DIPARTIMENTO
DI INGEGNERIA
DELL'INFORMAZIONE

Control Systems Engineering

Preparation of the study plan

INSTRUCTIONS

Common mandatory activities (72 cfu)

SYSTEMS THEORY 9 cfu (Year 1, Semester 1)

MACHINE LEARNING 9 cfu (Year 1, Semester 1)

DIGITAL CONTROL 6 cfu (Year 1, Semester 1)

ESTIMATION AND FILTERING 6 cfu (Year 1, Semester 2)

CONTROL LABORATORY 9 cfu (Year 1, Semester 2)

FINAL THESIS + INTERNSHIP/RESEARCH TRAINING 21+9=30 cfu

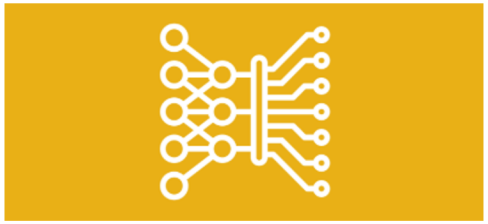
ITALIAN/ENGLISH LANGUAGE: 3 cfu

The remaining activities of the study plan can be chosen by:

- selecting one of the 4 suggested paths (*Machine Learning, Robotics, Industrial Automation and Complex systems*); or

- by preparing a customized plan according to the student's interests.

Machine Learning Path



Core Courses (30 cfu)

Convex Optimization

Learning Dynamical Systems

Reinforcement Learning

Computer Vision (9cfu)

… followed by "elective" courses (18 cfu),
e.g. centered on emerging subfields:

"Advanced Control"

Nonlinear Systems & Control

Robotics and Control 1

Adaptive and Model Predictive Control

"Methods and Models"

Game Theory

Neural Networks and DL

Learning from Networks

"Computation and measurements"

Big Data Computing

Measurements Architectures for Cyber-Physical Systems

Robotics Path

Core Courses (33cfu)

Robotics and Control 1

Robotics and Control 2

Convex Optimization

Computer Vision (9cfu)

… followed by “elective” courses (15cfu), e.g. centered on emerging subfields:

“Learning”

Learning Dynamical Systems

Reinforcement Learning

“Applied”

Industrial Robotics

Intelligent Robotics

Robotics Laboratory

“Industrial”

Electric Drives for Automation

Embedded Real-Time Control

Measurement Architectures for CPS

“Advanced Control”

Nonlinear Systems & Control

Network Dynamical Systems

Industrial Automation Path

Core Courses (30cfu)

Convex Optimization

Embedded Real-Time Control

Industrial Automation

Modeling and Control of Electric Drives

… followed by "elective" courses
(18cfu, of which at least one marked *),
e.g. centered on emerging subfields:

"Applied"

Industrial Robotics*

Computer Vision (9cfu)

Measurement Architectures for CPS

"Disruptive"

Reinforcement Learning*

Adaptive & MPControl*

Information Security

Computer Vision (6cfu)

"Methodological"

Learning Dynamical Systems*

Robotics and Control 1*

Complex Systems Path

Core Courses (27cfu)

Learning Dynamical Systems

Mathematical Methods for Optimization

Mathematical Physics

… followed by "elective" courses (21cfu), centered on emerging subfields.

"Advanced Control"

Nonlinear Systems & Control

Network Systems

Robotics and Control 1

Learning from Networks

"Algorithms"

Automata, Languages and Computation

Quantum Information & Computing

Game Theory

"System Biology"

System Biology

Control of Biological Systems

Math. Cell biology

*Sistemi Ecologici**

Customized Path

Choose AT LEAST 39 CFU among the following courses.
Of those, AT LEAST 15 AFFINE CFU and AT LEAST 15 CARACHTERIZING CFU.
Moreover, you can choose 9 elective cfu from any Master program of UNIPD (including the following list).

Convex Optimization (6cfu, AFFINE)
Mathematical Physics (9cfu, AFFINE)
Digital Signal Processing (6cfu, AFFINE)
Quantum Information and Computing (6cfu, AFFINE)
Neural Networks and Deep Learning (6cfu, AFFINE)
Measurement Architectures for Cyber-physical Systems (9cfu, AFFINE)
Computer Vision (9cfu, AFFINE)
Computer Vision (6cfu, AFFINE)
Intelligent Robotics (9cfu, AFFINE)
Big Data Computing (6cfu, AFFINE)
Learning from Networks (6cfu, AFFINE)
Game Theory (6cfu, AFFINE)
Information Security (6cfu, AFFINE)
Automata, Languages and Computation (9cfu, AFFINE)
Control of Biological Systems (6cfu, AFFINE)
Smart Grids ING-INF/01: (6cfu, AFFINE)
Automotive and Domotics (9cfu, AFFINE)
Stochastic Processes (6cfu, AFFINE)
Modeling and Control of Electric Drives (9cfu AFFINE)
Mathematical Methods for Optimization (6cfu AFFINE+3cfu CARACH.)
Industrial Automation (6cfu AFFINE+3cfu CARACH.)

Learning Dynamical Systems (9cfu, CARACHTERIZING)
Robotics and Control 1 (9cfu, CARACHTERIZING)
Robotics and Control 2 (9cfu, CARACHTERIZING)
Adaptive and Model Predictive (6cfu, CARACHTERIZING)
Reinforcement Learning (6cfu, CARACHTERIZING)
Nonlinear Systems and Control (6cfu, CARACHTERIZING)
Embedded Real-Time Control (6cfu, CARACHTERIZING)
Network Systems and Dynamics (6cfu, CARACHTERIZING)
Network Systems (6cfu, CARACHTERIZING)
Systems Biology (6cfu, CARACHTERIZING)
Robotics laboratory (6cfu, CARACHTERIZING)
Sistemi Ecologici (in Italian) (6cfu, CARACHTERIZING)
Industrial Robotics (9cfu, CARACHTERIZING)

Questions?

More info at:

https://lauree.dei.unipd.it/lauree-magistrali/control-systems-engineering/

Ask for help or suggestions by writing to:

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cenedese@dei.unipd.it