



Appendices Teaching and Examination Regulations MSc Energy and Environmental Sciences 2019-2020

Appendix I: Learning outcomes of the Msc. Energy and Environmental Sciences (EES) (art. 3.1)

INTRODUCTION

Appendix 1 presents the two parts of the EES learning outcomes. The first part of the learning outcomes is specific and concerns knowledge and skills. These learning outcomes are covered in the obligatory part of the EES programme.

The second part of the learning outcomes is more general. It focusses on the final skills a student is capable of (i.e. doing research independently). This part is mostly covered by the research projects. See also Table 1 that gives an overview of the specific and general outcomes of the master EES.

OBJECTIVES

The aims of the EES program result in the following objectives:

Specific academic knowledge and skills for the master's degree program 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 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 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.

Table 1. Overview of the specific and general outcomes of the master EES

Outcomes														
	Specific**				General**									
	Sa	Sb	Sc	Sd	G1	G2	G3	G4	G5	G6	G7	G8	G9	G10
Courses*														
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			
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		
Research project 1 (variant 1)	X	X		X	X	X	X	X		X	X	X	X	X
Research project 2 (variant 1)	X	X		X	X	X	X	X	X	X	X	X	X	X
Research project (variant 2)	X	X		X	X	X	X	X		X	X	X	X	X
Internship (variant 2)	X	X		X	X	X		X	X	X		X	X	X

*The abbreviations of the courses are given on the following page

** The abbreviations of the outcomes are given in the text above

Appendix II: Tracks/Specializations of the degree programme (art. 3.5) – not applicable



Appendix III: Content of the degree programme (art. 3.6)

Appendix IV Electives (art. 3.7)

Appendix V: Compulsory order of examinations (art. 4.4)

Table 2A: Overview of the obligatory courses

Course Unit	EC	Practical	Entry Requirements
<u>FIRST PART</u>			
<u>Obligatory courses</u>			
Data Analysis and Statistical Methods (DASM) (WMEE14000)	5	Yes	None
Impacts of Energy and Material Systems (IEMS) (WMEE13001)	5	Yes	None
Sustainable Use of Ecosystems (SUE) (WMEE16000)	5	Yes	None
Sustainability and Society (S&S) ((WMEE13003)	5	Yes	None
Systems Integration and Sustainability (SIS) (WMEE13004)	5	Yes	None

Table 2B: Overview of the obligatory projects

<u>SECOND PART</u>			
<u>Variant 1</u>			
Research Project 1 (EM5RTH30E)	30	Yes	DASM, IEMS, SUE, S&S, SIS and specialisation module(s)
Research Project 2 (EM5MTH30E)	30	Yes	DASM, IEMS, SUE, S&S, SIS, specialisation module(s),



			electives, Research Project 1
<u>Variant 2</u>			
Research Project (WMEE16002)	40	Yes	DASM, IEMS, SUE, S&S, SIS and specialisation module(s)
Internship (WMEE16003)	20	Yes	DASM, IEMS, SUE, S&S, SIS, specialisation module(s), electives, Research Project
<u>Variant 3</u>			
Research Project (WMEE16002)	40	Yes	DASM, IEMS, SUE, S&S, SIS and specialisation module(s)
Research Project 2 (EM5MTH30E)	30	Yes	DASM, IEMS, SUE, S&S, SIS, specialisation module(s), electives, Research Project 1 or Research project 40 EC

Science, business and policy variant

This profile consists of the following course units:

1. Obligatory courses mentioned in Table 2A (25 EC)
2. One elective/optional course (5 EC) from the list in Table 4 or 5
3. Research project 1 (EM5RTH30E) (30 EC) where the learning outcomes of the specialisation course Modeling Energy and Material Systems (MEMS) (WMEE13005) are covered as well
4. Science, business policy year (60 EC) consisting of: Introduction Science and Business (WNBIBEB08A, 10 EC), Introduction Science and Policy (WNBIBEB08B, 10 EC) and Internship Business and Policy (WNBIBEB08, 40 EC)

Appendix IV: Electives (art. 3.7)

Variant 1 and 2: The Specialisation and Optional courses comprise 35 EC to complete the 120 EC for the total study programme of the master EES.

Variant 3: The Specialisation and Optional courses comprise 25 EC to complete the 120 EC for the total study programme of the master EES.



The student needs to choose at least one of the two specialisation courses Modeling Energy and Material Systems (MEMS) or Global Change (GC), allowing him/her to specialize in either systems studies or experimental studies or both. Table 3 gives an overview of the specialisation courses.

Depending on the student's background and the topic of the research project(s), a package of specialisation courses and optional courses is composed as part of the MSc EES programme. The individual package of these specialisation and optional courses are discussed with a senior staff member (tutor) and has to be approved by the tutor and the Board of Examiners.

Table 4 and 5 give an overview of the optional courses, Table 4 optional courses offered by the EES degree programme itself, Table 5 are optional courses offered by other degree programmes.

Table 3. Overview of the specialisation courses

Course unit	EC	Practical	Entry Requirements
Modeling Energy and Material Systems (MEMS) (WMEE13005)	10	Yes	
Global Change (GC) (WMEE16001)	5	Yes	

Optional courses offered by EES

Table 4. Overview of the optional courses offered by EES.

Course unit	EC	Practical	Entry requirements
Geo-Energy and Subsurface Processes* (WMEE17001)	5	No	
Experimental Methods of Trace Gas Research (EMTGR) (EM4ITGo4)	5	Yes	
Climate Modelling (CM) (WMEE18001)	5	Yes	
Energy and Complexity Nexus (ECN) (WMEE18002)			

*It is not allowed to choose Geo-Energy and Subsurface Processes if the student already passed Geo-Energy in his Bachelor degree programme at the UG.



Optional courses offered by other degree programmes

Students can select other elective courses from other degree programmes. For the number of EC, Practical, Entry requirements, see the course catalogue Ocasys. Table 5 gives an overview of possible optional courses.

Table 5. Overview of possible optional courses offered by other degree programmes
All 5 EC, unless another amount is mentioned.

MLGBB04	Bio catalysis and Green Chemistry
GEMDILEIP	Dilemmas in Infrastructure Planning
EBM166A05	Energy & Finance
WMCH17007	Photovoltaics Science and Energy**
NAPMS-12	Principles of Measurement Systems***
STSMT-09	Space Mission Technology
EBM167A05	Energy Transition & Innovation
WMPH17001	Physics of Lasers
GEMREENVPL	Reinventing Environmental Planning
NASMPH05E	Statistical Methods in Physics
GEMTRWATM	Transitions in Water Management
GEMSOCIMAS	Social Impact Assessment
CHSFE05E	Sustainability for Engineers
TBSE05E	Systems Engineering
WMPH13007	Ultrafast Time-Resolved Spectroscopy
STBDT5E	Basic Detection Techniques (19/20)
CHBBP-09	Bio-based Products
PSMSB-2	Environmental Psychology
NAKE-12	Nuclear Energy****
RC-C++1	Programming in C/C++ (part I)
WMEC13004	Science communication skills
WMEC17003	Science and the public
WNBIBEB08B	Introduction Science and Policy (10 EC)
MLAA04	Advanced Statistics
WNBIBEB08A	Introduction Science and Business (10 EC)
EBM148A05	Economics of Regulating Markets
PSMEB-2	Working in interdisciplinary teams
WMIE14004	Bioprocess Technology
WMEC17001	History and Philosophy of Science
WNEC1WVJ5	Science Communication and Journalism
WLB07020	Conservation Biology *****
WMPH18001	Radio-carbon Dating and Analysis
EBM202A05	Sustainable Energy Supply
EBM169B05	Strategic Decision-making in Marketing
EBM201A05	Global Supply Chain Man & Sustainability
MLMB03	Polar Ecosystems
WMLS15002	Marine Ecosystem Service and Global Change

**It is not allowed to choose Photovoltaics Science and Energy when the student already passed Solar Cells in his Bachelor degree programme at the UG.



***It is not allowed to choose Principles of Measurement Systems when the student already passed this course in his Bachelor degree programme at the UG.

****It is not allowed to choose Nuclear Energy when the student already passed this course in his Bachelor degree programme at the UG.

*****It is not allowed to choose Conservation Biology when the student already passed this course in his Bachelor degree programme at the UG.

With approval of the tutor and the board of examiners, a student is allowed to choose another Master elective from another Master degree programme. The student needs to motivate his choice.

Appendix VI: Admission to the degree programme and different tracks/specializations (art. 2.1.1 and art. 2.2)

Requirements for admission to the Msc Energy and Environmental Sciences:

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 Energy and Environmental Sciences:

- Biology
- Life Science and Technology
- Pharmacy
- Chemistry
- Chemical Engineering
- Physics
- Applied Physics
- Astronomy
- Mathematics
- Applied Mathematics
- Computing Science
- Industrial Engineering and Management Science
- Artificial Intelligence

Appendix VII Transitional provisions (art 7.1)

The possibilities and conditions set in this document regarding the projects and electives also count for the students who started their Master EES in 2018-2019.

Appendix VIII

Application deadlines for admission (art. 2.6.1)

Starting date 1 September 2020

Deadline of Application	Non-EU students	EU students
Energy and Environmental Sciences	May 1st 2020	May 1st 2020

Decision deadlines (art. 2.6.3)

Deadline of Decision	Non-EU students	EU students
Energy and Environmental Sciences	June 1st 2020	June 1st 2020