

**School of Science and Technology**  
**Corso di Laurea/Undergraduate Degree Program in: Mathematics and Applications**

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### 1. Introduction

This Student's Guide contains key information on the Undergraduate Degree program in Mathematics and Applications. The guide illustrates the objectives of the course, how to complete the study plans, mentoring, and curricula.

For more complete information, students can consult the website of degree course <http://www.mat.unicam.it> or contact the Chairman or the Student representatives or the responsible for mentoring activities.

The course aims to provide a broad framework of modern mathematics, both pure as applied together with the necessary basic knowledge of Physics and Computer Science, in particular programming. In addition, the course prepares students for master's degree course in Mathematics and Graduate programs or specialized schools for Mathematics teachers and perspective Ph.D. mathematics students.

### 2. Qualifying Educational Objectives

As indicated in the Didactical Ordinance, the students completing this program in Mathematics and Applications at the University of Camerino:

- possess good basic knowledge in the main areas of mathematics along with their specific methods;
- possess suitable computational and computer programming abilities;
- are able to apply their knowledge to devise and put to use mathematical and computational models in the fields of natural sciences, engineering, technology, economy and finance.
- possess the knowledge and abilities required to adapt a given mathematical model to his own needs;
- are able to communicate concepts, problems and relative solutions pertaining to mathematics to specialists and non specialists;
- acquired the skills needed to operate with the prescribed degrees of autonomy in the subsequent formative career as well as in the working environments;

- know how to utilize the English language both in his specific field and for the exchange of general information.

With these goals, all curricula of the Undergraduate Degree Program in Mathematic and Applications includes:

- basic educational activities to let the student acquire the fundamentals of the main mathematical fields as well as the specific methods of mathematics as a whole;
- educational activities to let the student acquire the capacity to model natural phenomena, as well as social, economical and technological problems;
- educational activities to let the student acquire computational aspects of mathematics;
- a significant amount of educational activities characterized by strict logic rigor and high level of abstraction;
- external activities, as educational trainings in companies or public administration structures, and laboratories; besides educational sojourns in other Italian and/or foreign universities, also in the framework of international agreements.

### **3. Employment areas for graduates and professional job opportunities**

Students completing the Undergraduate Degree Program in Mathematics and Applications are qualified to:

- continue their curriculum with graduate studies and work in the field of learning and dissemination of scientific culture;
- carry out technical tasks or professional support in the fields of mathematical modeling and computation for industry, finance, services and public administration, such as:
  - financial analysis and management;
  - optimization of human resources, equipment and materials in industrial production and socio-economic processes;
  - modeling and numerical simulation for decision making;
  - systems of reliability and quality control;
  - opinion polls and market analyses;
  - automation of industrial production processes.
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### **4. Final exam and title acquisition**

Objective of the final exam is to test the ability of the student to present and discuss a mathematical topic of a mathematician, in case of stage or internship on this activity, orally and in writing, with clarity and mastery.

The Laurea examination consists in a public discussion of a written assignment, which may derive from activities or training stage, with also the goal of evaluating the overall preparation of the student. The essay must be prepared under the guidance of a professor appointed by the Chairman. To the preparation of the final examination, the student can access, normally, only when at least 120 CFU has been acquired.

The final grade, expressed in 110<sup>th</sup> with the possibility of the additional recognition of "lode" (with praise), evaluates the student's curriculum, his preparation and scientific achievements by the end of their course of study. The exam will be taken in front of a special Committee constituted in accordance with the University rules.

To determine the grade at the end of the exam, the Committee first evaluates the actual work completed assigning a mark out of 30.

Then the Committee determines the final grade using the following procedure:

- the weighted average is calculated of all the marks out of 30 obtained in the various courses, including the mark just obtained for actual work completed, and training activities carried out during the three-year degree, using the Credit Units as the weighting factor;
- the weighted average is transformed into a percentage
- this percentage is multiplied by a coefficient associated with the duration of the student's academic career;
- to this is added the product of 0.05 times the number of credits attained "con lode" (with praise);
- the result of this is represented as an integer percentage, by adding 0.5 and then retaining only the integer part;
- if the mark so obtained is at least 111, the committee may assign the label "lode", but only if they unanimously agree.

## **5. Organization of the Teaching Program**

### **5.1. University Credits (CFU)**

The acquisition of skills and knowledge by students is recorded as university credits (CFU). Credits represent the task of learning, including individual study, practice exercises and laboratory work, that required to be done by the student for the first degree in Mathematics and Applications.

The average amount of work in a year for a full-time student with adequate initial preparation is fixed at 60 credits. To attain the degree in Mathematics and Applications the student must have gained 180 credits.

Normally, the program of individual learning activities maintains a consistent ratio of (about) 1 to 3 between time devoted to teaching activities and time spent in individual study. The organization of the Degree into six semesters and its overall duration (three years) and are only indicative, serving as a reference for the organization of the teaching and for calculating the number of credits. Students can earn these credits and attain the degree in less than three years.

A credit corresponds to a standard load of 25 hours of work. As a pure indication, a credit could correspond to 7 hours of lectures in class, or 6 hours of lectures with additional 2 hours of practice exercises. These values may vary depending on the type of teaching. In laboratory courses a credit could correspond to 15 hours of assisted practice and 10 hours of individual work. Finally, a credit could correspond to 25 hours of work for a student preparing the final examination.

### **5.2. Teaching organization**

All activities leading to the acquisition of credits must be evaluated. The assessment is carried out by special committees chaired by the responsible of the educational activity. The assessment tests can be conducted in writing and / or orally, or other procedures suited to a particular type of activity can be utilized. In some cases, there could also be a midterm exam, for which participation is optional for the student and any negative result will not preclude admission to the final exam. For courses subdivided into modules, evidence verifying preparation of the students can be carried out at the end of each module.

Unless otherwise indicated, learning activities are evaluated by a mark out of thirty, with the possibility of the additional recognition of "lode" (with praise). For the credits for work experience or internship, verification of attendance is required and a report on the activities countersigned by the teacher / supervisor. The evaluation can be expressed with only two possible grades: "satisfactory" or "not satisfactory".

Teaching is divided into 2 semesters according to the following calendar:

Teaching for Semester I:	1 October 2009 to 29 January 2010 (1 <sup>st</sup> year students)
	5 October 2009 to 29 January 2010 (2 <sup>nd</sup> and 3 <sup>rd</sup> year students)
Session I Exams:	30 January 2010 to 28 February 2010
Teaching for Semester II:	1 March 2010 to 11 June 2010
Session II Exams:	13 June 2010 to 31 July 2010
Session III Exams:	1 September 2010 to 3 October 2010

### 5.3. Mentoring

The Class Advisory Board encourages regular meetings with students to discuss the trend of educational activities. Each student may request that a mentor be assigned to whom to turn to assess the opportunities and the choice in the curricula.

To every first year student a mentor is assigned to help identify potential problems in individual lessons and, in general, addressing in particular the problems of transition from school to university. Mentors report back to the Chairman any difficulties of the students in understanding specific topics or to follow particular patterns of work and any trouble linked to teaching organization.

## 6. Curricula

The Undergraduate Degree Program in Mathematics and Application is organized into two curricula:

- Mathematics,
- Mathematics for Economics and Management.

### 6.1. Curriculum Mathematics

The Mathematics curriculum provides a deep understanding of modern mathematics, both pure as applied, along with the necessary basic knowledge of physics and computer science, especially programming.

The curriculum is further subdivided into two subcurricula with a common two-year period.

The first subcurriculum *General* further deepens the basic math, preparing the students to successive higher degree in mathematics or specialized schools for the mathematics teacher, and in prospect also to mathematical Ph.D. programs.

The second subcurricula "Applied" provides additional skills in Numerical Analysis and Operations Research, and, through appropriate choices of courses and free activities and stages, aims to provide more expertise in application technology..

The tables below present the standard curriculum with the organization of the different subjects, listing the discipline areas and types of subjects, the divisions into modules, and the number of credits awarded.

Note that, having completed the first year examinations, the student may submit for approval by the Class Advisory Board individual curriculum for the following academic year, proposing learning goals other than those proposed in the standard curriculum. The Class Advisory Board is committed to assisting students in development of alternative curricula.

Undergraduate Degree Program Mathematics and Applications Curriculum  
 General/Applied

I Year						
N	Course	CFU	Module	CFU and SSD	Typology (a,b,c,d,e,f)	Mark or pass/fail
1	Algebra e logica	9		6 MAT/02 3MAT/01	b	Mark
2	Algebra	6		MAT/02	g	Mark
3	Analisi Matematica 1	12		MAT/05	a	Mark
4	Fisica 1	6		FIS/01	a	Mark
5	Geometria 1	12		MAT/03	a	Mark
6	Informatica 1	6		INF/01	a	Mark
7	Inglese	9	PARTE I	L-LIN/12	e	Mark
			PARTE II	L-LIN/12		

II Year						
N	Course	CFU	Module	CFU and SSD	Typology (a,b,c,d,e,f)	Mark or pass/fail
1	Analisi matematica 2	12		MAT/05	b	Mark
2	Probabilità e Statistica	9	Elementi di Probabilità	MAT/06	b	Mark
			Elementi di Statistica			
3	Elementi di Matematica Computazionale (*)	6		MAT/08	b	Mark
4	Fondamenti di Ricerca Operativa (*)	6		MAT/09	b	Mark
5	Matematica per le Applicazioni 1 (**)	12	Elementi di Matematica Computazionale	MAT/08	b	Mark
			Analisi Numerica			
6	Matematica per le Applicazioni 2 (**)	12	Fondamenti di Ricerca Operativa	MAT/09	b	Mark
			Tecniche di Ottimizzazione			
7	Geometria 2	12	Parte 1	MAT/03	g	Mark
			Parte 2			
8	Fisica Matematica 1 (*)	12	Parte 1	MAT/07	b	Mark
			Parte 2			
9	Informatica 2	6		INF/01	c	Mark

III Year						
N	Course	CFU	Module	CFU and SSD	Typology (a,b,c,d,e,f)	Mark or pass/fail
1	Fisica 2	10		FIS/01	c	Voto
2	Analisi Matematica 3	6		MAT/05	b	Mark
3	Geometria 3 (*)	6		MAT/03	g	Mark
4	Fisica Matematica 2 (*)	6		MAT/07	b	Mark
5	Fisica Matematica 1 (**)	12	Parte 1	MAT/07	b	Mark
			Parte 2			
6	Affine course	6			c	Mark
7	Free activity	9			d	Mark or pass/fail
8	Internship/other (*)	9			f	Mark or pass/fail
9	Stage/other (**)	9			f	Mark or pass/fail
10	Final exam	5			e	Mark

#### Recommended prerequisites

- Algebra e Logica before of Algebra
- Analisi Matematica 1 before of Fisica 1
- Informatica 1 before of Informatica 2
- Analisi Matematica 1 and Geometria 1 before of Analisi Matematica 2
- Fisica 1, Geometria 1 and Analisi Matematica 2 before of Fisica Matematica 1
- Geometria 1 before of Geometria 2
- Algebra e Logica e Analisi Matematica 1 before of Matematica per le Applicazioni 1
- Algebra e Logica e Analisi Matematica 1 before of Elementi di Matematica Computazionale
- Algebra e Logica before of Matematica per le Applicazioni 2
- Algebra e Logica before of Fondamenti di Ricerca Operativa
- Analisi Matematica 1 before of Probabilità e Statistica

## 6.2. Curriculum Mathematics for Economics and Management.

This curriculum has the declared goal of completing knowledge of mathematics with an introduction to world of economics and finance enabling the graduate a prompt placement in banks, financial institutions, industries, or further study in higher degree courses. To the basic mathematics and the necessary foundations of physics and computer science will be provided also courses in economics, statistics, law. A stage completes the student preparation.

The tables below present the standard curriculum with the organization of the different subjects, listing the discipline areas and types of subjects, the divisions into modules, and the number of credits awarded.

Note that, having completed the first year examinations, the student may submit for approval by the Class Advisory Board individual curriculum for the following academic year, proposing learning goals other than those proposed in the standard curriculum. The Class Advisory Board is committed to assisting students in development of alternative curricula.

Undergraduate Degree Program in Mathematics and Applications Curriculum Mathematics  
 for Economics and Management

I Year						
N	Course	CFU	Module	CFU and SSD	Typology (a,b,c,d,e,f)	Mark or pass/fail
1	Algebra e logica	9		6 MAT/02 3MAT/01	b	Mark
2	Analisi Matematica 1	12		MAT/05	a	Mark
3	Fisica	6		FIS/01	a	Mark
4	Geometria 1	12		MAT/03	a	Mark
5	Informatica 1	6		INF/01	a	Mark
6	Informatica 2	6		INF/01	c	Mark
7	Inglese	9	Parte I	L-LIN/12	e	Mark
			Parte II	L-LIN/12		

II Year						
N	Course	CFU	Module	CFU and SSD	Typology (a,b,c,d,e,f)	Mark or pass/fail
1	Analisi matematica 2	12		MAT/05	b	Mark
2	Probabilità e Statistica	9	Elementi di Probabilità	MAT/06	b	Mark
			Elementi di Statistica			
3	Matematica per le Applicazioni 1	12	Elementi di Matematica Computazionale	MAT/08	b	Mark
			Analisi Numerica			
4	Matematica per le Applicazioni 2	12	Fondamenti di Ricerca Operativa	MAT/09	b	Mark
			Tecniche di ottimizzazione			
5	Fisica Matematica	6		MAT/07	b	Mark
6	Statistica Aziendale ed Econometria	10	Statistica Aziendale	SECS-S/06	c	Mark
			Econometria			

III Year						
N	Course	CFU	Module	CFU and SSD	Typology (a,b,c,d,e,f)	Mark or pass/fail
1	Matematica finanziaria	12		SECS-S/06	g	Mark
2	Teoria economica	6		SECS-P/01	c	Mark
3	Bilancio, Gestione Aziendale, Economia delle Imprese	6		SECS-P/08	c	Mark
4	Diritto	6		IUS/04	c	Mark
5	Affine course	6				Mark or pass/fail
6	Free activity	9				Mark or pass/fail
7	Stage	9				Pass/fail
8	Final exam	5				Mark

### **Recommended prerequisites**

- Algebra e Logica before of Algebra
- Analisi Matematica 1 before of Fisica
- Informatica 1 before of Informatica 2
- Analisi Matematica 1 e Geometria 1 before of Analisi Matematica 2
- Fisica, Geometria 1 e Analisi Matematica 2 before of Fisica Matematica
- Algebra e Logica e Analisi Matematica 1 before of Matematica per le Applicazioni 1
- Algebra e Logica before of Matematica per le Applicazioni 2
- Analisi Matematica 1 before of Probabilità e Statistica
- Analisi Matematica 1 before of Statistica Aziendale e Econometria