Appendices to the Teaching and Examination Regulations for the Master's degree programme in Industrial Engineering and Management (2025-2026)

I. Learning outcomes
II. Tracks/specializations
III. Content of the degree programme
IV. Electives
V. Entry requirements and compulsory order of examinations
VI. Admission to the degree programme
VII. Pre-master programmes
VIII. Transitional provisions
IX. Additional Requirements Open degree programmes

Appendix I Learning outcomes of the degree programme (Article 3.1)

After the master's degree programme Industrial Engineering and Management students have:

1. The knowledge to describe complex and advanced technological processes and products in a managerial/business context.
2. The understanding to diagnose the functionality and performance of such processes and products in a multi-disciplinary way (e.g. technological, managerial and from the viewpoint of various stakeholders).
3. The skills to (re)design, implement and then evaluate such processes and products.
4. The knowledge, understanding and skills for doing research, i.e. applying industrial engineering methodologies in research.
5. The knowledge, understanding and skills for life-long learning (including information retrieval and ICT-use) needed to function autonomously.
6. The skills to think critically and communicate scientifically about ideas and solutions with engineers and managers.
7. The knowledge and understanding of advanced technology, managerial/business sciences and mathematics to do research and to enter a PhD-program in Industrial Engineering or a related discipline.
8. Professional skills for managerial, societal and ethical behaviour when applying technology.

Appendix II Tracks/Specializations of the degree programme (Article 3.6)

The master's programme Industrial Engineering and Management contains two tracks:

1. Production Technology and Logistics (PTL)
2. Sustainable Process Engineering (SPE)

Appendix III Content of the degree programme (Article 3.8)

Production Technology and Logistics Track

Course unit name	Course code	ECTS	Entry requirements
Nonlinear and Dynamic Optimization	WMIE035-05	5	
Robotics for IEM	WMIE005-05	5	
Technology Based Entrepreneurship	WMIE006-05	5	
Foundations of Logistics Systems Engineering	WMIE002-05	5	
Analysis and Control of Smart Systems	WMIE015-05	5	
Sustainable Industrial Practice	WMIE027-05	5	
Systems Engineering	WMIE021-05	5	
Elective courses		25	
Research Methodology	WMIE025-05	5	
Master's Design Project	WMIE901-25	25	- Research Methodology - 45 ECTS of 1st year IEM Master's programme - Passed the Scientific Integrity module (WMME004-00)
Master's Research Project	WMIE905-30	30	- Research Methodology - 45 ECTS of 1st year IEM Master's programme - Passed the Scientific Integrity module (WMME004-00)

Sustainable Process Engineering Track

Course unit name	Course code	ECTS	Entry requirements
Bioprocesses for Engineers	WMIE028-05	5	
Technology Based Entrepreneurship	WMIE006-05	5	
Advanced Polymer Processing	WMCE006-05	5	
Advanced LCA for Sustainability	WMIE034-05	5	
Advanced Product Engineering	WMCE007-05	5	
Sustainable Industrial Practice	WMIE027-05	5	
Systems Engineering	WMIE021-05	5	
Elective courses		25	
Research Methodology	WMIE025-05	5	
Master's Design Project	WMIE901-25	25	- Research Methodology - 45 ECTS of 1st year IEM Master's programme - Passed the Scientific Integrity module (WMME004-00)
Master's Research Project	WMIE905-30	30	- Research Methodology - 45 ECTS of 1st year IEM Master's programme - Passed the Scientific Integrity module (WMME004-00)

The assessment methods of the courses can be found in the assessment plan of the degree programme and on ocasys.rug.nl. The teaching method of the courses can be found on ocasys.rug.nl.

Appendix IV Electives (Article 3.9.1)

Students choose 25 ECTS of elective courses. These courses fit into five different specializations. However, students are free to choose from courses from any specialization.

The specializations of the Production Technology and Logistics track:
1. Production Logistics Engineering (PLE)
2. Advanced Production Engineering (APE)
3. Smart Systems in Control and Automation (SSCA)

The specializations of the Sustainable Process Engineering track:
1. Chemical Engineering (CE)
2. Biotechnology (BT)

Production Technology and Logistics track – Electives Production Logistics Engineering

Course unit name	Course code	ECTS
Advanced LCA for Sustainability	WMIE034-05	5
Game Theory with Engineering Applications	WMIE009-05	5
Simulation of Logistic Systems Engineering	WMIE002-05	5
Engineering Design Integration	WMEE029-05	5
Data-driven Optimization	WMME011-05	5
Introduction to Stochastic Programming	WMIE019-05	5

Production Technology and Logistics track – Electives Advanced Production Engineering

Course unit name	Course code	ECTS
Advanced LCA for Sustainability	WMIE034-05	5
MEMS, NEMS and Nanofabrication	WMIE010-05	5
Surface Engineering & Coating Technology	WMIE013-05	5
Multiscale Contact Mechanics and Tribology	WMIE011-05	5
Compressible Flows	WMCE008-05	5
Engineering Design Integration	WMEE029-05	5
Mechanical Properties	WMPH023-05	5
Product Design by the Finite Element Method	WMIE003-05	5
CFD for Engineers	WMCE013-05	5
Composites and Metamaterials	WMME031-05	5

Production Technology and Logistics track – Electives Smart Systems in Control and Automation

Course unit name	Course code	ECTS
Multibody and Non-Linear Dynamics	WMME009-05	5
Advanced LCA for Sustainability	WMIE034-05	5
Simulation of Logistic Systems Engineering	WMIE002-05	5
Fitting Dynamical Models to Data	WMIE007-05	5
Iterative Algorithms	WMMA057-05	5
MEMS, NEMS and Nanofabrication	WMIE010-05	5
Multiscale Contact Mechanics and Tribology	WMIE011-05	5
Surface Engineering & Coating Technology	WMIE013-05	5
Game Theory with Engineering Applications	WMIE009-05	5
Compressible Flows	WMCE008-05	5
Engineering Design Integration	WMEE029-05	5
Multimodal Mobile Sensing	WMCS041-05	5
Nonlinear Control Systems	WMSC003-05	5
CFD for Engineers	WMCE013-05	5
Data-driven Optimization	WMME011-05	5
Mathematical Modelling*	WBMA007-05	5

* The bachelor's course WBMA007-05 Mathematical Modelling has been deemed of appropriate level for IEM master's students and may therefore be taken as an elective.

Sustainable Process Engineering track – Electives Chemical Engineering

Course unit name	Course code	ECTS
Processes and Products for a Sustainable Carbon Cycle	WMCE021-05	5
Polymer Products	WMCE005-05	5
Catalysis for Engineers	WMCE002-05	5
Interfacial Engineering	WMCE003-05	5
Microfluidics	WMME020-05	5
Circular Polymers	WMCE017-05	5
Compressible Flows	WMCE008-05	5
Design of Industrial Catalysts	WMCE009-05	5
Engineering Design Integration	WMEE029-05	5
Product Focused Process Design	WMCE011-05	5
Advanced Process and Energy Technologies	WMCE012-05	5
CFD for Engineers	WMCE013-05	5

Sustainable Process Engineering track – Electives Biotechnology

Course unit name	Course code	ECTS
Processes and Products for a Sustainable Carbon Cycle	WMCE021-05	5
Polymer Products	WMCE005-05	5
Food Pharma Products	WMIE008-05	5
Microfluidics	WMME020-05	5
Circular Polymers	WMCE017-05	5
Engineering Design Integration	WMEE029-05	5

The assessment method of the courses can be found in the assessment plan of the degree programme and on ocasys.rug.nl. The teaching methods and entry requirements of the courses can be found on ocasys.rug.nl.

Appendix V Entry requirements and compulsory order of examinations (Article 4.4)

A student is allowed to start with either the Design project or Research project if at least 45 ECTS of first year courses, Research Methodology, and Scientific Integrity have been passed.

Appendix VI Admission to the degree programme (Article 2.1A.1 + 2.1B.1)

1. Holders of a Bachelor's degree in Industrial Engineering and Management from the University of Groningen.

Holders of other degrees with equivalent learning outcomes may be eligible for admission as well, but will need to file a request for admission.

Appendix VII Pre-master programmes

1. FSE offers Pre-Master's programmes of *60 EC, 45 EC or 30 EC* and individually determined Pre-Master's programmes. The overview below shows:
- which NVAO-accredited HBO diploma grants access to the MSc Industrial Engineering and Management after completion of the Pre-Master;
- the content and student workload for these fixed programmes.

a. Bachelor Mechanical Engineering/Werktuigbouwkunde (croho 34280)

Semester	Course Title	Course Code	ECTS
1	Design of Complex Systems	WBIE059-10	10
1a	Operations Research	WBIE007-05	5
1b	Linear Algebra (for IEM)	WBIE009-05	5
1b	Organizational Behaviour and Group Dynamics	WBIE012-05	5
2a	Calculus 2 (for IEM)	WBIE017-05	5
2a	Production Techniques	WBIE040-05	5
2a	Signals and Systems	WBIE030-05	5
2b	Control Engineering	WBIE034-05	5
Total			45

- Starting date 1 September

b. Bachelor Chemical Engineering/Chemische Technologie (croho 34275)

Semester	Course Title	Course Code	ECTS
1	Design of Complex Systems	WBIE059-10	10
1a	Operations Research	WBIE007-05	5
1b	Linear Algebra (for IEM)	WBIE009-05	5
1b	Organizational Behaviour and Group Dynamics	WBIE012-05	5
2a	Calculus 2 (for IEM)	WBIE017-05	5

2a	Technical Thermodynamics (IEM)	WWBIE031-05	5
2b	Applied Transport Phenomena for Sustainable Processes	WBIE058-05	5
2b	Process Design and Equipment	WBIE039-05	5
Total			45

- Starting date 1 September

2. For programmes not listed above, the Board of Admissions decides:
a. The content and the student workload of a tailor-made Pre-Master's programme.
or
b. Admission is not accepted.

The starting dates of the tailor-made programmes can be either 1 September or 1 February, depending on the selection of courses.

Appendix VIII Transitional provisions (Article 7.1)

The transitional arrangement is an arrangement that students can use if they wish to replace a course that is part of their Teaching and Examination Regulations, but either no longer exists or has been changed to a different course in a later set of Teaching and Examination Regulations. In some cases, an arrangement can consist of multiple courses. If a transition is not in the list of transitional arrangements, students will need permission from the Board of Examiners first.

Discontinued course units				**Substitute course units**				
Course unit code	*Course unit name*	*ECTS*	*Final exam period*	*Course unit code*	*Course unit name*	*ECTS*	*Explanation*	*Equivalent Yes/No*
WMIE029-05	Engineering Design Integration	5	2024-2025	WMEE029-05	Engineering Design Integration	5	Course will fall under the responsibility of the EES programme from this academic year onwards.	Yes
WMIE026-05	Optimization in Engineering Systems	5	2024-2025	WMIE035-05	Nonlinear and Dynamic Optimization	5	The course material of the new course is adjusted so that it is suitable for all IEM students.	No

Appendix IX Additional requirements open degree programmes (Article 3.10)

Students wishing to pursue an open degree programme may file a request with the Board of Examiners Engineering. The Board of Examiners will evaluate whether the proposed curriculum meets the learning outcomes of the degree programme.