



UNIVERSITA' DEGLI STUDI DELL'AQUILA
Dipartimento di Ingegneria e Scienze dell'Informazione e Matematica

Doctorate school: MATHEMATICS AND MODELS

The doctorate program in *Mathematics and Models* offers a graduate school in the major topics of mathematics. The program is open to national and international students. The doctorate council is made of 24 Professors of the University of L'Aquila, and the coordinator is Prof. Anna De Masi.

Research topics include the most significant areas of mathematics at the international level as Algebra: (theory of groups and of the representations, commutative algebra and applications), Geometry (riemannian, complex and algebraic). Partial differential equations with applications to continuum and quantum mechanics. Dynamical systems deterministic and stochastic. Stochastic processes with applications to biology, physics and finance. Numerical analysis of dynamical systems and numerical methods for partial differential equations.

Educational program: we offer a good variety of research related courses as well as introductory level courses which help first-year students strengthen their mathematical background. In consultation with their tutor, each year students will present a study plan to the doctorate council where they specify what research and training they plan to do in the coming academic year. In their three years students are expected to participate in seminars offered by the school and to take part in research internships in institutions both in and outside Italy. At the end of each academic year, with the exception of the final year, the students will then be interviewed on the studies and research they have carried out during the year in front of a committee appointed by the doctorate council. Successfully passing this interview means that the students can keep their post and fellowship, and thus be admitted to the following year. At the interview, the students will present a report on their scholarly activity, their research and its results, any seminars, congresses, or other scientific activities they have participated in, and any publications they have produced. For admission into the final year, this report will include a section relating to the progress made in their research project.

The program is in strict collaboration with the international phd school "Gran Sasso Scientific Institute" (GSSI, L'Aquila) and the students will have the possibility to follow all the activities held at the GSSI. Our graduate students also benefit from our close links with the international research center of Mathematics and Mechanics of Complex systems.

Laboratories and database. The students have access to a wide variety of computing equipment in the department Disim. They have access to various scientific laboratory among them there is the Hight Performance Parallel Computing (HPPC) with the supercalculator Caliban with a computing power of about 2.5 teraflops (<http://caliban.dm.univaq.it>). They also have access to databases as ARXIV, ALL, EBSCO, DOAJ, virtual Emeroteca Caspur, JCR, JSTOR, AMS/Mathschinet, Numdam, PUBMET, Science Direct, Scopus, Springer Link, WILEY on line library, ISI web of knowlwdge, Web of Science.

Objectives of the course. The aim is to train students able to create and study mathematical models with applications in many scientific areas. The students will learn how to simplify complex models in order to study them in a mathematically rigorous fashion and also numerically. On successful completion of the program the degree will allow to work into academic positions or in private or public institutions that need expertise in mathematical modeling.