



university of
 groningen

**Appendices for the Master's degree programme(s) in
 Mechanical Engineering (2022-2023)**

Appendix I Learning outcomes of the degree programme (art. 3.1)

After the completion of a master's degree programme in Mechanical Engineering, the graduate is expected to attain the following learning outcomes.

On knowledge and understanding

The graduate:

- 1.1. Has knowledge of the underlying concepts of mechanical engineering, including the necessary physics, mathematics and computer science, at a level that permits admission to a higher level post-graduate programme;
- 1.2. Is familiar with the quantitative character of mechanical engineering and with the relevant research methods;
- 1.3. Has operational knowledge and design skills in the field of mechanical engineering;
- 1.4.
 - a. Has a thorough understanding of advanced instrumentation (For Advanced Instrumentation Track);
 - b. Has a thorough understanding of smart processes, engineering materials and products (For Smart Factories Track);
 - c. Has a thorough understanding of process design for energy systems (For Smart and Green Energy Systems Track);
- 1.5. Has knowledge in the field of business and management.

On the synthesis and application of knowledge and understanding

The graduate:

- 2.1. Is able to carry out research in order to understand phenomena that are usable in developing mechanical engineering applications;
- 2.2. Is able to analyse a (new) complex applied problem, and develop a structured and well-planned approach to search for a solution;
- 2.3. Is able to apply his/her mechanical engineering knowledge and skills in his/her own and related subject areas;
- 2.4. Is able to seek new applications for mechanical engineering concepts 2.5 is able to use advanced instrumentation and/or advanced programming tools 2.6 is able to apply mechanical engineering concepts in an industrial environment or in an international mechanical engineering research environment;
- 2.5. Is able to collaborate in a (multi-disciplinary) international research and design team.

On reasoning and judgement

The graduate:

- 3.1. Is able to obtain relevant information using modern information channels, and interprets this information critically for specific use in mechanical engineering research;
- 3.2. Judges his/her and others' actions within a scientific context, taking societal and ethical aspects into account;
- 3.3. Is able to draw conclusions on the basis of limited or incomplete information, and realizes and formulates the limitations of such conclusions.

On communication skills

The graduate:

- 4.1. Is able to communicate clearly, verbally and in writing, on his/her subject and relevant applications, at different levels understandable to experts and non-experts using relevant communication tools.

On learning skills

The graduate:

- 5.1. Is able to address issues inside as well as outside his/her main subject area, therefore and thereby gaining new knowledge and skills;
- 5.2. Is able to familiarize him/herself with recent advances in science and engineering and use them in mechanical engineering applications.

Appendix II Tracks/specializations of the degree programme (art. 3.6)

The degree programme has three tracks:

1. Advanced Instrumentation
2. Smart Factories, two specializations
 - a. Materials for Mechanical Engineering
 - b. Robotics, Mechatronics & Smart Systems
3. Smart and Green Energy Systems

Appendix III Content of the degree programme (art. 3.8)

Advanced Instrumentation Track:

Course unit name	Course code	EC TS	Entry requirements
Basic Detection Techniques	WMAS002-05	5	
Introduction to Data Science	WMME027-05	5	
Computational Solid Mechanics	WMME028-05	5	
Advanced Instrumentation and Extreme Environments	WMME006-05	5	
Analysis and Control of Smart Systems	WMIE015-05	5	
Experimental Design	WMME012-05	5	
Course in Business, Management and Society		5	
Elective courses		25	
Master Design Project Mechanical Engineering	WMME901-20	20	Passed 45 ECTS of first year courses of the ME master programme
Master Research Project Mechanical Engineering	WMME902-40	40	Passed 45 ECTS of first year courses of the ME master programme

Smart Factories Track:

Course unit name	Course code	EC TS	Entry requirements
Introduction to Data Science	WMME027-05	5	
Robotics for IEM	WMIE005-05	5	
Advanced Processing for Complex Materials	WMME007-05	5	
Computational Solid Mechanics	WMME028-05	5	
Analysis and Control of Smart Systems	WMIE015-05	5	
Experimental Design	WMME012-05	5	
Course in Business, Management and Society		5	
Elective courses		25	
Master Design Project Mechanical Engineering	WMME901-20	20	Passed 45 ECTS of first year courses of the ME master programme
Master Research Project Mechanical Engineering	WMME902-40	40	Passed 45 ECTS of first year courses of the ME master programme

Smart and Green Energy Systems Track:

Course unit name	Course code	EC TS	Entry requirements
Introduction to Data Science	WMME027-05	5	
Electrochemical Systems & Engineering	WMME029-05	5	
Computational Solid Mechanics	WMME028-05	5	
Thermodynamics of Energy Conversion	WMME018-05	5	
Advanced Process and Energy Technologies	WMCE012-05	5	
Experimental Design	WMME012-05	5	
Course in Business, Management and Society		5	
Elective courses		25	
Master Design Project Mechanical Engineering	WMME901-20	20	Passed 45 ECTS of first year courses of the ME master programme
Master Research Project Mechanical Engineering	WMME902-40	40	Passed 45 ECTS of first year courses of the ME master programme

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

The teaching method of the courses can be found on www.rug.nl/ocasys.

Courses in Business, Management and Society

Course unit name	Course code	EC TS	Entry requirements
Technology Based Entrepreneurship	WMIE006-05	5	
Global Change	WMEE008-05	5	
Sustainable Industrial Practice	WMIE027-05	5	

Joint project options for obtaining a master's degree in a closely related programme:

Course unit name	Course code	ECTS	Entry requirements
Master Research Project IEM-ME*	WMIE903-55	55	- Passed 45 ECTS of first year courses of both the IEM and ME master programmes; - Passed Research Methodology (IEM).
Master Design Project IEM**	WMIE901-25	25	- Passed 45 ECTS of first year courses of both the IEM and ME master programmes; - Passed Research Methodology (IEM).
Master's Research Project ME-EES***	WMEE909-50	50	- Passed 45 ECTS of first year courses of the ME master programme

*The joint Master Research Project IEM-ME is available only to students enrolled in both the ME and IEM master programmes. This joint project replaces, and cannot be combined with, the regular Research Projects in both programmes.

**The IEM Design Project is available to students enrolled in both the ME and IEM master programmes. This project may substitute, or be followed in addition to, the Master Design Project ME.

*** The joint Master Research Project ME-EES is available only to students enrolled in both the ME and EES master programmes. This joint project replaces, and cannot be combined with, the regular ME Research Projects. For the entry requirements of EES, check the EES TER appendices.

Appendix IV Electives (art. 3.9.1)

Electives for Advanced Instrumentation Track

Course unit name	Course code	ECTS
Multibody and Nonlinear Dynamics	WMME009-05	5
Robotics for IEM	WMIE005-05	5
Space Mission Technology (for ME)	Will Follow	5
Bio-Signal Processing for Human Machine Interaction	WMBE026-05	5
Engineering Design Integration	WMIE029-05	5
Microfluidics	WMME020-05	5
Advanced Detection Techniques	WMME005-05	5
MEMS, NEMS and Nanofabrication	WMIE010-05	5
Fitting Dynamical Models to Data	WMIE007-05	5
Surface Engineering and Coating Technology	WMIE013-05	5
Multiscale Contact Mechanics and Tribology	WMIE011-05	5
Scientific Visualization	WMCS018-05	5
Finite Element Methods and Applications	WMMA051-05	5
Advanced Vibration	WMME030-05	5
Applied Optics	WMME010-05	5
Modelling and Control of Complex Nonlinear Engineering Systems	WMMA020-05	5
Product Design by the Finite Element Method	WMIE003-05	5
Medical Imaging Instrumentation	WMME014-05	5
Opto-Mechatronics	WMME015-05	5
Systems Engineering	WMIE021-05	5
Data-Driven Optimization	WMME011-05	5

Electives for Smart Factories Track

Each specialization, has its own set of specialization specific electives. 15 ECTS (out of 25 ECTS) of electives needs to be chosen from the list of electives from one specialization. The remaining 10 ECTS can be chosen from any of the electives within the track.

Electives for the specialization Materials for Mechanical Engineering

Course unit name	Course code	ECTS
Multibody and Nonlinear Dynamics	WMME009-05	5
Multiscale Contact Mechanics and Tribology	WMIE011-05	5
Surface Engineering and Coating Technology	WMIE013-05	5
Finite Element Methods and Applications	WMMA051-05	5
Smart Materials for Engineering	WMME021-05	5
Advanced Vibration	WMME030-05	5
Fracture of Materials	WMME023-05	5
Composites and Metamaterials	WMME031-05	5

Electives for the specialization Robotics, Mechatronics & Smart Systems

Course unit name	Course code	ECTS
Multibody and Nonlinear Dynamics	WMME009-05	5
Bio-Signal Processing for Human Machine Interaction	WMBE026-05	5
Fitting Dynamical Models to Data	WMIE007-05	5
MEMS, NEMS and Nanofabrication	WMIE010-05	5
Robotics for AI	WMAI011-05	5
Modelling and Control of Complex Nonlinear Engineering Systems	WMMA020-05	5
Smart Materials for Engineering	WMME021-05	5
Advanced Vibration	WMME030-05	5
Data-Driven Optimization	WMME011-05	5
Opto-Mechatronics	WMME015-05	5
Systems Engineering	WMIE021-05	5

General track electives (not specialization related)

Course unit name	Course code	ECTS
Basic Detection Techniques	WMAS002-05	5
Convex Analysis (biannually)	WMMA060-05	5
Engineering Design Integration	WMIE029-05	5
Microfluidics	WMME020-05	5
Scientific Visualisation	WMCS018-05	5
Product Design by the Finite Element Method	WMIE003-05	5
Polymer Physics	WMCH025-05	5

Electives for Smart and Green Energy Systems Track

Course unit name	Course code	ECTS
Multibody and Nonlinear Dynamics	WMME009-05	5
Advanced Reactor Technologies	WMME016-05	5
Interfacial Engineering	WMCE003-05	5
Photovoltaics Science and Energy	WMCH011-05	5
Engineering Design Integration	WMIE029-05	5
Microfluidics	WMME020-05	5
Surface Engineering and Coating Technology	WMIE013-05	5
Finite Element Methods and Applications	WMMA051-05	5
Hydrogen, Fuels and Electrolysers	WMME019-05	5
Analysis and Control of Smart Systems	WMIE015-05	5
Advanced Vibration	WMME030-05	5
Sustainable Electric Energy Storage	WMCH029-05	5
Processes, Energy and Materials Modelling	WMEE016-05	5
Analysis and control of smart systems	WMIE015-05	5
Modeling and Control of Complex Nonlinear Engineering Systems	WMMA020-05	5
Fuel Cell Systems	WMEE015-05	5
Systems Engineering	WMIE021-05	5
Fracture of Materials	WMME023-05	5
Capita Selecta in Ocean Energy	WMME033-05	5

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

The teaching methods and entry requirements of the courses can be found on www.rug.nl/ocasys.

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

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

Appendix VI Admission to the degree programme (art. 2.1A1+2.1B.1)

Holders of the following Bachelor's degrees from Universities in the Netherlands will be admitted to the Master's degree programme:

1. BSc Mechanical Engineering
2. BSc Aerospace Engineering

Holders of the following Bachelor's degrees from the University of Groningen are considered to have sufficient knowledge and skills and will be admitted to the Master's degree programme in Mechanical Engineering on that basis:

1. BSc Industrial Engineering and Management, Production Technology and Logistics specialization

Appendix VII Transitional provisions (art 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 of the Board of Examiners first.

Discontinued course units				Substitute course units				
Course unit code	Course unit name	EC TS	Final exam period	Course unit code	Course unit name	EC TS	Explanation	Equivalent Yes/No
WMME017-05	Computational Mechanics	5	2022-2023	WMME028-05	Computational Solid Mechanics	5	New course is better attuned to ME.	no
WMME013-05	Finite Element Modelling for Advanced Processing	5	2022-2023	-	-	-	*	-
WMME026-05	High- and Low-Temperature Fuel Cells	5	-	-	-	-	No student has ever followed this course, no transitional provisions necessary	-
WMIE020-05	Sustainability for Engineers	5	2022-2023	WMIE027-05	Sustainable Industrial Practice	5	**	**
WMPH020-05	Structure at Macro, Meso and Nano Scale	5	-	-	-	-	*	-
WMPH021-05	Characterisation of Materials	5	-	-	-	-	*	-
WMPH012-05	Micromechanics	5	-	-	-	-	*	-
WMPH007-05	Computational physics	5	-	-	-	-	*	-
WMCE008-05	Compressible flows	5	-	-	-	-	*	-
WMCE013-05	CFD for Engineers	5	-	-	-	-	*	-
WMCE006-05	Advanced Polymer Processing	5	-	-	-	-	*	-
WBAS003-05	Space Mission Technology	5	-	Will follow	Space Mission Technology (for ME)	5	Equivalent course on Master level for ME students	yes
WMMA016-05	Finite Element Methods for Fluid Dynamics	5	**	WMMA051-05	Finite Element Methods and Applications	5	**	**
WMMA006-05	Convex Optimization	5	**	WMMA060-05	Convex Analysis	5	**	**

*Course is removed from the curriculum to make room for (elective) courses better attuned to ME. Students from Cohort <2022-2023 can still participate in the course, since it is still part of another degree programme. As an alternative, students can choose a different elective.

**Please check the TER appendices of the degree programme that hosts the course for the specifics on the transitional

provisions.

Appendix VIII Additional Requirements Open degree Programmes (Art. 5.6)

Open degree programme

In exceptional circumstances students wishing to pursue an open degree programme may file a request with the Board of Examiners. The Board of Examiners will evaluate whether the proposed curriculum meets the learning outcomes of the degree programme and can determine further conditions in their Rules and Regulations.

Appendix IX Application and decision deadlines for admission (art. 2.6.1 and 2.6.3)

Programmes starting on 1 September 2022

Programme	Deadline of Application	Deadline of decision
Behavioural and Cognitive Neurosciences	1 May 2022	1 June 2022
Biology	1 May 2022	1 June 2022
Biomedical Engineering	1 May 2022	1 June 2022
Biomedical Sciences	1 May 2022	1 June 2022
Biomolecular Sciences	1 May 2022	1 June 2022
Ecology and Evolution	1 May 2022	1 June 2022
Energy and Environmental Sciences	1 May 2022	1 June 2022
Human-Machine Communication	1 May 2022	1 June 2022
Industrial Engineering and Management	1 May 2022	1 June 2022
Marine Biology	1 May 2022	1 June 2022
Mechanical Engineering	1 May 2022	1 June 2022
Medical Pharmaceutical Sciences	1 May 2022	1 June 2022
Nanoscience: for non-EU/EEA students	1 February 2022	1 June 2022
Nanoscience: for EU/EEA students	1 May 2022	1 June 2022
Science Education and Communication	1 May 2022	1 June 2022

Programmes starting on 1 September 2022 and 1 February 2023

Programme	Deadline of Application for 1 September	Deadline of decision for 1 September	Deadline of Application for 1 February	Deadline of decision for 1 February
Applied Mathematics	1 May 2022	1 June 2022	15 October 2022	15 November 2022
Applied Physics	1 May 2022	1 June 2022	15 October 2022	15 November 2022
Artificial Intelligence	1 May 2022	1 June 2022	15 October 2022	15 November 2022
Astronomy	1 May 2022	1 June 2022	15 October 2022	15 November 2022
Chemical Engineering	1 May 2022	1 June 2022	15 October 2022	15 November 2022
Chemistry	1 May 2022	1 June 2022	15 October 2022	15 November 2022
Computing Science	1 May 2022	1 June 2022	15 October 2022	15 November 2022
Farmacie	1 May 2022	1 June 2022	15 October 2022	15 November 2022
Mathematics	1 May 2022	1 June 2022	15 October 2022	15 November 2022
Physics	1 May 2022	1 June 2022	15 October 2022	15 November 2022