Appendices to the Teaching and Examination Regulations for the Master's degree programme in Mechanical Engineering (2026-2027)

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. Has a thorough understanding of:
   a. advanced instrumentation (for Advanced Instrumentation track).
   b. smart processes, engineering materials and products (for Smart Factories track).
   c. 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 their mechanical engineering knowledge and skills in their 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.
2.7. 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 their 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 their 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 their main subject area, therefore and thereby gaining new knowledge and skills.
5.2. Is able to familiarize themselves with recent advances in science and engineering and use them in mechanical engineering applications.

Appendix II Tracks/specializations (Art. 3.6)

The degree programme has three tracks:

1. Advanced Instrumentation
2. Smart Factories
3. Smart and Green Energy Systems

Appendix III Content of the degree programme (Art. 3.7.1)

The assessment method 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.

Advanced Instrumentation Track:

Course unit name	Course code	ECTS	Entry requirements
Basic Detection Techniques	WMAS002-05	5	
AI Applications in Engineering	WMME036-05	5	
Computational Solid Mechanics	WMME028-05	5	
Advanced Instrumentation and Extreme Environments	WMME006-05	5	
Analysis and Control of Smart Systems	WMIE015-05	5	
Systems Engineering	WMIE021-05	5	
Advanced Mechanical Measurement	WMME035-05	5	
Elective courses		25	
Master Design Project Mechanical Engineering	WMME901-20	20	- 45 ECTS of first year courses of the ME master programme - Completed the Scientific Integrity module (WMME004-00)
Master Research Project Mechanical Engineering	WMME902-40	40	- 45 ECTS of first year courses of the ME master programme - Completed the Scientific Integrity module (WMME004-00)

Smart Factories Track:

Course unit name	Course code	ECTS	Entry requirements
AI Applications in Engineering	WMME036-05	5	
Multibody and Non-Linear Dynamics	WMME009-05	5	
Advanced Processing for Complex Materials	WMME007-05	5	
Computational Solid Mechanics	WMME028-05	5	
Analysis and Control of Smart Systems	WMIE015-05	5	
Systems Engineering	WMIE021-05	5	
Advanced Mechanical Measurement	WMME035-05	5	
Elective courses		25	
Master Design Project Mechanical Engineering	WMME901-20	20	- 45 ECTS of first year courses of the ME master programme - Completed the Scientific Integrity module (WMME004-00)
Master Research Project Mechanical Engineering	WMME902-40	40	- 45 ECTS of first year courses of the ME master programme - Completed the Scientific Integrity module (WMME004-00)

Smart and Green Energy Systems Track:

Course unit name	Course code	ECTS	Entry requirements
AI Applications in Engineering	WMME036-05	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	
Advanced Mechanical Measurement	WMME035-05	5	
Systems Engineering	WMIE021-05	5	
Elective courses		25	
Master Design Project Mechanical Engineering	WMME901-20	20	- 45 ECTS of first year courses of the ME master programme - Completed the Scientific Integrity module (WMME004-00)
Master Research Project Mechanical Engineering	WMME902-40	40	- 45 ECTS of first year courses of the ME master programme - Completed the Scientific Integrity module (WMME004-00)

Appendix IV Electives (Art. 3.8.1)

Electives for Advanced Instrumentation Track

Course unit name	Course code	ECTS
Advanced Vibration	WMME030-05	5
Multibody and Non-Linear Dynamics	WMME009-05	5
Robotics and Automation	WMIE038-05	5
Space Mission Technology	WBAS003-05*	5
Finite Element Methods and Applications	WMMA051-05	5
Fitting Dynamical Models to Data	WMIE007-05	5
Applied Optics	WMME010-05	5
Engineering Design Integration	WMEE029-05	5
Nonlinear Control Systems	WMSC003-05	5
Product Design by the Finite Element Method	WMIE003-05	5
Data-driven Optimization	WMME011-05	5
Medical Imaging Instrumentation	WMME014-05	5
Opto-Mechatronics	WMME015-05	5

* The Bachelor's course WBAS003-05 Space Mission Technology has been deemed of appropriate level for ME Master's students and may therefore be taken as an elective.

Electives for Smart Factories Track

Course unit name	Course code	ECTS
Advanced Vibration	WMME030-05	5
Surface Engineering and Coating Technology	WMIE013-05	5
Smart Materials for Engineering	WMME021-05	5
Composites and Metamaterials	WMME031-05	5
Fracture of Materials	WMME023-05	5
Bio-signal Processing for Human Machine Interaction	WMBE026-05	5
Robotics and Automation	WMIE038-05	5
Fitting Dynamical Models to Data	WMIE007-05	5
MEMS, NEMS and Nanofabrication	WMME037-05	5
Engineering Design Integration	WMEE029-05	5
Nonlinear Control Systems	WMSC003-05	5
TinyML: Machine Learning for Embedded Devices	WMME034-05	5
Data-driven Optimization	WMME011-05	5
Opto-Mechatronics	WMME015-05	5
Product Design by the Finite Element Method	WMIE003-05	5
CFD for Engineers	WMCE013-05	5

Electives for Smart and Green Energy Systems Track

Course unit name	Course code	ECTS
Advanced Vibration	WMME030-05	5
Multibody and Non-Linear Dynamics	WMME009-05	5
Finite Element Methods and Applications	WMMA051-05	5
Microfluidics	WMME020-05	5
Photovoltaics Science and Energy	WMCH011-05	5
Surface Engineering and Coating Technology	WMIE013-05	5
Engineering Design Integration	WMEE029-05	5
Hydrogen, Fuels and Electrolysers	WMME019-05	5
Renewable Energy Systems	WMME023-05	5
Nuclear Power	WMEE014-05	5
Sustainable Electric Energy Storage	WMCH029-05	5
Fuel Cell Systems	WMEE015-05	5
CFD for Engineers	WMCE013-05	5
Energy and Sustainability in Practice	WMEE024-05	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 (Art. 4.4)

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

Appendix VI Admission to the degree programme (Art. 2.1A1,2.1A.2 and 2.1B.1)

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

1. BSc Mechanical Engineering (56966)
2. BSc Aerospace Engineering (56956)
3. BSc Civil Engineering (56952)

Holders of the following Bachelor's degrees from the University of Groningen will be admitted to the Master's degree programme in Mechanical Engineering:

1. BSc Industrial Engineering and Management, Production Technology and Logistics specialization including the following courses:
    a. Dynamics and Vibrations (WBIE054-05)
    b. Numerical Methods (for IEM) (WBIE049-05)
    c. Solid Mechanics (WBIE055-05 or WBPH015-05)
    d. Materials Science and Engineering (WBPH071-05)
    e. Mechatronics (WBIE011-05)
    f. Principles of Measurement Systems (WBPH029-05) or Technical Thermodynamics (WBIE031-05 or WBCE014-05)
2. BSc Applied Physics, including the following courses:
    a. Computer Aided Design and Manufacturing (WBIE033-05)
    b. Solid Mechanics (WBIE055-05 or WBPH015-05)
3. BSc Physics, including the following courses:
    a. Computer Aided Design and Manufacturing (WBIE033-05)
    b. Solid Mechanics (WBIE055-05 or WBPH015-05)
    c. Control Engineering (WBIE034-05 or WMBE024-05)
    d. Numerical Methods (for IEM) (WBIE049-05)
4. BSc Astronomy, including the following courses:
    a. Computer Aided Design and Manufacturing (WBIE033-05)
    b. Solid Mechanics (WBIE055-05 or WBPH015-05)
    c. Statistical Signal Processing (WBAS009-05)
    d. Principles of Measurement Systems (WBPH029-05)
    e. Control Engineering (WBIE034-05 or WMBE024-05)
5. BSc Applied Mathematics, including the following courses:
    a. Computer Aided Design and Manufacturing (WBIE033-05)
    b. Solid Mechanics (WBIE055-05 or WBPH015-05)
    c. Mechatronics (WBIE011-05)
    d. Materials Science and Engineering (WBPH071-05),
    e. Technical Thermodynamics (WBIE031-05 or WBCE014-05)
6. BSc Biomedical Engineering, including the following courses:
    a. Computer Aided Design and Manufacturing (WBIE033-05)
    b. Solid Mechanics (WBIE055-05 or WBPH015-05)
    c. Mechatronics (WBIE011-05) or Control Engineering (WBIE034-05 or WBME024-05)

    Additionally for the Smart and Green Energy Systems track:
    d. Fluid Dynamics (WBIE004-05) or Physical Transport Phenomena (WBIE061-05)

Appendix VII Pre-master's programmes and Fast-Track programmes (Art. 2.3)

A. Premaster's 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 Mechanical Engineering upon completion of the Pre-Master's programme;
   - The content and student workload for these fixed programmes.

   a. Bachelor Mechanical Engineering/Werktuigbouwkunde (34280)
   b. Bachelor Electrical Engineering/Elektrotechniek (34267)

Premaster for the Advanced Instrumentation or Smart Factories track

Semester	Course unit name	Course code	ECTS
1a	Calculus 1 (for IEM) (WBIE003-05)	WBIE003-05	5
1a	Numerical Methods (for IEM))	WBIE049-05	5
1b	Solid Mechanics (for IEM)	WBIE055-05	5
1b	Linear Algebra (for IEM)	WBIE009-05	5
1b	Materials Science and Engineering	WBPH071-05	5
2a	Calculus 2 (for IEM)	WBIE017-05	5
2a	Signals and Systems	WBIE030-05	5
2b	Literature Thesis ME	WBIE056-05	5
2b	Control Engineering	WBIE034-05	5
Total			45

Premaster for the Smart and Green Energy Systems track

Semester	Course unit name	Course code	ECTS
1a	Calculus 1 (for IEM) (WBIE003-05)	WBIE003-05	5
1a	Numerical Methods (for IEM))	WBIE049-05	5
1b	Solid Mechanics (for IEM)	WBIE055-05	5
1b	Linear Algebra (for IEM)	WBIE009-05	5
2a	Technical Thermodynamics (IEM)	WBIE031-05	5
2a	Calculus 2 (for IEM)	WBIE017-05	5
2a	Signals and Systems	WBIE030-05	5
2b	Literature Thesis ME	WBIE056-05	5
2b	Physical Transport Phenomena	WBIE061-05	5
Total			45

   - Starting date 1 September

2. For holders of a HBO diploma not listed above, or for holders of a Dutch or foreign degree not listed in Appendix VI, 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 granted.

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

B. Fast-Track programmes

FSE offers Fast-Track programmes of 30ECTS for access to the MSc Mechanical Engineering. The overview below shows:

- Which NVAO-accredited HBO diploma of which HBO institute grants access to the MSc Mechanical Engineering on the condition that the Fast-Track programme is completed;
- Whether nomination by the HBO institute is required;
- The content and student workload for these fixed programmes.

a. Bachelor Mechanical Engineering/Werktuigbouwkunde (34280) of the Hanze University of Applied Sciences
   Nomination required: Yes
b. Bachelor Mechanical Engineering/Werktuigbouwkunde (34280) of the NHL Stenden University of Applied Sciences
   Nomination required: Yes
c. Bachelor Electrical Engineering/Elektrotechniek (34267) of the Hanze University of Applied Sciences
   Nomination required: Yes
d. Bachelor Electrical Engineering/Elektrotechniek (34267) of the NHL Stenden University of Applied Sciences)
   Nomination required: Yes

The table below shows the courses of the fast-track programme.

Semester	**Course unit name**	**Course code**	**ECTS**
1a	Dynamics and Vibrations	WBIE054-05	5
1a	Numerical Methods (for IEM)	WBIE049-05	5
1a	Technical Thermodynamics	WBCE014-05	5
1b	Solid Mechanics (for IEM)	WBIE055-05	5
1b	Mechatronics	WBIE011-05	5
1b	Materials Science and Engineering	WBPH071-05	5
Total			30

- Starting date 1 September

Appendix VIII 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*	*ECTS*	*Final exam period*	*Course unit code*	*Course unit name*	*ECTS*	*Explanation*	*Equivalent Yes/No*
WMAS025-05	Space Mission Technology (for ME)	5	2023-2024	WBAS003-05	Space Mission Technology	5	Administrative course code change	Yes
WMMA020-05	Modeling and Control of Complex Nonlinear Engineering Systems	5	2023-2024	WMSC003-05	Nonlinear Control Systems	5	Name change of the course	Yes
WMIE029-05	Engineering Design Integration	5	2024-2025	WMEE029-05	Engineering Design Integration	5	Course now falls under the responsibility of the EES programme.	Yes
WMME027-05	Introduction to Data Science	5	2025-2026	WMME036-05	AI Applications in Engineering	5	The new course has more of an engineering focus, A final exam opportunity will be organized for Introduction to Data Science in 26-27 if a student does not want to take the new course instead.	No
WMIE005-05	Robotics for IEM	5	2025-2026	WMIE038-05	Robotics and Automation	5	Course contents are slightly adjusted and the name is changed to reflect this.	No
WMIE010-05	MEMS, NEMS and Nanofabrication	5	2025-2026	WMME037-05	MEMS, NEMS and Nanofabrication	5	ME takes ownership of the course. The contents remain the same.	Yes

Appendix IX Additional requirements open degree programmes (Art. 5.9.2)

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.