DRIM classes for 2026-2027

This is a preliminary list of classes for the 2026-2027 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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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	Daniel Fusaro, fusarodani@dei.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	yes	Mar/Apr 2027	English	yes	BASIC

			○ NumPy and SciPy: Numerical and Scientific Python ○ Pandas: Labeled Column-Oriented Data ○ Matplotlib: MATLAB-style scientific visualization 3 - Machine Learning and Deep Learning in Python ○ Scikit-learn: Basics of Machine Learning in Python ○ PyTorch: Fundamentals of Deep Learning					

Università degli Studi dell'Aquila (UNIVAQ)

Reference person: Elena De Santis elena.desntis@univaq.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**
Development of Complex Software Systems by Reusing Third-Party Open Source Components	Davide Di Ruscio	6	To be defined	To be defined	To be defined	To be defined	To be defined	To be defined
Collective Decision Making and Swarm Robotics	Giulia De Masi	12	To be defined	To be defined	To be defined	To be defined	To be defined	To be defined
Ethics of AI and Information and Communication Technology	Donatella Donati	12	To be defined	To be defined	To be defined	To be defined	To be defined	To be defined
Introduction to Robotics in the Medical Context	Daniela D'Auria	12	To be defined	To be defined	To be defined	To be defined	To be defined	To be defined
Research Projects: From Proposal Writing to Management	Antinisca Di Marco	4	To be defined	To be defined	To be defined	To be defined	To be defined	To be defined
Quantum Computing	Leonardo Guidoni	14	To be defined	To be defined	To be defined	To be defined	To be defined	To be defined
Research Methodology	Phuong Nguyen	24	To be defined	To be defined	To be defined	To be defined	To be defined	To be defined

Digital System-on-Chip Design	Guido Di Patrizio Stanchieri	15	To be defined	To be defined	To be defined	To be defined	To be defined	To be defined
Engineering Gamified Systems	Antonio Bucchiarone	24	To be defined	To be defined	To be defined	To be defined	To be defined	To be defined
Advanced Model-Driven Engineering Techniques: *Foundations, evolution, and research-grade modeling with Jjodel*	Alfonso Pierantonio	12	To be defined	To be defined	To be defined	To be defined	To be defined	To be defined
Wireless Sensor and Vehicular Networks Security	Marco Pugliese	28	To be defined	To be defined	To be defined	To be defined	To be defined	To be defined
Data Science and Artificial Intelligence in the EU regulatory framework	Lisandra Suárez Fernández	12	To be defined	To be defined	To be defined	To be defined	To be defined	To be defined
Graph Machine Learning	Francesco Gullo	12	To be defined	To be defined	To be defined	To be defined	To be defined	To be defined
Software Fairness	Antinisca Di Marco; Giordano D'Aloisio	12	To be defined	To be defined	To be defined	To be defined	To be defined	To be defined
Answer Set Programming	Stefania Costantini	12	To be defined	To be defined	To be defined	To be defined	To be defined	To be defined
Generative AI for Software Engineering	Henry Muccini; Roberta Capuano	12	To be defined	To be defined	To be defined	To be defined	To be defined	To be defined
Systematic Literature Reviews in ICT Research:	Federica Caruso	12	To be defined	To be defined	To be defined	To be defined	To be defined	To be defined

Methodological Approaches and Best Practices								
Learning Based Control	Daniele Masti	10	To be defined	To be defined	To be defined	To be defined	To be defined	To be defined
Applied Quantum Computing	Martin Beseda	12	To be defined	To be defined	To be defined	To be defined	To be defined	To be defined
Multi-Agent Systems: Path Planning and Coordination	Alessia Di Fonso	12	To be defined	To be defined	To be defined	To be defined	To be defined	To be defined

Università degli Studi di Milano-Bicocca (UNIMIB)

Reference person: Dimitri Ognibene dimitri.ognibene@unimib.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**
Foundation Models	Alessandro Raganato, Elisabetta Fersini, Matteo Palmonari				January 2027	English		

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	1	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 2027 Dates: 22 June 2027 (10:00–12:00) 24 June morning 2027 (10:30–12:30) 24 June afternoon 2027 (14:30–16:30) 30 June 2027 (9:00–12:00) 1 July 2027 (9:00–12:00)	English	yes	BASIC

Università degli Studi di Ferrara (UNIFE)

Reference person: Silvio Simani silvio.simani@unife.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
From Models to Learning: Intelligent Fault Diagnosis for Autonomous Systems	Silvio Simani silvio.simani@unife.it	20	This 20-hour advanced course introduces intelligent and adaptive methodologies for fault detection, isolation, identification and health monitoring in dynamic and autonomous systems. Starting from model-based residual generation and analytical redundancy, the course progressively addresses adaptive estimation, dynamic observers, filtering methods, neural and fuzzy models, and data-driven learning approaches. Particular attention is devoted to robustness against modelling uncertainty and disturbances, online adaptation, and the integration of diagnostic information within supervisory and fault-tolerant control architectures. Practical examples and case studies will illustrate the application of the presented methods to complex engineering and autonomous systems, supported by MATLAB and Simulink implementations.	Yes	January 2027	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	To be defined	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	To be defined 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	To be defined	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	To be defined Please see detailed calendar and registration form here: http://dausy.poliba.it/phd/dausy-courses-seminars/	English	Yes	ADVANCED
Control and Security of Cyber Physical Systems	To be defined	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	To be defined Please see detailed calendar and registration form here: http://dausy.poliba.it/phd/dausy-courses-seminars/	English	Yes	ADVANCED
Game Theory for Controlling Autonomous Systems	To be defined	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	To be defined Please see detailed calendar and registration form here: http://dausy.poliba.it/phd/dausy-courses-seminars/	English	Yes	ADVANCED

Data-driven fault diagnosis and fault prognosis	To be defined	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	To be defined 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	To be defined	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	To be defined Please see detailed calendar and registration form here: http://dausy.poliba.it/phd/dausy-courses-seminars/	English	Yes	ADVANCED

Human Autonomous System Interaction	To be defined	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 consists in lectures, numerical examples and analysis of case studies.	yes	To be defined Please see detailed calendar and registration form here: http://dausy.poliba.it/phd/dausy-courses-seminars/	English	Yes	ADVANCED

Intelligent Supervisory Systems	To be defined	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	To be defined Please see detailed calendar and registration form here: http://dausy.poliba.it/phd/dausy-courses-seminars/	English	Yes	ADVANCED
Introduction to autonomous systems	To be defined	10	The course aims at providing PhD students with the fundamental principles, technologies, and applications related to autonomous systems.	yes	To be defined Please see detailed calendar and registration form here: http://dausy.poliba.it/phd/dausy-courses-seminars/	English	Yes	ADVANCED
Linear algebra for control applications	To be defined	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	To be defined Please see detailed calendar and registration form here: http://dausy.poliba.it/phd/dausy-courses-seminars/	English	Yes	ADVANCED

Multiagent and multiobject estimation	To be defined	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	To be defined Please see detailed calendar and registration form here: http://dausy.poliba.it/phd/dausy-courses-seminars/	English	Yes	ADVANCED
Learning in multi-agent systems	To be defined	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	To be defined Please see detailed calendar and registration form here: http://dausy.poliba.it/phd/dausy-courses-seminars/	English	Yes	ADVANCED
Non-linear control	To be defined	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	To be defined Please see detailed calendar and registration form here: http://dausy.poliba.it/phd/dausy-courses-seminars/	English	Yes	ADVANCED

Variable Structure Control	To be defined	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	To be defined Please see detailed calendar and registration form here: http://dausy.poliba.it/phd/dausy-courses-seminars/	English	Yes	ADVANCED

Università degli Studi di Trento (UNITN)

Reference person: Daniele Fontanelli daniele.fontanelli@unitn.it, Luigi Palopoli luigi.palopoli@unitn.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**
Fundamentals of Statistical Estimation theory	Daniele Fontanelli daniele.fontanelli@unitn.it	18	The course provides an overview of estimation algorithms that are most commonly applied in engineering problems, with a special focus on robotics. The course will improve the background knowledge to model, analyse and solve estimation problems. The course has theory and practical sections, mainly simulative.	NO	8/3/2027 – 19/3/2027	English	Application project on the PhD student research activities	CROSSOVER
Advanced State Estimation and SLAM techniques for Mobile Robotics	Marco Camurri marco.camurri@unitn.it	18	The course will introduce nonlinear optimization and filtering techniques to solve estimation problems, with particular application to Simultaneous Localization and Mapping (SLAM) and other correlated problems such as path planning.	NO	September 2027	English	Presentation about a SLAM paper of choice or small project using the GTSAM library	ADVANCED
Optimization-based Legged Robot Control	Andrea Del Prete	12	The course provides an overview of state-of-the-art techniques for the dynamic control of robotic systems, with a specific focus on legged robots	YES	December 2026	English	Report about simulation results obtained	ADVANCED

	andrea.delprete@unitn.it		(bipeds and quadrupeds). The course covers both theory and implementation, relying on the Python language and some existing libraries for robot visualization, multi-body dynamic computation, and trajectory optimization.				with the code seen in class	

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**		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		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		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		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**		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**		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		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	???		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	???		ENG	yes	CROSSOVER