MASTER'S DEGREE COURSE

INDUSTRIAL ENGINEERING FOR SUSTAINABLE MANUFACTURING

24—25

UNI UD

The MSc (Laurea Magistrale) in Industrial Engineering for Sustainable Manufacturing is rooted in a triple-bottom line view of sustainability, and in a life cycle perspective on goods, services, and supply chains. Students will acquire practical knowledge of the latest technologies for the sustainable production of goods and services, and will become able to engineer safe and innovative products and processes. They will delve into the subjects at the core of digital manufacturing, such as additive manufacturing, robotics, and simulation, and they will get to master analytic approaches and computational tools to assess the environmental impact of industrial and logistic processes, and of manufactured goods over their life cycles.
Two curricular options are available:

Track M – Metals, production and materials provides students with a solid understanding of materials science and a practical focus on metals, on their properties and on the production processes of the metal industry.

Track E – Processing, Energy & Environment gives students the skills needed to reengineer and decarbonize industrial processes, by offering courses in renewable energy conversion, hydrogen technologies, carbon capture and utilization.

Active learning approaches, lab-based and project-based learning are a distinctive feature of this program, with a focus on real engineering case-studies.

The strengths of this program are its international character and the close cooperation with environmental consultancy firms, public agencies, energy-intensive and circular manufacturing companies, and generally with companies striving to optimize the sustainability of their processes, which represent the intended workplace for Industrial Engineers for Sustainable Manufacturing.

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INDUSTRIAL ENGINEERING FOR SUSTAINABLE MANUFACTURING

LOCATION	DURATION	ECTS	LANGUAGE
UDINE, CAMPUS "RIZZI"	2 YEARS	120	TAUGHT ENTIRELY IN ENGLISH

DEGREE EQUIVALENCE ACCORDING TO ITALIAN LAW

The program qualifies as an "interclass" degree program in LM-31-33 INGEGNERIA GESTIONALE – INGEGNERIA MECCANICA. This means that, when applying for graduation, students are free to choose whether to earn their Master's degree either in Mechanical Engineering – LM 33 INGEGNERIA MECCANICA or in Management Engineering – LM 31 INGEGNERIA GESTIONALE.

PROGRAM ENROLMENT

To enrol in this Master's program, you must hold a relevant bachelor's degree with major in engineering from either an Italian or a foreign university.
If the degree is awarded by an Italian university, a bachelor's degree (Laurea Triennale) in class L-9 (Industrial engineering) is required.
You will also be required to demonstrate proficiency in English at an upper-intermediate level (level B2 in the Common European Framework of Reference). This will be assessed by the Advisor Committee of the program, who will evaluate whether you meet the admission criteria by examining your application, the attached documents and certifications of your academic and linguistic background, and by arranging an interview if needed.
Enrolment of students who are not EU-citizens and/or who hold a BSc from a foreign university is subject to specific regulation.

Find more information here: **https://www.uniud.it/en/uniud-international/International_Students/enrolment-recognition-of-foreign-titles-and-diplomas** and write to studenti@uniud.it to get info and support for your specific case.

CURRICULUM OVERVIEW

FIRST YEAR

COURSES AND ACTIVITIES	ECTS
Sustainable Manufacturing (ING-IND/16)	**6**
integrated with	
Smart Manufacturing and Process Digitalization (ING-IND/16)	**6**
Fundamentals of Control Systems and Optimal Control (ING-INF/04)	**6**
Project Management (ING-IND/35)	**6**
Circular Economy (ING-IND/35)	**6**
integrated with	
Sustainable Supply Chain Management (ING-IND/35)	**6**
Mechatronic Systems (ING-IND/13)	**6**
integrated with	
Robotics (ING-IND/13)	**6**
Cleaner Production Systems (ING-IND/17)	**6**

ELECTIVE TRACK COURSES

TRACK M METAL PRODUCTIONS AND MATERIALS (6 CFU)

COURSES	ECTS
Materials for Sustainable Industrial Manufacturing Processes (ING-IND/22)	**6**

TRACK E PROCESSING AND ENVIRONMENT/ ENERGY (6 CFU)

COURSES	ECTS
Industrial eco-efficiency (ING-IND/17)	**6**

SECOND YEAR

COURSES AND ACTIVITIES	ECTS
Green Machine Design (ING-IND/14) *integrated with* **Digital Modelling for Structural Analysis and Design (ING-IND/14)**	6 6
Elective activities (*)	12
Seminars and workshops held by expert from companies	3
Preparation and discussion of the Master's thesis	15

ELECTIVE TRACK COURSES

TRACK M METAL PRODUCTIONS AND MATERIALS (18 CFU)

COURSES	ECTS
Fundamentals of Metallurgy (ING-IND/21) *integrated with* **Environmentally Friendly Plants for Steelmaking and Metallurgy (ING-IND/21)**	6 6
Advanced Technologies for Green Manufacturing (ING-IND/16)	6

TRACK E PROCESSING AND ENVIRONMENT/ ENERGY (18 CFU)

COURSES	ECTS
Decarbonization of Processing Industry (ING-IND/27) integrated with **Hydrogen Technologies (ING-IND/27)**	6 6
Sustainable Energy Conversion Systems (ING-IND/09)	6

(*) Elective activities

Credits for elective activities may be assigned to students for:

- Curricular (i.e. not thesis related) internships in companies (150 h equivalent to 6 ECTS or 300 h equivalent to 12 ECTS)
- Internal internships at labs or programs internal to the university (up to 150 h equivalent to 6 ECTS)
- Exams taken abroad in Erasmus programs which do not have an immediate equivalent in the study plan Additional elective courses.
- Additional elective courses can be chosen from any of the scheduled courses offered by the University of Udine at the graduate level. They are generally subject to approval by the Teaching commission of the program. Following courses offered at the Polytechnic Department of Engineering and Architecture are especially recommended:

COURSES	ECTS
Applied Statistics (SECS-S/01)	6
Data analytics & machine learning (ING-INF/05)	6
Exergy analysis (ING-IND/10)	6
Industrial Buildings' Sustainability (ICAR/10)	6

DPIA

DIPARTIMENTO POLITECNICO DI INGEGNERIA E ARCHITETTURA
UNIVERSITÀ DEGLI STUDI DI UDINE

UNIVERSITÀ DEGLI STUDI DI UDINE
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