



**POLITECNICO
DI TORINO**



**MASTER OF SCIENCE IN DATA SCIENCE AND
ENGINEERING
PAOLO GARZA**

NEW!

MSc in Data Science and Engineering



Motivations

- Increasing use of **data-analytics** and **data-driven solutions**
- Increasing demand for **data scientists** and **data engineers**

Companies are searching for one million data scientists

“Data science, which is a new economy, is based on a new professional: the data scientist. ...”

March 19, 2019

Il Sole **24 ORE**



Data science



*“A comprehensive **data science curriculum** is more than **machine learning and statistics**, possibly including courses on **programming, data stewardship, and ethics**, in addition to other areas.*

***Data scientists** must be able to **find meaning in unstructured data**, so classes on programming, data mining, and machine learning are often part of the core.*

***Data scientists** must also be able to **communicate** their findings effectively, so courses on **visualization** may be offered, at least as an elective. ”*



F. Berman et al. 2018. Realizing the potential of data science. *Commun. ACM* 61, 4 (March 2018), 67-72.

Master Degree Curriculum

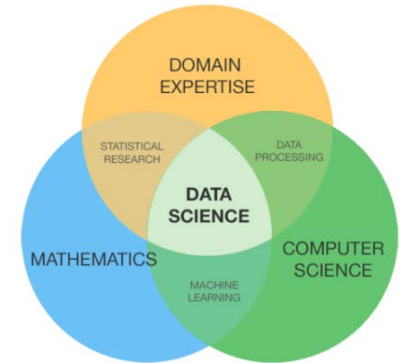


Educational objectives

- Training of **interdisciplinary** professionals focused on **data analysis**

Core knowledge


- Models and algorithms for **data analysis**
 - **Mathematics**, **statistics** and probability
 - **Machine learning** and **deep learning**
- Information processes and systems for **data management**
- **Distributed algorithms** for **Big Data** analytics
- Data **ethics** and protection
- **Innovation management**
- Strong **hands-on** approach




Program syllabus – First year



First year				
Sem.	Courses			
1	Statistical methods in data science 4 MAT/06 + 4 SECS-S/01		Computational linear algebra for large scale problems 6 MAT/08 + 2 MAT/03	
	Data science lab: process and methods 8 ING-INF/05			
	Data management and visualization 8 ING-INF/05			
	Object Oriented Programming 8 ING-INF/05	Decision making and optimization 8 MAT/09	Numerical optimization for large scale problems and Stochastic Optimization 6 MAT/08 + 2 MAT/06	Information Theory and Applications 8 ING-INF/03
2	Machine learning and Deep Learning 10 ING-INF/05			
	Distributed architectures for big data processing and analytics 8 ING-INF/05			
	Mathematics in Machine Learning 4 MAT/03 + 4 SECS-S/01			
	Data Ethics and Protection 3 ING-INF/05 + 3 IUS/01			

 Mandatory courses (foundational courses)

 Introductory courses (to be selected depending on the skills/bachelor degree of the student)

Program syllabus – Second year



Second year			
Sem.	Courses		
1	Innovation management 3 ING-IND/35 + 3 ING-IND/16		
	Computer Aided Simulations and Performance Evaluation 8 ING-INF/03	Dynamics on networks and graphs 8 MAT/05	Stochastic processes and time series 4 MAT/06 + 4 SECS-S01
	Machine learning for IOT 8 ING-INF/05		Bioinformatics 8 ING-INF/05
1,2	Applied data science project 12 CFUs	Internship 12 CFUs	Elective 6 CFUs course from other Master degrees
			Elective 6 CFUs course from other Master degrees
2	Master Thesis 22 CFU		

- Mandatory courses (foundational courses)
- Elective courses
- Application area: Information technology
- Application area: Industrial and energy engineering
- Application area: Finance, banking, insurance
- Application area: Life science

Career Opportunities



- **Data scientist**

- Analyses requirements, designs data analysis processes (through machine learning algorithms and mathematical models), visualizes and communicates results



- **Data engineer**

- Designs and develops IT systems and data analytics processes for extracting, storing and analyzing large amounts of heterogeneous data

- **Job sectors**

- Information technology and consulting
- Engineering and manufacturing
- Energy and utilities
- Finance, banking and insurance
- Life science
- Public and private research centers

Internationalization



Collaborations and Exchange Programs

- **Erasmus+** programme with many European Universities
- **TOP-UIC** programme
- Several other **international agreements** are currently being established

International and **multicultural environment**

- International students

