

Study Plan Master's Degree Program
LM-33 MECHATRONICS AND SMART TECHNOLOGY ENGINEERING (a.y. 2025-26)

Curriculum: **MECHATRONICS**

FIRST YEAR

Number		Course	Code	Credits	Area	Taught	Period
1	X	Sustainable Energy	161003-M1	9	IIND-06/B [ING-IND/09]	ENG	1
2,1	X	Virtual and Physical Prototyping + Advanced Machine Design (module VPP)	161001	6	IIND-03/B [ING-IND/15]	ENG	1
3	X	Smart sensors and electronic systems	39168-ENG	9	IINF-01/A [ING-INF/01]	ENG	1
4	X	Functional design and dynamic modeling of mechanical systems	39219	12	IIND-02/A [ING-IND/13]	ENG	1
	X	Power drive systems for mechanical machinery and vehicles			IIND-02/A [ING-IND/13]	ENG	2
5	X	Mechanical vibrations	39074-ENG	6	IIND-02/A [ING-IND/13]	ENG	2
6	X	Fundamental of control systems	161018	6	IINF-04/A [ING-INF/04]	ENG	2
	*	Control system technology	21065-ENG	6	IINF-04/A [ING-INF/04]	ENG	2
2,2	X	Virtual and Physical Prototyping + Advanced Machine Design (module AMD)	161001	6	IIND-03/A [ING-IND/14]	ENG	2
7		Trasmissione del calore	39021	6	IIND-07/A [ING-IND/10]	ITA	1
		Meccanica dei robot	39051		IIND-02/A [ING-IND/13]	ITA	1
		IT architecture in production	39187-ENG		IIND-02/A [ING-IND/13]	ENG	2
		Laboratorio di elettronica (3 CFU) + Functional design of mechatronic systems (3 CFU)	161019		IINF-01/A [ING-INF/01] IIND-02/A [ING-IND/13]	ITA-ENG	1+2
		Progettazione FEM	39056		IIND-03/A [ING-IND/14]	ITA	2
		Innovazione di prodotto e di processo (6 CFU)	39218		IIND-03/B [ING-IND/15]	ITA	1
		Industrial plant design and simulation	161005		IIND-05/A [ING-IND/17]	ENG	2

(*) : Only for students who have taken a course in Fundamental of control systems in the Bachelor's degree program

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SECOND YEAR

Number		Course	Code	Credits	Area	Taught	Period
8	X	Mechatronic systems and advanced robotic applications	161026	6	IIND-02/A [ING-IND/13]	ENG	1
9	X	Advanced manufacturing technologies	161007	6	IIND-04/A [ING-IND/16]	ENG	1
10		Electric energy conversion and management	161014	6	IIND-08/A [ING-IND/32]	ENG	1
		Sensori	38058		IINF-01/A [ING-INF/01]	ITA	1
		Laboratorio di elettronica (3 CFU) + Sensors (3 CFU)	161020		IINF-01/A [ING-INF/01]	ITA-ENG	1
		Collaborative robotics (3 CFU) + Laboratory Sustainable Industrial Systems SIS (3 CFU)	161021		IINF-04/A [ING-INF/04]	ENG	1+2

Curriculum: **SMART TECHNOLOGY ENGINEERING**

FIRST YEAR

Number		Course	Code	Credits	Area	Taught	Period
1,1	X	Sustainable Energy + Thermal Physics for advanced technology (module SE)	161003	9	IIND-06/B [ING-IND/09]	ENG	1
1,2	X	Sustainable Energy + Thermal Physics for advanced technology (module TP)	161003	6	IIND-07/A [ING-IND/10]	ENG	1
2,1	X	Virtual and Physical Prototyping + Advanced Machine Design (module VPP)	161001	6	IIND-03/B [ING-IND/15]	ENG	1
3	X	Smart sensors and electronic systems	39168-ENG	9	IINF-01/A [ING-INF/01]	ENG	1
2,2	X	Virtual and Physical Prototyping + Advanced Machine Design (module AMD)	161001	6	IIND-03/A [ING-IND/14]	ENG	2
4	X	Industrial plant design and simulation	161005	6	IIND-05/A [ING-IND/17]	ENG	2
5	X	Materials for advanced engineering applications	39171-ENG	6	IMAT-01/A [ING-IND/22]	ENG	2
6	X	Data science and automation	39170-ENG	6	IINF-04/A [ING-INF/04]	ENG	2
7	X	Mechanical vibrations	39074-ENG	6	IIND-02/A [ING-IND/13]	ENG	2

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SECOND YEAR

Number		Course	Code	Credits	Area	Taught	Period
8	X	Advanced manufacturing technologies	161007	6	IIND-04/A [ING-IND/16]	ENG	1
9		Lab course 1 (6 CFU)					
		Collaborative robotics (3 CFU) + Robots and automatic machinery for industrial applications (3 CFU)	161022	6	IINF-04/A [ING-INF/04] IIND-02/A [ING-IND/13]	ENG	1
		Laboratorio di elettronica (3 CFU) + Sensors (3 CFU)	161020		IINF-01/A [ING-INF/01]	ITA-ENG	1
		IT architecture in production	39187-ENG		IIND-02/A [ING-IND/13]	ENG	2
		Electric energy conversion and management	161014		IIND-08/A [ING-IND/32]	ENG	1
		Monitoring and Assessment [Structural monitoring (3 CFU) + Structural assessment lab (3 CFU)]	161023		CEAR-06/A [ICAR/08] CEAR-07/A [ICAR/09]	ENG	1
10		Lab course 2 (6 CFU)					
		Collaborative robotics (3 CFU) + Robots and automatic machinery for industrial applications (3 CFU)	161022	6	IINF-04/A [ING-INF/04] IIND-02/A [ING-IND/13]	ENG	1
		Laboratorio di elettronica (3 CFU) + Sensors (3 CFU)	161020		IINF-01/A [ING-INF/01]	ITA-ENG	1
		IT architecture in production	39187-ENG		IIND-02/A [ING-IND/13]	ENG	2

		Controlli automatici	39067		IINF-04/A [ING-INF/04]	ITA	1
		Robotica	39068		IINF-05/A [ING-INF/05]	ITA	1

		Electric energy conversion and management	161014		IIND-08/A [ING-IND/32]	ENG	1
		Monitoring and Assessment [Structural monitoring (3 CFU) + Structural assessment lab (3 CFU)]	161023		CEAR-06/A [ICAR/08] CEAR-07/A [ICAR/09]	ENG	1

11		Mechatronic systems LAB (17 CFU) codice 161024					
		Advanced mechatronics design	161008-1	4	IIND-02/A [ING-IND/13]	ENG	2
		Machine and structural design	161008-2	3	IIND-03/A [ING-IND/14]	ENG	2
		Industrial IOT	161008-3	3	IINF-01/A [ING-INF/01]	ENG	2
		Mechanical system control	161008-4	4	IINF-04/A [ING-INF/04]	ENG	2
		Embedded system software design	161008-5	3	IINF-05/A [ING-INF/05]	ENG	2
12		Elective course (6 CFU)		12			
		Elective course (6 CFU)					
	X	Computer and telematic skills (°)	39077	1			
	X	Thesis work and final defense	161000	12			

(*) included in thesis preparation

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opt.		Additional elective activities (supernumerary credits)					
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Each student must select:

- **1 course** in position #7
- **1 course** in position #10
- **2 elective courses** in position #12

11		Smart Technology LAB (17 CFU) 161025					
		Smart energy systems	161025-1	4	IIND-06/B [ING-IND/09]	ENG	2
		Human-machine interaction	161010-2	3	IIND-03/B [ING-IND/15]	ENG	2
		Smart manufacturing technologies	161010-3	3	IIND-04/A [ING-IND/16]	ENG	2
		Advanced production systems	161010-4	4	IIND-05/A [ING-IND/17]	ENG	2
		Smart electrical infrastructure	161025-2	3	IIND-08/B [ING-IND/33]	ENG	2
12		Elective course (6 CFU)		12			
		Elective course (6 CFU)					
	X	Computer and telematic skills (°)	39077	1			
	X	Thesis work and final defense	161000	12			

(*) included in thesis preparation

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opt.		Additional elective activities (supernumerary credits)					
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Each student must select:

- **1 course** in position #9
- **1 course** in position #10
- **2 elective courses** in position #12

Curriculum: MECHATRONICS

Elective courses (taught in English)

Course	Code	Credits	SSD	Taught	Semester
Computational mechanics of solids and structures	60039-ENG	6	CEAR-06/A [ICAR/08]	ENG	1
Computational fluid dynamics	39070-ENG	6	IIND-01/F [NG-IND/06]	ENG	1
Internal combustion engines and vehicle aerodynamics	39046-ENG	6	IIND-06/A [NG-IND/08]	ENG	2
Experimental techniques for fluid machinery	39204	6	IIND-06/A [NG-IND/08] (3) IMIS-01/A [NG-IND/12] (3)	ENG	2
IT architecture in production	39187-ENG	6	IIND-02/A [NG-IND/13]	ENG	2
Mechatronic systems and advanced robotic applications	161026	6	IIND-02/A [NG-IND/13]	ENG	1
Quality management systems	22027-ENG	6	IIND-04/A [NG-IND/16]	ENG	1
Industrial plant design and simulation	161005	6	IIND-05/A [NG-IND/17]	ENG	2
Lean manufacturing	39122	6	IIND-05/A [NG-IND/17]	ENG	2
Materials for advanced engineering applications	39171-ENG	6	IMAT-01/A [NG-IND/22]	ENG	2
Science and technology of light alloys	39109-ENG	6	IMAT-01/A [NG-IND/22]	ENG	2
Electric energy conversion and management	161014	6	IIND-08/A [NG-IND/32]	ENG	1
Data science and automation	39170-ENG	6	IINF-04/A [NG-INF/04]	ENG	2
Collaborative robotics (3 CFU) + Laboratory Sustainable Industrial Systems SIS (3 CFU)	161021	6	IINF-04/A [NG-INF/04]	ENG	1+2
Embedded and real time systems	21038-ENG	6	IINF-05/A [NG-INF/05]	ENG	1
Statistics for digital and organisational innovation	37195-E2	6	STAT-01/B [SECS-S/02]	ENG	2

Other elective courses (taught in Italian)

Course	Code	Credits	SSD	Taught	Semester
Combustione e impatto ambientale	39209-1	6	IIND-06/A [NG-IND/08]	ITA	1
Tecnologie delle energie rinnovabili	39071	6	IIND-06/B [NG-IND/09]	ITA	2
Acustica applicata	60118	6	IIND-07/A [NG-IND/10]	ITA	2
Progettazione di impianti termotecnici	39096	6	IIND-07/A [NG-IND/10]	ITA	2
Termofluidodinamica	39020	6	IIND-07/A [NG-IND/10]	ITA	1
Trasmissione del calore	39021	6	IIND-07/A [NG-IND/10]	ITA	1
Misure dimensionali e collaudi di produzione	39015	6	IMIS-01/A [NG-IND/12]	ITA	2
Meccanica dei robot	39051	6	IIND-02/A [NG-IND/13]	ITA	1
Modelistica e simulazione dei sistemi meccanici	39052	6	IIND-02/A [NG-IND/13]	ITA	1
Progettazione FEM	39056	6	IIND-03/A [NG-IND/14]	ITA	2
Progetto di macchine	39055	6	IIND-03/A [NG-IND/14]	ITA	2
Innovazione di prodotto e di processo (6 CFU)	39218	6	IIND-03/B [NG-IND/15]	ITA	1
Metodi e strumenti per il ciclo di vita del prodotto	37008	6	IIND-03/B [NG-IND/15]	ITA	2
Studi di fabbricazione	39057	6	IIND-04/A [NG-IND/16]	ITA	2
Tecnologie di formatura (fonderia)	39106	6	IIND-04/A [NG-IND/16]	ITA	1
Tecnologie di formatura (plasticità)	39105	6	IIND-04/A [NG-IND/16]	ITA	1
Gestione della produzione industriale	21033	6	IIND-05/A [NG-IND/17]	ITA	2
Corrosione e protezione dei materiali (6 CFU)	39010	6	IMAT-01/A [NG-IND/22]	ITA	1
Materiali polimerici, compositi e ceramici	39013	6	IMAT-01/A [NG-IND/22]	ITA	1
Gestione aziendale e dei sistemi logistici	39076	6	IEGE-01/A [NG-IND/35]	ITA	2
Elettronica industriale	21031	6	IINF-01/A [NG-INF/01]	ITA	1
Sensori	38058	6	IINF-01/A [NG-INF/01]	ITA	1
Laboratorio di elettronica (3 CFU) + Sensors (3 CFU)	161020	6	IINF-01/A [NG-INF/01]	ITA-ENG	1
Laboratorio di elettronica (3 CFU) + Functional design of mechatronic systems (3 CFU)	161019	6	IINF-01/A [NG-INF/01] IIND-02/A [NG-IND/13]	ITA-ENG	1+2
Automazione industriale	21052-1	6	IINF-04/A [NG-INF/04]	ITA	2
Controlli automatici	39067	6	IINF-04/A [NG-INF/04]	ITA	1
Intelligenza artificiale	38089-MOD1	6	IINF-05/A [NG-INF/05]	ITA	2
Robotica	39068	6	IINF-05/A [NG-INF/05]	ITA	1
Calcolo numerico	39064	6	MATH-05/A [MAT/08]	ITA	1

The selection of other courses provided by the School of Engineering must be verified and approved by the Degree Program Board

A **curricular internship** or a **Summer / Winter School** or a **CREO-Lab** (max 6 credits) can be included among the 12 credits for elective courses after evaluation by the Degree Program Board

Additional elective activities (supernumerary credits)

Course	Code	Credits	SSD	Taught	Semester
CREO-Lab Tourism and creative industries	44167-ENG	6		ENG	
CREO-Lab Salute	16021	6		ITA	
CREO-Lab Sustainability	179010-ENG	6		ENG	
CREO-Lab Tecnologie digitali e intelligenza artificiale	38110	6		ITA	

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Curriculum: SMART TECHNOLOGY ENGINEERING

Elective courses (taught in English)

Course	Code	Credits	SSD	Taught	Semester
Computational mechanics of solids and structures	60039-ENG	6	CEAR-06/A [ICAR/08]	ENG	1
Monitoring and Assessment [Structural monitoring (3 CFU) + Structural assessment lab (3 CFU)]	161023	6	CEAR-06/A [ICAR/08] CEAR-07/A [ICAR/09]	ENG	1
Computational fluid dynamics	39070-ENG	6	IIND-01/F [NG-IND/06]	ENG	1
Internal combustion engines and vehicle aerodynamics	39046-ENG	6	IIND-06/A [NG-IND/08]	ENG	2
Experimental techniques for fluid machinery	39204	6	IIND-06/A [NG-IND/08] (3) IMIS-01/A [NG-IND/12] (3)	ENG	2
IT architecture in production	39187-ENG	6	IIND-02/A [NG-IND/13]	ENG	2
Quality management systems	22027-ENG	6	IIND-04/A [NG-IND/16]	ENG	1
Lean manufacturing	39122	6	IIND-05/A [NG-IND/17]	ENG	2
Science and technology of light alloys	39109-ENG	6	IMAT-01/A [NG-IND/22]	ENG	2
Electric energy conversion and management	161014	6	IIND-08/A [NG-IND/32]	ENG	1
Collaborative robotics (3 CFU) + Robots and automatic machinery for industrial applications (3 CFU)	161022	6	IINF-04/A [NG-INF/04] IIND-02/A [NG-IND/13]	ENG	1
Embedded and real time systems	21038-ENG	6	IINF-05/A [NG-INF/05]	ENG	1
Statistics for digital and organisational innovation	37195-E2	6	STAT-01/B [SECS-S/02]	ENG	2

Other elective courses (taught in Italian)

Course	Code	Credits	SSD	Taught	Semester
Complementi di scienza delle costruzioni	60077-2	6	CEAR-06/A [ICAR/08]	ITA	1
Combustione e impatto ambientale	39209-1	6	IIND-06/A [NG-IND/08]	ITA	1
Tecnologie delle energie rinnovabili	39071	6	IIND-06/B [NG-IND/09]	ITA	2
Acustica applicata	60118	6	IIND-07/A [NG-IND/10]	ITA	2
Progettazione di impianti termotecnici	39096	6	IIND-07/A [NG-IND/10]	ITA	2
Termofluidodinamica	39020	6	IIND-07/A [NG-IND/10]	ITA	1
Misure dimensionali e collaudi di produzione	39015	6	IMIS-01/A [NG-IND/12]	ITA	2
Power drive systems for mechanical machinery and vehicles	161017	6	IIND-02/A [NG-IND/13]	ENG	2
Meccanica dei robot	39051	6	IIND-02/A [NG-IND/13]	ITA	1
Modelistica e simulazione dei sistemi meccanici	39052	6	IIND-02/A [NG-IND/13]	ITA	1
Progettazione funzionale di sistemi meccanici	39073	6	IIND-02/A [NG-IND/13]	ITA	1
Mechatronic systems and advanced robotic applications	161026	6	IIND-02/A [NG-IND/13]	ENG	1
Progettazione FEM	39056	6	IIND-03/A [NG-IND/14]	ITA	2
Progetto di macchine	39055	6	IIND-03/A [NG-IND/14]	ITA	2
Innovazione di prodotto e di processo (6 CFU)	39218	6	IIND-03/B [NG-IND/15]	ITA	1
Metodi e strumenti per il ciclo di vita del prodotto	37008	6	IIND-03/B [NG-IND/15]	ITA	2
Studi di fabbricazione	39057	6	IIND-04/A [NG-IND/16]	ITA	2
Tecnologie di formatura (fonderia)	39106	6	IIND-04/A [NG-IND/16]	ITA	1
Tecnologie di formatura (plasticità)	39105	6	IIND-04/A [NG-IND/16]	ITA	1
Gestione della produzione industriale	21033	6	IIND-05/A [NG-IND/17]	ITA	2
Corrosione e protezione dei materiali (6 CFU)	39010	6	IMAT-01/A [NG-IND/22]	ITA	1
Materiali polimerici, compositi e ceramici	39013	6	IMAT-01/A [NG-IND/22]	ITA	1
Gestione aziendale e dei sistemi logistici	39076	6	IEGE-01/A [NG-IND/35]	ITA	2
Elettronica industriale	21031	6	IINF-01/A [NG-INF/01]	ITA	1
Laboratorio di elettronica (3 CFU) + Sensors (3 CFU)	161020	6	IINF-01/A [NG-INF/01]	ITA-ENG	1
Automazione industriale	21052-1	6	IINF-04/A [NG-INF/04]	ITA	2
Controlli automatici	39067	6	IINF-04/A [NG-INF/04]	ITA	1
Intelligenza artificiale	38089-MOD1	6	IINF-05/A [NG-INF/05]	ITA	2
Robotica	39068	6	IINF-05/A [NG-INF/05]	ITA	1
Calcolo numerico	39064	6	MATH-05/A [MAT/08]	ITA	1

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Additional elective activities (supernumerary credits)

Course	Code	Credits	SSD	Taught	Semester
CREO-Lab Tourism and creative industries	44167-ENG	6		ENG	
CREO-Lab Salute	16021	6		ITA	
CREO-Lab Sustainability	179010-ENG	6		ENG	
CREO-Lab Tecnologie digitali e intelligenza artificiale	38110	6		ITA	

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