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UNIVERSITÀ DEGLI STUDI DI PADOVA

DIPARTIMENTO MATEMATICA

DATA SCIENCE
UNIVERSITY OF PADOVA

DATA SCIENCE OPEN HOUSE

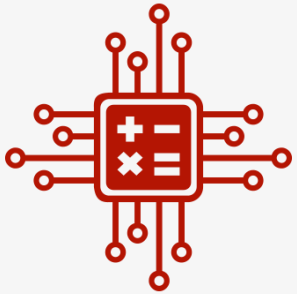
Master of Science in Data Science

Francesco Rinaldi Wolfgang Erb

Intro

DIPARTIMENTO MATEMATICA

- Key term to our contemporary world: Big Data
- Nowadays limitless amounts of data to be collected, managed, analyzed and processed
- Need for a new breed of experts: Data Scientists
- Data Scientists process the data to get valuable information for the decision-making process
- Need for a new multidisciplinary learning path combining:
  - technical skills (from engineering, computer science, statistics and mathematics)
  - knowledge of the specific field related to the required data processing



What about DS @ UniPD?

In 2016, the University of Padua established a 2 year Master's degree in Data Science. This has been possible thanks to a fruitful collaboration between

- Department of Mathematics
- Department of Statistics
- Department of Information Engineering
- Department of General Psychology
- Department of Biomedical Sciences

and the

- Bruno Kessler Foundation in Trento

The Master's degree in Data Science is highly interdisciplinary and is fully taught in English by internationally established researchers

Our Goal

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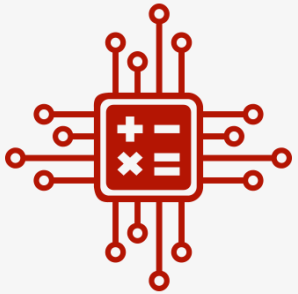
- Build Data Scientists with
  - solid technical background
  - multidisciplinary preparation on various fields where big data emerge
  - ability to analyze big data and provide managers and stakeholders with a clear account of their results
- Our Data Scientists are highly required by Industries, Consulting Companies and Public Institutions



Some More Details

- DS @ UniPD Master's Programme structured according to 4 curricula
- First Year's Courses give fundamental theories and tools related to Mathematics, Statistics and Computer Science
- Advanced Courses where theories/tools find a practical application (Biological Data, Human, Cognitive and Social Data, or Economic and Financial Data)
- Internship in a private company or in a research institution

Curricula @ DS

We have 4 different curricula:

1. Biological Data Analytics (BDA)
2. Cognitive, Social and Economic Data Analytics (CSDEA)
3. Machine Learning and Intelligent Systems (MLIS)
4. Mathematics of Data Science (MDS)

What we expect from students

Students should

- Have an attitude towards applied mathematics, computer science and statistics
- Apply their knowledge in the practical management of big data

Students should have an interest in using

- Data science tools
- Tailored algorithms for the analysis of data in real-world problems

What to expect...

Curricula conceived as a **multi-disciplinary platform** that enables students to

- handle data science models/methods
- 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 tailored techniques in the solution of exciting data science applications

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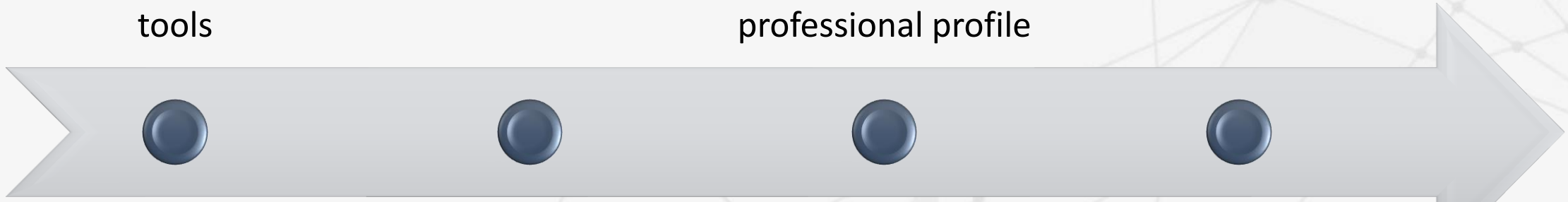
Our graduates

deep knowledge of data science tools

ability to deal with the computational challenges behind data-driven systems

effective and attractive professional profile

excellent placement in the job market



Employment Prospects

Companies/Research Institutions dealing with big data in

- ICT
- Finance
- Transportation
- Communications
- Biology and Healthcare
- …

Internship – What is It?

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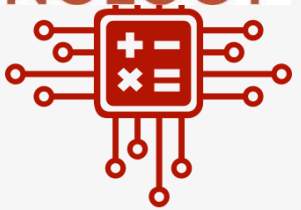
- Short-term work experience offered by
  - a company, industry, research centre, research lab
- When?
  - Typically, carried out during the second semester of the second year
- For how long?
  - four to six months
- MS thesis?
  - Yes, the internship and the final MS thesis's work are often combined

Why to Participate in an Internship

1. Explore good career options
2. Develop useful skills
3. Build networks / Establish mentors and references
4. Get a job directly

Some of our Partners



Internship Opportunities

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For further details visit:

https://datascience.math.unipd.it/internships.html

Foundations

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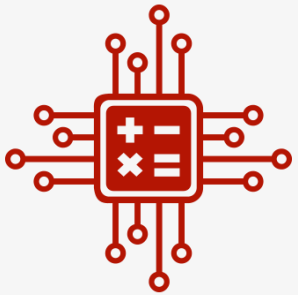
MATHEMATICS AND STATISTICS	COMPUTER SCIENCE	BIOLOGY, ECONOMICS, HUMAN & SOCIAL SCIENCE
STOC. METHODS (*)	FUND. OF INF. SYSTEMS (**)	LAW AND DATA
OPTIMIZATION FOR DS	MACHINE LEARNING	
STATISTICAL LEARNING		

(*) IT CAN BE REPLACED BY HD PROBABILITY FOR DS

(**) IT CAN BE REPLACED BY 2 OTHER ADVANCED COURSES



Other courses +2 elective

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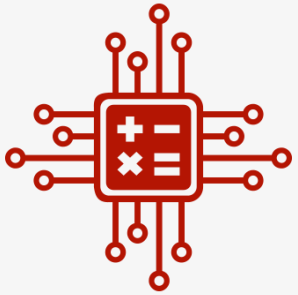
MATHEMATICS AND STATISTICS	COMPUTER SCIENCE	BIOLOGY, ECONOMICS, HUMAN & SOCIAL SCIENCE	ELECTIVE
HD PROBABILITY FOR DS	HUMAN DATA ANALYTICS	BIOLOGICAL DATA	2 COURSES
MATHEMATICAL MODELS AND NUM. METHODS 4 BIG DATA	GAME THEORY	STRUCTURAL BIOINFORMATICS	
STATISTICAL METHODS FOR HD DATA	NETWORK SCIENCE	BIOINFORMATICS	
FINANCIAL MATHS FOR DS	KNOWLEDGE REPR. AND LEARNING	INTRO TO MOL. BIOLOGY	
MATHEMATICAL CELL BIOLOGY	VISION AND COGNITIVE SYSTEMS	OMICS IN HUMAN DIS.	
	PROCESS MINING	SYSTEMS BIOLOGY	
	DEEP LEARNING	COGNITIVE BEHAV. AND SOCIAL DATA	
	NATURAL LANGUAGE PROCESSING	BUSINESS ECO. & FIN. DATA	
	BIG DATA COMPUTING	HUMAN COMPUTER INTERACTION	
	REINFORCEMENT LEARNING	COGNITION AND COMPUTATION	



Curriculum CSEDA

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First year

SEMESTER	MANDATORY UNITS	
1° & 2°	STATISTICAL LEARNING (Mod. A & Mod. B)	6CFU + 6CFU
2°	OPTIMIZATION FOR DS	6CFU
1°	MACHINE LEARNING	6CFU
2°	NATURAL LANGUAGE PROCESSING	6CFU
1°	BUSINESS ECONOMIC AND FINANCIAL DATA	6CFU
1°	COGN. BEHAV. & SOCIAL DATA	6CFU

	1 UNIT TO CHOOSE	
1°	FUND. OF INF. SYSTEMS	12CFU
	or 2 courses among	
2°	- KNOWLEDGE REPRESENTATION AND LEARNING	6CFU
2°	- DEEP LEARNING	6CFU
1°	- PROCESS MINING	6CFU

	1 UNIT TO CHOOSE	
1°	STOCHASTIC METHODS	6CFU
	or	
1°	HIGH DIMENSIONAL PROBABILITY FOR DS	6CFU

1° or 2°	ELECTIVE COURSE	6CFU

Curriculum CSEDA

DIPARTIMENTO MATEMATICA

Second year

SEMESTER	MANDATORY UNITS	
1°	LAW AND DATA	6CFU

	1 UNIT TO CHOOSE	
1°	HUMAN COMPUTER INTERACTION	6CFU
2°	FINANCIAL MATHEMATICS FOR DS	6CFU
1°	HUMAN DATA ANALYTICS	6CFU
1°	COGNITION AND COMPUTATION	6CFU

1° or 2°	ELECTIVE COURSE	6CFU

	1 UNIT TO CHOOSE	
1°	ADVANCED TOPICS IN DS	3CFU
1°	SEMINARS	3CFU
1°	ENGLISH LANGUAGE B2	3CFU

2°	INTERNSHIP	18CFU
2°	THESIS	15CFU

Curriculum BDA

DIPARTIMENTO MATEMATICA

First year

SEMESTER	MANDATORY UNITS	
1° & 2°	STATISTICAL LEARNING (Mod. A & Mod. B)	6CFU + 6CFU
2°	OPTIMIZATION FOR DS	6CFU
1°	MACHINE LEARNING	6CFU
2°	STRUCTURAL BIOINFORMATICS	6CFU
2°	INTRODUCTION TO MOLECULAR BIOLOGY	6CFU

	1 UNIT TO CHOOSE	
1°	FUND. OF INF. SYSTEMS	12CFU
	or 2 courses among	
2°	- BIG DATA COMPUTING	6CFU
2°	- DEEP LEARNING	6CFU
1°	- NETWORK SCIENCE	6CFU

	1 UNIT TO CHOOSE	
1°	STOCHASTIC METHODS	6CFU
	or	
1°	HIGH DIMENSIONAL PROBABILITY FOR DS	6CFU

1° or 2°	ELECTIVE COURSE	6CFU

Curriculum BDA

DIPARTIMENTO MATEMATICA

Second year

SEMESTER	MANDATORY UNITS	
1°	LAW AND DATA	6CFU
1°	BIOLOGICAL DATA	6CFU

	1 UNIT TO CHOOSE	
1°	MATHEMATICAL CELL BIOLOGY	6CFU
1°	COGN. BEHAV. & SOCIAL DATA	6CFU
1°	OMICS IN HUMAN DISEASE	6CFU
1°	SYSTEMS BIOLOGY	6CFU

1° or 2°	ELECTIVE COURSE	6CFU

	1 UNIT TO CHOOSE	
1°	ADVANCED TOPICS IN DS	3CFU
1°	SEMINARS	3CFU
1°	ENGLISH LANGUAGE B2	3CFU

2°	INTERNSHIP	18CFU
2°	THESIS	15CFU

Curriculum MLIS

DIPARTIMENTO MATEMATICA

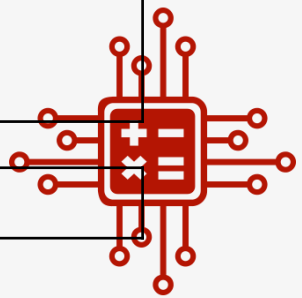
First year

SEMESTER	MANDATORY UNITS	
1° & 2°	STATISTICAL LEARNING (Mod. A & Mod. B)	6CFU + 6CFU
2°	OPTIMIZATION FOR DS	6CFU
1°	MACHINE LEARNING	6CFU
2°	DEEP LEARNING	6CFU
2°	NATURAL LANGUAGE PROCESSING	6CFU

	1 UNIT TO CHOOSE	
1°	FUND. OF INF. SYSTEMS	12CFU
	or 2 courses among	
2°	- BIG DATA COMPUTING	6CFU
2°	- KNOWLEDGE REPRESENTATION AND LEARNING	6CFU
1°	- PROCESS MINING	6CFU
1°	- REINFORCEMENT LEARNING	6CFU

	1 UNIT TO CHOOSE	
1°	STOCHASTIC METHODS	6CFU
	or	
1°	HIGH DIMENSIONAL PROBABILITY FOR DS	6CFU

1° or 2°	ELECTIVE COURSE	6CFU



Curriculum MLIS

DIPARTIMENTO MATEMATICA

Second year

SEMESTER	MANDATORY UNITS	
1°	LAW AND DATA	6CFU
1°	VISION AND COGNITIVE SYSTEMS	6CFU

	1 UNIT TO CHOOSE	
1°	COGNITION AND COMPUTATION	6CFU
1°	BUSINESS ECONOMIC AND FINANCIAL DATA	6CFU
1°	BIOINFORMATICS	6CFU
1°	BIOLOGICAL DATA	6CFU

1° or 2°	ELECTIVE COURSE	6CFU

	1 UNIT TO CHOOSE	
1°	ADVANCED TOPICS IN DS	3CFU
1°	SEMINARS	3CFU
1°	ENGLISH LANGUAGE B2	3CFU

2°	INTERNSHIP	18CFU
2°	THESIS	15CFU

Curriculum MDS

DIPARTIMENTO MATEMATICA

First year

SEMESTER	MANDATORY UNITS	
1° & 2°	STATISTICAL LEARNING (Mod. A & Mod. B)	6CFU + 6CFU
2°	OPTIMIZATION FOR DS	6CFU
2°	MATHEMATICAL MODELS & NUMERICAL METHODS 4 BD	6CFU
1°	MACHINE LEARNING	6CFU
2°	DEEP LEARNING	6CFU

	1 UNIT TO CHOOSE	
1°	FUND. OF INF. SYSTEMS	12CFU
	or 2 courses among	
1°	- GAME THEORY	6CFU
1°	- NETWORK SCIENCE	6CFU
1°	- PROCESS MINING	6CFU

	1 UNIT TO CHOOSE	
1°	STOCHASTIC METHODS	6CFU
	or	
1°	HIGH DIMENSIONAL PROBABILITY FOR DS	6CFU

1° or 2°	ELECTIVE COURSE	6CFU

Curriculum MDS

DIPARTIMENTO MATEMATICA

Second year

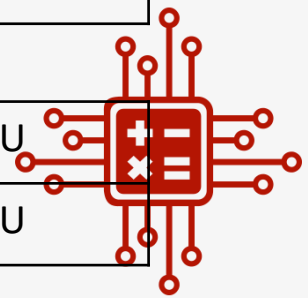
SEMESTER	MANDATORY UNITS	
1°	LAW AND DATA	6CFU
1°	STATISTICAL METHODS 4 HIGHDIMENSIONAL DATA	6CFU

	1 UNIT TO CHOOSE	
1°	MATHEMATICAL CELL BIOLOGY	6CFU
1°	FINANCIAL MATHEMATICS FOR DATA SCIENCE	6CFU
1°	HUMAN DATA ANALYTICS	6CFU

1° or 2°	ELECTIVE COURSE	6CFU

	1 UNIT TO CHOOSE	
1°	ADVANCED TOPICS IN DS	3CFU
1°	SEMINARS	3CFU
1°	ENGLISH LANGUAGE B2	3CFU

2°	INTERNSHIP	18CFU
2°	THESIS	15CFU



Study Plan

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- List of all the activities (exams, internship, etc.) you must carry out in order to earn the credits (CFU/ECTS) required to graduate.
- It can be modified throughout the years (in specific timeframes), until you apply for graduation.
- It can be
  - **Automatically Accepted:** it allows you to choose your curriculum and elective course units only among the educational activities offered by your Department/School in order to fulfill credit requirements, and it is approved as soon as you click on 'Confirm Plan' (i.e. all the activities are immediately uploaded to your online Transcript);
  - **Requiring approval:** it gives you the possibility to include some educational activities offered by other Departments/Schools but is subject to approval by the Degree Programme Board (CCS - Consiglio del Corso di Studi).
- Filling in your Study Plan is compulsory. You must fill it out in accordance with

  the “Manifesto degli Studi” of the DS programme, i.e., a list of all the course units offered in DS;

  the rules related to your enrolment year.
- Online procedure is available at specific timeframes (almost all year from September till June).

- **Study Plan Committee: Prof. Erb, Prof. Formentin**

Erasmus+ Programme

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It allows to spend a period (3 to 12 months) abroad

It is possible to

- attend courses and take exams,
- to prepare thesis work,
- to carry out internship work (as long as it runs alongside a period of study).

For further info: https://www.unipd.it/en/erasmus-studies-out

Erasmus+ Programme II

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Our Partners

- Politecnica de Catalunya (Barcelona)
- University of Helsinki
- Denmark Technical University (DTU)
- University of Mainz
- Technical University of Berlin
- Central Superlec (France)
- Universitat de Barcelona
- Bergen University
- University Paris 13
- University of Leiden
- Autonoma de Barcelona
- KU Leuven
- University of Bordeaux
- Universidad de Sevilla
- University of Amsterdam (UvA)
- Czech Technical University Prague

International Programmes

- **BDMA – Big Data Management and Analytics (Erasmus Mundus Joint Programme)**
- **TMDS – Trans Mediterranean Data Science (Erasmus Double Degree)**

Torre Archimede

Maths Department Building is **close to Padua City Center**

https://www.math.unipd.it/en/department/classrooms-and-laboratories/

https://www.math.unipd.it/en/department/buildings-and-facilities/

Address: Via Trieste, 63 – 35121 Padova, Italy

Classrooms & Labs

DIPARTIMENTO MATEMATICA

For further details visit:

https://www.math.unipd.it/en/department/classrooms-and-laboratories/

Other Buildings

Some lecture will be held in other buildings:

- Aula ex Bio. Via Loredan, 10 (Room 1)
- Paolotti building
- Department of Information Engineering
- ……

Carefully check the timetable using your **UniPD app**

University Library System

For further details visit:

http://bibliotecamatematica.cab.unipd.it/

Contacts

E-mail datascience@math.unipd.it

Website

https://datascience.math.unipd.it/index.html

Facebook: universitypadova

Instagram: unipd

Moodle Website

https://stem.elearning.unipd.it/course/view.php?id=4071

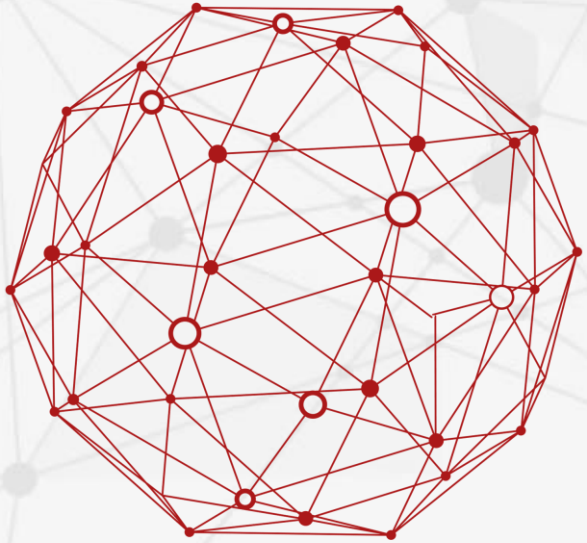
Tutors

Meetings with the DS tutors

Students will get an email with instructions to join those events.

Contacts: giovanni.donghi@studenti.unipd.it
abhishekvarma.dasaraju@studenti.unipd.it

Q&A Meetings



Monthly meetings with the Math Department admin staff

Students will get a zoom link to join those events.

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Questions and Answers