Master Degree in Mathematics
University of Verona

http://www.univr.it/mathematics

Department of Computer Science

a.y. 2017/2018
Why mathematics?

Economic repercussions of mathematics:


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Master Degree in Mathematics @ UNIVR.IT
Why mathematics?

Growing professional environments requiring strong mathematics skills:

- Life sciences, biology, health and medicine.
- Computer science in general, and HPC and big data in particular.
- Physics at all scales and engineering sciences. Material science.
- Social sciences, in the broadest sense. Development of complex systems or modelling and data analysis.
- Finance, insurance.
Modelling Week 2016, Verona

PhD Modelling Week, September 4-11, 2016 - Verona (Italy)

Projects

1) Simulation of Particle Accelerator Cavities (Instructor: Dr. Carlo De Falco, Milan Polytechnic)

Particle accelerators, such as the LHC at CERN, take fundamental particles up to the speed lightly exceeding them in properly cooled electromagnetic fields. Radio frequency cavities are responsible for the acceleration of the beam.

The fields created within these devices are extremely sensitive to the geometry of the cavity itself. A company in Italy (Tyrolean, Italy) for which the instructor acts as a consulting engineer, constructs such particle accelerator cavities and needs highly reliable simulations of these fields as function of the geometry of the cavity to reevaluate their products for scientific laboratories. The problem is then, assign different cavity geometries to simulate. A common optimization tool, but allow for new optimization methods that allow the instructor to evaluate the influence of the cavity design variations. The optimization methods are based on the use of a family of different optimization methods, combining different optimization methods, such as generative and regenerative. Analysis through the simulation of test cases, then the teams will go through the application of these tools and concepts to the simulation of a cavity model having a prescribed geometry.

2) Stress models and optimization models for the banking/industry sector (Instructor: Dr. Luca Di Persio, University of Verona, in collaboration with IASON Ltd (Dr. Michele Bonini), and in collaboration with Dr. Ben Puddett)
Why in English?

- The official language of science is **English**
- More opportunities for studying/research/job both in Italy and abroad
- CLIL: English as mandatory teaching language in high school classes (C1 level required)
- Highly qualified international teaching staff
Job opportunities: alumni

- Giulia 2016, PhD, Nice
- Greta 2016, Unicredit, Milano
- Silvia 2016, Intesa S. Paolo
- Gregorio 2015 Generali
- Franco 2016, PhD in Mathematics, Universities of Trento and Verona
- Giulia 2015, KPMG, Verona
- Chiara 2015, PhD Innsbruck
- Marcella 2014, internship and PhD in Applied Mathematics, University of Sophia-Antipolis (France)
- Simone, 2014, PhD in Applied Mathematics, Cambridge (UK)
- Davide, 2013 PhD in Computer Science, University of Lugano (Switzerland)
- Giulia, Elena, … 2013–15, PhD in Mathematics, Universities of Trento and Verona
- Sara, 2011, quantitative researcher, Ales Market Research, Milan
- Marcello, 2013, analyst, Panrhema (financial advice), Milan
- Anna, 2013, business intelligence analyst, Deloitte, Milan
- Chiara, 2013, quantitative analyst, Almaiura, Verona
- Silvia, Andrea, …, 2012, high school teachers

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Internships (some examples)

- Chiara, 2016, Google Summer of Code
- Cristiano, 2016, European Space Agency SOCIS
- Chiara, 2014, Camera di Commercio, Verona
- Andrea, 2014, Fairmat (software house and financial mathematics)
- Isacco, 2014, Aleph Energy (models for energy markets)
- Alessandro, 2014, Cattolica Insurance
- Cristina, 2013/14, Erasmus and internship, University of Innsbruck (Austria)
- Sara, 2011, French Institute of Petroleum, Paris (France)
- Gregorio, 2014, Enginsoft (Computer Aided Engineering)
- Elisa, 2012, Zamperla (roller coasters design), Vicenza
- Martina, 2013, Atraki (traffic flow modeling), Verona

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Curricula

Common foundational courses

- Differential geometry
- Functional analysis
- Analytical mechanics
- Algebra
Curricula and tracks

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- Differential geometry
- Functional analysis
- Analytical mechanics
- Algebra

Curriculum Mathematics for education - core courses

- Mathematical logic
- Mathematics teaching and workshop
- Mathematical methods for computer science

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Curricula and tracks

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- Differential geometry
- Functional analysis
- Analytical mechanics
- Algebra

**Curriculum Mathematics for education - core courses**
- Mathematical logic
- Mathematics teaching and workshop
- Mathematical methods for computer science

**Curriculum Applied Mathematics - core courses**
- Partial differential equations
- Advanced numerical analysis I and II
- Stochastic differential equations
- Optimization

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Master Degree in Mathematics @ UNIVR.IT
Elective courses: main tracks and tutors

- **Education** (foundations, modern physics, physics education laboratory, TFA, teaching): Sisto Baldo
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- **Industrial maths** (numerical modeling in applied sciences, scientific computing, ECMI): Marco Caliari
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- **Financial maths** (quantitative finance, stochastic modeling, numerical methods, ECMI): Luca Di Persio
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I. seminar courses delivered by international faculties
II. courses from other masters in Verona (partially in Italian)
III. courses in agreement with University of Trento
IV. courses within Erasmus+ mobility program

Type III. or IV. courses may supersede foundational or core courses
Further activities

- 1 semester (or 2) of mobility experience abroad (Erasmus+ & UniVR Worldwide programs)
- Soft skills (Scilab, C++, FreeFem++, R, foreign languages)
- Internships and summer schools (http://profs.scienze.univr.it/caliari/stage)
- Final project (also **abroad** within Erasmus+ program)
Information

- **Web page**
  http://www.univr.it/mathematics

- **Email**
  master.math@ateneo.univr.it

- **Facebook page** (managed by students’ representatives)