Zero Defect Manufacture for a Circular Economy

Master Science programme

General. Basic information

Name & type	Zero Defect Manufacture for a Circular Economy
Mode & duration	full-time, 2 years Credits: 120 ECTS
Accreditation	EIT Label accreditation - November 2020
Annual Tuition fee	EU/EFTA students tuition fee: EUR 8000.00 per year NON EU/EFTA students tuition fee: EUR 15000.00 per year Students financial support is provided to a sub-set of enrolled students. No specific request is needed. Available financial support is: * based on merit

EIT Manufacturing Master School

'Join the force of Innovation in Manufacturing'

The **EIT Manufacturing Master School** offers two-year programmes that encompasses a year of intensive study at two different universities, where students acquire comprehensive knowledge and expertise in their chosen field. Additionally, the **programme includes a three-week summer school** emphasizing a minor track in **Innovation & Entrepreneurship** held at a third university, enriching the learning experience further.

This initiative is a collaborative effort led by EIT Manufacturing, in association with **seven university partners**. Together, we have designed and implemented five diverse programmes that merge technical and technological coursework with specialized training in innovation and entrepreneurship. These programmes provide students with a multifaceted education that not only equips them with a strong academic foundation but also **fosters the development of practical skills** necessary for success in the dynamic and evolving landscape of manufacturing. The education at EITM Manufacturing Master School combines technical competencies with skills in Innovation and Entrepreneurship. EIT Manufacturing Master School students will be an elite group of forthcoming engineers, operators, innovators, and other relevant professionals.

Programme Overview

The **Zero-Defect Manufacture for a Circular Economy programme (ZD)** is a **Master of Science level programme** within the EIT Manufacturing (EITM) Master School. The EITM Master School is a highly prestigious Manufacturing Engineering and Science education provider on advanced level with a focus on Innovation and Entrepreneurship (I&E). The education at EIT Manufacturing Master School combines technical competence with skills in Innovation and Entrepreneurship. EIT Manufacturing Master School students will be an elite group of forthcoming engineers, operators, innovators, and other relevant professionals.

The EIT Manufacturing Master School students will:

- improve their knowledge on up to date manufacturing innovation and learn how to turn this knowledge into successful business;
- take part in events such as Summer Schools and Kick-offs;
- exchange ideas with business partners and researchers at Co-Locations Centres (CLC) and during internships;
- have access to renowned European research facilities;
- earn double degree and the EIT Manufacturing Certificate.

Zero Defect Manufacture for a Circular Economy is a combination of studying manufacturing science including physics of equipment and processes, data analysis, including the methodology

to use gained process data in the context of process quality, and process management including the flexibility enabled for smaller lot production. During the programme students will gain new skills in these areas.

- **In manufacturing science,** relevant fields include main thermal and mechanical processing technologies, with special reference to new processes with growing industrial importance and applied in different sectors, including automotive, aerospace, biomedical and energy.
- **In data analysis,** relevant fields include modelling, monitoring and improvement methods to design and manage data in industrial and service scenarios.
- **In process management,** relevant fields include analysis, design, and implementation of business and industrial processes as well as their business performance.

Programme structure

The first year is spent at one university (entry) and second year at another (exit) university in two different European countries. There is a choice of 4 entry points and 3 exit points.

The following universities provide an **entry year (first year)**:

- Aalto University (Aalto), Finland
- University College Dublin (UCD), Ireland
- Grenoble INP (GINP), France
- University of Trento (UNITN), Italy

The following parties provide an **exit year (second year)**:

- Aalto University (Aalto), Finland
- Grenoble INP (GINP), France
- University of Trento (UNITN), Italy

Possible combinations:

Combination	ENTRY University (YEAR 1)	EXIT University (YEAR 2)
Combination 1	University College Dublin (UCD)	Aalto University (Finland)

Combination 2	University College Dublin (UCD)	Grenoble INP (GINP)
Combination 3	Grenoble INP (GINP)	Aalto University (Finland)
Combination 4	Aalto University (Finland)	Grenoble INP (GINP)
Combination 5	University College Dublin (UCD)	University of Trento (UNITN)
Combination 6	Aalto University (Finland)	University of Trento (UNITN)
Combination 7	University of Trento (UNITN)	Aalto University (Finland)
Combination 8	University of Trento (UNITN)	Grenoble INP (GINP)
Combination 9	Grenoble INP (GINP)	University of Trento (UNITN)

EIT Manufacturing reserves the right to change the exit universities of this programme

Curricula structure:

The two years programme (120 ECTS) includes an Innovation and Entrepreneurship (I&E) Module (30 ECTS) and a Technical Major Module (90 ECTS) structured as follows:

- 45 ECTS for Host Programme technical courses
- 15 ECTS for Host Programme AM specialization courses
- 30 ECTS for the I&E Module courses
- 30 ECTS for the Master thesis

Students are committed to collect a total of 40-50 ECTS related to the Technical Major and of 10-20 ECTS related to the I&E Module in the first year (60 ECTS total) whereas in the second year they are committed to collect 10-20 ECTS for the Technical Major, 10-20 ECTS for the I&E Module and 30 ECTS for the Master Thesis Project (60 ECTS total). The total of technical

courses and specialization courses must be 60 ECTS, within the boundaries above. All Master School education will be held in English and all partner universities are assumed to use ECTS units.

NOTE: Each university can have, in addition to the general programme above, compulsory requirements for the student study plan, such us mandatory local language courses. You you will be informed by your university about this.

DEGREES and EIT Label Certificate:

At the end of the EIT Manufacturing Zero-Defect Manufacture for a Circular Economy programme (ZD) of 120 ECTS, students will get two degrees from each entry and exit university, according to the following list:

- **Aalto:** Diplomi-insinööri, Diplomingenjör, Master of Science (Technology), Decree of the Council of State on University Degrees (1136/2009) – 120 ECTS degree
- **Grenoble INP:** Master of Industrial Engineering => 120 ECTS
- **UNITN:** Management and Industrial Systems Engineering => 120 ECTS

In addition to the National Accredited degrees, the students receive the **EIT Label Certificate**, documenting the EIT accreditation and high quality of the programme.

Career opportunities:

Students will have a solid background with well-founded scientific knowledge with a significant technical and application content, favouring immediate entrance to job market. Typical functions of a ZD engineer includes quality management, design and management of manufacturing processes, industrial installations as well as production and logistics systems, maintenance management.

A student who graduates from the Zero-Defect Manufacture for a Circular Economy programme (ZD) shall:

- be able to implement the gained engineering expertise in ZD to create new or improved methods, techniques, products, and services in the field;
- be able to think out-of-the-box to find innovative solutions to real-world problems and to come up with new ideas;
- be able to draw up plans and to make decisions foreseeing future consequences from a scientific, ethical, and societal perspective;
- be able to turn innovations in the area into feasible and successful business solutions;
- be able to profitably work in small size teams and contexts by taking into account all relevant elements and showing effective decision-making and leadership abilities.

Admission process:

➢ First application window deadline is 8th December!

Please note we recommend this deadline to NON EU/EFTA students requiring to apply for a VISA to study in Europe.

If you apply BY 8th December:

- you will be evaluated along December 2024.
- you will receive the offer from the EIT Manufacturing in January 2024.
- local enrolment will start in February*
- 9th December your application will be frozen and we don't consider any further modification and resubmission

*as a preliminary date, depending on the individual conditions of the university

➢ Second application window deadline is 15th January!

Please note we recommend this deadline to NON EU/EFTA students requiring to apply for a VISA to study in Europe.

If you apply BY 15th January:

- you will be evaluated along January 2025.
- you will receive the offer in February 2025.
- local enrolment will start in February*
- 16th January your application will be frozen and we don't consider any further modification and resubmission.

*as a preliminary date, depending on the individual conditions of the university

➢ Third application window deadline is 31st March 2025!

If you apply BY 31st March:

- you will be evaluated along April 2025.
- you will receive the offer in April 2025.
- local enrolment will start in April*
- 1st April March your application will be frozen and we don't consider any further modification and resubmission.

*as a preliminary date, depending on the individual conditions of the university

other IMPORTANT information:

- Please check special university requirements, before applying!
- Applicants must have completed a bachelor's degree encompassing a minimum of 180 ECTS credits.
- Students should have basic competence in engineering analysis, production operations, and mathematics including calculus, algebra, and mathematical statistics.
- Conditional acceptance:
    - Students in their final year of undergraduate education may also apply and if qualified, receive a conditional acceptance. If you have not completed your studies, please include a written statement from the degree administration office (or equivalent department), confirming that you are enrolled in the final year of your education and giving your expected completion date – which should be before the start of the Master's programme.
    - **If you receive a conditional offer, you should present your degree certificate to your entry university before enrollment at the latest.**
- The specific required admission diplomas are:

The specific required admission diplomas are:

B.Sc. degree in Mechanical Engineering, Manufacturing Engineering, Computational Engineering, Mechatronics, Industrial Engineering or equivalent degrees.

Documentation languages:

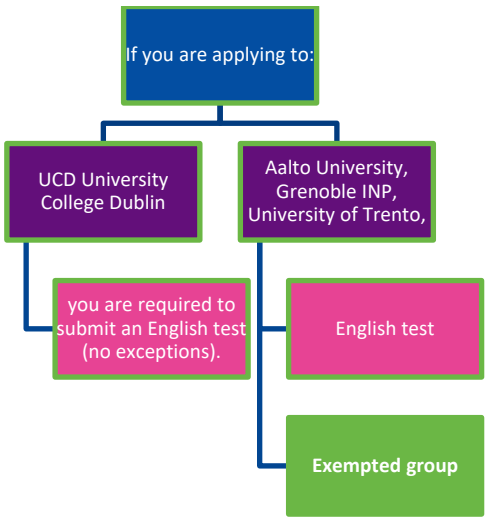
The entry qualification documents are accepted in the following languages: **English** (issued in or officially translated along with verified copies))

You must provide a duly certified copy of transcript of records in original language and translated into English. All courses must be included. Please scan the front and back of every document- all stamps and signatures must be fully visible.

Language requirements:

- ## Language proficiency requirements for EIT Manufacturing Master School

The language of instruction in all EIT Manufacturing Master School programmes is English. All applicants must provide proof of sufficient proficiency in English. Generally, the proficiency must be proved with sufficient results in a language test. Certain groups of applicants may be exempted from the language test but required to provide other documentation on their language proficiency. Only the tests and exemptions listed below will be accepted. Applications without acceptable proof of English proficiency will be discarded and not evaluated further. All language test results must be electronically verifiable.



- ## Accepted English language tests and minimum scores

Please note that the English test must be taken on or after 30 September 2023. Older results will not be accepted.

- IELTS >= 6.5, with no section lower than 6 A photocopy of your test IELTS test result together with your application documents is sufficient.
- TOEFL IBT>= 93 (minimum 21 for writing, 19 in the other sections) English test results from TOEFL should be uploaded to your application form and **sent directly** from the ETS test centre to the EIT Manufacturing Master School Office. (EIT Manufacturing Master School code number: C898 , you can choose industrial engineering if you apply to "Platform for Digitalized Value Networks" and "Data Science and AI for Competitive Manufacturing", otherwise choose mechanical engineering for the other programmes))
- CAE: grades A – C are accepted. Attach the document to your application on the DreamApply portal.
- CPE: grades A – C are accepted. Attach the document to your application on the DreamApply portal.

Exempted group

Aalto University, Grenoble INP, University of Trento, you may be exempted from the English test if you meet one of the conditions presented below in the table:

Exempted group	Required proof
Applicants who have completed a bachelor's degree (180 ECTS or equivalent) instructed in English at a university in an EU/EFTA country.	Degree certificate, diploma supplement, transcript of records or other official document issued by the institution clearly stating the language of instruction.

Applicants who have completed a bachelor's degree instructed in English at a university that is physically located in one of the following countries: Antigua and Barbuda, the Bahamas, Barbados, Belize, Botswana, Cameroon, Canada, Dominica, Eritrea, Eswatini, Ethiopia, Gambia, Ghana, Grenada, Guyana, Hong Kong, India, Jamaica, Kenya, Lesotho, Liberia, Malawi, Namibia, Nigeria, the Philippines, Rwanda, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, Sierra Leone, Singapore, South Africa, Switzerland, Tanzania, Trinidad and Tobago, Uganda, Zambia, or Zimbabwe.	Degree certificate or proof of estimated graduation granted by a university in this country.
Applicants who have completed a bachelor's degree instructed in English at a university that is physically located in one of the following countries: Australia, Canada, New Zealand, the United Kingdom, or the United States.	Degree certificate or proof of estimated graduation granted by a university in this country.
Applicants who have completed secondary education degree instructed in English in: an EU/EEA country, Australia, Canada, New Zealand, South Africa, Switzerland, the United Kingdom or the United States while residing in that country.	Secondary-school final certificate in PDF format. If the degree is completed in an EU/EEA country, Switzerland or South Africa, English as the language of instruction must be stated unambiguously on the certificate. For those countries, if the language of instruction is not indicated on the certificate, upload an official document issued by the institution clearly stating the language of instruction.

Documents to submit:

To apply to the Master School, you are required to upload the following documents/elements.

IMPORTANT: you need to **submit a complete application package** consisting of the following documents, in pdf and portrait format, **before the application deadline.**

It is every prospective student´s responsibility to make sure their application is correct and complete.

- **Degree Certificate/Diploma in its original language AND translated into English** (If your university does not provide this service, the translation has to be done by an authorized translator and his/her credentials, signature and stamps must be visible in the translated document). In case of on-going studies, a statement certifying that you are in the final year of your studies. The statement must be written by the degree administration office (or equivalent department), confirming that you are enrolled on the final year of your education and giving your expected completion date.

- **Official and stamped transcript of records in original language and translated into English.** All courses taken must be included. Please scan the front and back of every document- all stamps and signatures must be fully visible.

- **Proof of English proficiency.** Please refer to the 'Language requirements' section for more information.

- **Curriculum Vitae** including details on your academic and professional career, based on EuroPass template CV. Please note that no other CV formats than EuroPass will be accepted and your application will be automatically rejected if you do not meet this condition.

EuroPass CV editor you can find here: europa.eu/europass/eportfolio/screen/cv-editor?lang=en

- **Records of evidence** Please attach an additional, single PDF file, which will be a record and supporting document of your CV. This means that if you have

references, letters of recommendation, employment certificates, volunteer work certificates, contacts to people etc. who can attest to your educational and professional activity. All these evidence files must be one PDF, which you can create using a simple online creator.

- **Motivation short movie** A short motivational movie (max 2 minutes). In the movie, please answer two questions:

    1) Why are you fit for this program?

    2) where do you see yourself five years after graduation?

- **A coloured copy of your either National ID (only for EU/EFTA students) or passport**

Please notice that, from the moment you are admitted, your university will contact you to complete the formalities for enrolment and might request additional documents from you.

IMPORTANT:

- Please upload the **original version of your degree certificate and transcript of records.** If this is not possible, photocopies of your degree certificate, transcript of records and statements should be **stamped and signed by the degree administrations office (or equivalent department) of the issuing institution, or by a Notary Public.** Please note that we do not accept documents after the deadline. All documents must be uploaded/come in before the deadline in order for us to process your application.
- **Applications that are not supported by official documents will not be processed.**
- **Applications with fraudulent documents will invariably be rejected.**
- **All admitted students must present the original Transcript of records and Degree Certificate/Diploma before enrolment.**

VISA:

Applicants are responsible for their own VISA.

SYLLABI:

- Study plan –
UCD - Aalto collaboration

General structure of the EIT-M Master Programme

Type of modules	Total credits for EIT-M Master	Total credits 1st year	Total credits 2nd year
Technical courses (TC)	45	40-50	10-20
Specialization courses (SC)	15		
Innovation & entrepreneurship courses (I&E)	30	10-20	10-20
Master thesis (MT)	30	0	30
Tot	120	60	60

Entry university UCD – exit university Aalto

1st year UCD

ME Manufacturing Engineering w Zero Defect Man for a Circular Econ - Programme Details (ucd.ie)

Type of modules	UCD courses	ECTS	Semes-ter	Total credits
TC	Eng. Decision Support Systems	5	2	
	Manufacturing Engineering II	5	1	

	Supply Chain Design & Analysis	5	1	
	Energy Systems and Climate Change	5	1	
	Advanced Polymer Engineering	5	2	
	Operations Management	5	2	
SC	Sys. Anal. & Improv. (EITM)	5	1	
	Data Analytics for Engineers	5	1	
I&E	CBE Business Plan	5	2	
	Technical Comms (Online) (option)	5	1	
	Innovation Leadership (option)	5	1	
	Research Skills and Techniques (option)	5	1	
	Professional Engineering (Finance)	5	2	
	Professional Engineering (Management)	5	2	

2nd year Aalto

Note: The course list below belongs to Curriculum 2024-2026 which was published on 2 April 2024 at https://www.aalto.fi/en/programmes/masters-programme- in-manufacturing/curriculum-2024-2026. Aalto curriculum is renewed biannually.

Type of modules	Course code and name at Aalto	ECTS	Semes-ter	Total credits
	Compulsory courses			
TC	MEC-E1090 Quality Management and Metrology	5	1	8 ECTS
	LC-1310 Academic Communication for Msc students	3	1	
	Optional courses (select 7 to 10 ECTS)			7 ECTS
	MEC-E1075 Selection of Materials and Manufacturing Processes	5	1	

	MEC-E7012 Manufacturing Operations	5	1	
	MEC-E3007 Product Sustainability	5	1	
	MEC-E1003 Machine Design Project	5	1	
	MEC-E1061 Computer-Aided Engineering	5	1	
	MEC-E3900 Prototyping Tools at the Design Factory	1	1	
	JOIN-E3910 Design Thinking for Innovation	1-2	1	
I&E	TU-E4101 Entrepreneurship Lab	10	2	15 ECTS
	MEC-E7010 EIT Manufacturing Summer School	5	summer	

Recap

Type of modules	ECTS in S1	ECTS in S2	ECTS in S3	ECTS in S4	Total credits
TC	15	15	8		**45**
SC	10	0	7		**15**
I&E	5	15	10+5		**30**
MT				30	
	30	30		63	**120**

This study plan focuses on manufacturing engineering theory and practice, machine design, circular economy in energy systems, climate change and materials. Learners will gain specialised knowledge on quality control and improvement and data analytics to aid developing decision support systems for engineering practices, aiming at minimising defect and waste.

- Study plan –
UCD – Grenoble collaboration

General structure of the EIT-M Master Programme

Type of modules	Total credits for EIT-M Master	Total credits 1st year	Total credits 2nd year
Technical courses (TC)	45	40-50	10-20
Specialization courses (SC)	15		
Innovation & entrepreneurship courses (I&E)	30	10-20	10-20
Master thesis (MT)	30	0	30
Tot	120	60	60

Entry university UCD – exit university Grenoble INP

ME Manufacturing Engineering w Zero Defect Man for a Circular Econ - Programme Details (ucd.ie)

1st year - UCD

Type of modules	UCD courses	ECTS	Semes-ter	Total credits
TC	Eng. Decision Support Systems	5	2	
	Manufacturing Engineering II	5	1	
	Supply Chain Design & Analysis	5	1	
	Energy Systems and Climate Change	5	1	

	Advanced Polymer Engineering	5	2	
	Operations Management	5	2	
SC	Sys. Anal. & Improv. (EITM)	5	1	
	Data Analytics for Engineers	5	1	
I&E	CBE Business Plan	5	2	
	Technical Comms (Online) (option)	5	1	
	Innovation Leadership (option)	5	1	
	Research Skills and Techniques (option)	5	1	
	Professional Engineering (Finance)	5	2	
	Professional Engineering (Management)	5	2	

2nd year - Grenoble INP

Note: The course list below belongs to Curriculum 2024-2026 which was published on July 2024 at https://genie-industriel.grenoble-inp.fr/en/studies/master-in-sustainable-industrial-engineering-sie#page-programme. Grenoble INP curriculum is renewed biannually.

Type of modules	Grenoble courses	ECTS	Semes-ter	Total credits
TC (mandatory)	Multi-criteria Decision Aiding and Artificial Intelligence - 5GUC4202	5	S3	15
	Smart analytics for big data - 5GUC3500	5	S3	
	Virtual Reality for Industry 4.0 - 5GUC3319	5	S3	
SC (1 choice out of 4)	Circular EconomiX - 5GUC4302	6	S3	6
	Lean Six Sigma - 5GUC1304	6	S3	
	Environment Politics and Firm Strategies -	6	S3	

	5GUC4502			
	Advanced Life Cycle Assessment - 5GUC4402	6	S3	
I&E (the first two mandatory)	Centrally organized summer school-WGUS7804	5	S3	10
	Mastering Customer Satisfaction & Operational Excellence in the context of New Product Development - 5GUC5104	5	S3	
	Innovation challenge - 5GUC4602	0	S3	
MT	Master thesis - WGUS4015	30	S4	30

Recap

Type of modules	ECTS in S1	ECTS in S2	ECTS in S3	ECTS in S4	Total credits
TC	15	15	15		**45**
SC	10	0	6		**16**
I&E	5	15	10		**30**
MT				30	**30**
Total	**30**	**30**	**31**	**30**	**121**

There is a strong focus on lifecycle assessment and techniques for measuring circular economy practices as specialised courses. The concepts of smart analytics and VR for Industry 4.0 to aid establishing a quality control and assurance systems are also covered in this study plan.

Study plan
Grenoble INP –Aalto collaboration

1st year - Grenoble INP

Local up-to-date webpages for entry/exit university courses:

Note: The course list below belongs to Curriculum 2024-2026 which was published on July 2024 at https://genie-industriel.grenoble-inp.fr/en/studies/master-in-sustainable-industrial-engineering-sie#page-programme. Grenoble INP curriculum is renewed biannually.

Type of modules	UCD courses	ECTS	Semes-ter	Total credits
TC	Sustainability in industrial engineering - WGUS1074	3	S1	33 (18 S1, 15 S2)
	Basic Economics for Sustainable Industrial Engineering - WGUS1014	3	S1	
	Information systems management - WGUS2044	3	S1	
	Industry 4.0/Industry 5.0 - WGUS7202	3	S1	
	Performance evaluation of production systems - WGUS1065	3	S1	
	Sustainable design and innovation management - WGUS3012	3	S2	
	Industrial Economics for Sustainable industrial Engineering - WGMS7028	3	S2	
	Discrete event simulation and optimization - WGUS8042	6	S2	
	Research Project - 4GUC00E5	3	S2	
	Data analytics for industrial engineering - WGUS2092	3	S1	
SC	Project Management - WGUS7504	3	S1	9 (3 S1, 6 S2)
	Production and operations management - WGUS1044,	3	S2	
	Project on Data Analytics for Manufacturing - WGUS3022	3	S2	

I&E	Sustainable work and organization - WGUS2082	3	S1	18 (9 S1, 9 S2)
	French and Intercultural communication (S7) – WGMS7011 and WGMS7021	3	S1	
	Product Development Project 1 - 4GMP1611	3	S1	
	Product Development Project 2 - 4GUP1901	6	S2	
	Inventive problem solving, bio inspired innovation - WGUS2071	3	S2	

2nd year Aalto

Note: The course list below belongs to Curriculum 2024-2026 which was published on 2 April 2024 at https://www.aalto.fi/en/programmes/masters-programme- in-manufacturing/curriculum-2024-2026. Aalto curriculum is renewed biannually.

Type of modules	Course code and name at Aalto	ECTS	Semes-ter	Total credits
	Compulsory courses			
TC	MEC-E1090 Quality Management and Metrology	5	1	8 ECTS
	LC-1310 Academic Communication for Msc students	3	1	
	Optional courses (select 7 to 10 ECTS)			7 ECTS
	MEC-E1075 Selection of Materials and Manufacturing Processes	5	1	
	MEC-E7012 Manufacturing Operations	5	1	
	MEC-E3007 Product Sustainability	5	1	
	MEC-E1003 Machine Design Project	5	1	
	MEC-E1061 Computer-Aided Engineering	5	1	
	MEC-E3900 Prototyping Tools at the Design Factory	1	1	
	JOIN-E3910 Design Thinking for Innovation	1-2	1	
	TU-E4101 Entrepreneurship Lab	10	2	

I&E	MEC-E7010 EIT Manufacturing Summer School	5	summer	15 ECTS

Recap

Type of modules	ECTS in S1	ECTS in S2	ECTS in S3	ECTS in S4	Total credits
TC	18	15	8		41
SC	3	6	7		16
I&E	9	9	15		33
MT				30	30
Total	30	30	30	30	120

Study plan –
Aalto –Grenoble INP collaboration

1st year Aalto

Local up-to-date webpages for entry/exit university courses

Note: The course list below belongs to Curriculum 2024-2026 which was published on 2 April 2024 at https://www.aalto.fi/en/programmes/masters-programme- in-manufacturing/curriculum-2024-2026. Aalto curriculum is renewed biannually.

Type of modules	Course code and name at Aalto	ECTS	Semes-ter	To tal cre dits
	Compulsory courses			
TC	MEC-E1003 Machine Design Project	5	1	10 ECTS
	MEC-E1061 Computer-Aided Engineering	5	1	
SC	MEC-E1090 Quality Management and Metrology	5	1	10 ECTS
	MEC-E1075 Selection of Materials and Manufacturing Processes	5	1	
	Optional courses (select 25 ECTS)			25 ECTS
	MEC-E7012 Manufacturing Operations	5	2	
	MEC-E6002 Welding Technology and Design	5	2	
	MEC-E7011 Machining Processes	5	2	
	MEC-E7013 Casting and Forming Technologies	5	2	
	MEC-E7006 Advanced Manufacturing	5	2	
	MEC-E7009 Design for Additive Manufacturing	5	2	

I&E	TU-E4101 Entrepreneurship Lab	10	2	15 ECTS
	LC-1317 Integrated Project Communication for MSc Students (o,w) **	3	2	
	Elective courses (choose 2 ECTS)			
	MEC-E3900 Prototyping Tools at the Design Factory*	1	1	
	JOIN-E3910 Design Thinking for Innovation*	1-2	1	
	TU-C2080 Entrepreneurship Essentials *	1	1	
	TU-C2090 Starting Up *	1	1	

*) Online self-study courses that can be completed in any period / term, but we recommend these in the autumn term to secure sufficient background knowledge for Startup Experience in the spring.

**) Integrated with Entrepreneurship Lab; cannot be completed as a stand-alone course. This course is not mandatory for students who have completed a bachelor degree in Finland. The course fulfills the requirements of compulsory foreign language course in the degree. If you don't take this course, pick another eligible language course either in the autumn or in the spring term. Registration is required separately to both Entrepreneurship Lab and Integrated Project Communication course.

2nd year - Grenoble INP

Local up-to-date webpages for entry/exit university courses:

Note: The course list below belongs to Curriculum 2024-2026 which was published on July 2024 at https://genie-industriel.grenoble-inp.fr/en/studies/master-in-sustainable-industrial-engineering-sie#page-programme. Grenoble INP curriculum is renewed biannually.

Type of modules	Grenoble INP courses	ECTS	Semes-ter	Total credits
TC (2 choices out of 4)	Multi-criteria Decision Aiding and Artificial Intelligence - 5GUC4202	5	3	10
	Smart analytics for big data - 5GUC3500	5	3	
	Tactical and Operational Supply Chain Management - 5GUC2004	5	3	
	Virtual Reality for Industry 4.0 - 5GUC3319	5	3	
SC	Circular EconomiX - 5GUC4302	6	3	6
	Lean Six Sigma - 5GUC1304	6	3	
	Environment Politics and Firm Strategies - 5GUC4502	6	3	

(1 choice out of 4)	Advanced Life Cycle Assessment - 5GUC4402	6	3	
I&E (all 3 mandatory)	Centrally organized summer school - WGUS7804	5	3	14
	Mastering Customer Satisfaction & Operational Excellence in the context of New Product Development - 5GUC5104	5	3	
	Innovation challenge - 5GUC4602	4	3	
MT	Master thesis - WGUS4015	30	4	30

Recap

Type of modules	ECTS in S1	ECTS in S2	ECTS in S3	ECTS in S4	Total credits
TC	10	0	10		45
SC	10	25	6		15
I&E	2	13	14		32
MT				30	30
Total	22	38	30	30	122

Study plan –
UCD - Trento collaboration

General structure of the EIT-M Master Programme

Type of modules	Total credits for EIT-M Master	Total credits 1st year	Total credits 2nd year
Technical courses (TC)	45	40-50	10-20
Specialization courses (SC)	15		
Innovation & entrepreneurship courses (I&E)	30	10-20	10-20
Master thesis (MT)	30	0	30
Tot	120	60	60

Entry university UCD – exit University of Trento

1st year UCD

ME Manufacturing Engineering w Zero Defect Man for a Circular Econ - Programme Details (ucd.ie)

Draft plan:

Type of modules	UCD courses	ECTS	Semes-ter	Total credits
TC	Eng. Decision Support Systems	5	2	
	Manufacturing Engineering II	5	1	

	Supply Chain Design & Analysis	5	1	
	Energy Systems and Climate Change	5	1	
	Advanced Polymer Engineering	5	2	
	Operations Management	5	2	
SC	Sys. Anal. & Improv. (EITM)	5	1	
	Data Analytics for Engineers	5	1	
I&E	CBE Business Plan	5	2	
	Technical Comms (Online) (option)	5	1	
	Innovation Leadership (option)	5	1	
	Research Skills and Techniques (option)	5	1	
	Professional Eng. (Finance) (core)	5	2	
	Professional Engineering (Management) (core)	5	2	

2nd year Trento

Type of modules	Trento courses	ECTS	Semes-ter	Total credits
TC	Digital production and logistics systems	9	1	9 ECTS
	(Systems Dynamics)	(9)	1	
SC	Engineering system design	6	1	6 ECTS
I&E	People management and company organization	10	1	15 ECTS
	Summer school (centrally organized by EIT)	5	1	
MT	Master thesis + integration to master thesis	30	2	30 ECTS

* attendance to an Italian Language course (Level A1 CEFR) on top to the mandatory 120 ECTS

Recap

Type of modules	ECTS in S1	ECTS in S2	ECTS in S3	ECTS in S4	Total credits
TC	15	15	9		**39**
SC	10	0	6		**16**
I&E	5	15	10+5		**35**
MT				30	**30**

With this study path, most of the focus goes to digitalisation of production and logistics systems, data analytics and development of decision support systems. The aim is to equipped learners with digital tools that can help them build systems for minimising quality failures, waste. Subjects related to climate change and sustainable development goals will be also covered in this study plan

Study plan –
Aalto - Trento collaboration

1st year Aalto

Local up-to-date webpages for entry/exit university courses

Note: The course list below belongs to Curriculum 2024-2026 which was published on 2 April 2024 at https://www.aalto.fi/en/programmes/masters-programme- in-manufacturing/curriculum-2024-2026. Aalto curriculum is renewed biannually.

Type of modules	Course code and name at Aalto	ECTS	Semes-ter	Total credits
	Compulsory courses			
TC	MEC-E1003 Machine Design Project	5	1	10 ECTS
	MEC-E1061 Computer-Aided Engineering	5	1	
SC	MEC-E1090 Quality Management and Metrology	5	1	10 ECTS
	MEC-E1075 Selection of Materials and Manufacturing Processes	5	1	
	Optional courses (select 25 ECTS)			25 ECTS
	MEC-E7012 Manufacturing Operations	5	2	
	MEC-E6002 Welding Technology and Design	5	2	
	MEC-E7011 Machining Processes	5	2	
	MEC-E7013 Casting and Forming Technologies	5	2	
	MEC-E7006 Advanced Manufacturing	5	2	
	MEC-E7009 Design for Additive Manufacturing	5	2	
I&E	TU-E4101 Entrepreneurship Lab	10	2	
	LC-1317 Integrated Project Communication for MSc Students (o,w) **	3	2	

	Elective courses (choose 2 ECTS)			15 ECTS
	MEC-E3900 Prototyping Tools at the Design Factory*	1	1	
	JOIN-E3910 Design Thinking for Innovation*	1-2	1	
	TU-C2080 Entrepreneurship Essentials *	1	1	
	TU-C2090 Starting Up *	1	1	

*) Online self-study courses that can be completed in any period / term, but we recommend these in the autumn term to secure sufficient background knowledge for Startup Experience in the spring.

**) Integrated with Entrepreneurship Lab; cannot be completed as a stand-alone course. This course is not mandatory for students who have completed a bachelor degree in Finland. The course fulfills the requirements of compulsory foreign language course in the degree. If you don't take this course, pick another eligible language course either in the autumn or in the spring term. Registration is required separately to both Entrepreneurship Lab and Integrated Project Communication course.

2nd year UNITN (from 2025/26)

2nd year Trento *

Type of modules	Trento courses	ECTS	Semes-ter	Total credits
TC	Digital production, assembly and logistics systems	9	1	9 ECTS
	(Systems Dynamics)			
SC	Engineering system design	6	1	6 ECTS
I&E	People management and company organization	10	1	15 ECTS
	Summer school (centrally organized by EIT)	5	1	
MT	Master thesis + integration to master thesis	30	2	30 ECTS

* attendance to an Italian Language course (Level A1 CEFR) on top to the mandatory 120 ECTS

Study plan –
Trento - Aalto collaboration

General structure of the EIT-M Master Programme

Type of modules	Total credits for EIT-M Master	Total credits 1st year	Total credits 2nd year
Technical courses (TC)	40-48	40-50	10-20
Specialization courses (SC)	10-20		
Innovation & entrepreneurship courses (I&E)	30	10-20	10-20
Master thesis (MT)	30	0	30
Total	**120**	**60**	**60**

1st year UNITN 2024/25 *(from 2025/26)*

Type of modules	UNITN courses	ECTS	Semester	Total credits
TC				36
	Advanced manufacturing and sustainable products	12	1 and 2	
	Dynamics in systems and networks (Digital production and logistics systems)	12	2	
	Optimization models and algorithms	6	1	
	Materials selection for engineering design	6	1	

	Elective course	6	1 or 2	
	Elective course	6	1 or 2	
I&E	Financial analysis and performance management	6	1	12
	Project management	6	2	

Elective courses at 1st year:

Type of modules	UNITN courses	ECTS	Semester
SC			
	Design of precision systems	6	1
	Circular economy for materials processing	6	2
	Sustainable materials management	6	2
	Recycling and sustainable materials	6	2

* attendance to an Italian Language course (Level A1 CEFR) on top to the mandatory 120 ECTS

2nd year Aalto

Note: The course list below belongs to Curriculum 2024-2026 which was published on 2 April 2024 at https://www.aalto.fi/en/programmes/masters-programme- in-manufacturing/curriculum-2024-2026. Aalto curriculum is renewed biannually.

Type of modules	Course code and name at Aalto	ECTS	Semes-ter	Total credits
	Compulsory courses			
	MEC-E1090 Quality Management and Metrology	5	1	

TC	LC-1310 Academic Communication for Msc students	3	1	8 ECTS
	Optional courses (select 7 to 10 ECTS)			7 ECTS
	MEC-E1075 Selection of Materials and Manufacturing Processes	5	1	
	MEC-E7012 Manufacturing Operations	5	1	
	MEC-E3007 Product Sustainability	5	1	
	MEC-E1003 Machine Design Project	5	1	
	MEC-E1061 Computer-Aided Engineering	5	1	
	MEC-E3900 Prototyping Tools at the Design Factory	1	1	
	JOIN-E3910 Design Thinking for Innovation	1-2	1	
I&E	TU-E4101 Entrepreneurship Lab	10	2	15 ECTS
	MEC-E7010 EIT Manufacturing Summer School	5	summer	

Type of modules	ECTS in S1	ECTS in S2	ECTS in S3	ECTS in S4	Total credits
TC	24	12	8		**46**
SC		12	7		**17**
I&E	6	6	10+5		**28**
MT	30	30	30	30	**30**

Study plan –
Trento – Grenoble INP collaboration

1st year UNITN*2024/25 *(from 2025/26)*

Local up-to-date webpages for entry/exit university courses:

MANAGEMENT AND INDUSTRIAL SYSTEMS ENGINEERING | Course Catalogue, Università di Trento (cineca.it)

Type of modules	UNITN courses	ECTS	Semester	Total credits
TC	Advanced manufacturing and sustainable products	12	1 and 2	36
	Dynamics in systems and networks (Digital production and logistics systems)	12	2	
	Optimization models and algorithms	6	1	
	Materials selection for engineering design	6	1	
SC	*Elective course*	6	1 or 2	12
	Elective course	6	2	
I&E	Financial analysis and performance management	6	1	18
	Project management	6	2	

* attendance to an Italian Language course (Level A1 CEFR) on top to the mandatory 120 ECTS

Elective courses at 1st year:

Type of modules	UNITN courses	ECTS	Semester
SC	Design of precision systems	6	1
	Circular economy for materials processing	6	2
	Sustainable materials management	6	2
	Recycling and sustainable materials	6	2

2nd year Grenoble

Local up-to-date webpages for entry/exit university courses:

Note: The course list below belongs to Curriculum 2024-2026 which was published on July 2024 at https://genie-industriel.grenoble-inp.fr/en/studies/master-in-sustainable-industrial-engineering-sie#page-programme. Grenoble INP curriculum is renewed biannually.

Type of module	Grenoble courses (M2)	ECTS	Semester	Total credits
SC	Circular EconomiX - 5GUC4302	5	S3	10
	Advanced Life Cycle Assessment - 5GUC4402	5	S3	
TC (2 courses among 5)	Multi-criteria Decision Aiding and Artificial Intelligence - 5GUC4202	5	S3	10
	Smart Analytics for Big Data - 5GUC3500	5	S3	
	Lean Six Sigma - 5GUC1304	5	3	
	Environment Politics and Firm Strategies - 5GUC4502	5	3	
	Virtual Reality for Industry 4.0 - 5GUC3319	5	S3	
	Centrally organized summer school - WGUS7804	5	S3	

IE	Mastering Customer Satisfaction & Operational Excellence in the context of New Product Development - 5GUC5104 OR iDesigner : Tackling Complexity by Integration - 5GUC0904	5	S3	10
MT	Master thesis - WGUS4015	30	S4	30

Recap

Type of modules	ECTS in S1	ECTS in S2	ECTS in S3	ECTS in S4	Total credits
TC	18	18	10		**46**
SC	6	6	10		**18**
I&E	6	6	10		**26**
MT				30	**30**
Total	30	30	30	30	**120**

Study plan
Grenoble INP- Trento collaboration

1st year Grenoble – entry

Local up-to-date webpages for entry/exit university courses:

Note: The course list below belongs to Curriculum 2024-2026 which was published on July 2024 at https://genie-industriel.grenoble-inp.fr/en/studies/master-in-sustainable-industrial-engineering-sie#page-programme. Grenoble INP curriculum is renewed biannually.

Type of module	Grenoble courses (M1)	ECTS	Semester	Total credits
SC	Project Management - WGUS7504	3	S1	9 (3 S1, 6 S2)
	Production and Operations Management -	3	S2	
	Project on Data Analytics for Manufacturing - WGUS3022	3	S2	
TC	Sustainability in Industrial Engineering -	3	S1	36 (21 S1, 15 S2)
	Basic Economics for Sustainable Industrial Engineering - WGUS1014	3	S1	
	Product Development Project 1 - 4GMP1611	3	S1	
	Information Systems Management - WGUS2044	3	S1	
	Industry 4.0/Industry 5.0 - WGUS7202	3	S1	
	Performance Evaluation of Production Systems - WGUS1065	3	S1	
	Data analytics for industrial engineering -	3	S1	
	Sustainable design and innovation management - WGUS3012	3	S2	
	Industrial Economics for Sustainable industrial Engineering - WGMS7028	3	S2	
	Research Project - 4GUC00E5	3	S2	
	Discrete Event Simulation and Optimization -	6	S2	
	Sustainable work and organization - WGUS2082	3	S1	

IE	French and intercultural communication (S7) - WGMS7011 and WGMS7021	3	S1	15 (6 S1, 9 S2)
	Product Development Project 2 - 4GUP1901	6	S2	
	Inventive problem solving, bio inspired innovation - WGUS2071	3	S2	

2nd year UNITN*

A.Y.2024/25 (from 2025/26)

Local up-to-date webpages for entry/exit university courses:

MANAGEMENT AND INDUSTRIAL SYSTEMS ENGINEERING | Course Catalogue, Università di Trento (cineca.it)

Type of modules	Trento courses	ECTS	Semes-ter	Total credits
TC	Digital production and logistics systems (Systems Dynamics)	9	1	9 ECTS
SC	Engineering system design	6	1	6 ECTS
I&E	People management and company organization	10	1	15 ECTS
	Summer school (centrally organized by EIT)	5	1	
MT	Master thesis + integration to master thesis	30	2	

* attendance to an Italian Language course (Level A1 CEFR)

Recap

Type of modules	ECTS in S1	ECTS in S2	ECTS in S3	ECTS in S4	Total credits
TC	21	15	9		45

SC	3	6	6		15
I&E	6	9	15		30
MT				30	30
Total	30	30	30	30	120