

1. Introduction

This assessment plan is a systematic description of the testing and assessment modes for all study components in the curriculum of the Master's degree programme in Energy and Environmental Sciences (EES), 2022-2023. The plan is based on the assessment policy of the Faculty of Science and Engineering, as set out in the FSE Quality Assurance Manual and the protocol setting out the duties and powers of the Faculty's Board of Examiners (FSE Protocol Board of Examiners).

The assessment plan for the curriculum consists of the following parts:

1. Objective(s) of the degree programme.
2. The learning outcomes of the degree programme.
3. Descriptions of the study components, as set out in the appendices to the Teaching and Examination Regulations 2022-2023 of the degree programme.
4. Descriptions of the content of each study component in Ocasys, the online course catalogue. The following elements are relevant in this context:
 - objectives
 - description of content
 - lecturers
 - assessment mode(s) and calculation of final mark
 - mode(s) of instruction.
5. An overview of the examiners and a detailed assessment mode for each study component. This overview is based on the curriculum approved by the Programme Committee, as set out in the appendices to the Teaching and Examination Regulations 2022-2023 for the degree programme.
6. A matrix showing the relationship between the study components and the detailed learning outcomes for each competence area.

Parts 3 and 4 are not included in this document. For the descriptions of the study components, see the Appendices to the Teaching and Examination Regulations 2022-2023 for the MSc EES. Descriptions of the content of each study component can be found in Ocasys, the online course catalogue (<http://www.rug.nl/ocasys/>) for the MSc EES: <https://www.rug.nl/ocasys/rug/vak/showpos?opleiding=3576>

2. Objectives of the degree programme

The general objective of the MSc EES is to offer education addressing the important global challenges with respect to energy and environment – present, past and in the future - in an interdisciplinary approach from a societal and natural sciences perspective. This field of study is of importance for all parts of society, like research, policy, business, and non-governmental groups. For all these parties, Master graduates with deep and broad knowledge and skills in the field of energy and environment are needed. Therefore, the MSc EES aims to prepare students for a career at an academic level in research, government, and business with different work profiles related to the field of energy and environmental sciences like experimental research, system analysis and evaluation, and problem analysis and solving.

The objectives of the Master's degree programme EES are:

- to prepare students for an independent professional career; in this context this means being able to carry out fundamental or applied scientific research, as well as applying state of the art scientific knowledge in a wide variety of practical situations;
- to provide a learning environment for enabling students to develop skills, knowledge and insight in a specialization area of the field of study.
- to have students develop the ability to clearly and concisely communicate the acquired knowledge to others.
- to let students develop the ability to critically reflect, taking into account social and ethical aspects.

3. Learning outcomes of the degree programme

As set out in the Appendices Teaching and Examination Regulations for the Master Energy and Environmental Sciences 2022/2023.

The aims of the EES program result in the following learning outcomes:

Specific academic knowledge and skills for the MSc EES.

The graduate is able:

Sa) to analyze:

1. Energy and resource use in societies and ecosystems and their impacts on the climate/planet;
2. (Dis)advantages of the use of various energy sources using the people, planet, profit approach;
3. Current and future developments in the energy/environmental research field;
4. Policy developments in the energy/environment field.

Sb) to assess whether changes in systems will affect energy and resource use and their consequences.

Sc) to discuss the role of other academic (non-natural science) disciplines in the energy and/or environmental research field.

Sd) to distinguish career perspectives within the energy/environmental field.

General academic skills for the master's degree program EES

The graduate is able:

- G1. to write a review about literature in relevant subfields.
- G2. to effectively gain information within the field of Energy and Environmental Sciences (EES).
- G3. to formulate a research plan based on a general problem description in a subfield of EES.
- G4. to analyze and assess state-of-the-art research information and draw conclusions from these results.
- G5. to collaborate in a multidisciplinary team.
- G6. to communicate his/her/their findings to the scientific community (oral presentation, written reports and debates).
- G7. to design, conduct and evaluate experiments/scenarios/other scientific methods.
- G8. to evaluate his/her/their own results and conclusions compared to knowledge in the literature.
- G9. to function scientifically in a situation in which knowledge and research skills within the field of EES are required.
- G10. to consider its own position in society to come to a sensible choice of profession.

4. Overview of examiners and assessment modes for study components

In this section, an overview of the examiners and a detailed assessment mode for each study component is given. This overview is based on the curriculum approved by the Programme Committee, as set out in the appendices to the Teaching and Examination Regulations 2022-2023 for the degree programme.

The abbreviations for the relevant modes of assessment:

- Written exam with open questions (WE) (can be a digital exam)
- Oral exam (OR)
- Assignment (AST)
- Practical Work (PR)
- Presentation (P)
- Report (R)

Course units	Course coordinator	Other lecturers	Second examiner	Mode of Assessment	Changes if assessment will be online
Obligatory course units MSc EES					
Impact of Energy and Material Systems (IEMS) (WMEE002-05)	H AJ Meijer	RMJ Benders, GAH Laugs, PW Leenes, JM Miocic, F Ruzzenenti, T Schoot Uiterkamp	JM Miocic	WE, AST	Online WE instead of WE
Sustainable Use of Ecosystems (SUE) (WMEE003-05)	S Nonhebel	PW Leenes, EJ Stamhuis, J Zevenberg, P Boute (guest), AP Grootjans (guest), JD Driesens (guest), W Liu (guest), KR Timmermans (guest) and several external specialists.	PW Leenes	WE, AST (AST is including P)	Online WE instead of WE
Sustainability and Society(S&S) (WMEE005-05)	PJ Upham	A Teladia, AS Maqbool	AS Maqbool	WE, AST (AST is including P,R)	Online WE instead of WE
Systems Integration and Sustainability (SIS) (WMEE006-05)	MAH van den Broek	RMJ Benders, GAH Laugs and other (guest) lecturers	RMJ Benders	AST (is including a final assignment)	No changes needed
Data Analysis and Statistical Methods (DASM) (WMEE001-05)	U Dusek		H AJ Meijer	WE, AST, R	Online WE instead of WE
Core electives					
Modeling Energy and Material Systems (MEMS) (WMEE009-10)	MR Berger	GAH Laugs, F Ruzzenenti, MA van den Broek, KS Hubacek	<i>To be determined</i>	WE, AST, R (AST including P)	Online WE instead of WE
Global Change (GC) (WMEE008-05)	H AJ Meijer	U Dusek, H AJ Meijer, H Chen	H Chen	WE, AST, R	Online WE (open book) instead of WE
Compulsory modules					
Colloquia Energy and Environmental Sciences (WMEE017-00)	EJ Stamhuis			Mandatory attendance, see Ocasys for more information	No changes needed
Career Perspectives (EES) (WMEE018-00)	EJ Stamhuis			Mandatory attendance, see Ocasys	No changes needed

				for more information	
Scientific Integrity (WMEE019-00)	EJ Stamhuis			Mandatory attendance, see Ocasys for more information	No changes needed
Electives coordinated by MSc EES					
Geo-Energy and Subsurface Processes (WMEE004-05)	JM Miocic		HAJ Meijer	WE, AST	Online WE instead of WE
Climate Modelling (WMEE010-05)	R Bintanja	H Chen, and guest lecturers	H Chen	R	No changes needed
Energy and Complexity Nexus (WMEE012-05)	F Ruzzenenti		KS Hubacek	WE (take home exam), AST (including R), OE after exercises	No changes needed
Conceptualizing and Modeling Human-Environmental Systems (WMEE011-05)	KS Hubacek		F Ruzzenenti	AST (including 5% participation)	No changes needed
Radio-carbon dating and analysis (WMEE013-05)	MW Dee	SWL Palstra, D Paul	HAJ Meijer	OE, AST	Online OE instead of OE
Fuel cell systems (WMEE015-05)	A Purushothaman Vellayani	A Mani, TH Woudstra	TH Woudstra	WE	Online WE instead of WE
Nuclear Power Technology (WMEE014-05)	CE Rigollet		N Kalantar-Nayestanaki	IT, WE, P	Online WE instead of WE
Experimental Methods of Trace Gas Research	A Mokhov	H Chen, MW Dee, HAJ Meijer	HAJ Meijer	PR, WE, R	Online WE instead of WE
Electives coordinated by other Master's degree programmes		See Ocasys course descriptions and assessment plan of the corresponding Master's degree programme			
Individually supervised projects					
Research Project 1 (WMEE905-30/40)	See list of examiners			PR, P, R	If experimental projects are not allowed, the projects have to be changed into theoretical projects.
Research Internship/Research Project 2 (WMEE906-30)	See list of examiners			PR, P, R	If experimental projects are not allowed, the projects have to be changed into

					theoretical projects.
Minor Future Planet Innovation					
Global Challenges (WBEE002-10)	GAH Laugs	MR Berger, J Graver, MJ van den Nieuwenhof-Schilstra, B Piersma, M van Rijssel, J Zevenberg	J Zevenberg	WE, R	Online written exam
Global Integration (WBEE004-05)	S Grooters	J Zevenberg	J Zevenberg	AST, P	No changes needed
Sustainable Contributions to Society (WBEE003-15)	GAH Laugs	S Grooters, MJ van den Nieuwenhof-Schilstra, J Zevenberg, MR Berger (guest lecturer), J Graver (guest lecturer), B Piersma (guest lecturer), M van Rijssel (guest lecturer)	J Zevenberg	AST, P, R	No changes needed
Course for Minor Development Studies (coordination Interfaculty Minor: Faculty of Arts)					
Environment and Development (WBEE001-05)	MR Berger	WP Leenes, S Nonhebel, J Zevenberg	S Nonhebel	AST, WE	Online written exam
Course for MSc Mechanical Engineering: Track: Process Design for Energy Systems					
Processes Energy and Materials Modeling (WMEE016-05) (this course is in practice the first part of the MEMS course (WMEE009-10))	See MEMS, WMEE009-10	See MEMS, WMEE009-10		OR, AST, P, R	Online OE instead of OE
Course for Premaster MSc EES					
Paper Energy (WBEE005-05)	MR Berger		<i>To be determined</i>	R	Not applicable

5. Relationship between obligatory course units, core electives, Master's projects and the learning outcomes of the MSc EES

For an overview of the abbreviations of the specific and general learning outcomes of the MSc EES, see Part 3 of this assessment plan on page 2.

Learning Outcomes														
	Specific				General									
	Sa	Sb	Sc	Sd	G1	G2	G3	G4	G5	G6	G7	G8	G9	G10
OBLIGATORY COURSE UNITS														
Impact of Energy and Material Systems (IEMS)	X	X							X					
Sustainable Use of Ecosystems (SUE)	X	X				X		X	X	X				
Sustainability and Society (S&S)	X	X	X						X	X			X	
Systems Integration and Sustainability (SIS)	X	X			X				X				X	
Data Analysis and Statistical Methods (DASM)								X			X			
COMPULSORY MODULES														
Scientific Integrity													X	
Colloquia Master										X				
Career Perspectives														X
CORE ELECTIVES														
Modeling Energy and Material Systems (MEMS)	X	X	X		X	X	X	X	X	X	X	X	X	
Global Change (GC)	X	X	X		X	X		X		X		X		
ELECTIVES						X								
PROJECTS														
Research project 1	X	X		X	X	X	X	X		X	X	X	X	X
Research Internship/Research Project 2	X	X		X	X	X	X	X	X	X	X	X	X	X
Internship (only for cohort 2019-2020 or before)	X	X		X	X	X		X	X	X		X	X	X

6. List of examiners for MSc EES, containing

a. supervisors (examiners) and second examiners for individual (research internships/) research projects

b. course coordinators/teachers in EES-curriculum (see part 4 of this assessment plan)

Note: UTQ = University Teaching Qualification

Initials	Name	Research unit	Remarks	UTQ
R.M.J.	Benders	IREES		No
M.R.	Berger	IREES	Only second examiner for research internships/projects, examiner for Minor Future Planet Innovation	Yes
R.	Bintanja	Ocean Ecosystems	Honorary professor	Yes
P.	Boelen	Biomimetics	Only second examiner for research internships/projects in Biomimetics	Yes
M.K.	Boer, de	Graduate school of SSE		Yes
M.A.	Broek, van den	IREES		Yes
H.	Chen	CIO	Associate professor	Yes
M.W.	Dee	CIO	TT	Yes
U.	Dusek	CIO	TT	Yes
G.J.W.	Euverink	ENTEG	Projects related to Biotechnology for which Euverink is proficient	Yes
S.	Grooters	Docenten X-SSE — EMT - Docenten Team 1	Examiner for Minor Future Planet Innovation	Yes
A.P.	Grootjans	IREES	Emeritus, but active	n/a
S.M.A.C.	Heuven, van	CIO	Only second examiner for research internships/projects in CIO	n/a
K.S.	Hubacek	IREES	Full professor	In progress
N	Kalantar-Nayestanaki	Nuclear Energy	Full professor	Unknown
M	Kavatsyuk	Nuclear Energy	TT	Unknown
G.A.H.	Laugs	Docenten X-SSE — EMT - Docenten Team 1	Examiner for Minor Future Planet Innovation	In progress
P.W.	Leenes	IREES	Retired, but active	Yes
D.	Lentink	Biomimetics		In progress, new in ESRIG
A.S.	Maqbool	IREES	FSE-fellow	Unknown
J.C.	Meerman	IREES	Post-doc researcher	In progress

H.A.J.	Meijer	CIO	Full prof	Yes
J.M.	Miocic	Geo-Energy	TT	In progress
A.V.	Mokhov	Energy Conversion		Yes
H.C.	Moll	IREES	Emeritus, but active	Yes
H.A.J.	Mulder	Docenten SEC — EMT - Docenten Team 1		Yes
P.	Nienhuis	IREES	Guest-researcher	No, n/a
M.J.	Nieuwenhof-Schilstra, van den	Docenten X-SSE — EMT - Docenten Team 1		In progress
S.	Nonhebel	IREES	Associate professor	Yes
D.	Paul	CIO	Only second examiner for research internships/projects in CIO	n/a
W.	Peters	CIO	Also professor at Wageningen University	Yes
F.	Pierie	IVEM	Guest-teacher, second examiner	In progress
B.	Piersma	Docenten X-SSE — EMT - Docenten Team 1	Examiner for Minor Future Planet Innovation	In progress
W.H.	Poll, van de	Biomimetics		Yes
A.	Purushothaman Vellayani	Energy Conversion	Full professor	Yes, (TU Delft)
C.M.	Ree	ScienceLinx	Lecturer	Yes
C.E.	Rigollet	Lecturers Physics-EMT - Lecturers team 1	Lecturer	Yes
M.	Rijssel	Docenten X-SSE — EMT - Docenten Team 1	Examiner for Minor Future Planet Innovation	Yes
F.	Ruzzenenti	IREES	TT	Yes
H.A.	Scheeren	CIO	Only second examiner for research internships/projects in CIO	n/a
A.J.M.	Schoot Uiterkamp	IREES	Emeritus, but active	n/a
Y.	Shan	IREES	FSE-fellow	Yes
E.J.	Stamhuis	Biomimetics	Associate professor	Yes
K.R.	Timmermans	Ocean Ecosystems	Honorary professor	Yes
E.C.	Waal, van der	IREES		Unknown
H.J.	Windt, van der	IREES	Emeritus, but active	Yes
T.H.	Woudstra	Energy Conversion	Second examiner for courses	Yes (TU Delft)
J.	Zevenberg	Docenten X-SSE — EMT - Docenten Team 1	Examiner for Minor Future Planet Innovation	Yes