01/06/2023

Salone Dell'Orientamento Lauree Magistrali

NOME DEL CORSO DI LAUREA
INGEGNERIA INFORMATICA (COMPUTER ENGINEERING)

TITOLO: *Artificial Intelligence and Data Analytics*

Relatori/*Speakers*: **Prof. Tatiana Tommasi**

Politecnico di Torino

Artificial Intelligence and Data Analytics

You will learn about the **technological** and **theoretical** aspects of **big data** analysis, **machine learning** algorithms, **deep learning** and artificial intelligence for data analysis.

The focus is on theoretical and mathematical aspects of data analysis, technologies for big data processing, distributed systems and modern learning approaches used in advanced research and modern companies.

1st year - First Semester

https://www.polito.it/en/education/master-s-degree-programmes/computer-engineering/programme-curriculum

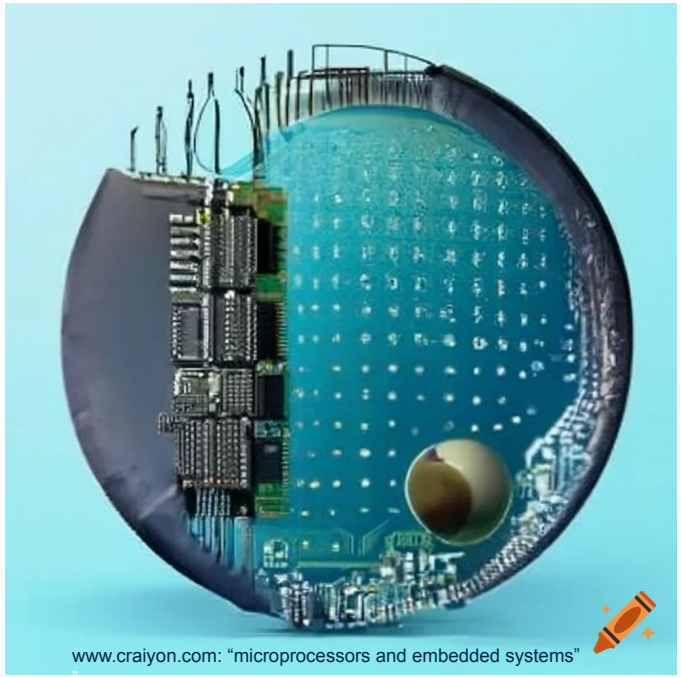
Code	Course	Language	Period	Credits
01DSHOV	Big data processing and analytics	EN	1	6
02GOLOV	Architetture dei sistemi di elaborazione	IT	1	10
	or			
02LSEOV	Computer architectures	EN	1	10
01SQJOV	Data Science and Database Technology	EN	1	8
	or			
01SQMOV	Data Science e Tecnologie per le Basi di Dati	IT	1	8
01OTWOV	Computer network technologies and services	EN	1	6
	or			
02KPNOV	Tecnologie e servizi di rete	IT	1	6

Big data processing and analytics

The course addresses the challenges arising in the Big Data era. Specifically, the course will cover **how to store, retrieve, and analyze big data** to extract useful knowledge and hints. The course covers not only **data models** and **data analytics** aspects but also **novel programming paradigms** for **distributed processing**.

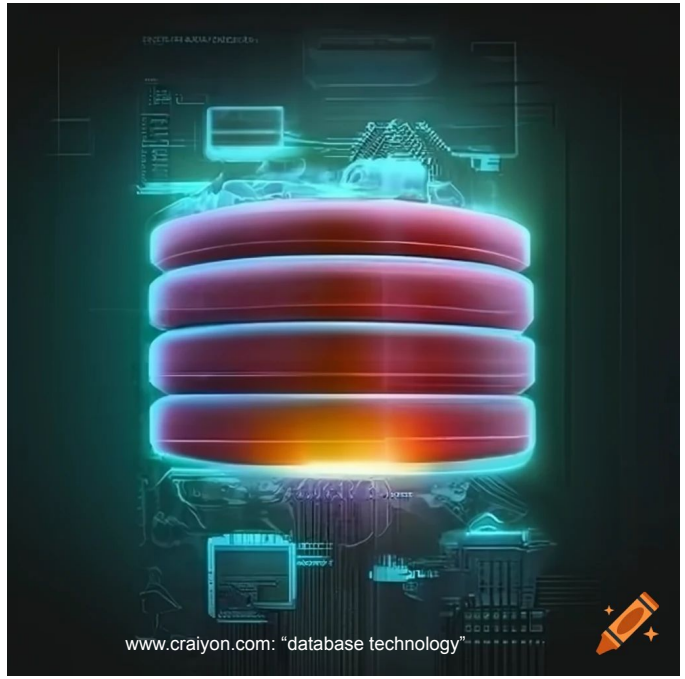
Computer architectures

Presents the basics of computing systems architectures, with a particular **focus on microprocessor based systems**. Analyzes the several components from the microprocessor internal architecture, up to system bus for peripheral devices management. It also covers **programming at assembly level**.



Data Science and Database Technology

Introduces **database management techniques for data warehouses** (database systems specialized in strategic decision support), typically characterized by the need of managing **very large databases**. Both **traditional OLAP** (On Line Analytical Processing) analysis techniques and **complex data mining techniques** will be addressed.



Computer network technologies and services

Delves into the design principles of basic technologies underlying **modern computer networks (Ethernet, IPv4, IPv6)**, addresses advanced topics related to the workings of the Internet, such as **routing architecture and protocols**, and presents a number of solutions that play a key role in services commonly offered through the Internet.

1st year - Second Semester

https://www.polito.it/en/education/master-s-degree-programmes/computer-engineering/programme-curriculum

Code	Course	Language	Period	Credits
05BIDOV	Ingegneria del software		2	8
	or			
04GSPOV	Software engineering		2	8
01UDFOV	Applicazioni Web I		2	6
	or			
01TXYOV	Web Applications I		2	6
02GRSOV	Programmazione di sistema		2	10
	or			
01NYHOV	System and device programming		2	10
01URTOV	Machine learning and pattern recognition		2	6

Software Engineering

Provide knowledge on how to tackle common issues in the **development of large software systems** (communication and coordination between contractors and developers, evolution, correctness, reliability, usability). Software life cycles. The Unified Modeling Language. Operational modeling and prototyping. Verification and validation. Management and support of software projects.

Web Applications

Presents the main techniques for **creating distributed web applications**, focusing in particular on the front-end programming, using the JavaScript language and a client-side programming framework. Manage the main **design choices**, analyze their impact in term of native JavaScript code, and study **different types of formats for data exchanges** with application examples.

System and Device Programming

It introduces the **architecture and the design principles of an operating system**. More specifically, it deals with internal operating system modules, together with the leading **techniques and strategies for efficiently managing the resources** of a computer, such as processors, memories, peripheral devices, files, etc.
The second part describes the **interfaces for system programming, resource management and concurrent programming**. It introduces system programming techniques within state-of-the-art operating systems, such as Unix/Linux, Windows, and macOS.

Machine Learning and Pattern Recognition

The course covers the basic concepts of **statistical machine learning**. The objective is to provide the students with solid theoretical bases that will allow them to **select, apply and evaluate different classification methods on real tasks**. The students will also acquire the required competencies to devise novel approaches based on the frameworks that will be presented during the classes. The course will include laboratory activities on real data using modern programming frameworks.

2nd year - First Semester

https://www.polito.it/en/education/master-s-degree-programmes/computer-engineering/programme-curriculum

Code	Course	Language	Period	Credits
01URWOV	Advanced Machine Learning		1	6
02TZHOV	Insegnamento a scelta 1 (view Full curriculum)	-	1	6
01TYMOV	Information systems security		1	6
	or			
01UDUOV	Sicurezza dei sistemi informativi		1	6

Advanced Machine Learning

The course addresses **core topics of modern Artificial Intelligence and Machine Learning**, presenting the principles underlying **Deep Neural Networks** and their applications in **Computer Vision**. The students will be guided through the relevant literature and will learn how to design and use deep learning algorithms.
Lab activities will equip students **with first-hand experience on modern optimization methods and programming framework**, applied on specific case studies.

Information systems security

This course deals with **security issues in modern networked computer systems**, paying special attention to data security and protection of computer networks and networked computer applications, in a closed (Intranet) or open (Internet) environment. The course aims to teach the skills needed to perform both the **analysis and the high-level design of the security features** of IT components and systems.

2nd year - Second Semester

https://www.polito.it/en/education/master-s-degree-programmes/computer-engineering/programme-curriculum

Code	Course	Language	Period	Credits
03UEWOV	Challenge	🇮🇹	1,2	8
	or			
63ICPOV	Crediti liberi (view Full curriculum)	-	1,2	6
22EBHOV	Tesi	🇮🇹	2	18
	or			
23EBHOV	Tesi	🇮🇹	1,2	30
	or			
10CWHOV	Tirocinio	🇮🇹	1,2	12
02TZJOV	Insegnamento a scelta 2 (view Full curriculum)	-	2	6

2nd year - 1st semester - “Insegnamenti a scelta”

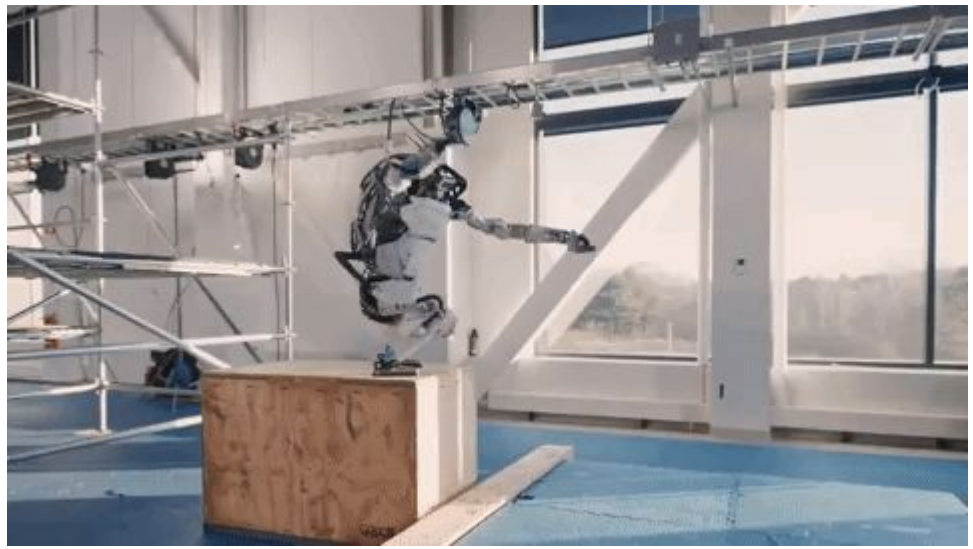
https://didattica.polito.it/pls/portal30/sviluppo.offerta_formativa_2019.vis?p_coorte=2024&p_sdu=37&p_cds=18

Semester	Code	SSD	
1	**01HFPOV**	ING-INF/05 (6)	Cloud Computing Technologies
1	**01URROV**	ING-INF/05 (6)	Computational intelligence
1	**01TXZOV**	ING-INF/05 (6)	Distributed systems programming
1	**02JSKOV**	ING-INF/05 (6)	Human Computer Interaction
1	**01OUVOV**	MAT/09 (6)	Optimization methods and algorithms
1	**01HFNOV**	ING-INF/05 (6)	Robot Learning
1	**01SQNOV**	ING-INF/05 (6)	Software Engineering II

6 CFU, 60h

Robot Learning

This course will provide foundational knowledge on **robot systems and their control**, with the purpose of developing robots with an **embodied intelligence**, able to learn how to perceive and interact with the surrounding world. Lectures will focus on theoretical and practical knowledge on **machine learning solutions for autonomous systems**.



2nd year - 2nd semester - “Insegnamenti a scelta”

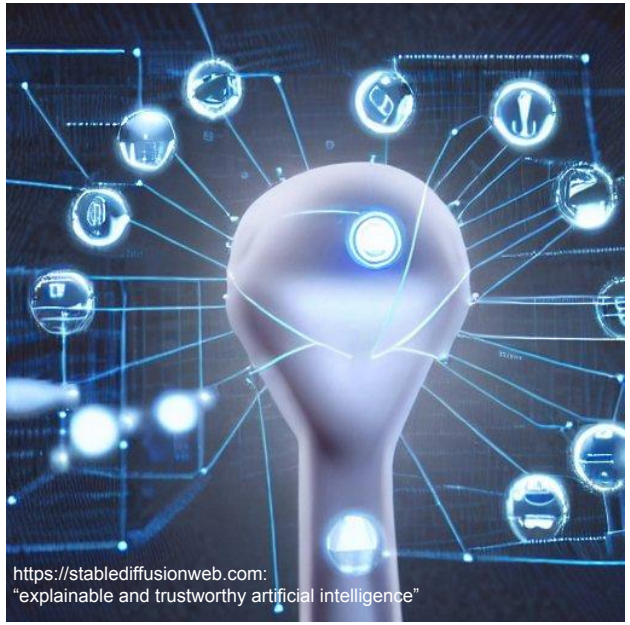
https://didattica.polito.it/pls/portal30/sviluppo.offerta_formativa_2019.vis?p_coorte=2024&p_sdu=37&p_cds=18

Semester	Code	SSD	
2	**01OVFOV**	ING-INF/05 (6)	Bioinformatics
2	**01HFOOV**	ING-INF/05 (6)	Explainable and trustworthy AI
2	**01URXOV**	ING-INF/05 (6)	Machine learning in applications
2	**01PFPOV**	ING-INF/05 (6)	Mobile application development
2	**01OUZOV**	ING-INF/05 (6)	Model-based software design
2	**01DTEOV**	ING-INF/05 (6)	Responsible Artificial Intelligence
2	**01SQHOV**	ING-INF/04 (2); ING-IND/14 (1); ING-INF/05 (3)	Technologies for Autonomous Vehicles
2	**01TXSOV**	ING-INF/05 (6)	Web Applications II

6 CFU, 60h

Explainable and trustworthy AI

This course will cover **explanation methods for both predictive and explorative Machine Learning algorithms**, with a specific attention to their exploitation in deployed machine learning frameworks. Experimental activities in lab will allow the practical evaluation of the presented explanation methods on real-world datasets, considering both the ML developer and final user perspectives.



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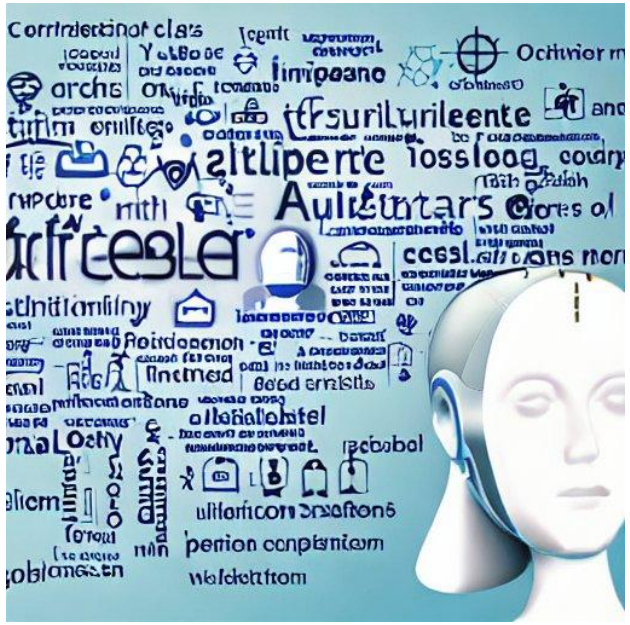
"explainable and trustworthy artificial intelligence"



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