



UNIVERSITÀ
DI CAMERINO

School of Science and Technology
Corso di Laurea (Undergrated Degree)
Mathematics and Applications
(Classe L-35)

STUDENT GUIDE

3-year program
ECTS 120

Teaching Location:
City CAMERINO
Address VIA MADONNA DELLE CARCERI 9

Academic Year 2010-2011

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2. *Presentation*

The course provides a comprehensive and updated knowledge of modern mathematics, both pure and applied with the necessary basic knowledge of physics and computer programming. In addition, the course prepares the student for Master Degree in Mathematics and Master Degree or School of Specialization for Teaching in Mathematics, and, in prospective, doctorates in mathematics or related field.

The course has three specific objectives:

1. to provide graduates with an excellent basic training to access Master Degree programs masterful, particularly those activated in the Class LM-40 Mathematics;
2. to prepare graduates with strong ability of reading and mathematically modeling of reality and with that power, are able to fit easily in a variety of industries, mainly those with high technological content;
3. to provide graduates with an excellent cultural base, enabling them to complete the training that enables the teaching of Mathematics and Physics in high school.

Therefore, the various courses tends to highlight the methodological aspects of the discipline and particular attention is still devoted to presenting the latest topics of mathematics and avoid obsolescence of acquired skills.

Graduates of the Degree in Mathematics and Applications will be able to continue their training courses in the graduate program, particularly courses in the LM-40 Mathematics, but also can enter the job market in enterprise, finance and services in technical and professional roles in the acquisition, processing and analysis of data, decision support and modeling.

3. *Learning outcomes*

Knowledge and understanding

- Differential and integral calculus in one and several variables and linear algebra;
- Basic knowledge of further aspects of mathematical analysis and geometry, algebra, mathematical logic, mathematical physics, discrete mathematics, probability and statistics, numerical methods, operations research.
- Applications of mathematics to physics, computer science and the social and economic sciences.
- Key features of programming languages and the most important data structures.
- Reading and understanding of specialized texts and research in different fields of mathematics.

These results are acquired through lectures, classroom exercises, individual study and exercises.

The verification of results is achieved through practical tests and written examinations and / or performed in any oral exams and the end of the course.

Applying knowledge and understanding

- Use the formalism and mathematical language, construct and develop logical arguments identifying assumptions and conclusions.
- Demonstrate familiarity with abstract thinking and logical development of formal theories.
- Formulate / translate problems into mathematical form for their analysis and resolution.
- Extract qualitative information from quantitative data properly analyzed also using specific computer systems and computing.
- Produce simple demonstration of theorems are not identical to those known but clearly related to these patterns using known demonstration.
- Develop simple mathematical and computational models (variations of models already known), apply existing models to analyze real-world situations and use algorithms.
- Use the main numerical methods, making calculations independently, even based on the development and adaptation of software programs and to use tools (algorithms, techniques, procedures), computational and computer.

These results are acquired through lectures, classroom exercises, individual study and exercises, laboratory activities and experiences of teamwork.

The verification of results is via written examinations and / or performed in any oral exams and the end of the course.

Making judgements

- Identify in theorems (even of advanced mathematics) the assumptions and conclusions, analyze and explain the demonstration lines.
- Evaluate and interpret the solution of a mathematical or physical problem.
- Determine the possible links between the different sectors and issues of mathematics and between these sectors and themes and other disciplines.
- Work with various levels of autonomy and judgment in the workplace or in subsequent training.

These results are obtained through class exercises, individual study and tutorials, test preparation and final stage of any experience and training.

The verification of results is achieved through practical tests and written exams and / or performed in any oral exams and the end of the course, with the evaluation of internship and apprenticeship training and orientation and the final exam.

Communication skills

- Present the results of their activity or mathematical literature both to a specialized and generic audience
- Clearly communicate the results of elementary mathematics (such as those taught in high school) to both the experts and non-experts..
- Present results of higher mathematics to an audience of specialists.
- Making effective use of English, written and oral, both technical and general information exchange.

These results are acquired through individual study and exercises, preparation and holding of seminars, preparation of the final test.

The verification of results is achieved via written examinations and / or performed in any oral exams and the end of the course and the final exam.

Assessments are also provided regarding the presentation of specific topics in a seminar..

Learning skills

- Acquire knowledge into new fields of mathematics through an independent study.
- Conduct literature searches in various fields of mathematics and use the results to develop a project.
- Independently study and learn about scientific texts in English, hold a conversation in English on topics relevant to the mathematical sciences.
- Identify and acquire their own scientific computing techniques to use in the workplace, in collaboration with experts from other disciplines.

Such results are obtained through classroom exercises, individual study and tutorials, test preparation and final stage of any experience and training.

The verification of these results is achieved through practical tests and written exams and / or performed in any oral exams and the end of the course, with evaluations of work experience and training and final testing. Assessments are also provided regarding the presentation of specific topics in a seminar.

4. Required knowledge for access

Are allowed to enroll students in possess of a secondary school diploma or other qualification recognized as valid. For admission to the course are required good communication skills both written and spoken English, capacity of understanding a text and summarize it, aptitude for rigorous reasoning, familiarity with mathematical language and the basic logical structures (eg meaning of implication, equivalence, negation of a sentence, etc.). and a good scientific knowledge base. Are also required elementary knowledge of arithmetic, algebra, Euclidean geometry and analytic geometry.

Entry requirements will be verified by a national entrance test for scientific degree courses. Recovery courses are included for the applicants who did not get a good mark.

5. Employment areas for graduates and professional job

Graduates in Mathematics and Applications, University of Camerino may find jobs in the field of industry, finance, services and public administration, carrying out technical and professional support in the following areas:

- acquisition and data processing;
- Modelling, simulation and forecasting models for decision support;
- dissemination of scientific culture with the role of disseminator of scientific results

The course is also the first stage of a curriculum that continuing with the MSc, and subsequently a PhD, a specific training for teaching, leading to job opportunities in the roles of training and learning as teacher of secondary school, tertiary and university lecturer or similar.

The course prepares to the professions of

- Matematici, statistici e professioni correlate - (2.1.1.3)
- Informatici e telematici - (2.1.1.4)

6. Organization of the Teaching Progra

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.

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".

Timetable

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

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

1-8 october 2010: beginning of the first year courses with the orientation days for freshmen; October 4 2010: beginning of the first semester for second and third year students; January 28 2011: end of the first semester.

Session I Exams: January 31 2011 – February 26 2011

Teaching for Semester II: February 28 2011– June 10 2011

Session II Exams: June 13 2011 – July 30 2011

Session III Exams: September 1 2011 – October 1 2011.

CURRICULUM

I YEAR						
N	Teaching Activity	CFU	Modules	CFU and SSD	Typology	Mark or pass/fail
1	Algebra e Logica	9	Algebra	6 MAT/02	A	Mark
			Logica	3 MAT/01	B	
2	Algebra	6		MAT/02	B	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	6		L-LIN/12	E	Mark

II YEAR						
N	Teaching Activity	CFU	Modules	CFU and SSD	Typology	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			
7	Matematica per le Applicazioni 2 (**)	12	Fondamenti di Ricerca Operativa	MAT/09	B (6 CFU) C (6 CFU)	Mark
			Tecniche di Ottimizzazione			

	Geometria 2	12		MAT/03	B	Mark
8	Fisica Matematica 1 (*)	12	Modulo 1	MAT/07	B	Mark
			Modulo 2			
9	Fisica 2	6		FIS/01	A	Mark

III Year						
N	Teaching Activity	CFU	Modules	CFU and SSD	Typology	Mark or pass/fail
1	Informatica 2	6		INF/01	C	Mark
2	Analisi Matematica 3	6		MAT/05	B	Mark
3	Geometria 3 (*)	6		MAT/03	C	Mark
4	Fisica Matematica 2 (*)	6		MAT/07	B	Mark
5	Fisica Matematica 1 (**)	12	Modulo 1	MAT/07	B	Mark
			Modulo 2			
6	Insegnamento Affine	12		FIS/01	C	Mark
7	Attività libera	12			D	Pass/Fail
8	Tirocinio formativo o di orientamento/Altro (*) ⁽³⁾	6			F	Pass/Fail
9	Tirocinio formativo o di orientamento/Altro (**) ⁽⁴⁾	6			F	Pass/Fail
10	Prova finale	6			E	Mark

Student must choose the course of the group (*) or courses of the group (**)

- (1) A student's choice in the areas of "Attività Affini" between those activated at the University of Camerino. Suggested activities are the following: Physics 3 (*) Financial Mathematics (**)
- (2) Teachings freely chosen by the student among those active in the First Degree in Mathematics and Applications, or in other programs offered on campus. Falls in the faculties of the student have the 12 credits in question, or part them, to increase the engagement in activities already provided in his curriculum, by acquiring further credits.
- (3) The student has the option of using the 6 credits for an apprenticeship or training in a school, or alternatively to have a computer course or an advanced language course or other activity he/she proposes for inclusion in the curriculum. This proposal is subject to approval by the Boards of CdS.
- (4) The student has the option of using the 6 credits for an apprenticeship in companies or industries or alternatively to have a computer course or an advanced language course or other activity he/she proposes for inclusion in the curriculum. This proposal is subject to approval by the Boards of CdS.

Activity Tipology::

- A. attività formative di base
- B. attività formative caratterizzanti
- C. attività formative affini o integrative
- D. attività formative a scelta dello studente
- E. per la prova finale e per la conoscenza della lingua straniera
- F. altre (ulteriori conoscenze linguistiche, abilità informatiche e relazionali, stage etc.)

Prova finale e conseguimento del titolo

1. 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 110th 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.

7. Tabella delle attività formative e docenti affidatari

Annex A contains the information on the courses offered in academic year 2010-2011

- for new students and are at the 1st year
- for students that started in 2009 and are now at their 2nd year
- for students that started in 2008 and are now at their 3rd year

ANNEX A

Year 1

Attività formativa	Modulo	SSD attività	Semestre	Tipologia attività (*)	CFU	n. ore lez.	ore eserc	ore lab	Docente Cognome	Docente Nome	Scuola di appartenenza
Fisica Generale I	Meccanica	FIS/01	I	a	9.0	54	18		Vitali	David	Scienze e tecnologie
Fisica Generale I	Termodinamica	FIS/01	II	a	6.0	36	12		Marini Bettolo	Umberto	Scienze e tecnologie
Calcolo Numerico		MAT/08	I	c	9.0	35		48	Simonucci	Stefano	Scienze e tecnologie
Esperimenti di Fisica I		FIS/01	II	a	9.0	28		60	Di Biasio	Antonio	Scienze e tecnologie
Lingua Inglese		L-LIN/12	II	e	3.0	30					
Lingua Inglese		L-LIN/12	II	f	3.0	30					
Analisi Matematica I		MAT/05	I	a	9.0	63			Giambò	Roberto	Scienze e tecnologie
Analisi Matematica I		MAT/05	I	a	9.0		63		Giambò	Roberto	Scienze e tecnologie
Analisi Matematica I		MAT/05	I	a	3.0		36				
Geometria		MAT/03	II	a	12.0	63	36		Pierrgallini	Riccardo	Scienze e tecnologie
Astronomia		FIS/05	II	d	6.0	40		12			

Year 2

Attività formativa	Modulo	SSD attività	Semestre	Tipologia attività (*)	CFU	n. ore lez.	ore eserc	ore lab	Docente Cognome	Docente Nome	Scuola di appartenenza
Chimica		CHIM/03	I	c	5.0	30	10		Lorenzotti	Adriana	Scienze e tecnologie
Fisica generale II		FIS/01	I	b	10.0	60	20		Stizza	Sergio	
Metodi matematici della Fisica II		FIS/02	II	b	10.0	60	20		Mancini	Stefano	Scienze e tecnologie
Esperimenti di Fisica II		FIS/01	II	g	10.0	42		48	Di Giuseppe	Giovanni	Scienze e tecnologie

Equazioni differenziali		MAT/05	I	c	5.0	40			Mancini	Giorgio	Scienze e tecnologie
Equazioni differenziali		MAT/05	I	f	4.0	14	18		Mancini	Giorgio	Scienze e tecnologie
Fisica Moderna	Fenomeni ondulatori	FIS/01	II	b	5.0	30	10		Stizza	Sergio	
Fisica Moderna	Meccanica ondulatoria	FIS/03	II	b	4.0	30			Marchesoni	Fabio	Scienze e tecnologie
Fisica Moderna	Meccanica ondulatoria	FIS/03	II	f	1.0		10		Marchesoni	Fabio	Scienze e tecnologie
Meccanica Analitica		MAT/07	I	c	5.0	30	10		Giachetta	Giovanni	Scienze e tecnologie

Year 3

Attività formativa	Modulo	SSD attività	Semestre	Tipologia attività (*)	CFU	n. ore lez.	ore eserc	ore lab	Sede (##)	Docente Cognome	Docente Nome	Scuola di appartenenza
Fisica Statistica		FIS/03	I	b	5.0	30	10		CAM	Marini Bettolo	Umberto	Scienze e tecnologie
Esperimenti di Fisica III		FIS/01	I	g	10.0	42		48	CAM	Pinto	Nicola	Scienze e tecnologie
Fisica della Materia		FIS/03	II	b	10.0	60	20		CAM	Strinati Clavanesse	Giancarlo	Scienze e tecnologie
Fisica Nucleare e Subnucleare		FIS/04	II	b	5.0	30	10		CAM	Marchesoni	Fabio	Scienze e tecnologie
Meccanica Quantistica		FIS/02	I	b	10.0	60	20		CAM	Tombesi	Paolo	Scienze e tecnologie
Energia ambiente fonti energ. rinn.		FIS/03	I	d	6.0	42			CAM	Pinto	Nicola	Scienze e tecnologie
Economia e gestione delle imprese	Organizzazione aziendale	SECS-P/08	I	c	5.0	40			REC			
Economia e gestione delle imprese	Logistica aziendale	ING-INF/05	I	c	5.0	40			REC			
Tecnologie per l'acquisizione dati		FIS/01	I	b	8.0	28		48	CAM	Conti	Massimo	Scienze e tecnologie
Diagnostiche avanzate per i materiali		CHIM/01	II	d	5.0	30	10		CAM	Nobili	Francesco	Scienze e tecnologie
Sensori e sistemi di misura		ING-IND/12	II	c	5.0	21		24	CAM	Gunnella	Roberto	Scienze e tecnologie
Disegno tecnico		ICAR/13	I	d	5.0	21		24	REC			
Tecnologie per il controllo dei processi		ING-INF/04	II	g	10.0	60	20		REC			

Legend:

(*)

- a introductory course
- b core course
- c supplementary course
- d elective course
- e for the final exam and for knowledge of a foreign language
- f other (additional language skills, computer skills, internship/work experience stage etc.)
- s stage