2025/26 2026/27	II	Topics in Advanced Numerical Analysis	MAT/08	MATH-05/A	B	9	L: 72
2025/26	I	Numerical Optimization Methods	MAT/08	MATH-05/A	B	9	L: 72
2026/27	I	Inverse Problems and Machine Learning	MAT/08	MATH-05/A	B	9	L: 72
2025/26	I	Numerical Solutions of	MAT/08	MATH-05/A	B	9	L: 72

		Conservation Laws					
2026/27	I	Numerical Solutions of Elliptic Problems	MAT/08	MATH-05/A	B	9	L: 72

YEAR I and II - Two activities among							
Year	**SEM**	**Name**	**Sector 2015**	**Sector 2024**	**TAF***	**CFU**	**Hours/type (**)**
2025/26 2026/27	I	Topics in Category Theory	MAT/01	MATH-01/A	B	6	L: 48
2025/26	I	Advanced Algebra A	MAT/02	MATH-02/A	B	6	L: 48
2026/27	I	Advanced Algebra B	MAT/02	MATH-02/A	B	6	L: 48
2025/26	I	Advanced Geometry A	MAT/03	MATH-02/B	B	6	L: 48
2026/27	II	Advanced Geometry B	MAT/03	MATH-02/B	B	6	L: 48
2025/26	I	Advanced Analysis A	MAT/05	MATH-03/A	B	6	L: 48
2026/27	I	Advanced Analysis B	MAT/05	MATH-03/A	B	6	L: 48
2025/26	II	Advanced Mathematical Physics A	MAT/07	MATH-04/A	B	6	L: 48
2026/27	II	Advanced Mathematical Physics B	MAT/07	MATH-04/A	B	6	L: 48
2025/26	II	Approximation Theory and Spectral Analysis	MAT/08	MATH-05/A	B	6	L: 48
2026/27	II	Iterative Methods for Large Scale Linear Systems	MAT/08	MATH-05/A	B	6	L: 48

YEAR I and II - 18 CFU among							
Year	**SEM**	**Name**	**Sector 2015**	**Sector 2024**	**TAF***	**CFU**	**Hours/type (**)**
2025/26 2026/27	II	Mathematical Logic	MAT/01	MATH-01/A	C	6	L: 36 ESE: 18
2025/26 2026/27	II	History of Mathematics	MAT/01	MATH-01/A	C	6	L: 72 L: 56 ESE: 24
			MAT/02	MATH-02/A	C	3	
2025/26 2026/27	II	Elementary Mathematics from an Advanced Standpoint	MAT/07	MATH-04/A	C	6	L: 48
2025/26	II	Introduction to Modern Physics	MAT/07	MATH-04/A	C	7	L: 56 LAB: 32
			FIS/01	PHYS-03/A	C	2	
2025/26 2026/27	II	Applied Statistics	SECS-S/01	STAT-01/A	C	9	L: 56 LAB: 32
2025/26 2026/27	II	Scientific Python	FIS/07	PHYS-06/A	C	6	LAB: 66

2025/26	I	Theoretical Physics	FIS/02	PHYS-02/A	C	9	L: 72
2026/27	I	Geometrical Methods in Physics	FIS/02	PHYS-02/A	C	9	L: 72
2026/27	I	Deep Learning	INF/01	INFO-01/A	C	6	L: 48
2025/26 2026/27	I	Intelligent Systems	INF/01	INFO-01/A	C	9	L: 72
2025/26	I	Models for Biological Systems	INF/01	INFO-01/A	C	6	L: 48
2026/27	I	Process Algebras	INF/01	INFO-01/A	C	6	L: 48

YEAR I and II - Compulsory activities					
SEM	**Name**	**S.S.D.**	**TAF***	**CFU**	**Hours/type (**)**
NN	Elective courses	NN	D	18	
NN	Other Knowledge For Entering The Job Market	NN	F	2	

YEAR I and II - One activity among					
SEM	**Name**	**S.S.D.**	**TAF***	**CFU**	**Hours/type (**)**
I	Additional linguistic knowledge	NN	F	3	
II	Additional IT knowledge	NN	F	3	
NN	Internship	NN	F	3	

YEAR II - Compulsory activity					
SEM	**Name**	**S.S.D.**	**TAF***	**CFU**	**Hours/type (**)**
NN	Final exam	NN	E	31	