

Assessment plan for the curriculum of the **Master's degree programme in Energy and Environmental Sciences, 2024-2025**

Programme director: Prof. dr. E.J. Stamhuis

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Date approval Faculty Board:

1. Vision on assessment

- Assessment guides and evaluates student learning in a multidisciplinary and multicultural international context to prepare them for a research, consultancy or (N)GO career in the Energy and Environmental Sciences field.
- Assessment aims at stimulating students to study actively and learn from their mistakes, combining specific knowledge and skills, while still stimulating and helping each other in learning processes and in contributing to multi-disciplinary/-cultural teams.
- Assessment stimulates transparent and effective use of tools in learning, research and communication, as a guiding principle for lifelong learning.
- Assessment also aims to teach students the real-world meaning of deadlines and/or to manage the temporal aspects of completing a certain work package.

2. Assessment guidelines

Core modules:

- Individual modules or parts of it are assessed and must be passed independently to ensure that students have a good understanding of the full breadth of each course.
- Core module parts are assessed through written or oral exams as assigned in the assessment plan. Assignments are assessed through a written report or through assessing a resulting presentation.
- Group assignments as part of a module are assessed for the group as a whole, or individually when there are explicit individual contributions (either written or in a presentation).
- Grading is done according to a predefined guidelines which are known to the students beforehand.
- Written exams include a first page with information on the module, the subjects, the grading scheme and the exam conditions.
- For all module parts with a written exam, a mock exam (for example an exam from a previous year) or mock sample questions will be available well before the exam date.
- Oral exams are graded by the first examiner in the presence and in consultation with a preassigned second examiner; both must be present during the full exam.

Electives:

- Students should, in consultation with their mentor, select elective courses from the electives list provided by the programme for the particular period. Electives should fit to the study path the student has laid out for him/her-self, aiming for a coherent study plan.
- Assessment rules for the core modules are normally also valid for electives, but depending on variations induced by the elective coordinator/examiner/programme. In cases of contradiction, the elective guidelines are prevailing.

Individual research projects:

- Individual research projects are selected in consultation with the mentor and should fit the study path that the student him/herself has laid out, aiming for a coherent study plan.
- The first project is done within an ESRIG group or affiliated UoG group, to ensure thorough scientific schooling and supervision. The end products are a written report and a colloquium which will be assessed and graded by the supervisor/first examiner and a second independent examiner.
- The categories on which assessment takes place are: 1) scientific quality of the project, 2) management of the project, 3) Colloquium, and 4) the Thesis/report. The final grade is a weighted average of the sub-grades on these categories.
- For all individual projects, midterm assessment with specific feedback on development points, project management and self-reflection for each student are provided. The feedback is documented on a dedicated form during a reflection session of student and supervisor.
- During the research projects, regular progress meetings (at least every week) with the daily supervisor together with fellow students working on similar subjects will take place, in which the student will be given feedback and instructions on the day-to-day research.
- In case of doing a research project within a company, the company/external supervisor is responsible for regular progress meetings. The external supervisor also provides the internal supervisor with a grading/assessment advice.
- During the research projects, the students learn to give and make use of peer assessment and comments during weekly meetings and outside of these meetings.
- Supervisors provide feedback on at least one full draft version of a written report, provided the student meets the agreed deadline for handing in the full draft.
- The students are instructed in the possible use and misuse of AI and online information tools with the focus on scientific integrity, how to do science, ethics, critical thinking, and proper referencing, to avoid plagiarism.
- All written products are to be checked for plagiarism before grading.
- To ensure fair grading, a Fail grade will be assigned to reports not handed in on time (+ or – 2 weeks) unless there are specific reasons for the delay which are then taken into account.
- The two individual research projects should preferably be on different topics (which can be related) and preferably with different supervisors.

General:

- All assessment and feedback, final and day-to-day, is provided in English to prepare students for a research career with an international job market.

3. Learning outcomes of the degree programme

	Learning Outcomes <i>At the end of the programme, the graduate ...</i>
1. Knowledge and Understanding	
1a	understands basic and advanced concepts of the field of Energy & Environmental Sciences in broad perspective at a level which permits admission to a PhD-programme;
1b	understands the societal, political and business aspects of the field of EES permitting an appointment in industry, government or NGO at a level of independent analyst and/or researcher;
2. Application (of knowledge and understanding)	
2a	is able to analyze and evaluate (changes in) the use of energy and resources and their impact on the environment, the society, and for a sustainable planet;
2b	is able to analyze and evaluate current and future developments in the energy & environment research field, including policy, business and societal aspects;
2c	can design and formulate a research plan based on the description of a problem/question/hypothesis in a sub-field of EES;
2d	can conduct scientific research individually or in cooperation aiming for answers to, and/or creating solutions for a research question/problem/hypothesis;
2e	can discuss research outcomes within the relevant EES sub-field;
3. Assessment	
3a	is able to gain and process relevant information from a sub-field of EES;
3b	is able to analyze and assess state-of-the-art research results and draw conclusions from these;
3c	is capable of evaluating and managing their own and other's actions within a scientific and professional context, taking societal and ethical aspects into account.
4. Communication Skills	
4a	can review (orally and writing) literature/information in a relevant EES sub-field;
4b	is able to communicate orally and/or in writing about own research outcomes towards a broader academic audience or other relevant public;
5. Cooperation and Societal Skills	
5a	can collaborate effectively and appropriately with peers in a multidisciplinary and/or multicultural team, taking multiple perspectives into account;
5b	is able to determine career perspectives within the field of energy & environment.

4. Overview of assessment methods, test moments for course units, and examiners

This table shows all the course units for each year of the programme and assessment methods.

Year	Period	Course	EC	Assessment methods	Does (part of the) assessment have a formative function?	Test moment(s) (e.g. mid-term, continuous assessment, exam week, etc)	First examiner	Second examiner
Obligatory Courses								
1	1a	Ecology and Ecosystem Sustainability (WMEE021-05)	5	WE, P, AST	Yes	P during the course, exam week	P. Pradhan	S. Nonhebel
1	1a	Energy, Atmosphere and Resources (WMEE028-05)	5	WE, AST	Yes	Exam week	A.A. van der Meer	J.M. Miocic
1	1a	Modelling Energy Systems (WMEE025-05)	5	WE, AST	Yes	Exam week	F. Ruzzenenti	M.R. Berger
1	1a	Scientific Integrity (EES) (WMEE019-00)	0	AST	Yes	After completing the lectures	E.J. Stamhuis	N/A
1	1b	Sustainable Society (WMEE020-05)	5	WE, P, AST	Yes	End-of-course presentation and assignment, exam week	P.J. Upham	P. Pradhan
1	1b	Renewable Energy Systems (WMEE023-05)	5	WE, R, P, AST	Yes	Tutorials and workshops in ALC rooms, exam week	X. Sun	W. Medjroubi
1	1b	Data Analysis and Statistical Methods (WMEE001-05)	5	WE, R, AST	Yes	Exam week	U. Dusek	H.A.J. Meijer
Core electives								
1	2a	Global Change (WMEE008-05)	5	WE, R, AST	Yes	Exam week	M.W. Dee	H.A.J. Meijer
1	2a	Climate Modelling (WMEE010-05)	5	R	Yes	Exam week	R. Bintanja	H. Chen

1	2a	Renewable Energy Technology (WMEE027-05)	5	<i>WE, R, AST</i>	Yes	<i>P</i> during the course, exam week	E.J. Stamhuis	J.M. Miocic
1	2a	Nuclear Power Technology (WMEE014-05)	5	<i>WE, P</i>	Yes	Midterm exam, exam week	C.E. Rigollet	N. Kalantar-Nayestanaki
1	2a	Conceptualizing and Modelling Sustainability (WMEE022-05)	5	<i>WE, AST</i>	Yes	Random test moments during course	K. Hubacek	F. Ruzzenenti
1	2a	Energy and Complexity Nexus (WMEE012-05)	5	<i>WE, OR, AST/R</i>	Yes	Exam week	F. Ruzzenenti	K. Hubacek
1	2b	Experimental Methods in Env. Science (WMEE026-05)	5	<i>WE, R</i>	Yes	Exam week	A.V. Mokhov	H.A.J. Meijer
1	2b	Radiocarbon Dating and Analysis (WMEE013-05)	5	<i>OR, PR, AST</i>	Yes	Halfway course and during exam week	M.W. Dee	H.A.J. Meijer
1	2b	Geo-Energy and Subsurface Processes (WMEE004-05)	5	<i>WE</i>	Yes	Several interim tests	J.M. Miocic	H.A.J. Meijer
1	2b	Fuel Cell Systems (WMEE015-05)	5	<i>WE, AST</i>	Yes	Exam week	A. Purushothaman Vellayani	T.H. Woudstra
1	2b	Energy and Sustainability in Practice (WMEE024-05)	5	<i>R, P, AST</i>	Yes	During course and exam week	P. Pradhan	K. Hubacek
Obligatory courses Year 1 and 2 (whole year)								
		Career Perspectives (EES) (WMEE018-00)	0	*				
		Colloquia Master Energy and Env. Sciences (WMEE017-00)	0	*				
Research projects Year 1 period 2b and/or Year 2								
		Research Project 1 (WMEE905-30/40)	30/ 40		Yes			
		Research Internship/Research Project 2 (WMEE906-30)	30		Yes			
Electives Year 1								
1	2a-2b	See Ocasys						

Electives Year 2								
2	1a-1b	See Ocasys						
Minor Future Planet Innovation								
	1a	Global Challenges (WBEE002-10)	10	<i>WE, R</i>	Yes	Exam week	G.A.H. Laugs	
	1a	Global Integration (WBEE004-05)	5	<i>AST</i>	Yes	Exam week	G.A.H. Laugs	
	1b	Sustainable Contributions to Society (WBEE003-15)	15	<i>R, P, AST</i>	Yes	Exam week	M. van Rijssel	
Other course								
	2a-2b	Paper Energy (WBEE005-05)	5	<i>AST</i>	Yes	Exam week	M.R. Berger	

The abbreviations for the relevant teaching methods are explained in the legend of the table:

- *Written Exam (WE)*
- *Multiple Choice (MC)*
- *Oral Exam (OR)*
- *Report I*
- *Presentation (P)*
- *Practical Work (PR)*
- *Assignment (AST)*

* *Mandatory attendance*

5. Relationship between course units and details of the learning outcomes

An X indicates which learning outcomes are assessed in which courses.

An **X** means that the learning outcome is explicitly assessed (not merely addressed) in the course.

		Learning outcomes of the degree programme													
		1a	1b	2a	2b	2c	2d	2e	3a	3b	3c	4a	4b	5a	5b
Period	Course	Year 1 – Compulsory courses													
1a	WMEE021-05 : ECOS	X	X	X	X				X			X	X	X	
1a	WMEE028-05 : EAR	X	X		X			X	X					X	
1a	WMEE025-05 : MES	X	X	X	X			X	X	X		X	X		
1b	WMEE020-05 : SUS	X	X	X	X				X			X	X		
1b	WMEE023-05 : RES	X	X	X	X			X	X	X		X	X	X	
1b	WMEE001-05 : DASM	X	X					X		X		X	X		
Period	Modules	Year 1 and 2 – Compulsory modules (whole year, except for S.I.)													
	WMEE017-00 : Coll.	X	X									X	X		
	WMEE018-00 : C.P.												X		X
1a	WMEE019-00 : S.I.	X	X								X	X			
Period	Course	Year 1 – Core electives													
2a	WMEE008-05 : GC	X	X	X	X			X	X		X		X		
2a	WMEE027-05 : RET	X	X	X	X			X	X	X		X	X	X	
2a	WMEE014-05 : NPT	X	X	X	X			X	X		X	X	X	X	
2a	WMEE022-05 : CMS	X	X	X	X	X	X	X	X	X	X	X	X		
2a	WMEE012-05 : ECN	X	X	X	X			X	X	X	X	X	X	X	
2b	WMEE010-05 : CM	X	X	X	X	X	X	X	X			X	X		
2b	WMEE026-05 : EMES			X	X	X		X	X	X	X	X	X		
2b	WMEE013-05 : RDA	X	X	X	X	X	X	X	X	X	X	X		X	
2b	WMEE004-05 : GEO	X	X	X	X			X	X		X	X			
2b	WMEE015-05 : FCS	X	X	X	X			X	X						
2b	WMEE024-05 : ESP	X	X	X	X	X	X	X	X	X	X	X	X	X	
Period	Projects	Year 1 period 2b and/or Year 2													
	WMEE905-30/40	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	WMEE906-30	X	X	X	X	X	X	X	X	X	X	X	X	X	X

Period	Course	Year 1 – Electives (offered by other FSE programmes or faculties)													
2a-2b	See Ocasys														
Period	Course	Year 2 - Electives (offered by other FSE programmes or faculties)													
1a-1b	See Ocasys														

6. List of examiners

This list contains staff which is allowed to be appointed as course coordinator for courses, and as first and second examiner for research projects - unless specified otherwise.

Name	Remarks
Dr. R.M.J. Benders	
Drs. M.R. Berger	examiner for EES-courses, for Minor Future Planet Innovation and second examiner for MSc projects
Prof. Dr. R. Bintanja	Honorary Professor
Dr. P. Boelen	only second examiner for MSc projects regarding Biomimetics
Dr. M.K. de Boer	
Prof. Dr. W.R. Browne	only second examiner for MSc projects
Prof. Dr. H. Chen	
Prof. Dr. M.W. Dee	
Prof. Dr. U. Dusek	
Prof. Dr. G.J.W. Euverink	research institute ENTEG
Drs. S. Grooters	examiner for Minor Future Planet Innovation
Prof. Dr. A.P. Grootjans	emeritus, but active
Dr. S.M.A.C. van Heuven	only second examiner for MSc projects regarding CIO
Prof. Dr. K.S. Hubacek	
Prof. Dr. N. Kalantar-Nayestanaki	
Dr. M. Kavatsyuk	
Prof. dr. L.J.H. Koster	
Dr. G.A.H. Laugs	examiner for Minor Future Planet Innovation
Dr. P.W. Leenes	
Prof. Dr. ir. D. Lentink	
Dr. W. Medjroubi (PENDING)	
Dr. A.A. van der Meer (PENDING)	
Prof. Dr. H.A.J. Meijer	
Prof. Dr. R. Middag	
Dr. J.M. Miocic	
Dr. A.V. Mokhov	
Prof. Dr. H.C. Moll	emeritus, but active
Dr. H.A.J. Mulder	
Prof. dr. M. Mulder	Faculty of Economics and Business
Drs. P. Nienhuis	
M.J. van den Nieuwenhof-Schilstra	examiner for Minor Future Planet Innovation

Dr. ir. S. Nonhebel	
Dr. D. Paul	only second examiner for MSc projects regarding CIO
Prof. Dr. W. Peters	
F. Pierie, MSc	
Dr. W.H. van de Poll	only second examiner for MSc projects regarding Biomimetics
Dr. P. Pradhan	
Prof. Dr. A. Purushothaman Vellayani	
Dr. C.E. Rigollet	
Dr. M. van Rijssel	examiner for Minor Future Planet Innovation
Dr. F. Ruzzenenti	
Dr. ir. H.A. Scheeren	only second examiner for MSc projects regarding CIO
Prof. Dr. A.J.M. Schoot Uiterkamp	emeritus, but active
Prof. Dr. E.J. Stamhuis	
Prof. Dr. K.R. Timmermans	
Dr. P.J. Upham	
Prof. Dr. A. Vakis	
Dr. V. Kyriakou	
Dr. H.J. van der Windt	
ir. T. Woudstra	second examiner for courses and a second examiner for MSc projects regarding Thermodynamics
J. Zevenberg, MSc	examiner for Minor Future Planet Innovation
Dr. Xin Sun (PENDING)	