ANNEX 1

MECHANICAL ENGINEERING FOR DESIGN AND PRODUCTION

CLASS LM-33

School: Polytechnic and Basic Sciences

Department: Industrial Engineering

Regulations in force since the academic year 2025-2026

STUDY PLAN

KEY

Type of Educational Activity (TAF):
B = Characterising
C = Related or Supplementary
D = At the student's choice
E = Final examination and language knowledge
F = Further training activities

Year I

Title Course	SSD	Module	CFU	Hours	Type Activities *(lectures, workshops, etc.)*	TAF	Disciplinary area	Mandatory/ optional
Mandatory curricular activities (36 CFU) chosen from the following subjects depending on the path (see note a)								
Advanced Structural Mechanics	IIND-03/A	single	9	72	Frontal lesson and exercises	B	Mechanical Engineering	36 CFU Mandatory electives
Mechanical vibrations	IIND-02/A	single	9	72	Frontal lesson and exercises	B		
Logistics and Operation Management	IIND-05/A	single	9	72	Frontal lesson and exercises	B		
Digital Modeling and Simulation for Industrial Engineering	IIND-03/B	single	9	72	Frontal lesson and exercises	B		
Advanced and Resource Efficient Manufacturing	IIND-04/A	single	9	72	Frontal lesson and exercises	B		
Curricular elective activities **(see note a)**		single	**A (1)**	A*8	Frontal lesson and exercises	B	Mechanical Engineering	To be chosen from suggested or approved exams in a study plan
Affiliated or Integrative Activity **(see note a)**		single	**B (2)**	B*8	Frontal lesson and exercises	C		
Free choice activities **(see note a)**		single	**C (3)**	C*8	Frontal lesson and exercises	D		
Additional language skills **(see note c)**			3			F		Mandatory

Year II

Title Course	SSD	Module	CFU	Hours	Type Activities *(lectures, workshops, etc.)*	TAF	Disciplinary area	Mandatory/ optional
Curricular elective activities **(see note a)**		single	36-**A** (1)	(36-A)*8	Frontal lesson and exercises	B	Mechanical Engineering	To be chosen from suggested or approved exams in a study plan
Affiliated or Integrative Activity **(see note a)**	**Dynamics of Mechanical Systems**	single	12-**B** (2)	(12-B)*8	Frontal lesson and exercises	C		
Free choice activities **(see note a)**		single	9-**C** (3)	(9-C)*8	Frontal lesson and exercises	D		
Internship **(see note b)**			9			F		
Final Exam **(see note d)**			15			E		

1) The curricular activities mentioned in note a) amount to a total of 36 CFU, distributed between the first year (max 18 CFU) and the second year, depending on the choices made.
2) The related or integrative activities mentioned in note a) amount to a total of 12 CFU, distributed between the first and second year, depending on the choices made.
3) The free choice activities mentioned in note a) amount to a total of 9 CFU, distributed between the first and second year, depending on the choices made.

Notes:

a) The choice of curricular activities by the student, in accordance with what is reported in tables A, B, C, D, and E, defines **a study plan that is automatically approved for the following pathways:**

- **Table A – Advanced and Smart Mechanical Design Pathway**
- **Table B – Advanced and Smart Production Pathway**
- **Table C – Road Vehicle Design Pathway**
- **Table D – Technological Processes Pathway**
- **Table E – Mechatronics Pathway**

The student can indicate their pathway choice and the automatically approved study plan during enrollment without any further formalities.
Students who opt for an individual study plan during enrollment must use the appropriate forms/procedures, which will be available on the website of the Master's Degree Course in Mechanical Engineering for Design and Production. The same forms must be used to modify the study plan for subsequent years. The Coordination Committee for the Master's Degree Course reserves the right to approve or reject such requests based on clear reasoning provided by the student, as required by law. It should be noted that, in all cases, an exam can only be taken after the respective course has been offered during the academic year when the study plan is presented.

b) The internship can be external (extramoenia) or internal (intramoenia). The external internship is carried out at companies, research centers, or other public and/or private entities, with the aim of acquiring specialized knowledge while working alongside personnel involved in design, production, and management activities, in order to gain initial exposure to the professional world. The internal internship is carried out at university research laboratories to acquire specialized knowledge by collaborating with faculty members and researchers in conducting research and development activities. In all cases, the internship must be documented in an internship booklet and certified by the university tutor using the AC form.

c) Students who do not possess certification of English language proficiency at least at the B2 level of the Common European Framework of Reference for Languages (CEFR) must include a sufficient number of CFUs for Additional Language Skills in their study plan to ensure they achieve this level of proficiency (3 CFUs). These credits can be acquired through external institutions or at the university's language center (cla.unina.it) and will be recognized upon presentation of the certification. Students who already hold a B2 level English certificate at the time of enrollment may request recognition of this for the Additional Language Skills (3 CFUs).

d) The thesis work can also be carried out at companies in Italy or abroad. It must always be carried out under the direct and full responsibility of a faculty member from the Didactic Area of Engineering at the University of Naples Federico II (the procedures for assigning the thesis advisor are specified in the Didactic Regulations of the Course of Study) and may include the collaboration of an external company tutor. The procedures for assigning the company tutor are regulated by the Didactic Regulations of the Course of Study and by specific agreements.

Table A – Advanced and Smart Mechanical Design Pathway				
Course Name	***Semester***	***SSD***	***CFU***	***TAF***
Mandatory pathway exams				
Assisted Design of Mechanical Structures Progettazione Assistita di Strutture Meccaniche	I	IIND-03/A	9	B
Mechanical vibrations Dinamica dei Sistemi Meccanici	I	IIND-02/A	9	B
Digital Modeling and Simulation for Industrial Engineering Modellazione geometrica e prototipazione virtuale	II	IIND-03/B	9	B
At least one exam to be chosen from:				
Advanced and Resource Efficient Manufacturing Tecnologie Speciali	II	IIND-04/A	9	B
Logistics and Operation Management Gestione della Produzione Industriale	I	IIND-05/A	9	B
Affiliated or Integrative Activity: 12 CFU to be chosen from:				
Electrical Machines Macchine Elettriche	I	IIND-08/A	6	C
Electronic Power Converters Convertitori Elettronici di Potenza	I	IIND-08/A	6	C
Surface Engineering Ingegneria delle Superfici	I	IIND-03/C	12	C
Economics and Business Organization Economia ed Organizzazione Aziendale	I	IEGE-01/A	6	C
Business Management Gestione Aziendale	II	IEGE-01/A	6	C
Statistics for Technology Statistica per la Tecnologia	II	STAT-01/B	6	C
Statistical Learning for Industrial Engineering (*)	I	STAT-01/B	6	C
Electronics for Intelligent Mechanical Systems Elettronica per Sistemi Meccanici Intelligenti	I	IINF-01/A	6	C
Machine Learning for Engineering	II	IINF-05/A	6	C
Curricular elective activities: choose at least three exams from:				
Advanced Machine Design Complementi di Costruzione di Macchine	I	IIND-03/A	9	B
Experimental Mechanics Meccanica Sperimentale	II	IIND-03/A	9	B
Sustainable Product Design and Development Progettazione e Sviluppo di Prodotto Sostenibile	I	IIND-03/B	9	B
Applied Mechanics for Energy Efficiency	II	IIND-02/A	9	B
Curricular elective activities: choose one exam from Table 1			9	B
Recommended courses for free choice: Table 1 and Table 2			9	D

(*) The exam *Statistical Learning for Industrial Engineering* can be taken after completing *Statistics for Technology*.

Table B – Advanced and Smart Production Pathway				
Course Name	***Semester***	***SSD***	***CFU***	***TAF***
Mandatory pathway exams				
Assisted Design of Mechanical Structures Progettazione Assistita di Strutture Meccaniche	I	IIND-03/A	9	B
Logistics and Operation Management Gestione della Produzione Industriale	I	IIND-05/A	9	B
Advanced and Resource Efficient Manufacturing Tecnologie Speciali	II	IIND-04/A	9	B
at least one exam to be chosen from:				
Mechanical vibrations Dinamica dei Sistemi Meccanici	I	IIND-02/A	9	B
Digital Modeling and Simulation for Industrial Engineering Modellazione geometrica e prototipazione virtuale	II	IIND-03/B	9	B
Affiliated or Integrative Activity: 12 CFU to be chosen from:				
Electrical Machines Macchine Elettriche	I	IIND-08/A	6	C
Electronic Power Converters Convertitori Elettronici di Potenza	I	IIND-08/A	6	C
Surface Engineering Ingegneria delle Superfici	I	IIND-03/C	12	C
Economics and Business Organization Economia ed Organizzazione Aziendale	I	IEGE-01/A	6	C
Business Management Gestione Aziendale	II	IEGE-01/A	6	C
Statistics for Technology Statistica per la Tecnologia	II	STAT-01/B	6	C
Statistical Learning for Industrial Engineering(*)	I	STAT-01/B	6	C
Electronics for Intelligent Mechanical Systems Elettronica per Sistemi Meccanici Intelligenti	I	IINF-01/A	6	C
Machine Learning for Engineering	II	IINF-05/A	6	C
Polymer Science Scienza dei Polimeri	I	IMAT-01/A	6	C
Polymer Technology Tecnologia dei Polimeri	II	IMAT-01/A	6	C
Curricular elective activities: at least three exams to be chosen from:				
Computer-Aided Manufacturing Produzione Assistita da Calcolatore	I	IIND-04/A	9	B
Project Management for Industrial Production Project Management per la Produzione Industriale	I	IIND-05/A	9	B
Safety and Maintenance of Industrial Plants Sicurezza e manutenzione degli Impianti Industriali	II	IIND-05/A	9	B
Smart Modelling of Industrial Production Systems	I	IIND-05/A	9	B

Automated Production Systems Sistemi di Produzione Automatizzati	II	IIND-05/A	9	B
Green Manufacturing and Sustainability	I	IIND-04/A	9	B
Management and Control of Manufacturing Systems Gestione e Controllo dei Sistemi di Lavorazione	II	IIND-04/A	9	B
Additional curricular elective activity: one exam from Table 1	I/II		9	B
Recommended courses for free choice: Table 1 and Table 2	I/II		9	D

(*) The exam *Statistical Learning for Industrial Engineering* can be taken after completing *Statistics for Technology*.

Table C- Road Vehicle Design Pathway				
Course Name	***Semester***	***SSD***	***CFU***	***TAF***
Mandatory pathway exams				
Assisted Design of Mechanical Structures Progettazione Assistita di Strutture Meccaniche	I	IIND-03/A	9	B
Mechanical vibrations Dinamica dei Sistemi Meccanici	I	IIND-02/A	9	B
Digital Modeling and Simulation for Industrial Engineering Modellazione geometrica e prototipazione virtuale	II	IIND-03/B	9	B
at least one exam to be chosen from:				
Advanced and Resource Efficient Manufacturing Tecnologie Speciali	II	IIND-04/A	9	B
Logistics and Operation Management Gestione della Produzione Industriale	I	IIND-05/A	9	B
Affiliated or Integrative Activity: 12 CFU to be chosen from:				
Electrical Machines Macchine Elettriche	I	IIND-08/A	6	C
Electronic Power Converters Convertitori Elettronici di Potenza	I	IIND-08/A	6	C
Surface Engineering Ingegneria delle Superfici	I	IIND-03/C	12	C
Economics and Business Organization Economia ed Organizzazione Aziendale	I	IEGE-01/A	6	C
Business Management Gestione Aziendale	II	IEGE-01/A	6	C
Statistics for Technology Statistica per la Tecnologia	II	STAT-01/B	6	C
Statistical Learning for Industrial Engineering (*)	I	STAT-01/B	6	C
Electronics for Intelligent Mechanical Systems Elettronica per Sistemi Meccanici Intelligenti	I	IINF-01/A	6	C
Machine Learning for Engineering	II	IINF-05/A	6	C
Polymer Science Scienza dei Polimeri	I	IMAT-01/A	6	C
Polymer Technology Tecnologia dei Polimeri	II	IMAT-01/A	6	C
Curricular elective activities: at least three exams to be chosen from:				
Vehicle Construction Costruzione di Autoveicoli	I	IIND-03/A	9	B

Vehicle Mechanics Meccanica del Veicolo	II	IIND-02/A	9	B
Tribology and Diagnostics of Mechanical Systems Tribologia e Diagnostica dei sistemi meccanici	I	IIND-02/A	9	B
Mechanical Design Progettazione meccanica	II	IIND-03/A	9	B
Bio-Inspired Generative Design for Additive Manufacturing	II	IIND-03/B	9	B
Additional curricular elective activity: one exam from Table 1			9	B
Recommended courses for free choice: Table 1 and Table 2			9	D

(*) The exam *Statistical Learning for Industrial Engineering* can be taken after completing *Statistics for Technology*.

Table D – Technological Processes Pathway				
Course Name	***Semester***	***SSD***	***CFU***	***TAF***
Mandatory pathway exams				
Assisted Design of Mechanical Structures Progettazione Assistita di Strutture Meccaniche	I	IIND-03/A	9	B
Advanced and Resource Efficient Manufacturing Tecnologie Speciali	II	IIND-04/A	9	B
Logistics and Operation Management Gestione della Produzione Industriale	I	IIND-05/A	9	B
at least one exam to be chosen from:				
Mechanical vibrations Dinamica dei Sistemi Meccanici	I	IIND-02/A	9	B
Digital Modeling and Simulation for Industrial Engineering Modellazione geometrica e prototipazione virtuale	II	IIND-03/B	9	B
Affiliated or Integrative Activity: 12 CFU to be chosen from:				
Electrical Machines Macchine Elettriche	I	IIND-08/A	6	C
Electronic Power Converters Convertitori Elettronici di Potenza	I	IIND-08/A	6	C
Surface Engineering Ingegneria delle Superfici	I	IIND-03/C	12	C
Economics and Business Organization Economia ed Organizzazione Aziendale	I	IEGE-01/A	6	C
Business Management Gestione Aziendale	II	IEGE-01/A	6	C
Statistics for Technology Statistica per la Tecnologia	II	STAT-01/B	6	C
Statistical Learning for Industrial Engineering (*)	I	STAT-01/B	6	C
Electronics for Intelligent Mechanical Systems Elettronica per Sistemi Meccanici Intelligenti	I	IINF-01/A	6	C
Machine Learning for Engineering	II	IINF-05/A	6	C
Polymer Science Scienza dei Polimeri	I	IMAT-01/A	6	C
Polymer Technology Tecnologia dei Polimeri	II	IMAT-01/A	6	C
Curricular elective activities: at least three exams to be chosen from:				
Simulation and Modeling of Plastic Deformation Processes Simulazione e Modellazione dei Processi per Deformazione Plastica	I	IIND-04/A	9	B

Welding and Joining Techniques Tecnica della Saldatura e delle Giunzioni	I	IIND-04/A	9	B
Non-Conventional Materials Technologies Tecnologie dei Materiali non Convenzionali	II	IIND-04/A	9	B
Safety and Maintenance of Industrial Plants Sicurezza e Manutenzione degli Impianti Industriali	II	IIND-05/A	9	B
Additive Manufacturing	I	IIND-04/A	9	B
Additional curricular elective activity: one exam from Table 1	I/II		9	B
Recommended courses for free choice: Table 1 and Table 2	I/II		9	D

(*) The exam *Statistical Learning for Industrial Engineering* can be taken after completing *Statistics for Technology*.

Table E – Mechatronics Pathway				
Course Name	***Semester***	***SSD***	***CFU***	***TAF***
Mandatory pathway exams				
Mechanical vibrations Dinamica dei Sistemi Meccanici	I	IIND-02/A	9	B
Advanced and Resource Efficient Manufacturing Tecnologie Speciali	II	IIND-04/A	9	B
Digital Modeling and Simulation for Industrial Engineering Modellazione geometrica e prototipazione virtuale	II	IIND-03/B	9	B
at least one exam to be chosen from:				
Logistics and Operation Management Gestione della Produzione Industriale	I	IIND-05/A	9	B
Assisted Design of Mechanical Structures Progettazione Assistita di Strutture Meccaniche	I	IIND-03/A	9	B
Affiliated or Integrative Activity: 12 CFU to be chosen from:				
Electrical Machines Macchine Elettriche	I	IIND-08/A	6	C
Electronic Power Converters Convertitori Elettronici di Potenza	I	IIND-08/A	6	C
Surface Engineering Ingegneria delle Superfici	I	IIND-03/C	12	C
Economics and Business Organization Economia ed Organizzazione Aziendale	I	IEGE-01/A	6	C
Business Management Gestione Aziendale	II	IEGE-01/A	6	C
Statistics for Technology Statistica per la Tecnologia	II	STAT-01/B	6	C
Statistical Learning for Industrial Engineering (*)	I	STAT-01/B	6	C
Electronics for Intelligent Mechanical Systems Elettronica per Sistemi Meccanici Intelligenti	I	IINF-01/A	6	C
Machine Learning for Engineering	II	IINF-05/A	6	C
Curricular elective activities: at least three exams to be chosen from:				
Modeling and Simulation of Mechatronic Systems Modellazione e Simulazione di Sistemi Meccatronici	I	IIND-03/B	9	B
Mechanical Systems Control Controllo dei sistemi meccanici	II	IIND-02/A	9	B
Integration of Advanced Systems in Industrial Production Integrazione di sistemi avanzati nella produzione industriale	II	IIND-04/A	9	B
Robot Mechanics Meccanica dei Robot	I	IIND-02/A	9	B

Design of Mechatronic Systems	I	IIND-03/A	9	B
Additional curricular elective activity: one exam from Table 1	I/II		9	B
Recommended courses for free choice: Table 1 and Table 2	I/II		9	D

(*) The exam *Statistical Learning for Industrial Engineering* can be taken after completing *Statistics for Technology*.

Table F1 - Curricular Elective Exams

Course Name	*Semestre*	*CFU*	*SSD*	*TAF*
Applied Mechanics for Energy Efficiency	II	9	IIND-02/A	*B/D*
Mechanical Systems Control Controllo dei sistemi meccanici	II	9	IIND-02/A	*B/D*
Dynamics of Mechanical Systems Dinamica dei Sistemi Meccanici	I	9	IIND-02/A	*B/D*
Dynamics of Railway Vehicles Dinamica del veicolo ferroviario	I	9	IIND-02/A	*B/D*
Vehicle Mechanics Meccanica del Veicolo	II	9	IIND-02/A	*B/D*
Robot Mechanics Meccanica dei Robot	I	9	IIND-02/A	*B/D*
Tribology and Diagnostics of Mechanical Systems Tribologia e diagnostica dei sistemi meccanici	I	9	IIND-02/A	*B/D*
Advanced Machine Design Complementi di Costruzione di Macchine	I	9	IIND-03/A	*B/D*
Vehicle Construction Costruzione di Autoveicoli	I	9	IIND-03/A	*B/D*
Railway Construction Costruzioni Ferroviarie	I	9	IIND-03/A	*B/D*
Design of Mechatronic Systems Design of Mechatronic Systems	I	9	IIND-03/A	*B/D*
Experimental Mechanics Meccanica Sperimentale	II	9	IIND-03/A	*B/D*
Assisted Design of Mechanical Structures Progettazione Assistita di Strutture Meccaniche	I	9	IIND-03/A	*B/D*
Mechanical Design Progettazione Meccanica	II	9	IIND-03/A	*B/D*
Railway Construction Techniques Tecnica delle costruzioni ferroviarie	II	9	IIND-03/A	*B/D*
Modeling and Simulation of Mechatronic Systems Modellazione e Simulazione di Sistemi Meccatronici	I	9	IIND-03/B	*B/D*
Bio-Inspired Generative Design for Additive Manufacturing	II	9	IIND-03/B	*B/D*
Digital Modeling and Simulation for Industrial Engineering Modellazione Geometrica e Prototipazione Virtuale	II	9	IIND-03/B	*B/D*
Sustainable Product Design and Development Progettazione e Sviluppo di Prodotto Sostenibile	I	9	IIND-03/B	*B/D*
Additive Manufacturing	I	9	IIND-04/A	*B/D*
Management and Control of Manufacturing Systems Gestione e Controllo dei Sistemi di Lavorazione	II	9	IIND-04/A	*B/D*
Green Manufacturing and Sustainability	I	9	IIND-04/A	*B/D*
Integration of Advanced Systems in Industrial Production Integrazione di Sistemi Avanzati nella Produzione Industriale	II	9	IIND-04/A	*B/D*
Computer-Aided Manufacturing Produzione Assistita da Calcolatore	I	9	IIND-04/A	*B/D*
Simulation and Modeling of Plastic Deformation Processes Simulazione e Modellazione dei Processi per Deformazione Plastica	I	9	IIND-04/A	*B/D*

Welding and Joining Techniques Tecnica della Saldatura e delle Giunzioni	I	9	IIND-04/A	*B/D*
Non-Conventional Materials Technologies Tecnologie dei Materiali non Convenzionali	II	9	IIND-04/A	*B/D*
Advanced and Resource Efficient Manufacturing Tecnologie Speciali	II	9	IIND-04/A	*B/D*
Logistics and Operation Management Gestione della Produzione Industriale	I	9	IIND-05/A	*B/D*
Smart Modelling of Industrial Production Systems	I	9	IIND-05/A	*B/D*
Project Management for Industrial Production Project Management per la Produzione Industriale	I	9	IIND-05/A	*B/D*
Safety and Maintenance of Industrial Plants Sicurezza e Manutenzione degli Impianti Industriali	II	9	IIND-05/A	*B/D*
Automated Production Systems Sistemi di Produzione Automatizzati	II	9	IIND-05/A	*B/D*

Table F2 - Additional Exams recommended for Autonomous Choice

Course Name	***Semestre***	***CFU***	***SSD***	***TAF***
Applied Acoustics Acustica Applicata	I	9	IIND-07/A	*B/D*
Heating and Cooling systems Impianti di Climatizzazione	II	9	IIND-07/A	*B/D*
Fluid Power and Pneumatic Systems Oleodinamica e Pneumatica	II	9	IIND-06/A	*B/D*
Probability and Statistics Probabilità e Statistica	I	9	STAT-01/B	*B/D*
Electronics for Intelligent Mechanical Systems Elettronica per Sistemi Meccanici Intelligenti	I	9	IINF-01/A	*B/D*
Machine Learning for Engineering	II	9	IINF-05/A	*B/D*
Energy Management for Transportation	I	9	IIND-08/A	*B/D*
Railway and Transit Services	II	9	CEAR-03/B	*B/D*

Curriculum Railway Mechanics

I Year

Course Name	SSD	Module	CFU	Hours	Type of Activity (lectures, lab, etc.)	TAF	Disciplinary Area	Mandatory/Optional
First Semester								
Railway Vehicle Dynamics Dinamica del veicolo ferroviario	IIND-02/A	Single	9	72	Lectures and exercises	B	Mechanical Engineering	Mandatory
Railway Construction Costruzioni ferroviarie	IIND-03/A	Single	9	72	Lectures and exercises	B	Mechanical Engineering	Mandatory
Product Management and Maintenance for Railways Elementi di gestione e manutenzione del prodotto ferroviario	IIND-05/A	Single	9	72	Lectures and exercises	B	Mechanical Engineering	Mandatory
Second Semester								
Electric Drives for Railway Traction Azionamenti Elettrici per la Trazione Ferroviaria	IIND-08/A	Single	6	48	Lectures and exercises	C	Mechanical Engineering	Mandatory
Hybrid Diesel-Electric Propulsion Propulsione Ibrida Diesel-Elettrica	IIND-06/B	Single	6	48	Lectures and exercises	B	Mechanical Engineering	Mandatory
Special Technologies Tecnologie speciali	IIND-04/A	Single	9	72	Lectures and exercises	B	Mechanical Engineering	9 CFU mandatory electives
Geometric Modeling and Virtual Prototyping Modellazione geometrica e prototipazione virtuale	IIND-03/B	Single	9	72	Lectures and exercises	B	Mechanical Engineering	
Curricular elective activity chosen by the student **(Table F1)**		Single	**A** (1)	A*8	Lectures and exercises	B	Mechanical Engineering	Elective (from suggested or approved study plan)
Free choice activity by the student **(see note a)**		Single	**B** (2)	B*8	Lectures and exercises	D		Elective (from suggested or approved study plan)
Additional language skills **(see note c)**			3			F		Mandatory

II Year

Course Name	SSD	Module	CFU	Hours	Type of Activity (lectures, lab, etc.)	TAF	Disciplinary Area	Mandatory/Optional
Organization and Safety of Railway Network Operations Organizzazione e sicurezza dell'esercizio delle reti ferroviarie	CEAR-03/B	Single	9	72	Lectures and exercises	C		Mandatory
Railway Construction Techniques Tecnica delle costruzioni ferroviarie	IIND-03/A	Single	9	72	Lectures and exercises	B	Mechanical Engineering	Mandatory

Curricular elective activity chosen by the student **(Table F1)**		Single	18-**A** (1)	(18-A)*8	Lectures and exercises	B	Mechanical Engineering	Elective (from suggested or approved study plan)
Free choice activity by the student **(Table F2 and Table F1)**		Single	9-**B** (2)	(9-B)*8	Lectures and exercises	D		Elective (from suggested or approved study plan)
Internship **(see note c)**			9			F		
Final Exam			15			E		

1) The curricular activities in note a) total 18 CFU, distributed between the first and second year depending on the choices made.
2) The free choice activities in note a) total 9 CFU, distributed between the first and second year depending on the choices made.

Notes:

a) A student who wishes to follow the Railway Mechanics Curriculum must notify this in writing at the time of enrollment. The selection of curricular activities by the student, in accordance with what is stated in Tables F1 and F2, defines an automatically approved study plan. Alternative solutions can be followed by presenting an individual study plan. The Coordinating Committee of the Master's Degree Program reserves the right to approve or reject such plans based on the justification provided by the student, as required by law. It should be noted that, in all cases, an exam can only be taken after the corresponding course has been delivered in the academic year of the study plan submission.

b) The internship can be either external (extramoenia) or internal (intramoenia). The external internship is carried out at companies, research centers, or other public and/or private entities, aiming to acquire specialized knowledge by working alongside professionals involved in design, production, and management of production or research plants, providing a first introduction to the professional world. The internal internship is conducted at university research laboratories to acquire specialized knowledge by collaborating with faculty members and researchers in carrying out research and development activities. In all cases, the internship must be documented in an internship booklet and certified by the university tutor using the AC form.

c) Students who do not possess certification of English language proficiency at least at the B2 level of the Common European Framework of Reference for Languages (CEFR) are required to include in their study plan a sufficient number of CFUs for Additional Language Skills to ensure they achieve this level of proficiency (3 CFUs). These credits can be acquired from external institutions or at the university's language center (cla.unina.it) and will be recognized upon submission of the certification. Students who already possess an English certificate at least at the B2 level at the time of enrollment may request its recognition for Additional Language Skills (3 CFUs).

d) The thesis work can also be carried out at companies in Italy or abroad. It must always be conducted under the direct and full responsibility of a faculty member from the Didactic Area of Engineering at the University of Naples Federico II (the procedures for assigning the thesis supervisor are specified in the Didactic Regulations of the Course of Study) and may, if necessary, include the collaboration of a company tutor. The procedures for assigning the company tutor are governed by the Didactic Regulations of the Course of Study as well as specific agreements.

TABLE F1 – Curricular Elective Activities Chosen by the Student

Course Name	Semester	CFU	SSD	Type
Applied Mechanics for Energy Efficiency	II	9	IIND-02/A	*B/D*
Mechanical Systems Control Controllo dei sistemi meccanici	II	9	IIND-02/A	*B/D*
Dynamics of Mechanical System Dinamica dei Sistemi Meccanici	I	9	IIND-02/A	*B/D*
Vehicle Mechanics Meccanica del Veicolo	II	9	IIND-02/A	*B/D*
Robot Mechanics Meccanica dei Robot	I	9	IIND-02/A	*B/D*
Tribology and Diagnostics of Mechanical Systems Tribologia e diagnostica dei sistemi meccanici	I	9	IIND-02/A	*B/D*
Advanced Machine Design Complementi di Costruzione di Macchine	I	9	IIND-03/A	*B/D*
Vehicle Construction Costruzione di Autoveicoli	I	9	IIND-03/A	*B/D*
Design of Mechatronic Systems	I	9	IIND-03/A	*B/D*
Experimental Mechanics Meccanica Sperimentale	II	9	IIND-03/A	*B/D*
Assisted Design of Mechanical Structures Progettazione Assistita di Strutture Meccaniche	I	9	IIND-03/A	*B/D*
Mechanical Design Progettazione Meccanica	II	9	IIND-03/A	*B/D*
Modeling and Simulation of Mechatronic Systems Modellazione e Simulazione di Sistemi Meccatronici	I	9	IIND-03/B	*B/D*
Bio-Inspired Generative Design for Additive Manufacturing Bio-Inspired Generative Design for Additive Manufacturing	II	9	IIND-03/B	*B/D*
Geometric Modeling and Virtual Prototyping Modellazione Geometrica e Prototipazione Virtuale	II	9	IIND-03/B	*B/D*
Sustainable Product Design and Development Progettazione e Sviluppo di Prodotto Sostenibile	I	9	IIND-03/B	*B/D*
Additive Manufacturing	I	9	IIND-04/A	*B/D*
Management and Control of Manufacturing Systems Gestione e Controllo dei Sistemi di Lavorazione	II	9	IIND-04/A	*B/D*
Green Manufacturing and Sustainability	I	9	IIND-04/A	*B/D*
Integration of Advanced Systems in Industrial Production Integrazione di sistemi avanzati nella produzione industriale	II	9	IIND-04/A	*B/D*
Computer-Aided Manufacturing Produzione Assistita da Calcolatore	I	9	IIND-04/A	*B/D*
Simulation and Modeling of Plastic Deformation Processes Simulazione e Modellazione dei Processi per Deformazione Plastica	I	9	IIND-04/A	*B/D*
Welding and Joining Techniques Tecnica della Saldatura e delle Giunzioni	I	9	IIND-04/A	*B/D*
Non-Conventional Materials Technologies Tecnologie dei Materiali non Convenzionali	II	9	IIND-04/A	*B/D*
Special Technologies Tecnologie Speciali	II	9	IIND-04/A	*B/D*
Industrial Production Management Gestione della Produzione Industriale	I	9	IIND-05/A	*B/D*
Smart Modelling of Industrial Production Systems	I	9	IIND-05/A	*B/D*
Project Management for Industrial Production Project Management per la Produzione Industriale	I	9	IIND-05/A	*B/D*
Safety and Maintenance of Industrial Plants Sicurezza e Manutenzione degli Impianti Industriali	II	9	IIND-05/A	*B/D*

Automated Production Systems Sistemi di Produzione Automatizzati	II	9	IIND-05/A	*B/D*

Table F2 - Additional Exams recommended for Autonomous Choice

Course Name	Semestre	CFU	SSD	TAF
Internal Combustion Engines Motori a combustione interna	I	9	IIND-06/A	D
Hydraulics and Pneumatics Oleodinamica e Pneumatica	II	9	IIND-06/B	D
Heat Transfer Trasmissione del calore	I	9	IIND-07/A	D
Applied Acoustics Acustica Applicata	I	9	IIND-07/A	D
Air Conditioning Systems Impianti di Climatizzazione	II	9	IIND-07/B	D
Electrical Engineering for Automotive and Mechatronics Elettrotecnica per l'Automotive e la Meccatronica	II	9	IIET-01/A	D
Electric Systems for Renewable Energy Sistemi Elettrici per le Fonti Rinnovabili	II	9	IIND-08/B	D
Design of Electronic Circuits and Systems Progettazione di Circuiti e Sistemi Elettronici	I	9	IINF-05/A	D
Power Devices and Circuits Dispositivi e Circuiti di Potenza	I	9	IINF-05/A	D
Energy Management for Transportation Gestione dell'Energia per i Trasporti	I	9	IIND-08/A	D
Electric Technologies for Mobility Tecnologie elettriche per la mobilità	I	9	IIND-08/A	D
Surface Engineering Ingegneria delle Superfici	I	12	IMAT-01/A	D
Business Economics and Organization Economia ed Organizzazione Aziendale	I	6	IEGE-01/A	D
Business Management Gestione Aziendale	II	6	IEGE-01/A	D
Statistics for Technology Statistica per la Tecnologia	II	6	STAT-01/B	D
Statistical Learning for Industrial Engineering Apprendimento Statistico per l'Ingegneria Industriale	I	6	STAT-01/B	D
Electronics for Intelligent Mechanical Systems Elettronica per Sistemi Meccanici Intelligenti	I	6	IINF-05/A	D
Machine Learning for Engineering Apprendimento Automatico per l'Ingegneria	II	6	IINF-05/A	D
Polymer Science Scienza dei Polimeri	I	6	IMAT-01/A	D
Polymer Technology Tecnologia dei Polimeri	II	6	IMAT-01/A	D

Curriculum Sustainable Development

I Year

Course Name	SSD	Module	CFU	Hours	Type of Activity (lectures, lab, etc.)	TAF	Disciplinary Area	Mandatory/ Optional
Mandatory curricular activities (36 CFU) chosen from the following subjects depending on the path (see note a)								
Advanced Structural Mechanics	IIND-03/A	Single	9	72	Lectures and exercises	B	Mechanical Engineering	36 CFU Mandatory electives
Mechanical vibrations	IIND-02/A	Single	9	72	Lectures and exercises	B		
Logistics and Operation Management	IIND-05/A	Single	9	72	Lectures and exercises	B		
Digital Modeling and Simulation for Industrial Engineering	IIND-03/B	Single	9	72	Lectures and exercises	B		
Advanced and Resource Efficient Manufacturing	IIND-04/A	Single	9	72	Lectures and exercises	B		
Curricular elective activities **(see note a)**		Single	**A** (1)	A*8	Lectures and exercises	B	Mechanical Engineering	Elective (from suggested or approved study plan)
Affiliated or Integrative Activity **(see note a)**		Single	**B** (2)	B*8	Lectures and exercises	C		Elective (from suggested or approved study plan)
Free choice activity by the student **(see note a)**		Single	**C** (3)	C*8	Lectures and exercises	D		Elective (from suggested or approved study plan)
Additional language skills **(see note c)**			3			F		Mandatory

II Year

Course Name	SSD	Module	CFU	Hours	Type of Activity (lectures, lab, etc.)	TAF	Disciplinary Area	Mandatory/ Optional
Curricular elective activity **(see note a)**		Single	36-A (^)	36-**A** (1)	Lectures and exercises	B	Mechanical Engineering	Elective (from suggested or approved study plan)
Affiliated or Integrative Activity **(see note a)**		Single	12-B (°)	12-**B** (2)	Lectures and exercises	C		Elective (from suggested or approved study plan)
Free choice activity by the student **(see note a)**		Single	9-C (°)	9-**C** (3)	Lectures and exercises	D		Elective (from suggested or approved study plan)
Internship **(see note b)**			9			F		
Final Exam **(see note d)**			15			E		

1) The curricular activities mentioned in note a) amount to 36 CFU, distributed between the first year (max 18 CFU) and the second year, depending on the choices made.
2) The affiliated or integrative activities mentioned in note a) amount to 12 CFU, distributed between the first and second year, depending on the choices made.
3) The free choice activities mentioned in note a) amount to 9 CFU, distributed between the first and second year, depending on the choices made.

Notes:

a) A student who wishes to follow the Sustainable Development Curriculum must notify this in writing at the time of enrollment. The selection of curricular activities by the student, in accordance with what is stated in Tables G1, G2, and G3, defines an **automatically approved study plan**. Alternative solutions can be followed by presenting an individual study plan. The Coordinating Committee of the Master's Degree Program reserves the right to approve or reject such plans based on the justification provided by the student, as required by law. It should be noted that, in all cases, an exam can only be taken after the corresponding course has been delivered in the academic year of the study plan submission.

b) The internship can be either external (extramoenia) or internal (intramoenia). The external internship is carried out at companies, research centers, or other public and/or private entities, aiming to acquire specialized knowledge by working alongside professionals involved in design, production, and management of production or research plants, providing a first introduction to the professional world. The internal internship is conducted at university research laboratories to acquire specialized knowledge by collaborating with faculty members and researchers in carrying out research and development activities. In all cases, the internship must be documented in an internship booklet and certified by the university tutor using the AC form.

c) Students who do not possess certification of English language proficiency at least at the B2 level of the Common European Framework of Reference for Languages (CEFR) are required to include in their study plan a sufficient number of CFUs for Additional Language Skills to ensure they achieve this level of proficiency (3 CFUs). These credits can be acquired from external institutions or at the university's language center (cla.unina.it) and will be recognized upon submission of the certification. Students who already possess an English certificate at least at the B2 level at the time of enrollment may request its recognition for Additional Language Skills (3 CFUs).

d) The thesis work can also be carried out at companies in Italy or abroad. It must always be conducted under the direct and full responsibility of a faculty member from the Didactic Area of Engineering at the University of Naples Federico II (the procedures for assigning the thesis supervisor are specified in the Didactic Regulations of the Course of Study) and may, if necessary, include the collaboration of a company tutor. The procedures for assigning the company tutor are governed by the Didactic Regulations of the Course of Study as well as specific agreements.

TABLE G1 – Curricular Elective Activities Chosen by the Student

Course Name	Semester	CFU	SSD	Type
Applied Mechanics for Energy Efficiency	II	9	IIND-02/A	*B/D*
Mechanical vibrations	I	9	IIND-02/A	*B/D*
Design of Mechatronic Systems	I	9	IIND-03/A	*B/D*
Advanced Structural Mechanics	I	9	IIND-03/A	*B/D*
Bio-Inspired Generative Design for Additive Manufacturing	II	9	IIND-03/B	*B/D*
Digital Modeling and Simulation for Industrial Engineering	II	9	IIND-03/B	*B/D*
Additive Manufacturing	I	9	IIND-04/A	*B/D*
Advanced and Resource Efficient Manufacturing	II	9	IIND-04/A	*B/D*
Green Manufacturing and Sustainability	I	9	IIND-04/A	*B/D*
Logistics and Operation Management	I	9	IIND-05/A	*B/D*
Smart Modelling of Industrial Production Systems	I	9	IIND-05/A	*B/D*

TABLE G2 – Affiliated or Integrative Activities Chosen by the Student

Course Name	Semester	CFU	SSD	TAF	Disciplinary Area
Statistical Learning for Industrial Engineering (1)	I	6	STAT-01/B	D	LM-IMPP
Machine Learning for Engineering	II	6	IINF-05/A	D	LM-IMPP
Sustainable Metallurgy	II	6	IIND-03/C	D	LM-IMPP
Materials Selection for Engineering Applications	I	6	IMAT-01/A	D	LM-IMPP

(1) The course Statistical Learning for Industrial Engineering can only be chosen if the student has documented prior knowledge of basic statistics.

TABLE G3 – Additional Recommended Courses for Free Choice

Course Name	Semester	CFU	SSD	TAF	Disciplinary Area
Principles and Applications of Fluid Machinery	II	9	IIND-06/A	D	LM-IMEA
Heat Transfer Principles in Engineering	I	9	IIND-07/A	D	LM-IMEA
Smart Production Systems	II	9	IIND-05/A	D	LM_IELT
Design of Electronic Circuits and Systems	I	9	IINF-01/A	D	LM-IELN
Power Devices and Circuits	I	9	IINF-01/A	D	LM-IELN
Energy Management for Transportation	I	9	IIND-08/A	D	LM_TEAM
Railway and Transit Services	II	9	CEAR-03/B	D	LM_TEAM