DRIM classes for 2025-2026

This is a preliminary list of classes for the 2025-2026 academic year. This document will be updated periodically. If you wish to attend a class, please contact the designated reference persons as soon as possible.

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Consiglio Nazionale delle Ricerche (CNR-ISTC and CNR-STIIMA)

Reference person: Andrea Orlandini <andrea.orlandini@istc.cnr.it>, Nicola Pedrocchi <nicola.pedrocchi@stiima.cnr.it>

The courses can be BASIC (to establish cultural foundations), ADVANCED (advanced study of specific topics), CROSSOVER (on interdisciplinary subjects).

Name	**Teacher**	**Ore**	**Class description**	**Available online**	**Time of the year (please check)**	**Language**	**Final evaluation**	**Level**
Automated Planning	Andrea Orlandini, Alessandro Umbrico, andrea.orlandini@istc.cnr.it, umbrico.alessandro@gmail.com	10	The course presents Artificial Intelligence automated planning. It introduces models and resolution approaches for both "classic" and temporal planning. Different methodologies for the synthesis of action plans and their execution will be presented, as well as applications in relation to the control of autonomous robots.	Yes	June 2026 (ask for details)	English	yes	BASIC

Istituto Italiano di Tecnologia (IIT)

Reference person: Lorenzo Natale <Lorenzo.Natale@iit.it>

The courses can be BASIC (to establish cultural foundations), ADVANCED (advanced study of specific topics), CROSSOVER (on interdisciplinary subjects).

Name	**Teacher**	**Ore**	**Class description**	**Available online**	**Time of the year (please check)**	**Language**	**Final evaluation**	**Level**
Open Science and Research Data Management (OS&RDM)	Anna Maria Pastorini, Valentina Pasquale, anna.maria.pastorini@unige.it, valentina.pasquale@iit.it	10	This training module for PhD Students aims to introduce early-career researchers to the principles of scholarly communication, Open Science and Research Data Management. Students will gain a better understanding of the available research e-infrastructures, tools, and services for Open Access publishing, Research Data Management and FAIR Data. Students will also learn the importance and the transformative potential of Open Science practices in research, especially to improve reproducibility and increase research integrity. They will learn what means to make data FAIR, as required by many funders, including the European Commission, and how to draft a data management plan. Finally, they will have the chance to practice on common tools for Research Data Management, like Data Stewardship Wizard, Zenodo, and Dataverse.	yes	Feb 2025 (ask for details)	English	yes	CROSSOVER
Modern C++	Marco Accame, Valentina Gaggero, Nicolò Genesio, marco.accame@	30	The students will learn the new syntax and philosophy of Modern C++ (releases C++11, -14, -17, -20) with hands on the code at every lesson.	yes	May 2026	English	yes	BASIC

	iit.it, valentina.gaggero@iit.it							
Mechanical Drawing Fundamentals	Diego Torazza, diego.torazza@iit.it	18	This course provides an introduction to Mechanical Technical Drawing with mention to manufacturing techniques. The aim of the course is to give a base knowledge in understanding and preparing mechanical technical drawings, so there is no need of prior background of mechanical drawing. Mechanical drawing is the main way to communicate design need to technicians, workshops, suppliers. A base knowledge of rules and methods helps the researcher, even if not directly engaged in mechanical design, to better contribute to interdisciplinary team working when involved in the design of experimental setups, scientific devices, and the writing/understanding of technical specifications.	No	Jan 2026	English	yes	BASIC
ComputerAided Design	Diego Torazza, diego.torazza@iit.it	12	The aim of the course is to gain and apply knowledge of 3D CAD concepts and techniques by using high-end CAD systems (PTC Creo).	No	Jun 2026	English	yes	ADVANCED
Perceptual systems	Monica Gori, Alessia Tonelli, monica,gori@iit.it, alessia.tonelli@iit.it	12	From birth, we interact with the world through our senses. How the brain process and transform sensory signals into perceptual outputs is one of the main questions in the field of experimental psychology. The goal of the course is to present the perceptual from the anatomical, physiological, and functional points of view. A particular focus will be on how physical stimuli are transduced into sensory signals by our peripheral sensory apparatus in a hierarchy organize complex	NaN	not active this year	NaN	NaN	NaN

			behaviour. In the last part of the course, these topics will be described in relation with cross-sensory interaction and multisensory integration in the adult and the developing brain. Students will learn how the functioning of the main sensory systems, i.e. vision, audition, touch, small and taste. Moreover, it will be explain the process of multisensory integration and cross-modal interaction.					
Robotic Virtual Prototyping Design	Ferdinando Cannella, Mariapaola D'Imperio, ferdinando.cannella@iit.it	18	The aim of the Robotic Virtual Prototyping Design course is to give the basic knowledge about the Finite Element Analysis (FEA) and Multi-Body Simulations (MBS) applied to the robotics. These computational techniques predict the behavior of physical systems: joined together permit to study the dynamics taking in account the body flexibility, the control and optimization. It will be introduced mainly applied to the mechanical field, in particular to the robotic anthropomorphic arm. The student gets 6 credits if he/she attends the entire course and accomplishes the final project.	yes	May-Jun 2026	English	yes	CROSSOVER
Mechatronics and AI	Ferdinando Canella, Gabriele Marchello, ferdinando.cannella@iit.it	18	The aim of the Mechatronics and Artificial Intelligence (AI) course is to give the basic knowledge about AI and Deep Learning (DL) applied to mechatronics. The course will provide the students with an overview of AI, DL and the possible applications, and will focus in the last lectures on reinforcement learning (RL) techniques. AI, DL and especially RL can be adopted to control the behavior of mechatronic systems acting in complex environment, and solving tasks too hard to be tackled with traditional approaches. The student	yes	Not available	English	yes	ADVANCED

			gets 6 credits if they attend the entire course and passes the final project.					

Politecnico di Milano (POLIMI)

Reference person: Andrea Maria Zanchettin <andreamaria.zanchettin@polimi.it>

The courses* can be BASIC (to establish cultural foundations), ADVANCED (advanced study of specific topics), CROSSOVER (on interdisciplinary subjects).

* A tuition fee (stamp duty, regional tax for “diritto allo studio”) applies to all courses for non-POLIMI students.
** Subject to the availability of streaming infrastructure (WebEx) in the classroom, live interaction with the class might be compromised for remote students.

From the doctoral programme in Information Technology - https://phd-inf.polimi.it

Name	Teacher	Ore	Class description	Available online	Time of the year	Language	Final evaluation	Level
HYBRID SYSTEMS	Maria Prandini	25	https://www11.ceda.polimi.it/manifestidott/manifestidott/controller/MainPublic.do?evn_dettaglioinsegnamento=evento&aa=2025&k_cf=82&k_corso_la=1380&ac_ins=0&lang=IT&c_insegn=063934&jaf_currentWFID=main	Yes**	July 27-31, 2026	ENG	Yes	BASIC
LEARNING THEORY	Alberto Metelli	25	https://www11.ceda.polimi.it/manifestidott/manifestidott/controller/MainPublic.do?evn_dettaglioinsegnamento=evento&aa=2025&k_cf=82&k_corso_la=1380&ac_ins=0&lang=IT&c_insegn=063914&jaf_currentWFID=main	No	March 6, April 1, 2026	ENG	Yes	CROSSOVER
MODEL PREDICTIVE CONTROL	Marcello Farina	25	https://www11.ceda.polimi.it/manifestidott/manifestidott/controller/MainPublic.do?evn_dettaglioinsegnamento=evento&aa=2025&k_cf=82&k_corso_la=1380&ac_ins=0&lang=IT&c_insegn=063924&jaf_currentWFID=main	no	September 7-11, 2026	ENG	Yes	BASIC
OBJECT-ORIENTED MODELLING AND SIMULATION	Francesco Casella	25	https://www11.ceda.polimi.it/manifestidott/manifestidott/controller/MainPublic.do?evn_dettaglioinsegnamento=evento&aa=2025&k_cf=82&k_corso_la=1	No	October 13-17	ENG	Yes	CROSSOVER

			380&ac_ins=0&lang=IT&c_insegn=063930&jaf_currentWFID=main					

REINFORCEMENT LEARNING	Marcello Restelli	25	https://www11.ceda.polimi.it/manifestidott/manifestidott/controller/MainPublic.do?evn_dettaglioinsegnamento=evento&aa=2025&k_cf=82&k_corso_la=1380&ac_ins=0&lang=IT&c_insegn=063910&jaf_currentWFID=main	Yes**	Feb 2-20, 2026	ENG	Yes	BAISC
STOCHASTIC DYNAMIC PROGRAMMING	Ola Jabali	25	https://www11.ceda.polimi.it/manifestidott/manifestidott/controller/MainPublic.do?evn_dettaglioinsegnamento=evento&aa=2025&k_cf=82&k_corso_la=1380&ac_ins=0&lang=IT&c_insegn=063925&jaf_currentWFID=main	Yes**	May 4-8, 2026	ENG	Yes	CROSSOVER

From the doctoral programme in Mechanical Engineering - https://www.mecc.polimi.it/en/phd

AI APPLICATIONS TO INDUSTRIAL ROBOTICS	Loris Roveda	25	https://www11.ceda.polimi.it/manifestidott/manifestidott/controller/MainPublic.do?evn_dettaglioinsegnamento=evento&aa=2025&k_cf=82&k_corso_la=1383&ac_ins=0&lang=IT&c_insegn=061805&jaf_currentWFID=main	Yes	June 15-19, 2026	ENG	Yes	BASIC

From the doctoral programme in Bioengineering - https://www.phdbioengineering.polimi.it

AI METHODS FOR BIOENGINEERING CHALLENGES	Luca Mainardi	25	https://www11.ceda.polimi.it/manifestidott/manifestidott/controller/MainPublic.do?evn_dettaglioinsegnamento=evento&aa=2025&k_cf=82&k_corso_la=1373&ac_ins=0&lang=IT&c_insegn=064005&jaf_currentWFID=main	TBD	January 20-28, 2026	ENG	Yes	CROSSOVER

OPEN-SOURCE DATA SCIENCE: STRUCTURING, SHARING, AND EXPLOITING MULTI-CENTER AND MULTI-SOURCE BIOMEDICAL DATA	Stefania Coelli	25	https://www11.ceda.polimi.it/manifestidott/manifestidott/controller/MainPublic.do?evn_dettaglioinsegnamento=evento&aa=2025&k_cf=82&k_corso_la=1373&ac_ins=0&lang=IT&c_insegn=063918&jaf_currentWFID=main	T BD	January 26 – February 6, 2026	ENG	yes	CROSSOVER

Politecnico di Torino (Polito)

Reference person: Giuseppe Quaglia <giuseppe.quaglia@polito.it>, Carmen Visconte <carmen.visconte@polito.it>

The courses can be BASIC (to establish cultural foundations), ADVANCED (advanced study of specific topics), CROSSOVER (on interdisciplinary subjects).

Name	Teacher	Ore	Class description	Available online	Time of the year (please check)	Language	Final evaluation	Level
Advanced scientific programming in matlab	Paolo Bardella paolo.bardella@polito.it	30	The course aims to provide advanced skills in scientific programming, and to teach sound methodologies for the development of reliable, optimized and maintainable codes. A basic knowledge of MATLAB and the C language represents a prerequisite of this course. During this course, many common methods used in Scientific Computing will be presented, with particular attention to the most recent programming techniques in MATLAB. At the end of the course, the student will have expanded his/her knowledge of MATLAB and will be able to choose the best approach for the solution of numerical problem he/she will face.	yes	January 2026	English	yes	ADVANCED
Development and management of data-acquisition systems	Alessio Carullo alessio.carullo@polito.it	25	The course, open to all those who perform experimental activity and do not have specific knowledge on analogue and digital electronic circuits, is conceived to analyze and study multi-channel data-acquisition systems, to develop the know-how required for choosing and configuring the components of the measuring chain according to the requirements. Sensors and circuitry commonly employed in the industrial field to adapt the sensor output signals to the analogue-to-digital converter will be studied. Furthermore, the performance of different architectures of	No	Jun 2026	English	yes	ADVANCED

			data-acquisition systems will be analyzed (dedicated systems, data-acquisition boards for personal computer, micro-controller based boards), also revising the most common development environments. Eventually, guide lines for the estimation of the expected uncertainty will be provided. Laboratory experiments will be arranged in order to develop and analyze some case studies.					
Machine learning for pattern recognition	Sandro Cumani sandro.cumani@polito.it	20	This course gives a broad yet rigorous introduction to machine learning and statistical pattern recognition. It focuses on supervised generative and discriminative learning models, analyzing some important topics such as model architectures, training and evaluation techniques. The course will compare different models and classification approaches on the popular MNIST digit recognition dataset. It will also discuss about the applications of the proposed machine learning approaches to image, speech, and speaker recognition. Students will be asked to apply the acquired knowledge to develop their own classification system using labeled training and evaluation data provided during the course. Each system will then be evaluated on another unlabeled and previously unseen data set.	no	Jun/July 2026	English	yes	ADVANCED
Principi, materiali ed applicazioni della robotica nella biomedicina	Alberto Arezzo alberto.arezzo@mac.com marina.indri@polito.it	20	Introduzione alla Robotica: Storia, definizioni, problemi di base, applicazioni, problemi aperti Materiali per la chirurgia robotica: panoramica dei nuovi sistemi di materiali multifunzionali intelligenti utilizzati negli strumenti e nelle apparecchiature chirurgiche (materiali intelligenti, attuatori e sensori). Applicazioni della robotica alla chirurgia: panoramica sull'effettiva limitazione della chirurgia endoscopica, potenziali	yes	Feb 2026	Italian	yes	ADVANCED

			applicazioni della robotica alla chirurgia, analisi dei risultati, prospettive future Applicazioni della robotica all'urologia: panoramica sull'effettiva limitazione dell'urologia endoscopica, potenziali applicazioni della robotica all'urologia, analisi dei risultati, prospettive future Automazione in chirurgia robotica: esempi attuali e "prossimo futuro" di applicazioni dell'intelligenza artificiale nella robotica chirurgica. Sulla base della nostra ricerca, la maggior parte delle applicazioni correlate rientrano nelle seguenti quattro sottocategorie: Automazione della sutura, Apprendimento automatico per la valutazione delle abilità chirurgiche, Apprendimento automatico per il miglioramento dei materiali robotici chirurgici, Apprendimento automatico per la modellazione del flusso di lavoro chirurgico					
Research design and methodology	Federico Bella federico.bella@polito.it	11	This course is intended to explain to PhD students how high-quality scientific research can be carried out during the three years of the doctorate course. The lessons will address the path that goes from the assignment of the research project to the literature analysis, from the design of research activities to the interaction with other scientists, from the production of tangible results to the analysis of the metrics commonly adopted to assess the quality of research and researchers. The overall aim of the course is that of making PhD students aware of what a PhD is and which is the spirit required to face it.	No	Mar 2026	English	yes	CROSSOVER
Facing the scientific publishing world	Federico Bella federico.bella@polito.it	13	This course is intended to introduce the world of scientific publishing to PhD students starting their academic career. The lessons will address the main pillars of this sector, from the fundamentals of journals organization to the rational	No	Mar 2026	English	yes	CROSSOVER

			construction of an article, from the peer-review process to the evaluation of research and researchers through internationally recognized metrics. The main aim of this course is to make PhD students aware of the international scientific publishing system.					
Writing research proposal and EU projects	Cattivelli Valentina valentina.cattivelli@polito.it	10	The figure of the researcher has become more complex. In addition to knowing how to do research and translate the results of their efforts into scientific papers, the researcher must possess project management skills that include knowing how to monitor European, national, and regional funding opportunities, as well as how to write project proposals in response to such calls. The ongoing European programming 2021-2027 offers considerable opportunities for the researcher who aspires to obtain more funds to finance its own research. Although only an introduction, this course aims to help PhD candidates develop certain project management skills, i.e., the search of funding opportunities, the analysis of the essential elements and requirements of the calls, and the preparation of a project proposal.	No	Sept 2026	English	yes	CROSSOVER
Innovation management	Francesca Montagna francesca.montagna@polito.it	8	Innovation Management is nowadays a recognized discipline that concerns scientific knowledge and professional skills. In the current economic environment, the transfer of technological development results into products and services, which must be both profitable for businesses and useful to society, is in fact not immediate and requires special capabilities. These required capabilities and skills are transversal and common to the different expressions of technology, as well as to various disciplines and industrial sectors. In this sense, they constitute a fundamental professional and cultural background for	No	Nov 2026	English	yes	CROSSOVER

			Engineers, Architects and Designers. Innovation management covers both strategic and technical-operational decisions, as well as the definition of those core competences for the management and support of innovation processes and product and service development. The course mainly aims at blending a managerial perspective, so to make the doctoral student capable of understanding the innovation process, to the more traditional perspectives from the specific design disciplines. It also provides indications on the main current research questions and on the work being carried out by researchers in the field. The course is based on lessons, with wide use of cases drawn from experience and empirical research and case studies where students are required to analyse information in a quantitative manner. At the end of the course, students will have acquired a concrete ability to analyze and manage business and design decisions related to technological innovation in both strategic and operational terms. They also acquire full mastery of approaches for the management of R&D and innovative processes, product and service development.					
Intellectual Property Rights and Innovation	Federico Caviggioli federico.caviggioli@polito.it	6	This course aims to provide students with fundamental knowledge on the Intellectual Property Rights (IPRs) that are available to protect creativity and innovation. The definitions and the main characteristics of patents, trademarks, copyrights, designs, creative commons, etc. will be examined. Students will be introduced to some of the sources of IPR data which can be searched to perform preliminary prior art analyses. In particular, the course will focus on patent data as a source of information which could help the researchers in	No	Mar 2026	English	yes	CROSSOVER

			developing new technical developments from a scientific perspective and improve their understanding of a technological field. The definition of such a technology landscape can be also useful for supporting the communication of technology trends and their socio-economic impact, in particular for project funding.					

Scuola Superiore Sant'Anna (SSSA)

Referenti: Arianna Menciassi <arianna.menciassi@santannapisa.it> e Calogero Oddo <Calogero.Oddo@santannapisa.it>

The courses can be BASIC (to establish cultural foundations), ADVANCED (advanced study of specific topics), CROSSOVER (on interdisciplinary subjects).

Name	**Teacher**	**Ore**	**Class description**	**Available online**	**Time of the year (please check)**	**Language**	**Final evaluation**	**Level**
Neuromorphic Computing	Calogero Maria Oddo, Calogero.Oddo@santannapisa.it	20	The course will explore computational and physical models that emulate the neural dynamics and the efficiency of biological neurons of peripheral and central nervous system.	Yes	Dec 2026/Jan 2027 (not held in academic year 2025-26)	English	yes	CROSSOVER
Graphical programming for measurement, test, and control systems in bioengineering	Calogero Maria Oddo, Calogero.Oddo@santannapisa.it	20	The main competences developed will be fundamentals and technical abilities of graphical programming for biomedical engineering. The main software used will be LabVIEW (Core 1 module), with the aim to address the following detailed topics: introduction to graphical programming; navigating the graphical programming environment; what is graphical programming; project explorer; parts of a Virtual Instrument (VI); front panel; block diagram; searching for controls, Vis, and functions; selecting a tool; dataflow; building simple Vis; troubleshooting and debugging Vis; implementing a VI; data types; documenting code; while and for loops; timing a VI and data feedback in loops; plotting data; case structures; developing modular applications; data structures: arrays and clusters; managing file and hardware resources; introduction to data exchange via UDP; Euler method for discrete fixed-step solution of differential equations and graphical implementation; hands on examples with graphical programming.	Yes	Course calendar: Feb 10, 2026, h. 9-13 Feb 12, 2026, h. 14-18 Feb 17, 2026, h. 9-13 Feb 24, 2026, h. 9-13 Feb 27, 2026, h. 9-13	English	yes	BASIC
Fundamentals of Surgical and Interventional Robotics	Arianna Menciassi, arianna.menciassi@santannapisa.it	10-12	The course will be focused on methodologies and guidelines related to robotic technologies for minimally invasive therapy, diagnosis and	Yes	Course calendar:	English	yes	CROSSOVER

			surgery. Lectures will introduce different solutions for targeted therapies both minimally invasive and no invasive, e.g. which exploit external generators of therapeutic actions. At the end of the course the student will be able to identify the most appropriated targeting/therapeutic solutions for the different human body districts, at different scales, and for different pathologies. Final exam: presentation of a topic/paper or written test (in a fixed day). In case of a topic/paper presentation, all students are invited to prepare the exam in the same day for organizing a sort of workshop open to other interested researchers. Competence to be acquired along the course: • the design principles behind robotic technology for MIS; • different technologies and paradigms for autonomous, teleoperated, hand held robots for minimally invasive surgery; • actuation technologies for robotic tools for minimally invasive surgery.		May 4-6-7-11-13-14, 2026, h. 15-17			
Neural Networks and Deep Learning: Theoretical Foundations	Giorgio Buttazzo, giorgio.buttazzo@santannapisa.it	30	The objective of the course is to provide key concepts and methodologies to understand neural networks, explaining how to use them for pattern recognition, image classification, signal prediction, system identification, and adaptive control. Topic will include fully connected networks, unsupervised learning, self-organizing maps, clustering algorithms, autoencoders, reinforcement learning, supervised learning, and convolutional networks for various tasks.	Yes	Starts on Jan 13, 2026	English	yes	BASIC
Neural Network and Deep Learning: Advanced Topics	Giorgio Buttazzo, giorgio.buttazzo@santannapisa.it	20	This module presents some advanced topics related to deep learning algorithms, including recurrent networks and natural language processing, transformers, deep reinforcement	Yes	Starts on Feb 24, 2026	English	yes	CROSSOVER

			learning, model-based reinforcement learning, semi-supervised learning, contrastive learning, neural networks for multi-object tracking, and generative networks.					
Neural Network and Deep Learning: Trustworthy AI	Giorgio Buttazzo, giorgio.buttazzo@santannapisa.it	20	This module presents methods aimed at improving safety and security of neural networks, with a focus on autonomous driving applications. Topics include explainable and trustworthy AI, anomaly detection, adversarial attacks and defenses, simulation frameworks for autonomous driving, and hardware-in-the-loop simulation.	Yes	Starts on March 31, 2026	English	yes	ADVANCED
Neural Networks and Deep Learning: Implementation Issues	Giorgio Buttazzo, giorgio.buttazzo@santannapisa.it	30	The objective of the course is to present practical and implementation issues useful to deploy neural networks on a variety of embedded platforms using different languages and development environments. Topics include implementing neural networks from scratch in C, TensorFlow, Keras, and PyTorch. Neural Networks for autonomous driving. Model optimization for embedded platforms. Accelerating deep networks on GPGPUs and FPGA.	Yes	Starts on May 5, 2026	English	yes	ADVANCED

Università Cattolica (UNICATT)

Reference person: Antonella Marchetti: antonella.marchetti@unicatt.it; Federico Manzi: federico.manzi@unicatt.it

The courses can be BASIC (to establish cultural foundations), ADVANCED (advanced study of specific topics), CROSSOVER (on interdisciplinary subjects).

Name	**Teacher**	**Ore**	**Class description**	**Available online**	**Time of the year (please check)**	**Language**	**Final evaluation**	**Level**
Developing In Human-Robot Interaction	Antonella Marchetti, Cinzia Di Dio, Federico Manzi, Giulia Peretti and Laura Miraglia Contacts: antonella.marchetti@unicatt.it federico.manzi@unicatt.it	16	Social robots represent the new frontier of interactions. We are looking at a future in which these entities will be included and integrated within many types of everyday activities, where they will be our new friends, collaborators, educators, and care assistants. In this course we will therefore offer a look at the state of the art in the development of robots as socially effective agents in psychology, highlighting their strengths, and trying to project our thinking into a future where these entities can be perceived as social partners. We will approach to the main psychological developmental steps in early infancy (e.g., gaze, imitation, action understanding), embodied cognition, social cognition (i.e., Theory of Mind) with respect to social and educational robotics. These will help to better understand the role of developmental psychology in AI and Human-Robot Interaction.	yes	June/July 2026 Dates: 23 June (10:00-12:00). 25 June morning (10:30-12:30) 25 June afternoon (14:30-16:30). 1 July (9:00-14:00) 2 July (9:00-14:00)	English	yes	BASIC

Università degli Studi di Padova (UNIPD)

Reference person: Giulio Rosati <giulio.rosati@unipd.it>

The courses can be BASIC (to establish cultural foundations), ADVANCED (advanced study of specific topics), CROSSOVER (on interdisciplinary subjects).

Name	**Teacher**	**Ore**	**Class description**	**Available online**	**Time of the year (please check)**	**Language**	**Final evaluation**	**Level**
Python programming for Data Science and Engineering	Stefano Tortora, stefano.tortora@unipd.it	20	**Aim**: Python is an easy-to-learn and powerful high-level language and it is becoming more and more popular for scientific applications such as machine learning, statistics, manipulating and transforming data, but also computer vision and robotics. The first objective of the course is to become familiar with Python syntax, environments and basic libraries. Secondly, the learner will be guided in performing basic inferential data analyses and introduced to the application of common machine learning algorithms. **Topics**: 1- Introduction to the Python Programming Language o What is different in Python? o The Python Language Syntax o Basic and advanced data structures 2- Modules and Packages o NumPy and SciPy: Numerical and Scientific Python o Pandas: Labeled Column-Oriented Data	yes	Mar/Apr 2026	English	yes	BASIC

			○ Matplotlib: MATLAB-style scientific visualization ○ Scikit-learn: Basics of Machine Learning in Python					

Università degli studi di Genova (UNIGE)

Reference person: Paolo Massobrio <paolo.massobrio@unige.it>, Antonio Sgorbissa <antonio.sgorbissa@unige.it>

The courses can be BASIC (to establish cultural foundations), ADVANCED (advanced study of specific topics), CROSSOVER (on interdisciplinary subjects).

Name	Teacher	Ore	Class description	Available online	Time of the year (please check)	Language	Final evaluation	Level
Ethics and Bioethics in Bioengineering and Robotics	Linda Battistuzzi, linda.battistuzzi@unige.it	21	*Can ethical considerations be incorporated into the design of novel artifacts? What duties and obligations do researchers have towards research participants? How can we develop models of human-robot interaction that preserve human values?* Increasingly, researchers and professionals in the fields of bioengineering and robotics are faced with ethical questions like these. The goal of this course is therefore twofold: to develop PhD students' sensitivity to the ethical issues that arise in research and professional practice, and to provide them with knowledge and tools that will help them navigate ethically complex scenarios. Upon successful completion of this course, students will be able to: - explain some of the key ethical and bioethical issues in bioengineering and robotics - identify ethically problematic facets of a research project - apply an ethical decision-making framework to ethically problematic	Ask the teacher	February 9 2026 (15:30-18:30) February 13 2026 (15:30-18:30) February 16 2026 (15:30-18:30) February 23 2026 (15:30-18:30) February 27 2026 (15:30-18:30) March 2 2026 (15:30-18:30) March 6 2026 (15:30-18:30)	English	Yes	CROSSOVER

			scenarios involving questions that are relevant to their research interests.					
Paper Writing	Mario Marchese, mario.marchese@unige.it	12	*The course aims to provide some basic elements to:* - choose a research topic - manage and use sources - do a novel, serious, and useful research - describe and explain a research	Ask the teacher	July 14, 2026 (14:00-17:00) July 16, 2026 (14:00-17:00) July 20, 2026 (14:00-17:00) July 22, 2026 (14:00-17:00)	English	Yes	CROSSOVER
Grant Writing	Cinzia Leone, Cinzia.Leone@unige.it	12	The course will present and discuss guidelines on how to design a research grant proposal and on the coordination of a research grant, with a special focus on European Horizon Europe Framework Programme. The students will be invited to participate to concrete exercise and the drafting of real and possible project ideas. A part of the lessons is dedicated to participatory activities.	Ask the teacher	- October 5, 2026 - October 7, 2026 - October 9, 2026	English	Yes	CROSSOVER
Open Science and Research Data Management (OS&RDM)	Anna Maria Pastorini, annamp@unige.it ; Valentina Pasquale, valentina.pasquale@iit.it	10	This training module for PhD Students aims to introduce early-career researchers to the principles of scholarly communication, Open Science and Research Data Management. Students will gain a better understanding of the available research e-infrastructures, tools, and services for Open Access publishing, Research Data Management and FAIR Data. Students will also learn the importance and the transformative potential of Open Science practices in research, especially to improve reproducibility and increase research integrity. They will learn what means to make data FAIR, as required by many	Ask the teacher	9, 10, 11, 12, 13 February 2026 (10:00 – 12:00)	English	Yes	CROSSOVER

			funders, including the European Commission, and how to draft a data management plan. Finally, they will have the chance to practice on common tools for Research Data Management, like Data Stewardship Wizard, Zenodo, and Dataverse.					
From Labs to Enterprise	Francesca Redoano Francesca.redoano@twobirds.com	14	From the tech transfer process to the incorporation and governance of the company, passing through the relationship among the founders and with investors and collaborators, to the fundraising. The course aims to provide a complete and practical guide on how to turn research into an enterprise and to avoid common mistakes, with a focus on the legal aspects. The course is addressed to students and researchers interested in launching or being involved in a startup project, or simply curious about it. Moving from real cases deriving from professional experience as a startup lawyer, the course addresses the dos and don'ts to launch a startup, with a legal prospective and a simple approach. The aim is to provide basic knowledge and legal instruments to navigate the leap between academic research and startups.	Ask the teacher	January 21, 2026 (10:00-12:00) January 28, 2026 (14:00-18:00) February 4 2026 (14:00-17:00) February 11 2026 (14:00-17:00) February 18 2026 (14:00-17:00)	English	Yes	CROSSOVER
C++ programming techniques	Fabio Solari, fabio.solari@unige.it, Manuela Chessa, manuela.chessa@unige.it	20	This course introduces the specificities of C++ object oriented programming language and focuses on the use of C++ for the implementation of object-oriented software modules. In particular, programming techniques to tackle the issues of memory management, robustness and efficiency are considered.	Ask the teacher	January 26 to 30, 2026 14:00 – 18:00	English	Yes	BASIC

Computational models of visual perception	Fabio Solari, fabio.solari@unige.it	20	This course introduces paradigms and methods that allow students to develop computational models of visual perception, which are based on hierarchical networks of interacting neural units, mimicking biological processing stages. Case studies on computer vision applications and mixed reality systems are considered.	Ask the teacher	June 8, 10, 12, 15, 2026 14:00-17:00 June 17, 19, 2026, 14:00-18:00	English	Yes	BASIC
Effective habits and skills for successful young scientists	Fabio Roli, fabio.roli@unige.it	20	Although tons of books on effective habits and soft skills have been published, they have not been thought for scientists, and, therefore, issues that are relevant for them are not easily available. This short course aims to collect spread ideas and place them in a coherent framework useful for young scientists and provide a small tactical guide for scientists at the first stages of their career. First, I review the main concepts of Steve Covey's personal and time management paradigm, the inspirational speeches of Professor Randy Pausch, and the paradigm of atomic habits of James Clear, and discuss their utility for daily activity of a young scientist. Then, I focus on a few practical skills, namely, on how to write a great paper and give a great talk. I try to convey the message that succeeding in science and technology requires skills and habits beyond the pure intelligence and intellectual abilities, and that good habits and skills of personal and time management are extremely important for young scientists.	Ask the teacher	22-26 June 2026, 09:00-13:00	English	Yes	BASIC
Robot programming with ROS	Carmine Tommaso Recchiuto, carmine.recc	15	ROS is a robotic middleware that offers a collection of packages for commonly used functionality, low-level control, hardware abstraction, and message passing. Given all	Ask the teacher	9 Sep 2026, 10:00 - 13:00 14:00 - 17:00	English	Yes	BASIC

	hiuto@unige.it		these aspects, it has become a standard in robotics. The course will explore its most relevant functionalities, with the help of different examples, analyzing how the ROS framework may help in solving common problems in robotics. The course will describe in detail the ROS framework, also giving some general operative instructions (classes I – II- III), and it will then deal with some specific aspects (class IV-V), in particular, 3D simulations with ROS and ROS2. The course is particular suggested to students who have never used ROS, which will receive some insights about its features. The course will foresee the usage of some commonly used robotic simulators, such as Gazebo, giving the possibility of practically testing the ROS features. During the course, a Docker image with ROS and ROS2 already installed will be given to students.		10 Sep 2026, 10:00 - 13:00 14:00 - 17:00 11 Sep 2026, 10:00 - 13:00			
Modern C++	Marco Accame : marco.accame@iit.it Valentina Gaggero: valentina.gaggero@iit.it Nicolò Genesio: nicolo.genesio@iit.it	30	The students will learn the new syntax and philosophy of Modern C++ (releases C++11, -14, -17, -20) with hands on the code at every lesson, its application with modern SW development techniques and finally they will challenge themselves with an online assignment where they will put in practice what learnt.	Ask the teacher	4 May 2026, 14:00 – 17:00 6 May 2026, 10:00 – 13:00 7 May 2026, 10:00 – 13:00 11 May 2026, 14:00 – 17:00 13 May 2026, 10:00 – 13:00 14 May 2026, 10:00 – 13:00	English	Yes	BASIC

					18 May 2026, 14:00 – 17:00 20 May 2026, 10:00 – 13:00 21 May 2026, 10:00 – 13:00 28 May 2026, 10:00 – 13:00			
Electronics and Circuits	TBA	48	This course offers detailed knowledge and very practical skills about the electronics circuits and systems that Ph.D. students in the Engineering fields are likely to need during their research studies. The approach totally differs from standard electronics courses where a strong theory hides the useful circuitry and methods of analysis in hard-to-find sections and endnotes, thus leaving the practicing Engineer weak in circuit design. Attending the whole course (4 modules) is strongly reccommended to take the most benefit from the addressed topics, because each class relies on the preceding one and it is a basis for the next one, in a progressive scheme. Nevertheless, students are allowed to attend just single modules.	Ask the teacher	TBA	English	Yes	BASIC
Motion control drivers	TBA	48	This course offers detailed knowledge about the correct way to drive the main motor types utilized in Robotics, exploring the driver circuits and highlighting the related insights, namely Stepper and Brushless motors (despite DC Motors are not explicitly included, the students will	Ask the teacher	TBA	English	Yes	BASIC

			however get the necessary skills to deal with them too). Attending the whole course (4 modules) is strongly recommended to take the most benefit from the addressed topics, because each class relies on the preceding one and it is a basis for the next one, in a progressive scheme. Nevertheless, students are allowed to attend just single modules.					
Theatrical techniques for scientific presentation	Antonio Sgorbissa, antonio.sgorbissa@unige.it	12	Upon successful completion of this course, students will be able to successfully prepare a scientific presentation for a specific audience, and to deliver it to the public by using their voice, their body and the space around them in the most efficient way as possible.	No	May 18, 2026 (09:00-12:00) May 25, 2026 (09:00-12:00) June 15, 2025 (09:00-12:00) June 22, 2025 (09:00-12:00)	English	Yes	BASIC
Principles of Polymer Synthesis, Functionalization, and Recycling	Martina Nardi, martina.nardi@iit.it	12	The aims of the course is to gain basic knowledge in organic, polymer and material chemistry. Synthetic methods, industrial manufacturing processes (e.g., extrusion, injection molding…), and characterization techniques for polymeric materials will be thoroughly explained. In addition, concepts related to end-of-life scenarios of polymers, such as biodegradability, composting, recycling, and upcycling, will be explored. The students will acquire skills on common polymers widely used both in academic and industrial fields and useful information about how to handle, recognize, and recycle them in ordinary life.	Ask the teacher	April 14, 2026 (14-16) April 16, 2026 (14-16) April 21, 2026 (14-16) April 23, 2026 (14-16) April 27, 2026 (14-16) April 29, 2026 (14-16)	English	Yes	BASIC

Advanced Topics in In Vitro Neuroengineering: Techniques, Applications, and Future Directions	Martina Brofiga, martina.brofiga@dibris.unige.it	12	The PhD course is designed to provide students with a comprehensive understanding of in vitro neuroengineering, focusing on the principles, techniques, and applications of engineering approaches for studying and manipulating neuronal systems in vitro. The course will cover fundamental concepts, experimental methodologies, and cutting-edge advancements in the field, with an emphasis on multidisciplinary perspectives. Students will gain practical skills in designing and conducting experiments, and analyzing data.	Ask the teacher	6-9 September 2026 10:00 – 13:00	English	Yes	ADVANCED
An introduction to Body-Machine Interface	Camilla Pierella, camilla.pierella@edu.unige.it	12	The course will introduce the field of body-machine interface (BoMI). It will present different concepts for dimensionality reduction to be applied in the domain of biological signals to control external devices. It will also discuss current scientific and technological perspectives and limitations. Emphasis will be given to the study of the learning process while using a BoMI both from a modeling and from a data analysis point of view.	Ask the teacher	23-26 June 2026 (14:00-17:00)	English	Yes	ADVANCED
Cloud Architectures and RESTful Services for Robotics	Lucrezia Grassi, Lucrezia.grassi@unige.it	12	The course provides doctoral students with practical skills for designing, implementing, and integrating cloud services and AI/ML APIs within robotic systems. Emphasis is placed on pragmatic development in Python, REST API design, and the integration of generative models applicable to multiple branches of robotics.	Ask the teacher	June 11, 2026 (14:00-17:00) June 12, 2026 (9:00-12:00) June 16, 2026 (14:00-17:00) June 18, 2026 (14:00-17:00)	English	Yes	ADVANCED

Computational models of visual attention	Lucia Schiatti, lucia.schiatti@iit.it	12	By the end of the course, students will be able to: - Describe the basic mechanisms of human visual attention based on eye movements. - Design an experimental protocol with eye-tracking and select suitable outcome measures. - Identify, train and visualize the output of ANNs suitable to model human visual attention. - Discuss the choice of different ANNs architectures based on a specific application. - Present a project idea and discuss their scientific hypothesis and methodological choices.	Ask the teacher	April 20, 2025 (9:00-12:00) April 21, 2025 (9:00-12:00) April 22, 2025 (9:00-12:00) April 24, 2025 (9:00-12:00)	English	Yes	ADVANCED
Dynamic Modelling of Multiphysics System	Daniele Ludovico	18	The course aims to provide students with the theoretical foundations and practical skills required to model and simulate the dynamics of multiphysics systems using energy-based approaches. By the end of the course, students will be able to: • Understand the principles of energy-based modeling for mechanical, electrical, and multiphysics systems. • Apply Lagrangian and Hamiltonian formulations to derive dynamic models of physical systems. • Represent multiphysics systems using Bond Graph methodology for unified modeling across domains. • Implement numerical simulations of dynamic systems in MATLAB, validating	Ask the teacher	May 19, 2026 (10:00-13:00) May 21, 2026 (14:00-17:00) May 26, 2026 (10:00-13:00) June 9, 2026 (10:00-13:00) June 11, 2026 (10:00-13:00) June 16, 2026 (10:00-13:00)	English	YES	ADVANCED

			models through computational experiments.					
Functional quantitative assessment in sport, ergonomics and rehabilitation	TBA	12	The present course will introduce the topic of functional quantitative assessment. This subject is becoming fundamental in all the fields where is important to understand human sensorimotor performance and in general in all the applications where the human is physically in the loop, such as collaborative robotics, wearable robotics, rehabilitation robotics, and many others. The difficulty to quantify human performance is due to the complexity of human behaviour. In fact, the human nervous system is capable of a simultaneous, integrated, and coordinated control of 100-150 mechanical degrees of freedom via tensions generated by about 700 muscles. There is also a different number of sensors (visual, auditory, proprioceptive) and actuators (muscles and skeletal system) to take into account. The course will initially review the traditional techniques adopted to quantitatively assess human sensorimotor performance in the fields of sport, rehabilitation and ergonomics. In the second part of the course will be deeply analysed all the potential technologies that can be exploited to innovate the traditional techniques, with special emphasis on robotic technologies.		TBA	English	Yes	ADVANCED
Introductory Systems and Circuit Neuroscience for Neuroengineering	Angelo Forli Angelo.forli@iit.it	9	The course introduces PhD students to the key concepts, methods, and landmark findings in modern systems and circuit neuroscience. Special emphasis is placed on the engineering dimension, both in terms of the technologies that drive	Ask the teacher	February 10, 12, 17, 19 2026 (10:30-12:45)	English	YES	ADVANCED

			discovery and the technological implications of neuroscientific advances. No specialized background is required beyond a basic understanding of biology and physics.					
Multimodal Brain Analysis Reconstruction	TBA	26	The present course will introduce the student to the most advanced techniques to non-invasively reconstruct brain activity using both electroencephalography (EEG) and magnetic resonance imaging (MRI). The EEG section of the course will consist of a first part based on sensors analysis and a second part on distributed sources analysis. Guidelines and common good practices for acquisition and analysis will be discussed considering both the time, the frequency, and the time-frequency domains. The MRI section will cover both structural (either grey and white matter integrity) and functional (at rest and during a task) MRI and their integration. Comparison between EEG and MRI will be described.	-	July 2, 2026 (9:00-12:00) July 7, 2026 (14:00-17:00) July 9, 2026 (14:00-16:00) July 10, 2026 (14:00-16:00) July, 13-16, 2026 (9:00-13:00) July 17, 2026 (10:00-13:00)	English	YES	ADVANCED
Roboticv Virtual Prototyping Design	Mariapaola D'Imperio	18	The aim of the Robotic Virtual Prototyping Design course is to give the basic knowledge about the Finite Element Analysis (FEA) and Multi-Body Simulations (MBS) applied to the robotics. These computational techniques predict the behavior of physical systems: joined together permit to study the dynamics taking in account the body flexibility, the control and optimization. It will be introduced mainly applied to the mechanical field, in particular to the robotic anthropomorphic arm. The student	Ask the teacher	July 6, 8, 10, 13, 15, 17, 2026 (14:00-17:00)	English	YES	ADVANCED

			gets 6 credits if he/she attends the entire course and accomplishes the final project.					
The 3Rs approach in biomedical research and advanced 3D in vitro tissue models	Laura Pastorino, laura.pastorino@unige.it , Donatella Di Lisa, Donatella.Dilisa@edu.unige.it	12	Replacement, Reduction, and Refinement: 3Rs methods are becoming an essential element in the whole field of biomedical research, from its most fundamental aspects to its daily applications. Today 3Rs methods represent a multidisciplinary scientific area comprising animal science, basic biology, test development, pharmacology, toxicology, regulations and regulatory practices, as well as ethics and behavioral sciences. The aim of the course is to raise consciousness for the scientific soundness of the 3Rs methodology. Advanced 3D in vitro models: Bioprinting can be applied to engineer 3D in vitro tissue models by mimicking the structure and function of native tissue through the precise assembly of materials and cells. This approach allows the spatiotemporal control over cell–cell and cell–extracellular matrix communication and thus the recreation of tissue-like structures. Tissue models are applied in regenerative medicine, pharmaceutical, diagnostic, and basic research, reducing the use of laboratory animals according to the 3Rs principle. According to European Directive 2011/63/eU1, all personnel working with experimental animals should be educated to be competent to work with animals.	Ask the teacher	June 29, 2026 (9:00-13:00) July 1, 2026 (9:00-13:00) July 3, 2026 (9:00-13:00)	English	Yes	ADVANCED

Technologies and methods for medical and surgical training	Serena Ricci, serena.ricci@unige.it	12	Technology has been increasingly used in healthcare education. As an example, adult learning theories support the use of immersive technologies such as Virtual Reality, Augmented Reality and Mixed Reality, for the training and evaluation of medical students, healthcare providers, patients and caregivers. Indeed, the use of different technologies (i.e., computer based-simulations, low-cost electronics) provide a riskless, controlled and personalized environment, that might also be realistic and engaging for the user. Another important advantage of using technology in medical education concerns the possibility of assessing the users in an objective and quantitative way, as most of the evaluations are currently based on instructor observations. Medical training covers a broad range of very different abilities: form theoretical and procedural knowledge, manual skills, and non-technical skills (e.g., stress management, communication). Therefore, it is crucial to select and use the most appropriate technology, considering the end user and the skill to be trained and/or evaluated. The course provides an overview of healthcare simulation, and how different technologies and methods can improve the training and evaluation of medical and surgical skills. The course includes an introduction on the theories supporting medical education, followed by a part on simulation methodologies and technologies and how they are used in different specialties.	Ask the teacher	February 4, 5, 10, 12, 2026 (14:00-17:00)	English	Yes	ADVANCED

Theory and Practice of Learning from Data	Luca Oneto, luca.oneto@unige.it	20	. This course aims at providing an introductory and unifying view of learning from data (inductive Artificial Intelligence). The course will present an overview of the theoretical background of learning from data, including the most used algorithms in the field, as well as practical applications.	Ask the teacher	TBA	English	Yes	ADVANCED

Università della Calabria (UNICAL)

Reference person: Giuseppe Carbone <giuseppe.carbone@unical.it>

The courses can be BASIC (to establish cultural foundations), ADVANCED (advanced study of specific topics), CROSSOVER (on interdisciplinary subjects).

Name	Teacher	Ore	Class description	Available online	Time of the year (please check)	Language	Final evaluation	Level
Advanced scientific programming applied to process optimization using Matlab	Alessio Caravella, alessio.caravella@unical.it	16	The course deals with parametric optimization of processes of interest for engineers. In particular, the Students will acquire the ability of formalizing and solve problems dealing with minimization of objective functions depending on parameters to optimize. For this purpose, the commercial software MATLAB® will be used.	Ask the teacher	Jan/Feb 2026	English	Yes	ADVANCED
Introduction to stochastic and mathematical modelling of discrete systems	Vittorio Astarita, vittorio.astarita@unical.it	12	The course begins with some introduction to probability theory and its applications to engineering problems. This will provide the foundation for the subsequent discussion of Markov chains. The course will then focus on the theory of Markov chains, including their definition, properties, and applications. Students will learn about discrete-time Markov chains and continuous-time Markov chains, as well as methods for analyzing these chains, such as the stationary distribution, and the limiting behavior of Markov chains. The course will also cover game theory and its application to engineering problems. Students will learn about the basics of game theory, including the concept of Nash equilibrium. In addition, the course will introduce students to the Monte Carlo method, a powerful tool for solving complex engineering problems. Students will learn how to simulate random events using	Ask the teacher	Feb 2026	English	Yes	BASIC

			Monte Carlo simulations and will apply this technique to a range of problems. Finally, the course will introduce students to Blockchain systems and digital currencies. Students will learn about the basics of Blockchain technology, including distributed ledgers and smart contracts, and will explore the potential applications of this technology to engineering problems. Throughout the course, students will be exposed to representative case studies that demonstrate the application of the aforementioned theories to real-world engineering problems. By the end of the course, students will have a better understanding of probability theory and its applications to engineering, as well as a general view on practical toolkits for solving complex engineering problems.					
Introduction to Python	Vittorio Astarita, vittorio.astarita@unical.it	12	This course is designed to provide an introduction to the fundamental concepts of the Python programming language. Students will learn the syntax and semantics of Python, including variables, data types, and control structures. The course will cover basic data structures such as lists, dictionaries, and tuples, as well as functions and modules. Students will also learn about file input/output, error handling, and debugging techniques. By the end of the course, students will have gained a solid foundation in Python programming, which they can use to solve real-world problems.	Ask the teacher	Feb/Mar 2026	English	Yes	BASIC
How to conduct a Systematic Literature Review: design, methods and supporting tools	Salvatore Ammirato, Marilena De Simone salvatore.ammirato@unical.it, marilena.de	8	Topics: Motivation and goals of a systematic literature review (SLR); Methodology; Literature search, Exclusion and inclusion criteria, Metadata Analysis, Synthesis and results presentation. Applications: Designing a SLR; Paper location and selection; Paper analysis; Results synthesis; Digital tools for SLR; The	Ask the teacher	Nov/Dec 2025	English	Yes	CROSSOVER

	simone@unical.it		MySLR digital platform; How to conduct a review with MySLR; Project works					
Spin-off creation: key fundamentals for a good plan	Gianpaolo Iazzolino, gianpaolo.iazzolino@unical.it	8	The course describes the main steps for constructing a business plan also referred to projects arising from results obtained in research. The main areas of a business plan are described with reference to the s.c. technology firms. The course proposes insights deriving from cases of spin-offs at the University of Calabria	Ask the teacher	May 2026	English	Yes	CROSSOVER

Università degli Studi di Napoli Federico II (UNINA)

Reference person: Alessandra Rossi <alessandra.rossi@unina.it>

The courses can be BASIC (to establish cultural foundations), ADVANCED (advanced study of specific topics), CROSSOVER (on interdisciplinary subjects).

Name	**Teacher**	**Ore**	**Class description**	**Available online**	**Time of the year (please check)**	**Language**	**Final evaluation**	**Level**
Social Robotics	Alessandra Rossi	18	The course will give elements of Human-Robot Interaction, with particular attention to the usage of robots in verbal and non-verbal interaction, Intentional Action in Human-Robot Interaction, and key points for designing user studies in this context.	Yes	7, 9, 20, 22, 23 January 2026 3 February 2026	English	Yes	Advanced

Politecnico di Bari (POLIBA)

From the Italian National Doctoral Programme in Autonomous Systems (DAuSy) - http://dausy.poliba.it/

Reference person: Raffaele Carli <raffaele.carli@poliba.it >

The courses can be BASIC (to establish cultural foundations), ADVANCED (advanced study of specific topics), CROSSOVER (on interdisciplinary subjects).

Name	Teacher	Hours	Class description	Available online	Time of the year (please check)	Language	Final evaluation	Level
Distributed/Decentralized Control and Optimization of Large-Scale Systems	Raffaele Carli Politecnico di Bari raffaele.carli@poliba.it	10	This course aims at providing PhD students with modeling and methodological tools for formulating and solving large-scale op-timization problems with a focus on the use of duality theory. Dur-ing the course several optimization problems will be formalized, particularly referred to relevant issues within management and industrial engineering. Problem definition and resolution will be also implemented in simulation and engineering software (Matlab). The final goal is to provide PhD students with the neces-sary background for starting research in the field of duality-based decentralized and distributed optimization techniques to be ap-plied to large-scale systems. Each lesson consists in lectures, nu-merical examples, simulation and analysis of case studies.	yes	January 2026 Please see detailed calendar and registration form here: http://dausy.poliba.it/phd/dausy-courses-seminars/	English	Yes	ADVANCED

Non-integer order systems and controllers	Guido Maione Politecnico di Bari guido.maione@poliba.it	10	The course concerns non-integer-order systems. These systems can propose engineering solutions to modeling and control prob-lems that often improve those based on integer-order calculus. Basic tools of fractional calculus are introduced, and some meth-ods and models are described for different engineering fields. Models for practical applications are proposed. Moreover, ap-proaches to design and realize non-integer-order (fractional-order) controllers are described. These controllers show higher flexibility, increased robustness, and ability to obtain a better trade-off between stability and dynamic performance with respect to widespread PID controllers. As case-studies, the course uses applications in automotive and mechatronic systems.	yes	February 2026 Please see detailed calendar and registration form here: http://dausy.poliba.it/phd/dausy-courses-seminars/	English	Yes	ADVANCED
Deep Reinforcement Learning for Control of Autonomous Systems	Volpe Gaetano Politecnico di Bari gaetano.volpe@poliba.it	10	Reinforcement learning deals with solving sequential decision problems when minima prior information is available. Solving se-quential decision problems means finding their optimal control policies. Using reinforcement learning algorithms, the optimal policy is learned through the cooperation between the agent (or controller) and the system to be controlled. Deep Reinforcement Learning (DRL) is a subfield of machine learning that combines re-inforcement learning (RL) and deep learning. The course will pro-pose the main modeling frameworks, investigate the most rele-vant deep reinforcement learning techniques and show some in-teresting applications.	yes	April 2026 Please see detailed calendar and registration form here: http://dausy.poliba.it/phd/dausy-courses-seminars/	English	Yes	CROSSOVER

Control and Security of Cyber Physical Systems	Liu Ruotian Politecnico di Bari ruotian.liu@poliba.it	10	The aim of the course is to show the importance of control and security in Cyber Physical Systems (CPSs). CPSs are systems where a decision making(cyber/control)component is tightly integrated with a physical system(with sensing/actuation) to enable real-time monitoring and control. Therefore, control and security are cru-cial issues for commissioning these systems and for improving competitiveness of companies. In this context, the study of opacity is a fundamental notion to determine if an industrial "secret" can be discovered by a malicious observer (intruder).	yes	March 2026 Please see detailed calendar and registration form here: http://dausy.poliba.it/phd/dausy-courses-seminars/	English	Yes	ADVANCED
Simulation Systems for Engineering Applications	Nicola Mignoni Politecnico di Bari nicola.mignoni@poliba.it	10	The course shall address the basis of simulation techniques for engineering applications, with a focus on the underlying mathe-matical formalism. At end of this course students will be able to deal with system modeling and to implement simulation models in engineering tools (e.g., Python, Matlab). Each lesson shall consist in lecture and numerical examples.	yes	May 2026 Please see detailed calendar and registration form here: http://dausy.poliba.it/phd/dausy-courses-seminars/	English	Yes	CROSSOVER

Modeling and Simulation of Smart Energy Systems	Michele Roccotelli Politecnico di Bari michele.roccotelli@poliba.it	10	This course aims at providing PhD students with modeling and methodological tools for formulating and solving large-scale op-timization problems with a focus on the use of duality theory. Dur-ing the course several optimization problems will be formalized, particularly referred to relevant issues within management and industrial engineering. Problem definition and resolution will be also implemented in simulation and engineering software (Matlab). The final goal is to provide PhD students with the neces-sary background for starting research in the field of duality-based decentralized and distributed optimization techniques to be ap-plied to large-scale systems. Each lesson consists in lectures, nu-merical examples, simulation and analysis of case studies.	yes	September 2026 Please see detailed calendar and registration form here: http://dausy.poliba.it/phd/dausy-courses-seminars/	English	Yes	CROSSOVER
Game Theory for Controlling Autonomous Systems	Paolo Scarabaggio Politecnico di Bari paolo.scarabaggio@poliba.it	10	This course is designed to provide PhD students with the necessary modeling and methodological tools for analyzing and designing algorithms to solve game equilibrium problems. The course will include lectures, numerical examples, simulations, and analysis of case studies.	yes	June 2026 Please see detailed calendar and registration form here: http://dausy.poliba.it/phd/dausy-courses-seminars/	English	Yes	ADVANCED

Modeling and simulation of biosystems	Alessandro Borri CNR alessandro.borri@iasi.cnr.it	20	This course provides mathematical tools to model, analyze, simulate, and control biological and medical systems, primarily within a deterministic framework. By the end of this course, students will be able to model such systems and implement simulation models using Matlab. Note: Although Course "Modeling and simulation of biosystems" (Prof. Borri) and Course "Dynamical stochastic models of biologi-cal systems" (Prof. Palumbo) may be followed independently, they have been conceived as a single module divided into two parts, both dealing with mathematical models for biological systems: the former focuses on deterministic approaches, while the latter fo-cuses on stochastic approaches.	yes	February 2026 Please see detailed calendar and registration form here: http://dausy.poliba.it/phd/dausy-courses-seminars/	English	Yes	CROSSOVER
Dynamical stochastic models of biological systems	Pasquale Palumbo Università di Milano Bicocca pasquale.palumbo@unimib.it	10	This course gives the mathematical tools to model and analyze most common biological frameworks such as chemical reactions and gene transcription networks, according to the stochastic approach of the Chemical Master Equations. Note: Although Course "Modeling and simulation of biosystems" (Prof. Borri) and Course "Dynamical stochastic models of biological systems" (Prof. Palumbo) may be followed independently, they have been conceived as a single module divided into two parts, both dealing with mathematical models for biological systems: the former focuses on deterministic approaches, while the latter focuses on stochastic approaches.	yes	February 2026 Please see detailed calendar and registration form here: http://dausy.poliba.it/phd/dausy-courses-seminars/	English	Yes	CROSSOVER

Data-driven fault diagnosis and fault prognosis	Riccardo Felicetti Università Politecnica delle Marche r.felicetti@univpm.it	10	This module aims at providing PhD students with the main con-cepts of data-driven fault diagnosis and fault prognosis which are at the base of modern condition-based and predictive mainte-nance. During the module, the students will learn how to apply a data-driven workflow to solve real case studies and to adapt it to the specific cases of fault diagnosis and fault prognosis. The work-flow will include data processing, feature extraction and model training, with some insights on deployment complexity; problem resolution will also be implemented by using a common engineer-ing software (MATLAB). The final goal is to provide PhD students with the necessary background to process sensors data and use them to monitor the condition of a physical system, classify possi-ble undesired behaviours and eventually estimate the remaining useful life of specific components. Each lesson consists in lectures, numerical examples and analysis of case studies.	yes	May 2026 Please see detailed calendar and registration form here: http://dausy.poliba.it/phd/dausy-courses-seminars/	English	Yes	ADVANCED
Gaussian processes for modeling and control of robotics systems	Alberto Dalla Libera alberto.dallalibera@unipd.it	20	The course shall address the basis of Gaussian Process Regression applied to modeling and control of robotic manipulators. At end of this course, students will be able to apply Gaussian Process Regression to the following problems: • Inverse dynamics identification; • Estimation of forward dynamics model to simulate the evolution of a robotic system; • Use such models to derive a controller. Lesson shall consist in lecture and numerical examples in MATLAB and Python.	yes	January-February 2026 Please see detailed calendar and registration form here: http://dausy.poliba.it/phd/dausy-courses-seminars/	English	Yes	ADVANCED

Human Autonomous System Interaction	Sabrina Iarlori Università Politecnica delle Marche s.iarlori@staff.univpm.it	10	The course aims at providing PhD students with the main concepts of the well-known technology for improving human-autonomy interaction with a special focus on autonomous systems. It is especially focused on technology and case studies relevant to complex, applied environments in which people interact with autonomous systems regularly, particularly in the context of ambient assisted living. The course focuses on approaches that include task inputs from humans: how to model humans and their tasks and at what level of details. Moreover, the human in-the loop approach will be introduced as a new scenario to facilitate the goal achievement, to reduce the anomalies and the unexpected responses from the system or inappropriate responses by the human to enhance human safety. New human-system engineering techniques are needed to ensure autonomous systems will be smoothly and readily adopted into society. Autonomous systems that work together in the environment should integrate the connections and interactions between them, over networks, with the physical environment, and with humans must be assured, resilient, productive, and fair in the autonomous future. Autonomous systems should be analysed including concept, context, requirements, design, integration, operationalization, validation, testing and evaluation. During the course, the students will learn how the human-autonomous system interaction is achieved and how it is articulated. The workflow will include data processing, feature extraction and model training for human-robot interaction tasks, with some insights on deployment complexity; problem resolution will also be proposed by using a common engineering software (MATLAB), and the ROS (Robot Operating System). Each lesson	yes	April-May 2026 Please see detailed calendar and registration form here: http://dausy.poliba.it/phd/dausy-courses-seminars/	English	Yes	ADVANCED

			consists in lectures, numerical examples and analysis of case studies.					
Intelligent Supervisory Systems	Silvio Simani Università di Ferrara silvio.simani@unife.it	20	This course aims to offer a foundation of intelligent supervisory system techniques and their application in various real-world do-mains and how to implement a solution with “intelligent” func-tionality. Students will learn to judge when intelligent functionality and artificial intelligence may be a good solution for a problem and be able to choose suitable artificial intelligence methods and techniques. Students will also acquire knowledge enabling them to develop the necessary skills to design and implement an intelli-gent supervisory system.	yes	March 2026 Please see detailed calendar and registration form here: http://dausy.poliba.it/phd/dausy-courses-seminars/	English	Yes	ADVANCED
Introduction to autonomous systems	Nicola Mignoni Politecnico di Bari nicola.mignoni@poliba.it	10	The course aims at providing PhD students with the fundamental principles, technologies, and applications related to autonomous systems.	yes	April 2026 Please see detailed calendar and registration form here: http://dausy.poliba.it/phd/dausy-courses-seminars/	English	Yes	ADVANCED

Linear algebra for control applications	Matthias Pezzuto Università di Padova matthias.pezzutto@unipd.it	20	The course will introduce advanced linear algebra tools that are commonly used in many applications in Control and System Theory. The course will address this topic from different perspective: 1. Theory with formal proofs of many results, 2. Algorithms to understand the most common algorithms used in MATLAB or Python for linear algebra, Implementation via MATLAB of algorithms and performance evaluation on large data sets.	yes	June 2026 Please see detailed calendar and registration form here: http://dausy.poliba.it/phd/dausy-courses-seminars/	English	Yes	ADVANCED
Linear and nonlinear Kalman filtering: theory and applications	Marco Todescato Fraunhofer Italia Research marco.todescato@fraunhofer.it	20	This course aims to provide both theoretical and practical tools to tackle estimation problems encountered in several areas of engineering and science. In particular, it is shown how to formulate such estimation problems as instances of a general dynamical system state estimation problem and how to derive the mathematical solution of the latter problem. Then it is shown that, for a linear Gaussian system, such a so-lution yields the well known Kalman filter. Further, approximate tech-niques (e.g. extended and unscented Kalman filters, particle filter, etc.) are presented for the case of nonlinear and/or non-Gaussian sys-tems, for which an exact closed-form solution cannot be found. To conclude the theoretical part, theoretical limitations (i.e. the Cramer-Rao lower bound) on the quality of estimation are discussed. In the fi-nal part of the course, we illustrate some applications of line-ar/nonlinear Kalman filtering (e.g., tracking, robotic navigation, envi-ronmental data assimilation).	yes	April-May 2026 Please see detailed calendar and registration form here: http://dausy.poliba.it/phd/dausy-courses-seminars/	English	Yes	ADVANCED

Optimal Control for Climate Change and Air Quality	Claudio Carnevale Università di Brescia claudio.carnevale@unibs.it	20	The course will address the fundamentals of the modelling and control of real-world systems, presenting the application of con-trol theory to climate change and air quality. Each lesson shall consist in lecture and numerical examples.	yes	July 2026 Please see detailed calendar and registration form here: http://dausy.poliba.it/phd/dausy-courses-seminars/	English	Yes	CROSSOVER
Learning in multi-agent systems	Nicola Bastianello KTH Royal Institute of Technology nicolba@kth.se	20	The aim of the course is to provide a thorough overview of learn-ing and optimization in multi-agent systems. At the end of the course, students will be familiar with applications, with the chal-lenges of decentralized learning, and the current state-of-the-art solutions. Additionally, they will have an overview of current re-search trends and opportunities. Lessons will merge theoretical lectures and numerical examples (using Python).	yes	April-May 2026 Please see detailed calendar and registration form here: http://dausy.poliba.it/phd/dausy-courses-seminars/	English	Yes	ADVANCED

Non-linear control	Karl Dietrich von Ellenrieder Libera Università di Bolzano karl.vonellenrieder@unibz.it	20	The course introduces analytical tools for the analysis and design of nonlinear control systems. At the end of the course students will understand how to analyze the stability of nonlinear dynamic sys-tems and knowledge of some of the main approaches for design-ing nonlinear controllers. Basic engineering examples and Matlab exercises are provided.	yes	July 2026 Please see detailed calendar and registration form here: http://dausy.poliba.it/phd/dausy-courses-seminars/	English	Yes	ADVANCED
Variable Structure Control	Elio Usai Università di Cagliari elio.usai@unica.it	10	Variable Structure Control (VSC) is a control technique who force a dynamical system to behave as a Variable Structure System (VSS) whose characteristics satisfy the required performance, in spite of a class of uncertainties in the system dynamics and exter-nal disturbances. In particular the system is forced to reach and remain constrained onto a properly chosen surface of the state space such that the movement on such a surface, i.e., the Sliding Mode (SM), is invariant and corresponds to specifications. The lec-tures will present the general theoretic and applicative frame-work of VSC with SMs, presenting it in the more general vision of the control systems. Some of the mathematical tools to analyze and design a VSC with SM will be presented and discussed, also by means of simple examples. The limits of the resulting switching control, the tools to analyze the approximate behavior and the approaches to mitigate the so-called chattering phenomenon will be presented and discussed. Finally, some applications of VSC to real systems and to observer design will be presented.	yes	February 2026 Please see detailed calendar and registration form here: http://dausy.poliba.it/phd/dausy-courses-seminars/	English	Yes	ADVANCED

Università di Modena e Reggio Emilia (UNIMORE)

The courses can be BASIC (to establish cultural foundations), ADVANCED (advanced study of specific topics), CROSSOVER (on interdisciplinary subjects).

Name	Teacher	Hours	Class description	Available online	Time of the year (please check)	Language	Final evaluation	Level
Smart Sensing from Noisy Data: Estimation & Filtering	Laura Giarrè laura.giarre@unimore.it	12	Introduction: Smart sensing from Noisy Data, ML vs Estimation, Parametric vs Nonparametric Estimation Kalman filtering, Bayesian approach, and ML, Applications of Kalman Filtering Literature on Kalman filtering Estimation Theory: Parametric estimation, Properties of estimators, Minimum Vari-ance estimator Maximum likelihood estimators, Bayesian estimation Least Squares Algorithm (RLS, LMS): Linear regressions, LS Estimates: Statistical properties, Bias, vari-ance, covariance BLUE estimation, RLS algorithms, LMS algorithms The relation between Kalman and RLS Kalman Filtering: Markov Processes, Linear Stochastic Systems, State Estimation Kalman filter, Kalman filter in Prediction form, Asymptotic Proper-ties of Kalman Filter, EKF	yes	26-1-2026 11:00-13:00 26-1-2026 15:00-17:00 27-1-2026 10:00-13:00 27-1-2026 15:00-17:00 29-1-2026 10:00-13:00 The course will be held online via on Microsoft Teams via the following link: https://teams.microsoft.com/meet/34688126000486?p=e0ut30OhGvEGCGp49e	English	Yes	ADVANCED

Modeling and Control of Automotive and Robotic Systems	Davide Tebaldi davide.tebaldi@unimore.it	12	Introduction Energy-based modeling using the Power-Oriented Graphs (POG) Modeling Technique Connection of Physical Elements POG Modeling of Physical Systems From the POG scheme to the State Space Model Model Reduction of a POG block scheme POG Modeling of Automotive Systems Planetary Gear Sets Full Toroidal Variator Continuous Variable Transmission (CVT) Permanent Magnet Synchronous Motor (PMSM) POG Modeling of Robotic Manipulators	yes	17-2-2026 15:00-18:00 18-2-2026 15:00-18:00 19-2-2026 15:00-18:00 20-2-2026 15:00-18:00 The course will be held online via on Microsoft Teams via the following link: https://teams.microsoft.com/dl/launcher/launcher.html?url=%2F_%23%2Fmeet%2F35853021884346%3Fp%3DyDXJtNUUBCkBVB7a5j%26anon%3Dtrue&type=meet&deeplinkId=110947da-9060-4c6d-85d1-1ea6b6942e1b&directDl=true&msLaunch=true&enableMobilePage=true&suppressPrompt=true	English	Yes	ADVANCED

Università di Firenze (UNIFI)

The courses can be BASIC (to establish cultural foundations), ADVANCED (advanced study of specific topics), CROSSOVER (on interdisciplinary subjects).

Name	Teacher	Hours	Class description	Available online	Time of the year (please check)	Language	Final evaluation	Level
Multiagent multiobject estimation	Luigi Chisci luigi.chisci@unifi.it	20	The course will provide an overview of advanced research in estimation, specifically concerning the two topics of multi-agent and multi-object estimation. Multi-agent estimation deals with a network of agents with sensing, processing and communication capabilities that aim to cooperatively monitor a given system of interest. Multi-object estimation aims to detect an unknown number of objects present in a given area and estimate their states. Special attention will be devoted to the Kullback-Leibler paradigm for fusion of possibly correlated information from multiple agents and on the random-finite-set paradigm for the statistical representation of multiple objects. Applications to distributed cooperative surveillance, monitoring and navigation tasks will be discussed.	yes	Date, time, and connection links: 2-2-2026 9:00-13:00 meet.google.com/wvp-wwvf-fta 3-2-2026 9:00-13:00 meet.google.com/ofy-aryt-tob 5-2-2026 9:00-13:00 meet.google.com/zow-yfzv-txk 9-2-2026 9:00-13:00 meet.google.com/eau-huix-kzq 10-2-2026 9:00-13:00 meet.google.com/qcu-dujq-ujb Please register here: https://docs.google.com/forms/d/e/1FAIpQLSfEyYlDnrim46u_PMAmP6i56-H91Rf7xs_3GNfsXaWGyJ-GmQ/viewform	English	Yes	ADVANCED