



Descrizione del percorso formativo

<b>MASTER DEGREE COURSE IN</b>		
<b>CONTROL SYSTEMS ENGINEERING</b>		
<i>Study programme for students enrolled in the academic year 2025-2026</i>		
<b>INDUSTRIAL AUTOMATION PATH</b>		
<b>1st YEAR</b>		
<b>MANDATORY UNITS</b>	<b>HOURS</b>	<b>CREDITS</b>
SYSTEMS THEORY	72	9
MACHINE LEARNING	72	9
DIGITAL CONTROL	48	6
ESTIMATION AND FILTERING	48	6
CONTROL ENGINEERING LABORATORY	72	9
CONVEX OPTIMIZATION	48	6
INDUSTRIAL AUTOMATION	72	9
EMBEDDED REAL-TIME CONTROL	48	6
<b>2nd YEAR</b>		
<b>MANDATORY UNITS</b>	<b>HOURS</b>	<b>CREDITS</b>
MODELLING AND CONTROL OF ELECTRIC DRIVES	72	9
<b>1 FREE-CHOICE UNIT AMONG THE FOLLOWING:</b>	<b>HOURS</b>	<b>CREDITS</b>
ADAPTIVE AND MODEL PREDICTIVE CONTROL	48	6
REINFORCEMENT LEARNING	48	6
DESIGN OF MECHANICAL DRIVES	48	6

<b>15 ADDITIONAL FREE-CHOISE CREDITS AMONG THE FOLLOWING:</b>		
COMPUTER VISION (1st year)	48	6
COMPUTER VISION (1st year)	72	9
ROBOTICS AND CONTROL 1 (1st year)	72	9
INDUSTRIAL ROBOTICS (2nd year)	72	9

LEARNING DYNAMICAL SYSTEMS (2nd year)	72	9
SENSING AND MEASUREMENT SYSTEMS (2nd year)	72	9
INFORMATION SECURITY (2nd year)	48	6
<b>FURTHER MANDATORY ACTIVITIES</b>	<b>HOURS</b>	<b>CREDITS</b>
<b>PRACTICAL TRAINING</b>	-	9
<b>FINAL THESIS</b>	-	21

MACHINE LEARNING PATH		
1st YEAR		
MANDATORY UNITS	HOURS	CREDITS
SYSTEMS THEORY	72	9
MACHINE LEARNING	72	9
DIGITAL CONTROL	48	6
ESTIMATION AND FILTERING	48	6
CONTROL ENGINEERING LABORATORY	72	9
CONVEX OPTIMIZATION	48	6
COMPUTER VISION	72	9
2nd YEAR		
MANDATORY UNITS	HOURS	CREDITS
LEARNING DYNAMICAL SYSTEMS	72	9
REINFORCEMENT LEARNING	48	6
<b>1 FREE-CHOICE UNIT AMONG THE FOLLOWING:</b>	<b>HOURS</b>	<b>CREDITS</b>
ADAPTIVE AND MODEL PREDICTIVE CONTROL	48	6
NONLINEAR SYSTEMS AND CONTROL	48	6
NETWORK DYNAMICAL SYSTEMS	48	6

15 ADDITIONAL FREE-CHOISE CREDITS		
ROBOTICS AND CONTROL 1 (1st year)	72	9
GAME THEORY (2nd year)	48	6
LEARNING FROM NETWORKS (2nd year)	48	6
SENSING AND MEASUREMENT SYSTEMS (2nd year)	72	9
BIG DATA COMPUTING (2nd year)	48	6
NEURAL NETWORKS AND DEEP LEARNING (2nd year)	48	6
FURTHER MANDATORY ACTIVITIES	HOURS	CREDITS
PRACTICAL TRAINING	-	9
FINAL THESIS	-	21

COMPLEX SYSTEMS PATH		
1st YEAR		
MANDATORY UNITS	HOURS	CREDITS
SYSTEMS THEORY	72	9
MACHINE LEARNING	72	9
DIGITAL CONTROL	48	6
ESTIMATION AND FILTERING	48	6
CONTROL ENGINEERING LABORATORY	72	9
CONVEX OPTIMIZATION	48	6
MATHEMATICAL PHYSICS	72	9
2nd YEAR		
MANDATORY UNITS	HOURS	CREDITS
LEARNING DYNAMICAL SYSTEMS	72	9
NONLINEAR SYSTEMS AND CONTROL	48	6
1 FREE-CHOICE UNIT AMONG THE FOLLOWING:	HOURS	CREDITS
NETWORK DYNAMICAL SYSTEMS	48	6
REINFORCEMENT LEARNING	48	6
SYSTEMS BIOLOGY	48	6
15 ADDITIONAL FREE-CHOISE CREDITS		
ROBOTICS AND CONTROL 1 (1st year)	72	9
ROBOTICS AND CONTROL 2 (2nd year)	72	9
QUANTUM INFORMATION AND COMPUTING (1st year)	48	6
AUTOMATA, LANGUAGES AND COMPUTATION (2nd year)	72	9
CONTROL OF BIOLOGICAL SYSTEMS (2nd year)	48	6
GAME THEORY (2nd year)	48	6
MATHEMATICAL CELL BIOLOGY (2nd year)	48	6
LEARNING FROM NETWORKS (2nd year)	48	6

<b>FURTHER MANDATORY ACTIVITIES</b>	<b>HOURS</b>	<b>CREDITS</b>
<b>PRACTICAL TRAINING</b>	-	<b>9</b>
<b>FINAL THESIS</b>	-	<b>21</b>

ROBOTICS PATH		
1st YEAR		
MANDATORY UNITS	HOURS	CREDITS
SYSTEMS THEORY	72	9
MACHINE LEARNING	72	9
DIGITAL CONTROL	48	6
ESTIMATION AND FILTERING	48	6
CONTROL ENGINEERING LABORATORY	72	9
CONVEX OPTIMIZATION	48	6
COMPUTER VISION	48	6
ROBOTICS AND CONTROL 1	72	9
2nd YEAR		
MANDATORY UNITS	HOURS	CREDITS
ROBOTICS AND CONTROL 2	72	9
1 FREE-CHOICE UNIT AMONG THE FOLLOWING:	HOURS	CREDITS
NETWORK DYNAMICAL SYSTEMS	48	6
REINFORCEMENT LEARNING	48	6
ROBOTICS LABORATORY	48	6
EMBEDDED REAL-TIME CONTROL	48	6
NONLINEAR SYSTEMS AND CONTROL	48	6
DESIGN OF MECHANICAL DRIVES	48	6
15 ADDITIONAL FREE-CHOISE CREDITS		
INDUSTRIAL ROBOTICS (2nd year)	72	9
LEARNING DYNAMICAL SYSTEMS (2nd year)	72	9
INTELLIGENT ROBOTICS (2nd year)	72	9
SENSING AND MEASUREMENT SYSTEMS (2nd year)	72	9
MODELLING AND CONTROL OF ELECTRIC DRIVES (2nd year)	72	9

<b>FURTHER MANDATORY ACTIVITIES</b>	<b>HOURS</b>	<b>CREDITS</b>
<b>PRACTICAL TRAINING</b>	-	<b>9</b>
<b>FINAL THESIS</b>	-	<b>21</b>

### **ANY FURTHER NOTES**

The Master Degree in Control Systems Engineering is managed by the Department of Information Engineering (<https://www.dei.unipd.it/>) which belongs to the School of Engineering (<https://www.ingegneria.unipd.it/>).

Educational activities are organized in semesters.

Class attendance is not compulsory, but strongly recommended.