CURRICULUM
MATHEMATICS OF DATA SCIENCE

Master of Science in Data Science
Francesco Rinaldi
Introduction

- Mathematics is ubiquitous in Data Science
- Plenty of mathematical tools behind Data Science models & methods
- Mathematical tools make things work!
- Data Scientists need to understand/develop **models** and **methods** for dealing with data
What about MODS?

It qualifies students to

• build/analyze structured models for representation of concrete applications

• properly choose and/or develop methods for the handling of those models

• get a deep understanding of tailored techniques and math theory for data analysis

• combine and redevelop all those tools in order to solve complex problems
What about MODS courses?

Courses put an emphasis on notions coming from

- Statistics
- Optimization
- Machine Learning
- Theory of Big Data Representation
Prospective student's background

We welcome students with a good background in

- Mathematics
- Statistics
- Computer Science

Prospective students should

- Have the willingness to study mathematical theory
- Apply their knowledge in the practical management of big data
What we expect from students

Students in the curriculum should have an interest in using

• Mathematical tools

• Tailored algorithms for the analysis of data
What to expect...

Curriculum conceived as a **multi-disciplinary platform** that enables students to
- handle models/methods coming from statistics, machine learning, optimization
- properly understand the way all those tools are intertwined in big data applications

**Projects** and **homeworks** allow to develop project management and analytical skills

**Partnerships** with industries/research institutions enable to implement mathematical techniques in the solution of exciting data science applications
Who you will become

After this two-year programme student will be able to

• Represent, compress and store huge datasets
• Develop suitable models to recognize and analyze data
• Understand methods/algorithms for the handling of big data models
• Tackle advanced problems and applications based on current research
Employment Prospects

Companies/Research Institutions dealing with big data in

• Finance
• Transportation
• Communications
• Biology
Employee's required skills

- strong mathematical background
- approach real-world problems using computational analysis
- understand the mathematics underpinning big data
Our graduates

- deep knowledge of mathematical theory
- ability to deal with the computational challenges behind data-driven systems
- effective and attractive professional profile
- excellent placement in the job market
Foundations

MATHMATICS
- STOC. METHODS
- OPTIMIZATION FOR DS
- MATHEMATICAL MODELS AND NUM. METHODS 4 BIG DATA

STATISTICS
- STATISTICAL LEARNING
- STATISTICAL METHODS FOR HD DATA

COMPUTER SCIENCE
- FUND. OF INF. SYSTEMS
- MACHINE AND DEEP LEARNING

BIOLOGY, ECONOMICS, HUMAN & SOCIAL SCIENCE
- COGN. BEHAV. & SOCIAL DATA
2 recommended courses + 2 elective courses to complete the study plan

- Mathematics:
  - HD Probability for DS
  - Mathematical Cell Bio

- Computer Science:
  - Human Data Analytics
  - Game Theory
  - Network Science

- Biology, Economics, Human & Social Science:
  - Biological Data
  - Law and Data
  - Business Eco. & Fin. Data
  - Human Computer Interaction

- Elective:
  - 2 courses
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