UNIVERSITÀ DEGLI STUDI
DELL'INSUBRIA

DEPARTMENT OF SCIENCE AND HIGH TECHNOLOGY

# DESCRIPTION OF THE EDUCATION COURSE (COURSE RULES)

# MASTER'S DEGREE in MATHEMATICS

**2024/2025**

| I - GENERAL INFORMATION | |
|---|---|
| **NAME OF THE DEGREE PROGRAMME (CDS)** | Master's degree in mathematics |
| **CLASS** | LM-40 |
| **TYPE** | 2-year degree |
| **LOCATION** | Department of Science and High Technology, via Valleggio, 11- Como |
| **INTERNET ADDRESS** | For information on the educational goals of the degree course, employment opportunities, admission requirements, admission procedures, expected learning outcomes, training path/study plan, final examination, you can consult the Annual Report (SUA-CdS), published on the web page of the course at the following address:<br>Link: www.uninsubria.it/magistrale-matematica |
| **DEPARTMENT** | Science and High Technology – DiSAT<br>https://www.uninsubria.it/ugov/organizationunit/7976 |
| **RESPONSIBLE** | Prof. Giovanni Bazzoni |
| **COURSE TEACHING SECRETARIAT** | https://www.uninsubria.it/servizi/tutti-i-servizi/servizio-di-ascolto-manager-didattici-la-qualita-disat |
| **CALENDAR OF TEACHING ACTIVITIES** | 1st semester: start date 23/09/2024 – end date 17/01/2025<br>2nd semester: start date 24/02/2025 – end date 13/06/2025<br>Exam session: from 01/12/2024 to 31/03/2026<br>To find out the dates of suspension of the teaching activities and closures of the University facilities due to national and local holidays and other closures (Christmas Holidays, Easter Holidays, University closures), students are required to consult the **University Teaching Calendar** approved by the Academic Bodies at this link:<br>https://www.uninsubria.it/chi-siamo/sedi-e-orari/calendario-didattico-di-ateneo |
| **FURTHER INFORMATION** | ACCESS TO THE COURSE: free access<br>POSSIBLE ISSUE OF DOUBLE DEGREE:<br>An agreement is active for a double degree with the Linnaeus University of Vaxjo-Kalmar in Sweden, by virtue of which it is possible to obtain the Master's Degree in Mathematics, conferred by the University of Insubria, and the Master in Mathematics in Modelling conferred by the Linnaeus University.<br>LANGUAGE IN WHICH TEACHING IS PROVIDED: English<br>PRESENCE OF ANY PATHS/CURRICULA: There are no paths or curricula. |
| **ADMISSION PROCEDURES** | Graduates of the class of degrees in Mathematical Sciences (L-35) and of the corresponding class relating to Ministerial Decree 509/99 can access the Master's Degree in Mathematics.<br>Those who hold a degree of another class obtained at a national university can also access it, as well as those who hold another qualification obtained abroad and recognized as suitable, provided they demonstrate that they possess the skills necessary to profitably follow their studies. |

| | |
|---|---|
| | The curricular requirements for admission to the Master's Degree Program are defined as follows in terms of the number of credits obtained in the scientific-disciplinary sectors:<br>• at least 48 credits obtained indifferently in the scientific sector MAT (from 01 to 09)<br>• at least 9 credits obtained indifferently in the scientific sector FIS (from 01 to 08)<br>• at least 6 credits obtained in the scientific sector INF/01<br>Access to the Degree Program is free. |
| **ANY PREPARATORY TRAINING ACTIVITIES FOR THE VERIFICATION OF INITIAL KNOWLEDGE** | Not foreseen. |
| **VERIFICATION OF THE POSSESSION OF CURRICULAR REQUIREMENTS AND THE ADEQUACY OF PERSONAL PREPARATION** | The personal preparation of graduates is verified by means of an interview on topics related to the disciplines covered in the fundamental courses of the Bachelor's Degree in Mathematics. The interview is performed by a commission of professors appointed by the Course Committee, and covers basic knowledge in algebra, analysis, geometry, probability, mathematical physics and numerical analysis. If the need arises for educational integrations in specific scientific sectors, these integrations are quantified in credits that must be acquired before the admission to the Master's degree course.<br>The interview will also verify the knowledge of the English language, evaluating both the comprehension of the texts and the ability of oral and written expression. The knowledge of an adequate disciplinary and technical vocabulary will also be specifically assessed. Graduates from the three-year degree in Physics or Mathematics of the University of Insubria who have passed the English course (equivalent to the B2 level), are automatically recognized as meeting the access requirement for the English language.<br>Any curricular integration, in terms of university credits, must be acquired before the verification of the individual preparation. |
| **ORIENTATION, ENROLMENT PROCEDURES AND OTHER ADMINISTRATIVE ASPECTS** | **STUDENT SERVICE**<br>The INFOSTUDENTI service is a web application that offers a communication channel through which students or potential students can obtain useful information by contacting the various offices of the University (Student Secretariats, Right to Education and Student Services, Career Guidance and Placement, Teaching Secretariats and International Relations).<br>With this system it will be possible to send questions and receive the related answers by also attaching documents and following the status of your request.<br>You can access the service at the following link:<br>https://www.uninsubria.it/servizi/infostudenti-servizio-informazioni-gli-studenti |

# II - STUDY PLAN

## PLANNED TEACHING - Cohort 2024/2025

By planned teaching we mean the set of courses provided for the entire course of study, which must be taken by all students who enroll in the current academic year (Enrollment Cohort) to complete the training course and obtain the qualification.
LES = lesson, EX = exercises, LAB = laboratory,

## ELECTIVE COURSES (CURRICULAR, IN BLOCKS OF CHOICE)

### YEAR I – TWO COURSES TO BE CHOSEN FROM:

| SEMESTER | COURSE Title | MODULES Name | Scientific sector S.S.D | DISCIPLINARY AREA/TAF | CFU | HOURS | ASSESSMENT METHODS* | |
|---|---|---|---|---|---|---|---|---|
| I | ADVANCED ALGEBRA B | | MAT/02 | B/Advanced theoretical training | 8 | LES 64 | V | |
| I | ADVANCED ANALYSIS B | | MAT/05 | B/Advanced theoretical training | 8 | LES 64 | V | |
| I | ADVANCED GEOMETRY B | | MAT/03 | B/Advanced theoretical training | 8 | LES 64 | V | |
| I | TOPOS THEORY | | MAT/01 | B/Advanced theoretical training | 8 | LES 40 EX 36 | V | |
| II | MATHEMATICAL LOGIC | | MAT/01 | B/Advanced theoretical training | 8 | LES 36 EX 42 | V | |
| II | TOPICS IN ADVANCED ALGEBRA B | | MAT/02 | B/Advanced theoretical training | 8 | LES 64 | V | |
| II | TOPICS IN ADVANCED ANALYSIS B | | MAT/05 | B/Advanced theoretical training | 8 | LES 64 | V | |
| II | TOPICS IN ADVANCED GEOMETRY B | | MAT/03 | B/Advanced theoretical training | 8 | LES 64 | V | |

### YEAR I – TWO COURSES TO BE CHOSEN FROM:

| SEMESTER | COURSE Title | MODULES Name | Scientific sector S.S.D | DISCIPLINARY AREA/TAF | CFU | HOURS | ASSESSMENT METHODS* | |
|---|---|---|---|---|---|---|---|---|
| I | ANALYTIC AND PROBABILISTIC METHODS IN MATHEMATICAL PHYSICS I | | MAT/07 | B/Application modeling training | 8 | LES 64 | V | |
| I | DYNAMICAL SYSTEMS B | | MAT/07 | B/Application modeling training | 8 | LES 64 | V | |
| I | NUMERICAL SOLUTIONS OF PDE'S B | | MAT/08 | B/Application modeling training | 8 | LES 64 | V | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| II | ANALYTIC AND PROBABILISTIC METHODS IN MATHEMATICAL PHYSICS II | | MAT/07 | B/Application modeling training | 8 | LES 64 | V | |
| II | APPROXIMATION METHODS B | | MAT/08 | B/Application modeling training | 8 | LES 64 | V | |

## I YEAR – ONE COURSE TO BE CHOSEN FROM:

| SEMESTER | COURSE Title | MODULES Name | Scientific sector S.S.D | DISCIPLINARY AREA/TAF | CFU | HOURS | ASSESSMENT METHODS* | |
|---|---|---|---|---|---|---|---|---|
| I | NUMERICAL METHODS AND APPLICATIONS B | | MAT/08 | C/Related and supplementary training | 8 | LES. 64 | V | |
| I | GEOMETRICAL METHODS IN PHYSICS | | FIS/02 | C/Related and supplementary training | 8 | LES. 64 | V | |
| I | PROCESS ALGEBRAS | | INF/01 | C/Related and supplementary training | 8 | LES. 64 | V | |
| II | APPLIED STATISTICS | | SECS-S/01 | C/Related and supplementary training | 8 | ES. 48<br>LAB. 32 | V | |
| II | INTELLIGENT SYSTEMS | | INF/01 | C/Related and supplementary training | 8 | LES. 64 | V | |

## II YEAR – ONE COURSE TO BE CHOSEN FROM:

| SEMESTER | COURSE Title | MODULES Name | Scientific sector S.S.D | DISCIPLINARY AREA/TAF | CFU | HOURS | ASSESSMENT METHODS* | |
|---|---|---|---|---|---|---|---|---|
| I | ADVANCED ALGEBRA A | | MAT/02 | B/Advanced theoretical training | 8 | LES. 64 | V | |
| I | ADVANCED ANALYSIS A | | MAT/05 | B/Advanced theoretical training | 8 | LES. 64 | V | |
| I | ADVANCED GEOMETRY A | | MAT/03 | B/Advanced theoretical training | 8 | LES. 64 | V | |
| I | CATEGORICAL LOGIC | | MAT/01 | B/Advanced theoretical training | 8 | LES. 40<br>EX. 36 | V | |
| II | MATHEMATICAL LOGIC | | MAT/01 | B/Advanced theoretical training | 8 | LES. 36<br>EX. 42 | V | |
| II | TOPICS IN ADVANCED ALGEBRA A | | MAT/02 | B/Advanced theoretical training | 8 | LES. 64 | V | |
| II | TOPICS IN ADVANCED ANALYSIS A | | MAT/05 | B/Advanced theoretical training | 8 | LES. 64 | V | |
| II | TOPICS IN ADVANCED GEOMETRY A | | MAT/03 | B/Advanced theoretical training | 8 | LES. 64 | V | |

## YEAR II – ONE COURSE TO BE CHOSEN FROM:

| SEMESTER | COURSE Title | MODULES Name | Scientific sector S.S.D | DISCIPLINARY AREA/TAF | CFU | HOURS | ASSESSMENT METHODS* | |
|---|---|---|---|---|---|---|---|---|
| I | ANALYTIC AND PROBABILISTIC METHODS IN MATHEMATICAL PHYSICS I | | MAT/07 | B/Application modeling training | 8 | LES. 64 | V | |
| I | DYNAMICAL SYSTEMS A | | MAT/07 | B/Application modeling training | 8 | LES. 64 | V | |
| I | NUMERICAL SOLUTIONS OF PDE'S A | | MAT/08 | B/Application modeling training | 8 | LES. 64 | V | |
| II | ANALYTIC AND PROBABILISTIC METHODS IN MATHEMATICAL PHYSICS II | | MAT/07 | B/Application modeling training | 8 | LES. 64 | V | |
| II | APPROXIMATION METHODS A | | MAT/08 | B/Application modeling training | 8 | LES. 64 | V | |

## YEAR II – ONE COURSE TO BE CHOSEN FROM:

| SEMESTER | COURSE Title | MODULES Name | Scientific sector S.S.D | DISCIPLINARY AREA/TAF | CFU | HOURS | ASSESSMENT METHODS* | |
|---|---|---|---|---|---|---|---|---|
| I | MODELS FOR BIOLOGICAL SYSTEMS | | INF/01 | C/Related and supplementary training | 8 | LES. 64 | V | |
| I | NUMERICAL METHODS AND APPLICATIONS A | | MAT/08 | C/Related and supplementary training | 8 | LES. 64 | V | |
| I | THEORETICAL PHYSICS | | FIS/02 | C/Related and supplementary training | 8 | LES. 64 | V | |
| II | APPLIED STATISTICS | | SECS-S/01 | C/Related and supplementary training | 8 | LES. 48 LAB. 32 | V | |
| II | INTELLIGENT SYSTEMS | | INF/01 | C/Related and supplementary training | 8 | LES. 64 | V | |

## YEAR II – OTHER ACTIVITIES:

| SEMESTER | COURSE Title | MODULES Name | Scientific sector S.S.D | DISCIPLINARY AREA/TAF | CFU | HOURS | ASSESSMENT METHODS* | |
|---|---|---|---|---|---|---|---|---|
| ND | ELECTIVE COURSES | | NN | | 16 | | | |
| ND | OTHER USEFUL KNOWLEDGE FOR ENTERING THE JOB MARKET | | NN | | 2 | | | |
| ND | FINAL EXAM | | NN | | 35 | | V | |

| YEAR I or II - THREE CREDITS AMONG THE FOLLOWING ELECTIVE ACTIVITIES: | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **SEMESTER** | **COURSE Title** | **MODULES Name** | **Scientific sector S.S.D** | **DISCIPLINARY AREA/TAF** | **CFU** | **HOURS** | **ASSESSMENT METHODS*** | |
| | ADDITIONAL LANGUAGE SKILLS | | | | 3 | LAB. 48 | G | |
| | ADDITIONAL COMPUTER SKILLS | | | | 3 | LAB. 48 | G | |
| | TRAINING AND CAREER GUIDANCE INTERNSHIPS | | | | 3 | | | |

***G** – JUDGMENT

***V** – EXAM

***I** – ELIGIBILITY

***F** – FREQUENCY

## III RULES OF THE DEGREE COURSE

**PREREQUISITES:** not foreseen

### RECOGNITION OF LANGUAGE AND COMPUTER CERTIFICATIONS

Any language certification can be recognized to obtain the 2 credits for the "additional knowledge useful for entering the job market" according to the procedures detailed below.

Up to 3 credits are provided for training and career guidance internships. The related activities must be approved by the Course Committee before their start and must include the presence of an internal supervisor. The following activities can result in the recognition of credits are:

i. Internships, of mathematical content, at companies and external institutions;

ii. Internal internship, under the supervision of a professor, on topics not covered in the lectures and which will not be contained in the thesis. In this case, the assignment of credits is subject to the presentation of a seminar;

iii. Active participation in career guidance activities, and, in particular, in the Scientific Degrees project, the mathematics summer stage and high school projects;

iv. Tutoring activities supported by dedicated grants. Performing these activities for a total of at least 10 hours allows the student to acquire 1 credit. As a rule, tutoring activities can result in the recognition of a maximum of 2 CFU. The request for the attribution of more than 2 CFU must be adequately motivated.

The 3 credits relating to "Additional language skills" can be acquired by attending the supplementary course of Advanced Scientific English.

The 3 credits relating to "Additional computer skills" can be acquired by attending the "Scientific Python" laboratory.

The acquisition of 2 credits is expected for the "additional knowledge useful for entering the job market". Credits can be acquired through:

- the knowledge of a foreign language, certified by an official document, with at least a C1 level for English and B2 for the other languages. A C1 level or equivalent in a language is considered to have been acquired in the case of students who have attended at least two semesters at foreign universities or higher education courses taught in that language.
- Certified, qualifying and relevant computer skills for the training course;
- Certified, qualifying and relevant work experience for the training course;
- All the activities i.-iv. in the Internship list above.

### RECOGNITION OF PROFESSIONAL SKILLS OR EXAMS OBTAINED IN PREVIOUS CAREERS

Requests for recognition of exams obtained in previous careers will be evaluated by the Course Committee, who will formulate the recognition of university credits according to the following criteria:

- analysis of the program;
- evaluation of the congruity of the previous career scientific sectors and contents of the training activities, with the specific training goals of the course and of the individual activities. The recognition is performed in accordance with art. 3 paragraphs 8 and 9 of the Ministerial decree for the redefinition of the Classes (March 16th 2007). The recognition is performed up to the amount of university credits foreseen by the course.

The Course Committee may also recognize

- certified professional knowledge and skills in accordance with current legislation on the subject;
- knowledge and skills gained in post-secondary level training activities in the implementation and design of which the University has contributed.

The request for recognition will be evaluated by the Course Committee. Recognition may take place if the activity is consistent with the specific training goals of the course and the training activities for which recognition is requested, also taking into account the content and duration in hours of the performed activity. The maximum number of credits that can be recognized is 12.

### ATTENDANCE OBLIGATIONS

Attendance is not compulsory but is strongly recommended.

### ENROLLMENT IN THE YEARS FOLLOWING THE FIRST

There are no barriers

### TEACHING MODALITY

The teaching activities are organized in courses that include one or more of the following activities:

- Lectures in the classroom
- Classroom exercises
- Laboratory activities

For each type of training activity, a correspondence between hours and CFU is defined:

- 1 CFU of lectures: 8 hours

- 1 CFU of exercises: 12 hours
- 1 CFU of laboratory: 16 hours

Considering career guidance internships, the following correspondence between hours and credits is defined:

- 1 CFU internship: 25 hours

## PROCEDURES FOR TRANSFERRING FROM OTHER DEGREE PROGRAMMES

Students coming from another University or from another Degree Program of this University, or from previous cohorts, may request a transfer to the Degree Program. Transfer requests will be considered by the Course Committee who will perform the recognition of the university credits on the basis of the following criteria:

- analysis of the program;
- evaluation of the congruity of the previous career scientific sectors and contents of the training activities, with the specific training goals of the course and of the individual activities.

The recognition is performed in accordance with art. 3 paragraphs 8 and 9 of the Ministerial decree for the redefinition of the Classes (March 16th 2007). The recognition is performed up to the amount of university credits foreseen by the course.

The transfer is however allowed only to students who have participated in a test to verify the initial preparation similar to the one of the Degree Course.

## RULES FOR THE SUBMISSION OF STUDY PLANS AND INDIVIDUAL STUDY PLANS

Starting from the first year, the student submits the study plan, which also includes the indication of the elective courses for a total of at least 16 CFU. The study plan must be approved by the Teaching Coordination Council. Justifying their request, students can submit a study plan in which the distribution between the two academic years of the different types of courses differs from the one defined in the tables, provided that the overall requirements described in this document are met.
The student's right to take verification tests relating to a course is subject to the presence of the course itself in the last approved study plan.

## HOW TO ENROLL IN THE INTERNATIONAL INTEGRATED EDUCATIONAL PATH (DOUBLE DEGREE)

An agreement is active for a double degree with the Linnaeus University of Vaxjo-Kalmar in Sweden, by virtue of which it is possible to obtain the Master's Degree in Mathematics, conferred by the University of Insubria, and the Master in Mathematics in Modelling conferred by the Linnaeus University. To enter the double degree program the student has to participate to a comparative selection organized by the Course Committee. The selected student has to spend at least one semester at the Linnaeus University and to obtain at least 30 CFU at the Partner University.

**For further information and insights, you can consult the web page of the course:**
www.uninsubria.it/magistrale-matematica
**In particular, the programs of the courses with names A and B are specified, which alternate, with different programs, every two years.**