Hanze
University of Applied Sciences
Groningen

Teaching and Examination Regulations
of the programme

European Master in Renewable Energy

(full-time)

School of Engineering

Hanze University of Applied Sciences, Groningen

Adopted by the Dean of the School of Engineering on 30 August 2013

These regulations take effect from 1 September 2013

CONTENTS

1. STUDY PROGRAMME

1.1 Introduction

This document contains the teaching and examination regulations of the European Master in Renewable Energy as provided by Hanze University of Applied Sciences, Groningen (Hanze UAS). The teaching and examination regulations incorporate the EUREC regulations (Appendix A) and the general examination regulations of Master programmes at the Hanze UAS (Appendix B). If they conflict, the EUREC regulations take precedence over the examination regulations of the Hanze UAS. The teaching and examination regulations apply to all students who are enrolled in the programme.

The master's degree programme outlined in this document builds on the framework of the existing EUREC European Master in Renewable Energy. The European Master in Renewable Energy intends to deliver renewable energy engineers who will bridge the gap between growing industry demand for specialised renewable energy expertise and the skills available in the job market. Aims of the European Master in Renewable Energy programme are to:

- train students to become renewable energy engineers who will be designers and developers of the next generation of renewable and sustainable energy systems.
- provide a firm technical background in the key renewable energy fields and to create a context for energy production and use in European perspective.
- enable students to specialise at high level in the state-of-the-art technology in one of the renewable energy areas
- enable students to undertake a project related to the specialisation in industry, a research laboratory or at the university and during which the student can gain practical and research experience.
- enable students to gain international experience by studying in at least two different European countries and in an international environment.

The EUREC master is offered by a consortium of a selected group of 11 European universities consisting of core universities (first semester) and specialisation providers (second semester). Present core universities are:

- Ecole des Mines de Paris, France - French-taught
- Loughborough University, UK - English-taught
- University of Zaragoza, Spain - Spanish-taught
- Oldenburg University, Germany - English-taught
- Hanze UAS – English-taught

Specialisations and their providers are:

- Hybrid Systems, Kassel University, Germany
- Photovoltaics, University of Northumbria, UK
- Solar Thermal Energy, University of Perpignan, France
- Wind Energy, National Technical University of Athens, Greece
- Grid Integration, University of Zaragoza
- Ocean Energy, University of Lisbon

Students enrol in one of the core universities. Core universities award the degree (Master of Science). The partner universities recognize each other's credits.

Educational principles

The educational basis of the Hanze European Master in Renewable Energy is provided by developments in the professional practice of Renewable Energy. Sources of inspiration are a contemporary view on the needs of international professional practice, independent learning and

students taking responsibility for their own learning process at Master level. Academic learning outcomes focusing on applied research and analytical skills and application-oriented learning outcomes are central in this degree programme, in combination with context and integrative learning outcomes. Learning outcomes and assessments are aligned to this educational policy.
The programme's main educational characteristics:

- Competence based learning with focus on academic, technical and social and communicative learning outcomes.
- Integrated learning of knowledge skills.
- Flexible learning path: specialization abroad is chosen on the basis of student interest.
- Development of professional and personal competence.
- Studying in an international environment.

1.2 Examining Board

The Examining Board is an independent body within our institution. The Examining Board appoints the examiners, monitors the quality of assessments, approves assessment results, decides on proposed changes to a student's programme (upon advice by the EUREC Master Steering Committee), and on exemptions. Students may request the Examining Board for individual arrangements by handing in a written request. The Examining Board decides if such a request is valid.

The Examining Board appoints examiners to conduct the assessments. Examiners may be lecturers, external experts, staff members who teach in the unit of study concerned, or any other suitable persons. The examiners provide the Examining Board with any information they may request. The Examining Board can issue guidelines and instructions to the examiners with regard to the assessment of individual students and the marking of assessments.

The Examining Board reports on its activities to the Dean annually. The report must, at minimum, describe any measures which have been taken to uphold the examination rules, the quality assurance of the assessments and the application of general exemption rules. In case the Examining Board has to review issues regarding the upholding of these Examination Regulations in situations where one of the members of this Board is, or may be, involved, the chairman is obliged and authorised to temporarily replace this member of the Board for that specific issue by a temporary member that is in no way involved in that specific issue brought to the Board.

The members of the Examining Board are:

- Ir. J. (Jan) Bekkering (chair)
- Dr. mr. N.Y. (Nicky) Del Grosso
- Ing. M. (Marten) Wiersma MEd (advisor)

Secretary support by J. Fokkinga.

1.3 Admission Committee

EUREC checks whether students applying for admission to the master programme meet the EUREC entry requirements, and forward a list of eligible students to the core provider. Subsequently, the Admission Committee checks whether the student meets the Hanze entry requirements and advises the dean which applicants may be admitted to the programme.
Students that have been admitted will receive a formal letter of acceptance. Attached to the letter of acceptance will be information about visa procedures, housing, insurance etc. and assistance provided by the Hanze International Student Office in these matters.
Students who do not meet the Hanze admission requirements will receive a letter of rejection and are informed of the appeal procedure.

The Admission Committee consists of the members of the Examining Board. They are:

- Ir. J. (Jan) Bekkering (chair)
- Dr. mr. Nicky Del Grosso
- Ing. M. (Marten) Wiersma MEd (advisor)

Secretary support by J. Fokkinga.

1.4 Study Programme Committee

A Study Programme Committee, consisting of staff and students, will be formed. The committee will supervise the quality of the programme and advises (upon request or by its own initiative) the programme management about programme content and processes. Topics that will be discussed by the Committee are the outcomes of module evaluation, examination regulations, student mentoring and facilities. The Committee will meet once every three months or more often when necessary.
The Study Programme Committee consists of:

- Drs. M. (Marietta) de Rooij (chair)
- Dr. F. (Folkert) Faber
- Two students

1.5 Academic Board

The Academic Board monitors and evaluates scientific quality and advises the programme management on required changes to the Hanze European Master RE programme. The Board approves thesis research proposals of Hanze students and advises the Examining Board on the thesis assessment results. Typical examples of assessment items are submitted to the academic board for their approval from the point of view of scientific content. The Academic Board will participate in the annual master programme evaluation meeting, reviewing the material at hand and providing its own evaluation of scientific quality of the programme. Based on their evaluation the Academic Board will offer guidelines and support for improvement. The Academic Board will meet at least once a year and will meet with the Professional Board at least once a year. The Academic Board consists of four academic peers from different partners at PhD and senior teaching staff level. They are:

- Dr. ir. J.P. (Jan-Peter) Nap (chair) - Hanze UAS
- Prof. dr. H.C. (Henk) Moll - University of Groningen
- Prof. dr. ir. M. (Mannes) Wolters - Twente University – Chair of Gas Technology
- Ir. J.G. (Gerard) Schepers - ECN
- Prof. dr.ir. W. Sinke - ECN

1.6 Professional board

The Professional Board monitors, and evaluates the professional relevance of the master programme. The Board makes recommendations for changes to the programme to the programme management and makes recommendations for thesis project topics.
The Professional Board consists of at least five representatives at strategic level from organisations and companies in the field of Renewable Energy. The Board meets at least twice a year to discuss developments and provide input. The Board will meet with the Academic Board at least once a year.
Board members are:

- Ir. R. (Robbert) Wittmaekers - BAM Infratechniek – Deputy Director
- Ing. J.J. (Hans) Overdiep - Gas Terra - manager energy transition
- Ing. D. (Douwe) Faber - Ekwadraat Advies bv – director
- Dr. B.J. (Barend) Botter - NAM – Deputy Director
- R. Kleiburg - ECN – R&D Director

- Dr. K. (Koos) Lok - Energy Valley and Hanze UAS

1.7 Legal Protection

Students enrolled in the Hanze European Master in Renewable Energy enjoy full legal protection according to article 17 of the Hanze UAS Examination Regulations (appendix B).

2. LEARNING OUTCOMES

The following learning outcomes were defined for graduates of the Hanze European Master in Renewable Energy.
These learning outcomes are thought to be essential for the future energy professional to meet all challenges of the decentralized energy market shaped by the upcoming energy transition. These six key competences agree with the Dublin Descriptors for a master level programme (see below), implement the recommendations of the European Federation of National Engineering Associations and of the Accreditation Board for Engineering and Technology. These learning outcomes comprise:

A. Academic learning outcomes: good and applicable knowledge of, and skills in, analytical and research methodology relevant for current and future renewable energy sources; being able to conduct applied research, which combines scientific rigor and practical impact, in complex professional 'real life' situations. M.Sc.-graduates will be **reflective** professionals, with a **sound grasp of research methodology**: they will be competent to conduct applied scientific research in order to implement fundamental research insights in renewable energy innovations. The M.Sc.-graduate is competent to use a range of applied research methods and techniques **independently**:

a. to formulate a problem definition, employ specific research and analysis methods and plan and conduct research on real-life non-routine problems.
b. to translate a practical problem into questions in terms of a conceptual model, to collect relevant data and to translate the outcomes of the model into answers to the original problem.
c. to apply appropriate scientific methods and techniques, mathematics, economics and other sciences in energy systems design.
d. to communicate findings in both written and oral form in English to the problem owner and other relevant stakeholders.
e. to display a reflective attitude (investigative, critical) towards the possibilities and limitations of the scientific methods used and the development of a body of knowledge and, based on that attitude, make meaningful contributions to the energy debate.

B. Application-oriented learning outcomes: good and **applicable** knowledge of multiple renewable energy technologies, and a higher level in at least one particular renewable energy technology. Learning attention will focus on solar, water, biomass and wind energy in the context of the analysis and/or **originality** of **design** of near energy neutral systems (as little energy loss as possible). The M.Sc.-graduate is competent in:

a. multiple renewable energy technologies and – depending on the specialisation chosen by the student – specialist in at least one renewable energy technology.
b. integrating renewable energy sources (wind, solar [photovoltaic, thermal], water, biomass energy) into a flexible, distributed energy system.
c. applying the principles of integrated storage techniques.
d. analysing and improving the energy efficiency of production chains (implementing innovations).

C. Context-oriented learning outcomes: basic understanding of issues in energy strategy and politics at different **levels of context** (local, regional, national, global).
The M.Sc.-graduate is competent in:

a. applying knowledge and insights of the principles of a range of renewable energy systems for optimal energy conversion.

b. **designing a (range of)** renewable energy **system(s)** for optimal energy conversion at a given location and for particular applications.
c. critically appraising codes of practice relevant to renewable energy systems.
d. analysing economic and sustainability aspects of renewable energy systems as well as technological considerations.
e. statistically assessing renewable energy resources at a specific location given appropriate data.

D. Integrative learning outcomes: good ability to **integrate** technical knowledge and skills with technological, strategic, social and economic issues; ability to **handle complexity**.
The M.Sc.-graduate is competent in:
a. using appropriate mathematical methods for modelling and analyzing engineering problems relevant to renewable energy systems.
b. using knowledge and understanding of the socio-economic effects of introducing and using relevant technologies.
c. Making an economic evaluation of the profitability and competiveness of renewable energy projects.

E. Communication learning outcomes: ability to communicate **appropriately** and perform efficiently in international, **multidisciplinary teams**.
The M.Sc.-graduate is competent in:
a. carrying out tasks in a project environment.
b. participating effectively in an international, multidisciplinary team.
c. communicating effectively orally, visually and in writing at an appropriate level (in English) to clients and stakeholders.
d. communicating the link between technological projects and strategic objectives, to the management and other relevant stakeholders.

F. Professional development learning outcomes: ability to **learn independently** and **reflect** on oneself in a professional context.
The M.Sc.-graduate is competent in:
a. staying abreast of relevant (inter)national developments, trends and ideas in society, policy, and professional practice and to translating, developing and introducing these in an innovative manner to improve professional practice.
b. managing his or her own learning process and sharing expertise with peers and other experts in professional practice.

The master's level
The master's level is characterized by the student's expertise in their specialism. Students are (semi)autonomous, demonstrating independence in the negotiation of assessment tasks (including the thesis project) and the ability to evaluate, challenge, modify and develop theory and practice. Students are expected to demonstrate an ability to isolate and focus on the significant features of problems and to offer synthetic and coherent solutions, with some students producing original or innovative work in their specialism that is worthy of publication or public performance or display. Students demonstrate abstract thinking in research and when applying technical energy concepts.

From the point of view of the framework for Qualifications of the European Higher Education Area, the Hanze European Master RE is a second cycle programme. This means it should develop learning

outcomes in line with Dublin Descriptors for the master level. The table below describes the alignment of the Hanze European Master RE learning outcomes with these descriptors.

Table 1 Alignment of Hanze European Master RE to Dublin Descriptors

Dublin Descriptors Master level	Hanze European Master in Renewable Energy
Knowledge and understanding Demonstrated knowledge and understanding that is founded upon and extends and/or enhances that typically associated with Bachelor's level, and that provides a basis or opportunity for originality in developing and/or applying ideas, often within a research context	This is accomplished by learning outcomes A (academic learning outcomes) and B (application-oriented learning outcomes)
Applying knowledge and understanding Can apply their knowledge and understanding, and problem solving abilities in new or unfamiliar environments within broader (or multidisciplinary) contexts related to their field of study	This is accomplished by learning outcomes B (application-oriented learning outcomes) and C (context-oriented learning outcomes)
Making judgments Have the ability to integrate knowledge and handle complexity, and formulate judgments with incomplete or limited information, but that include reflecting on social and ethical responsibilities linked to the application of their knowledge and judgments	This is accomplished by learning outcomes C (context-oriented learning outcomes) and D (integrative learning outcomes)
Communication Can communicate their conclusions, and the knowledge and rationale underpinning these, to specialist and non-specialist audiences clearly and unambiguously	This is accomplished by learning outcomes E (communication-oriented learning outcomes)
Learning Skills Have the learning skills to allow them to continue to study in a manner that may be largely self-directed or autonomous	This is accomplished by learning outcomes F (professional development learning outcomes)

Academic Orientation

The orientation of the Hanze European Master RE is academic. Research is an integral part of the set of intended learning outcomes. Research methodology skills to carry out scientific research are described in the Academic learning outcomes. The competence to resolve multidisciplinary or interdisciplinary issues in relation to Renewable Energy is demonstrated in the Context-oriented learning outcomes and the Integrative learning outcomes. The context for the research in energy is international. Independent research is carried out in the final semester during the thesis. The research is a supervised by a core university supervisor, a specialisation university supervisor and a representative of the thesis provider. Students are responsible for all the stages of research; from gaining ethical approval to reporting findings in the thesis to an international EUREC committee.

3. PROGRAMME OUTLINE

The European Master in Renewable Energy is a fulltime programme.

EUREC Framework
The EUREC framework for the master programme comprises the general programme structure, EUREC general core learning outcomes and core curriculum outlines developed and evaluated by the EUREC Master Steering Committee. The exact content of the curriculum is the responsibility of each partnering university and each university is expected to use its own strengths to provide its own profile in the core.

3.1 Curriculum overview

The content and structure of the EUREC Master is predetermined by the EUREC university consortium and comprises:
1. a core semester of 30 ECTS credits; and
2. a specialisation semester of 30 ECTS credits; and
3. a thesis project of 30 ECTS credits.

The Hanze European Master in RE was developed to suit these requirements.

Semester 1 Core (30 ECTS credits) provided by Hanze UAS	Semester 2 Specialisation (30 ECTS credits) provided by one of the specialisation universities	Semester 3 Thesis (30 ECTS credits) provided by Hanze UAS
Technical Foundation (4 EC's) Energy Transition Context (5 EC's) Biomass Energy (4 EC's) Wind & Hydro Energy (5 EC's) Solar Energy (5 EC's) Energy Distribution and Storage (4 EC's) Numerical Modelling (2 EC's) Professional Skills and Mentoring (1 EC)	Hybrid Systems Photovoltaics Wind Energy Solar Thermal Grid Integration Ocean Energy	Choice by student in consultation with and after approval from Hanze UAS.

3.1.1 Core semester at Hanze UAS

The core semester should enable the student to successfully complete one of the specialisations and the thesis. Core providers adhere to the EUREC framework for the core but are stimulated and expected to use their own strengths to deliver the core. Hanze UAS used its strengths to develop the core in the following manner:

Semester 1		
Module	EC	Examination (W/O)
Technical Foundation	4	
Energy Basics	*1*	W
Electrical Engineering	*3*	W
Energy Transition Context	5	
Geopolitics (Energy policy and economics)	*2*	W
Research Methodology and Research Project	*3*	O
Biomass Energy	4	
Theory Biomass Energy	*2*	W
Assignments Biomass Energy	*2*	O
Wind and Hydro Energy	5	O
Solar Energy	5	O
Energy Distribution and Storage	4	
Distribution and Storage Technologies	*2*	W
Biogas Storage Technology and Network Balancing	*2*	O
Numerical Modelling	2	O
Professional Skills and Mentoring	1	O
Total	**30**	
Semester 2		
Module	EC	Examination (W/O)
Specialisation Hybrid Systems (Kassel)	30	
Specialisation Photovoltaics (Northumbria)	30	
Specialisation Wind Energy (Athens)	30	
Specialisation Grid Integration (Zaragoza)	30	
Specialisation Solar Thermal (Perpignan)	30	
Specialisation Ocean Energy (Lisbon)	30	
Total	**30**	
Semester 3		
Thesis Project	30	
Total	**30**	

W = written O = Other

For short module descriptions of the core semester, see appendix C.

3.1.2 Specialisation semester

Students enrolling at Hanze University are given a choice of the following specialisations:

- *Photovoltaics* (30 ECTS) delivered by University of Northumbria, UK
- *Solar Thermal Energy* (30 ECTS) delivered by the University of Perpignan, France
- *Wind Energy* (30 ECTS) delivered by the National Technical University of Athens, Greece
- *Renewable Energy Grid Integration and Distributed Generation* (30 ECTS) delivered by the University of Zaragoza, Spain
- *Ocean Energy (*30ECTS) delivered by the Technical University of Lisbon, Portugal

New specialisations that will be added to the EUREC programme will be offered to Hanze students after these specialisations have been approved by the Examining Board. For more information on specialisations, see appendix D.

To start the specialisation, it is required that the student has obtained a minimum of 25 out of the 30 core credits.

3.1.3 Thesis Project

Upon completion of the specialisation, the student conducts a 6-month applied research project in an industry, a research institute or a university department (EUREC members only). The project must contain sufficient technical challenge and must be directly related to renewable energy. Topic approval, supervision and assessment will be in line with the EUREC General Programme Regulations (appendix 1). During the project, the student's progress is supervised by:

- a Hanze UAS supervisor;
- a specialisation university supervisor; and
- a professional tutor from the project provider.

It is the Hanze UAS, who ultimately decides on the mark for the project report and project presentation. Criteria for grading have been set by EUREC. In addition to EUREC-criteria, Hanze UAS will use its learning outcomes to supervise and assess the student. In practice this will mean that much attention will be paid to the integrative and context-oriented learning outcomes. The student is required to write a master thesis. The thesis consists of two documents written in English:

1. A comprehensive report of up to 40 pages (including annexes).
2. A summary paper of up to 6 pages (plus up to 20 pages of annexes).

The M.Sc. thesis manual specifies the process, supervision and assessment of the thesis project in detail. Students will receive this manual at the start of the core semester.
The project outcomes must be presented at the EUREC Agency headquarters in Brussels. The jury will consist of representatives from the core provider, the specialisation provider and a representative of another partnering University.
The project presentations also provide an opportunity for students to meet the staff from the renewable energy associations, from the renewable energy industry and from the European Commission.
During the master thesis project students continue to reflect on their own learning goals as part of Professional Skills and Mentoring.

Thesis	ECTS credits/contact hours	Learning Outcomes	Teaching & learning methods	Assessment Methods
Thesis project	30/ 25 hrs	All	Independent research	Thesis report (80%) Thesis presentation (20%)

To start the thesis project in the third semester, the student is required to have obtained

- 30 credits of the core and a minimum of 20 credits of the specialisation semester;
- approval of the thesis topic and proposal by the Academic Board;
- a thesis contract, signed by the Hanze supervisor, the professional tutor and the student.

The student is required to inform the Hanze supervisor of progress at least once a month.

3.2 Diplomas, Degrees and Accreditation

Upon successful completion of the degree programme, Hanze UAS will award students the degree European Master of Science in Renewable Energy.
The Hanze UAS degree certificate will list the specialisation that the student has completed.
In addition to their diploma, students receive a Certificate of Equivalence from the EUREC Agency. This document formally states that the different degrees awarded by the five core universities are equivalent in value and contents.
Furthermore, students will receive a European Diploma Supplement.

Requirements for degree:

1. In order to qualify for the EUREC Master Degree, Students must have:
   i) Complied with the regulations of the Provider responsible for each of the three Sections.
   ii) Accumulated a total of 90 ECTS credits. These credits are allocated as follows:
      - Core semester: Total of 30 ECTS credits
      - Specialisation: Total of 30 ECTS credits
      - Thesis project: Total of 30 ECTS credits
   iii) Paid in full all fees due to the Co-ordinator and, if applicable under Article 6 of the Memorandum, to the Partners.
2. The degree-awarding Partners must keep records of the final marks for each Course Section for each of the Students to whom they may award a degree. At the end of the Course Section they publish their Students' final results according to the following system: 0 to 40% (Fail); 40 to 50% (graded Fail); 50 to 70% (Pass); above 70% (Distinction).

- The degree-awarding Partner may, with the agreement of the Steering Committee, award the EUREC Master Degree with Distinction if a Student has achieved 90 ECTS credits and at least the equivalent of a Distinction for the Core and at least a Distinction and a high Pass for the Specialisation or Thesis Project. Students taking re-sit examinations may never graduate with more than a Pass from the EUREC Master. A student who fails a re-sit examination will not be awarded the Master degree. Such student has the opportunity to re-enrol in the failed Master section for the successive Academic Year. The maximum time for obtaining the EUREC Master Degree is two consecutive Academic Years.

3.3 Cum laude regulations

See appendix A (EUREC General Programme Regulations).

4. ADMISSION REQUIREMENTS

Students wishing to enrol in the EUREC-programme must comply with EUREC admission requirements: they are required to hold a B.Sc. Engineering, Mathematics or Physics subject OR equivalent with appropriate work experience. Furthermore students must have excellent English language skills in accordance with the requirements outlined below:

- TOEFL: minimum score of 575 (paper-based test), or 90 (internet-based test, with not less than 20 in Reading, Listening, Speaking or Writing); or
- IELTS: 6.5 minimum with not less than 6.0 in Reading, Listening, Speaking or Writing; or
- Cambridge Advanced Exam in English: B minimum; or
- Cambridge Proficiency Exam in English: C minimum.

The application procedure is described in appendix A.

5. EXAMINATIONS

Information on examinations can be found in the Student Manuals of the modules. For more information also see appendix A: General programme regulations of EUREC.

6. COMPULSORY ATTENDANCE

Attendance at lectures, workshops and other educational activities is strongly advised but never strictly required, unless otherwise stated (in the student manual) by the lecturer at the start of the module.

APPENDIX A - EUREC GENERAL PROGRAMME REGULATIONS

The regulations below are downloaded from:
http://www.master.eurec.be/en/About-the-Master/Regulations
Please follow link for the most recent version

Definitions

- EUREC Master: the degree programme "European Master in Renewable Energy"
- Memorandum: the Memorandum of Understanding between the academic institutions jointly offering the European Master in Renewable Energy
- Course sections: The EUREC Master is divided into three course sections:
  - The Core (duration approx. 5 months)
  - The Specialisation (duration approx. 4 months)
  - The Project (duration approx. 6 months) – a period during which the Student works full-time on a renewable energy engineering project for a company or research institute.

- Partner: one of the academic institutions that is a signatory to this Memorandum
- Applicant: a person who has applied for a place on the EUREC Master
- Student: a person who takes up his/her offer of a place on the EUREC Master
- Module: part of the course section which can be examined
- Steering Committee: A committee composed of one or more representatives from each of the Partners, charged with determining the structure and content of the course. The Steering Committee meets on an ad hoc basis and has the authority to revise part or all of this Memorandum, including its annexes, on a consensual basis. These meetings will be minuted.
- Co-ordinator: the signatory to this Memorandum charged with assuring a satisfactory co-ordination between the Partners and EUREC Master students.
- Core Provider: a Partner charged with teaching and examining the Core. Core Providers conduct their teaching in their national language, unless under special circumstances the Steering Committee and the Co-ordinator agree that teaching should be conducted in English.
- Specialisation Provider: a Partner charged with teaching the Specialisation to a group of Students. The Specialisation shall be taught in English unless otherwise approved by the Steering Committee.
- Project Host: the company or research institute for which the Student works during his/her Project
- Academic Year: The academic year begins on the date when Applicants who have been accepted onto the course ('successful Applicants') are invited to take up their places at their Core Provider. These dates will differ slightly from Partner to Partner, but will start in the period September/October.
- Offer Letter: letter sent to successful Applicants by the Co-ordinator offering them a place on the EUREC Master.
  Master Thesis: two documents, written by the student about their Project:
  - The summary paper: 4-pages plus max. 2 pages of references, conforming to a pro-forma circulated to the Students by the Co-ordinator
  - The comprehensive report: 40 pages, including annexes (single spaced, 12 point font)
- Project Presentation: A presentation made by each Student at the end of Academic Year relating to the work each has undertaken during his/her Project.

General

The RES-Master will follow the time schedule below:

- Core: starts in September/early October, ends by the end of January/beginning of February.
- Specialisation: starts at the latest mid- February, ends at the end of May.
- Project: lasts six months, starts early June, ends by the end of November or early December.

Application Procedure

1.Applicants nominate a first and second choice of Provider for both the Core and the Specialisation, bearing in mind that these should preferably be attended in different countries.
2.The minimum entrance criteria are a Bachelor degree in engineering or a scientific discipline (e.g. physics, chemistry, mathematics…). The criteria may be waived for Applicants with relevant work experience deemed equivalent to the academic admission requirements. All candidates must satisfy the language requirements of their chosen Core Provider and meet a minimum standard of English defined by those Partners teaching a Course Section in English.
3.There is no age limit on Applicants.
4.From the pool of Applicants, the Steering Committee select Applicants to whom they wish to send an Offer Letter, decide on the Core and Specialisation Provider for each Applicant in consultation with the Co-ordinator, and, if necessary, stipulate any conditions that the Applicant must fulfil in order to take up his/her place.

Tuition Fee

5.Failure of payment within the deadlines stated in the offer letter leads the Student to be taken off the course, and not being permitted to take his/her exams
6.The registration fee is non refundable. The 1st instalment is non refundable once students have started core classes. The 2nd instalment is non refundable once students have started specialisation classes

Changes and cancellations of core and/or specialisation courses

7.The Coordinator reserves the right not to run the entire Master programme. In this case, students are fully refunded for any tuition already paid.
8.Specialisation changes and offer of specialisations:
i.Students are allowed to change their specialisation choices until 31 October. Later change requests will not be granted.
ii.The Coordinator reserves the right not to run a particular Specialisation up to the end of July of the Academic Year. Any Students that have requested this Specialisation will be offered an alternative Specialisation.
iii.The Coordinator reserves the right not to allow a Specialisation change if the maximum number of students at the desired target Specialisation has already been reached, or if the departure of a student brings the number of students at a given specialisation below the minimum. These maximum and minimum numbers are fixed by the Specialisation Provider and are communicated to the Coordinator.
9.Core changes are not permitted once a student has registered for the course.

Mobility

10.Each student must study at least one Course Section in a different country to the other two.

The Project

Arranging the project

11.The student is encouraged to arrange his/her own Project. The Project should complement the knowledge that the Student has gained during his/her Specialisation, so, if necessary, the relevant Specialisation Provider should offer assistance to the Student in finding a Project. If despite the best efforts of the Student and Specialisation Provider, a suitable Project is not found, the Core Provider shall propose a Project to the Student. However, the main responsibility for finding a project falls on the student.
12.Each year, the Co-ordinator shall contact previous Project Hosts to see if they would host one or more Students in the current Academic Year.

Approval

13.Prospective Project Hosts must fill in a standard form ('Project Proposal Form for Companies R&D Centres') downloadable from the Co-ordinator's website and return it to the Co-ordinator or, if a Student has approached them, to this Student.
14.Each Student must obtain his/her Core Provider's approval for the Project work (s)he wishes to undertake. The Core Provider assesses Projects on the basis of the information contained in the forms described in 13. Therefore, each Student must make sure his/her Core Provider receives the Project Proposal Form.
15.Once approved by the Core Provider, each Student shall send his Project Proposal Form to his Specialisation Provider, as well as to the Co-ordinator (EUREC Agency).

Supervision

16.One month after beginning work on his/her Project, each Student should send a 1-2 pages document to his/her Core and Specialisation Providers describing his/her Project in detail, the role (s)he fulfils at the Project Host and setting out a timetable by when (s)he expects to complete different stages of his/her Project work.
17.The regularity of progress reports to be sent by the Student during his/her project will be determined by the Core Provider.
18.Core and Specialisation Providers will provide their Students with prompt feedback on the messages the Students send them.
19.Core Providers and Specialisation Providers reserve the right to impose further measures to ensure adequate supervision of their Students.
20.The company or research centre at which the Students work during their Project is required to write personally to the Student's Core and Specialisation Providers at least one month before the Project Presentations. The letter should describe the Student's commitment to the work that the company or research centre set them, their ability to take initiative, to work in a team, and any other aspects of the Student's working environment that the company or research centre deems noteworthy. The letter should contain a mark out of ten for the Student's performance. This information will be used by the Core and Specialisation Providers to assess the effort that each Student has put in to their Project.

Assessment

21.Project assessment will be in two parts: the Master Thesis and the Project Presentation. The relative weighting between the Master Thesis and Project Presentation is 80% and 20% respectively. The relative weighting between the comprehensive report and the summary paper of the Master Thesis is 75% and 25%.
22.The Steering Committee will ensure that all Students are marked according to a common scheme
23. If a Student fails the project, (s)he may redo this course section in the following Academic Year, under approval and particular conditions of their Core provider University.

Handing in the Master thesis

24.Projects are assessed on the basis of six months of work.
25.Each Student is to send his/her Master Thesis by e-mail to his/her Core and Specialisation Providers, and to the Co-ordinator no later than two weeks before the first day of the Project Presentations. The files e-mailed should be in 'doc' or 'pdf' format.
26.If the Master Thesis is not handed in on time, the student will fail the Project unless he/she has prior written permission (including by e-mail) from the designated supervisor at their Core provider The Co-ordinator will confirm receipt of each Master Thesis and their accompanying summaries by e-mail.
27.The Co-ordinator will post the e-mailed files in an area of its website accessible only to it and the Steering Committee.
28.If the project hosts wishes it, Students can request their thesis content to be treated confidentially by indicating this on the cover of the thesis. In this case, the Co-ordinator undertakes not to allow access to the Co-ordinator's copy of the Student's Master Thesis to anyone outside the Steering Committee, aside from the Co-ordinator itself.

Presentations

29.The Steering Committee will decide well in advance the exact dates and venue for the Project Presentations and the Co-ordinator will communicate this to the Students.
30.Each Student's Project Presentation will be heard by a jury composed of a representative of that Student's Core and Specialisation Providers and the representative of another EUREC Master Partner. The Steering Committee and Co-ordinator will select this jury. The marks awarded by this jury will inform the mark that the Core Provider awards for the Project.
31.Each Student's Project Presentation should last 15 minutes. The Student will then be subjected to 10 minutes of questioning on his/her Project by the jury mentioned in § 30.
32.Power-point presentation software and overhead LCD projector facilities will be available to the Students.
33.All Master students are requested to be physically present at the Master Presentation days in Brussels. However, under exceptional circumstances and previous approval of the student's core university, students can have the possibility to present their Thesis in a conference call mode. In this case, the Core provider should, at the latest two weeks before the Presentation Days, send an email to EUREC Agency approving the student's request.

Examinations

34.Examinations on each of the Core and Specialisation Course Sections will be held shortly after teaching has finished for the respective Course Section.
35.Under normal circumstances, examinations are written, but the Steering Committee reserves itself the right in special circumstances to approve or recommend the oral examination of a Student.
36.The Steering Committee will ensure that the type and level of examination for the Core follow a standard scheme and that the basis on which marks are awarded for course-work follows a standard scheme.
37.For the Specialisation,
i.The type and level of examination should be consistent with the ECTS credits to be awarded. This will consist of at least 2 written examinations of 3 hours in duration together with a further examination or other equivalent assessment, as determined by the Specialisation Provider.
ii.Students are not to be allowed access to sources of information beyond any information given in the questions.
iii.The proportion of assessment between the exams and the practical work (either a mini-project or laboratories) should be approximately 75% - 25%
iv.Each Student's Core and Specialisation examination and coursework results shall be communicated as soon as available to the Co-ordinator. Each Specialisation shall officially communicate the marks that Students have earned during their Specialisation to each Core Provider that their Students have attended in writing.
v.Without prejudice to iv), the Core Providers will translate the marks communicated to them by the Specialisation Providers into equivalent marks on the scale that each Core provider uses, and to use only these translated marks as the basis on which to assess and report their Students' performance.
38.If a Student fails a module, (s)he will be offered one chance to re-sit it at the earliest opportunity. Often this is likely to be a year after the first attempt. The requirement for a Student to re-sit an exam is the decision of his/her degree-awarding Partner, in consensus with the other Partners.
39.If a Student fails the entire Core or Specialisation course component, they will be offered the chance to retake the failed component but need to pay the associated costs.

Student Misconduct:

40.In cases where a student is in breach of the local regulations of the Partner where they are being taught, the Partner is responsible for applying a fair sanction, if necessary in consultation with the Steering Committee and/or the Co-ordinator.
41.Complaints made by Students that are unrelated to misconduct will be considered by the Steering Committee.

Requirements for Awards

42.In order to qualify for the EUREC Master Degree, Students must have:
i.Complied with the regulations of the Provider responsible for each of the three Sections.
ii.Accumulated a total of 90 ECTS credits. These credits are allocated as follows:

- Core section: Total of 30 ECTS credits, comprising solar, wind, biomass and water power.
- Specialisation: Total of 30 ECTS credits
- Project: Total of 30 ECTS credits

iii.Followed a course in the Core on the non-examinable topic "socio-economic issues". The Core Providers and Specialisation may add other non-examinable topics at their discretion.
iv.Paid in full all fees due to the Co-ordinator and, if applicable under Article 6 of the Memorandum, to the Partners.
43.The degree-awarding Partners must keep records of the final marks for each Course Section for each of the Students to whom they may award a degree. At the end of the Course Section they publish their Students' final results according to the following system: 0 to 40% (Fail); 40 to 50% (graded Fail); 50 to 70% (Pass); above 70% (Distinction).
44.The degree-awarding Partner may, with the agreement of the Steering Committee, award the EUREC Master Degree with Distinction if a Student has achieved 90 ECTS credits and at least the equivalent of a Distinction for the Core and at least a Distinction and a high Pass for the Specialisation or Project.

- Students taking re-sit examinations may never graduate with more than a Pass from the EUREC Master. A student who fails a re-sit examination will not be awarded the RES-Master degree. Such student has the opportunity to re-enrol in the failed Master section for the successive Academic Year. The maximum time for obtaining the EUREC Master Degree is two consecutive Academic Years.

Departures from the Programme Regulations

45.If a Student requests a departure from the Programme Regulations, the circumstances of his/her request will be judged by the Core Provider. If the Core Provider sees sufficient merit in the request (after consultation with the Steering Committee, if appropriate), the Core Provider will allow the departure in accordance with its standard internal rules.

Hanze
University of Applied Sciences
Groningen

APPENDIX B - EXAMINATION REGULATIONS HANZE UAS

The text below is downloaded from this link
Please follow link for the most recent version of: Examenregeling Masters HG [Engels]

EXAMINATION REGULATIONS

2012-2013

FOR THE MASTER'S DEGREE PROGRAMMES OF

HANZE UNIVERSITY OF APPLIED SCIENCES, GRONINGEN

Adopted by the Executive Board
June 2012

Hanze University of Applied Sciences,
Groningen

Examination Regulations - Contents

Article 1. General provisions

1.1 These Examination Regulations in conjunction with the Teaching Regulations form the Teaching and Examination Regulations for the Master's degree programmes taught at Hanze University Groningen.

1.2 In these Examination Regulations, 'examination' means: an assessment of a student's knowledge, understanding and/or skills.[1] An examination can be in the form of a written, oral or computer examination, a practical, a practice-based examination or competence assessment, an individual or group (project) assignment or any other form of assessment approved by the Examining Board.

1.3 For the purposes of these Regulations, a written request or a written communication has the same status as a request or communication made by electronic means.

1.4 Where these Examination Regulations refer to credits, European Credits are meant. One European Credit (ECTS) is equivalent to 28 hours of study.

1.5 If any serious inequity arises in the application of these Examination Regulations, the Examining Board may deviate from these regulations as it deems advisable.

1.6 In cases which are not covered by the Examination Regulations or the Examination Protocol, the Examining Board decides.

Article 2. Admission requirements

2.1 Enrolment in a master's degree programme is open to anyone who complies with the educational entry requirements referred to in the second paragraph and, if applicable, the admission requirements referred to in the third paragraph.

2.2 Enrolment is open to anyone who, in the opinion of the Dean, complies with the educational entry requirements set out in the Teaching Regulations. The requirements should refer exclusively to the knowledge, understanding and skills that the student has acquired by completing a bachelor's degree programme.

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[1] 'Examination', in these Teaching Regulations, corresponds to Dutch *tentamen*, which is an end-of-term or mid-term assessment. A 'final examination' (*afsluitend examen*) concludes a course or programme and is comprised of all the individual examinations taken.

2.3 For part-time courses, enrolment may be on condition that the student is in employment which is approved by the Examining Board, during the whole period of their enrolment.

2.4 A student holding a diploma that was issued outside the Netherlands must meet the two following requirements in order to be admitted to a master's degree programme taught in Dutch:
a. the National Diploma, NT2-II (Dutch as a second language), which is comprised of four modular certificates, and
b. a positive report from the Admissions Committee with regard to the diploma obtained outside the Netherlands.

2.5 Students who want to be admitted to an English-language programme must have achieved a minimum IELTS score of 6.0, or an equivalent score if a different kind of admission test was taken. Students from EEA countries are exempted from this requirement, as are students who hold an International or European Baccalaureate and students from countries where English is the official language as well as the language of instruction.

Article 3. Programme Organisation

3.1 The academic programme, the organisation of teaching and the annual planning of the master's degree programme is set out in the Teaching Regulations.

3.2 Curricula are divided into units of study. The workload of a unit of study is expressed as credits/ECTS in whole numbers. The workload of the entire master's degree programme is specified in the Teaching Regulations.

3.3 The units of study comprised in the master's degree programme are stated in a Credits Table which forms part of the Teaching Regulations. The number of credits allocated to the various units of study in the Credits Table corresponds to the workload stated for the units of study.

3.4 If any prerequisites apply to a unit of study, they are specified in the Teaching Regulations.

Article 4. Teaching Regulations

4.1 The Teaching Regulations contain a description of the content of the master's degree programme and the units of study of which it is comprised. The Teaching Regulations also include a description of the competencies in the field of knowledge, understanding and skills that the student must have achieved on the completion of the master's degree programme.

4.2 The Teaching Regulations describe any practical assignments that are part of the programme.

4.3 The Teaching Regulations state the number and order in time of the examinations as well as the times they can be taken. They also state whether examinations will be taken orally, in writing or in any other way, and whether oral examinations will be open to public attendance, all subject to the Examining Board's power to determine otherwise in special cases.

4.4 The Teaching Regulations also state the way in which students with a physical or sensory disability may reasonably be given the opportunity to take examinations.

Article 5. Final Examination

The final examination is passed when a student has passed all the individual examinations pertaining to the units of study that are part of the master's degree programme.

Article 6. Examinations

6.1 One or more examinations (*tentamens*, see note 1) are held for each unit of study. The Teaching Regulations stipulate for each study period, the maximum number of examinations that may be taken in that period.

6.2 When a student passes an examination, the examination result is recorded and credits are awarded. No compensation between examination results is possible.

6.3 The Teaching Regulations may stipulate that students have to sign up for examinations.

Article 7. Term of validity

7.1 Final examinations and the results of individual examinations remain valid indefinitely.

7.2 In respect of students who have been enrolled in a master's degree programme without interruption, no limitations can be set to the term of validity of credits awarded or exemptions granted, unless the student's period of enrolment exceeds the nominal length of study plus one year.

7.3 Notwithstanding the provisions of the preceding paragraph, in respect of students who have been enrolled in the Architecture master's degree programme without interruption, no limitations can be set to the term of validity of credits awarded or exemptions granted unless their period of

enrolment exceeds the nominal length of study plus two years.

Article 8. Examination results

8.1 Examinations are assessed and marked by the examiner(s) who administer the examination. If an examination is assessed by more than one examiner, the examiners decide on the mark in consultation. If they cannot agree, the Examining Board will appoint a third examiner to determine the result with due regard to the assessments given by the other two examiners.

8.2 Examinations are marked and the results announced to students as soon as possible, but no later than twenty days after the examination was held, and no later than five working days before any resit examination. The result of an oral examination is announced on the same day as the examination was held, unless the Examining Board stipulates otherwise.

8.3 Examination results can be announced by electronic means.

8.4 The result of an examination is expressed as a mark between 1 and 10 with no more than one decimal after the point, or as a 'pass' or 'fail'. A mark of 5.5 or higher is deemed a pass; a mark below 5.5 is deemed a fail. A student participating in an examination will always receive a mark, with a minimum of a 1 or a fail.

Article 9. Viewing of Examination Papers

9.1 The Examining Board makes sure that students have the opportunity of viewing their examination papers within twenty-five working days after the last day of the study period and no later than five days before any resits that are offered. Students may only view their examination papers in the presence of the examiner or their deputy.

9.2 The provisions of the preceding paragraph do not apply if the way in which the course is organised makes it impossible to follow the normal procedure. In such a case, the Dean will offer an alternative arrangement for viewing the papers which will enable the student to view the examination papers no later than five working days before any resit. This arrangement will be provided in the Teaching Regulations.

9.3 Viewing, or taking cognizance, will take place at a predetermined place and time.

Article 10. Resit Examinations

10.1 If a student takes a resit examination, the highest result achieved will be recorded.

10.2 Written examinations can be retaken at least once in any academic year.

10.3 Examinations other than those referred to under paragraph 10.2 can be resat in the manner described in the Teaching Regulations for the relevant unit of study.

10.4 If it is decided during an academic year, that a certain unit of study, or part of it, will no longer be offered in the following academic years or will be substantially revised, the students concerned will be given at least one extra opportunity to take the relevant examination(s) before the end of the academic year after which the new arrangement comes into force. Such resit opportunities will be announced at least three months before the resit takes place.

Article 11. Exemptions

11.1 The Examining Board may, on a student's written application, grant the student exemption from one or more examinations on the grounds of a competence assessment or because the student possesses a certificate, diploma or other document which proves that they have complied with the requirements of the examination(s) in question. The Teaching Regulations may include regulations regarding procedures for applying for exemptions.

11.2 If an Examining Board grants the exemption requested, it will send the applicant a certificate of exemption within four weeks of the day that the application was received. This certificate must state the date on which the exemption was granted and the examination(s) which the exemption applies to. It must be signed by the Chair of the Examining Board.

11.3 The Examining Board has the power to grant exemption from the obligation to participate in practical exercises and may impose other requirements instead.

11.4 The Teaching Regulations may stipulate that, with regard to the units of study referred to in them, no exemption may be granted for taking the examinations associated with these units of study.

Article 12. Diploma

12.1 If a student has passed all the examinations pertaining to the units of study that are part of the master's degree programme, the Examining Board will confirm

that the student has passed the final examination. It will award the associated diploma once the Dean has declared that all the procedural requirements for awarding the diploma have been complied with. The diploma will be drawn up in the language in which the course was taught, as ascertained by the Executive Board.

12.2 The diploma awarded for passing the final examination must state, at minimum:
- the degree programme;
- the examination subjects;
- the qualifications attached to the diploma, if applicable;
- the degree awarded;
- the most recent accreditation period of the study programme;
- if applicable: the successful completion of an Honours Talent Programme;
- if applicable: the designation 'Cum Laude', as referred to in Article 13.

12.3 The diploma is accompanied by a list of marks and a diploma supplement. The diploma supplement is drawn up in the English language.

12.4 At the student's request, the Student Administration will provide extra copies of the diploma supplement, including a transcript of records, and a certified copy of the diploma, for a charge.

Article 13. Cum laude

13.1 The Examining Board can award a student the classification 'cum laude' if the student's overall achievement meets the following requirements:

a. the units of study that are assessed as a pass or a fail must have been successfully completed within the nominal time set for completing the degree programme;
b. where a marking scheme is applied, the average of all the individual results must be at least 8.0, no mark may be below 7.0 and the student must have completed their studies within the nominal length of study.

The average referred to in the preceding paragraph under (b) is calculated according to a Weighted Grade Average system, where the weighting factor used in calculating the weighted average is the number of ECTS credits that the unit of study represents.

13.2 Without prejudice to the provisions of the preceding paragraph, the Teaching Regulations may stipulate that the result achieved for a certain unit of study must be at least an 8.0.

13.3 No student against whom the Examining Board has taken a measure depriving him/her of the right to take one or more examinations at Hanze University will be entitled to the classification 'cum laude'.

Article 14. Cheating

14.1 Cheating means any act or omission on the part of the student that is intended to wholly or partly obstruct the proper assessment of the student's knowledge, understanding or skills. Cheating includes any act or omission on the part of the student that is intended to wholly or partly obstruct the proper assessment of *another* student's knowledge, understanding or skills. Plagiarism is also regarded as a form of cheating.

14.2 Plagiarism is the copying of another person's work and passing it off as one's own. In principle, no more than five per cent of a text, not including any appendices, may consist of quotations, unless provided otherwise in the assignment. Any quotations or paraphrases must be identifiable as such and their sources must be mentioned. In all cases where cheating is suspected, the Examining Board is notified.

14.3 The Examining Board may take appropriate measures against students who cheat, including exclusion of the student from participation in certain examinations at Hanze University or any of its departments for a period of time

to be determined by the Examining Board, with a maximum of one year.

14.4 If cheating recurs, the Examining Board may take more severe measures with due observance of the maximum term stated in the preceding paragraph.

14.5 In serious cases of cheating, the Executive Board can terminate the student's enrolment permanently on the recommendation of the Examining Board.

14.6 The Examining Board will give the student the opportunity to be heard before it takes a decision such as referred to in the third paragraph of this Article.

14.7 In urgent cases, the Examining Board may take a provisional decision to exclude a student on the basis of an oral report by the examiner or the invigilator. If possible, the student will be interviewed before a provisional decision to exclude him or her is made. The Board will ensure that this report is put into writing immediately after the examination and that the student is provided with a copy.

14.8 If the irregularity is discovered only after the student has passed the final examination, the Examining Board may withhold the student's diploma or decide that it may only be awarded to the student after he/she has taken the final examination again, in which case the Examining Board will determine which examinations have to be resat, and in what form.

Article 15. Studying with a functional disability

15.1 Students who believe they are entitled to extra examination time or other special facilities at an examination because of a (temporary) functional limitation need to contact one of the student counsellors.

15.2 Students with dyslexia who wish to have special facilities made available to them must submit an official certificate of dyslexia to the Dean, who will then advise on the matter. For other functional limitations, the Dean will only advise on the provision of special facilities on submission of a medical certificate.

15.3 Students with functional limitations who desire extra time or other special facilities during an examination should submit an application to the Examining Board of their study programme no later than four weeks before the start of the examination. The Examining Board decides on the application with due observance of the advice given by the student counsellor. Students with chronic functional limitations need to submit an application only once during their studies.

15.4 If the Examining Board grants a student's application, the student will receive a letter from the Examining Board stating their right to extra facilities.

15.5 The student is required to fill in an application form for extra facilities [*Opgavenformulier extra faciliteiten*] before the start of the examination period indicating which examinations he/she intends to take. This form is available on the university' s intranet or from the Student Administration Department.

15.6 The application form must be submitted to the Student Administration Department no later than ten working days before the start of the examination. The department will ensure that extra time is reserved or special facilities arranged.

Article 16. Copyright

16.1 Hanze University does not claim copyright in theses. The Dean may make an agreement with the student which exempts the university from the obligations that ensue from the copyright.

16.2 Without prejudice to the provisions of the preceding paragraph, Hanze University shall receive a digital copy of the thesis and, subject to agreement, other work, which the university may use for publication purposes.

Article 17. Legal protection

17.1 Chapters 10 and 11 of the Student Charter of Hanze University apply by analogy to students who are enrolled in master' s degree programmes.

17.2 Decisions relating to the implementation of the Examination Regulations can be appealed to the Student Appeals Board of Hanze University, which will take cognizance of the dispute in its capacity of Examination Appeals Board.

17.3 Decisions other than those referred to in Article 15.1 can be appealed to the Student Appeals Board of Hanze University, which will take cognizance of the objection in its capacity of Disputes Committee.

Article 18. Code of Conduct for international students

Hanze University subscribes to the Code of Conduct relating to International Students in Higher Education in the Netherlands [*Gedragscode internationale student in het Nederlandse hoger onderwijs*] (available on http://www.internationalstudy.nl). Accordingly, Hanze University applies the provisions of this Code to student recruitment and selection, provision of information relating to the quality of the study programmes offered and their place in the Dutch system of education, the facilities offered, study and living expenses, and admission requirements for international students. If a student

believes that Hanze University is not, or not properly, applying the code, they can lodge a complaint with the Complaints and Disputes Office.

APPENDIX C – SHORT MODULE DESCRIPTIONS CORE SEMESTER

Field name	*Description*			
Title Educational Unit	**Technical Foundation**			
Code				
Academic year	2013/2014			
Study load	4 EC			
Competencies	A. Academic			
Group aimed at	Compulsory for students Master of Science in Renewable Energy			
Prerequisites	None			
Level	Advanced			
Content	The technical foundation module consists of two separate courses. 1. Energy Basics (1 EC) In the first week of the semester students refresh their knowledge of the fundamentals of energy: mechanical, electrical, thermodynamics and fluid mechanics. 2. Electrical Engineering (3 EC) This course serves as an introduction to the technical modules, more specific the electrical engineering aspects. Attention is paid to the fundamental aspects of electrical engineering, Among others, these aspects comprise matters like voltage, current, power, transformers, etc.			
Type of course	Lecture / seminars Practical / skill training			
Assessment type(s)	Assignments Report Written exam			
Costs	See the book list on the EMRE Blackboard site.			
Literature / study materials (for the latest info, go to the book list on the Blackboard site or the Blackboard course)				
Title	Author	ISBN/ code school	Compulsory or	remarks

			recommended	
Renewable Energy Resources	Twidell J. & Weir, T.		C	
Various readers			C	
Language	English			
Details	-			
Contact	ir. J. Bekkering (module-coordinator)			
Year of study	1			
Period	1			
Position in the curriculum	1.1			

Field name	*Description*
Title Educational Unit	**Energy Transition Context**
Code	
Academic year	2013/2014
Study load	5 EC
Competencies	A. Academic B. Application-orientated C. Context-orientated D. Integrative E. Communication F. Professional
Group aimed at	Compulsory for students Master of Science in Renewable Energy
Prerequisites	None
Level	Advanced (geopolitics) Introductory/intermediate (research methodology and research project)
Content	This module consists of two courses: 1. Geopolitics (2 EC) Students get insight into how local, national and regional governments handle and secure the energy transition in the course dealing with the geopolitical, social and economic framework of safe sustainable energy transition. 2.Research methodology and research project (3 EC)

	This module is organized in two phases. In the first phase, the students acquire knowledge and skills related to research methodology. The aim is to teach students how to design, conduct and report proper applied and design research. The students are introduced to the principles underlying formulation of a research question, the definition of a research project, the collection of data, and scientific report writing. The validity, reliability and ethical aspects related to research results are also studied. In the second phase, the students will work on a research project. The aim is to provide the students with a practical research experience on a problem faced by the the energy sector in the energy transition context. In this research project the students are asked to make the connection between the knowledge acquired in the technical modules and the basics module, and their newly developed research and professional skills. In this sense, it corresponds to a capstone assignment for the core semester.
Type of course	Assignment Guest lecture Lecture / seminars Project learning Simulation Tutorials
Assessment type(s)	Assignments Portfolio assessment Presentation Professional product Report Written exam
Costs	See the book list on the EMRE Blackboard site.

Literature / study materials (for the latest info, go to the book list on the Blackboard site or the Blackboard course)

Title	Author	ISBN/ code school	Compulsory or recommended	remarks
They say, I say, the moves that matter in academic writing	Gerald Graff & Cathy Birkenstein	978-0-393-93361-1	R	Other study materials will be provided in the syllabus
Renewable Energy Resources	Twidell J. & Weir, T.		C	
Various readers			C	

Language	English
Details	-
Contact	Drs. M. de Rooij (module-coordinator)
Year of study	1
Period	1 / 2

Position in the curriculum	1.1 / 1.2

Field name	*Description*
Title Educational Unit	**Biomass Energy**
Code	
Academic year	2013/2014
Study load	4 EC
Competencies	A. Academic B. Application-orientated C. Context-orientated D. Integrative E. Communication F. Professional
Group aimed at	Compulsory for students Master of Science in Renewable Energy
Prerequisites	Basic understanding in • Thermodynamics • Mathematics (integrating, differentiating) • Chemistry • Microsoft EXCEL
Level	Advanced
Content	The module 'Biomass Energy' covers energy conversion processes related to biomass. In the module students will gain basic knowledge of various biomass conversion processes and will apply this knowledge in a lab experiment producing biogas in a bioreactor. The student will be able to: • describe thermochemical biomass conversion processes • describe and arrange the biochemical processes involved in biogas formation by anaerobic digestion • theoretically combine various biomass conversion techniques into one process to improve overall biomass conversion efficiencies • mathematically model bacterial growth in batch cultures and continuous cultures • mathematically model an anaerobic digester producing biogas, taking into account operational parameters type of biomass input, Hydraulic Retention Time, Organic Loading Rate, etc. • independently perform various analytical measurements to acquire reliable and reproducible results on samples taken from a lab scale bioreactor • explain the importance to measure various process parameters in a full scale digester to control and optimize biogas production (e.g. scale of digester, costs of input material such as manure or various types of biomass) • formulate a synthetic, clear and coherent recommendation with respect to improve biogas production of a lab scale bioreactor based on results obtained from experimental research
Type of course	Guest lecture Lecture / seminars Practical / skill training Simulation
Assessment type(s)	Presentation Report (lab notebook, lab report) Written exam

Costs	See the book list on the EMRE Blackboard site.			
Literature / study materials (for the latest info, go to the book list on the EMRE Blackboard site or the Blackboard course)				
Title	Author	ISBN/ code school	Compulsory or recommended	remarks
Biofuels Engineering Process Technology	Drapcho, C., Nghiem, J. & Walker, T.		C	
Renewable Energy Resources	Twidell J. & Weir, T.		C	
Language	English			
Details	-			
Contact	Dr. F. Faber			
Year of study	1			
Period	1 / 2			
Position in the curriculum	1.1/1.2			

Field name	*Description*
Title Educational Unit	**Wind and Hydro Energy**
Code	
Academic year	2013/2014
Study load	5 EC
Competencies	A. Academic
Group aimed at	Compulsory for students Master of Science in Renewable Energy
Prerequisites	Foundation module Energy Transition Context module (Research methodology) and Numerical Modelling module
Level	Advanced
Content	Introduction on wind energy situation Resource assessment Rotor design Integrated wind turbine and wind farm design Introduction into tidal energy
Type of course	Lecture / seminars Practical / skill training
Assessment type(s)	Assignments Lab Report
Costs	See the book list on the EMRE Blackboard site.

Literature / study materials (for the latest info, go to the book list on the EMRE Blackboard site or the Blackboard course)

Title	Author	ISBN/ code school	Compulsory or recommended	remarks
Wind Energy Explained 2nd edition, Wiley and Sons, 2009	James F. Manwell Jon G. McGowan, Anthony L. Rogers		C	

Language	English
Details	-
Contact	Ir. W. Swart-Ranshuysen
Year of study	1
Period	1 / 2
Position in the curriculum	1.1 / 1.2

Field name	*Description*
Title Educational Unit	**Solar Energy**
Code	
Academic year	2013/2014
Study load	5 EC
Competencies	A. Academic B. Application C. Communication F. Professional
Group aimed at	Compulsory for students Master of Science in Renewable Energy
Prerequisites	Foundation module Energy Transition Context module (Research Methodology) & Numerical Modelling module
Level	Advanced
Content	solar resource characteristics Solar energy conversion technologies compared Photovoltaic solar energy Balance of System components Thermal solar energy
Type of course	Lecture / seminars Practical / skill training
Assessment type(s)	Assignments Presentation Lab Report
Costs	See the book list on the EMRE Blackboard site.

Literature / study materials (for the latest info, go to the book list on the EMRE Blackboard site or the Blackboard course)

Title	Author	ISBN/ code school	Compulsory or recommended	remarks
Renewable Energy Sources	Twidell, J. & Weir, T. (2006)		C	
Solar Cells: Operating Principles, Technology, and System Applications, UNSW (1986)	M.A. Green		C	
Proceedings of European Photovoltaic Solar Energy Conferences			C	
Journal: Progress in Photovoltaics: Research and Applications			C	
Journal: Solar Energy Materials and Solar cells			C	

Photovoltaics: Devices, Systems and Applications	C. Honsberg and S. Bowden,		C	
The Physics of Solar Cells	J. Nelson		C/R	
Language	English			
Details				
Contact	Ir. W. Swart-Ranshuysen			
Year of study	1			
Period	1 / 2			
Position in the curriculum	1.1/1.2			

Field name	*Description*
Title Educational Unit	**Energy Distribution & Storage**
Code	
Academic year	2013/2014
Study load	4 EC
Competencies	A. Academic B. Application-oriented
Group aimed at	Compulsory for students Master of Science in Renewable Energy
Prerequisites	Basic Understanding in • Thermodynamics (e.g. Laws of thermodynamics, Meaning of entropy) • Mechanics (e.g. 2nd law of Newton for rotation, Kinetic energy equation for rotation , Potential energy equation) • Electrochemics (e.g. Gibbs free energy change) • Fluid dynamics (e.g. Bernouilli equation) • Mathematics (e.g.Integrating, Differentiating)
Level	Advanced
Content	In this module the student will learn to evaluate the performance of power distribution and storage technologies, such as energy density, cycle efficiency. In addition the student will learn to develop advanced (bio)gas storage technologies. The student will be able to: • mathematically derive relationships for performance figures of distribution and storage technologies as a function of relevant parameters in an energy network • examine the relationships and the effect that a variation of parameters has on the performance figures • analyze experimental data and calculate results that allow drawing conclusions on performance figures of (bio)gas storage technology. • evaluate experimental results as a function of experimental methods and assumptions, as well as accuracy and precision. • analyze the application of integrated distribution and storage technologies for a

	specific energy network that allows conversion of one form of energy into another.			
Type of course	Lecture / seminars Practical / skill training Simulation			
Assessment type(s)	Report Written exam			
Costs	See the book list on the EMRE Blackboard site.			
Literature / study materials (for the latest info, go to the book list on the EMRE Blackboard site or the Blackboard course)				
Title	Author	ISBN/ code school	Compulsory or recommended	remarks
Renewable Energy Sources	Twidell, J. & Weir, T.		C	
Renewable energy, conversion, transmission and storage	Sorensen, B.		R	
Language	English			
Details	-			
Contact	Drs. M. de Rooij			
Year of study	1			
Period	1 / 2			
Position in the curriculum	1.1/1.2			

Field name	*Description*
Title Educational Unit	**Numerical Modelling**
Code	
Academic year	2013/2014
Study load	2 EC
Competencies	A. Academic D. Integrative E. Communication
Group aimed at	Compulsory for students Master of Science in Renewable Energy
Prerequisites	Basic understanding in: • Mathematics • General computer skills

Level	Advanced (numerical modelling)
Content	In this course, the students are introduced to different numerical and data methods that could be applied in the context of integrated energy system. Specifically descriptive and basic inference statistics, approximation techniques (least-square and maximum likelihood methods), iteration methods, basic optimization methods (linear and non-linear) will be studied. In addition error propagation and the techniques of formulating constraints will be treated. During the lectures, the students will use R (statistical freeware) and Matlab to train their newly acquired knowledge on practical exercises. No particular knowledge in R and Matlab is required.
Type of course	Lecture / seminars Tutorials
Assessment type(s)	Report Oral exam
Costs	See the book list on the EMRE Blackboard site.

Literature / study materials (for the latest info, go to the book list on the IMM Blackboard site or the Blackboard course). Most of the study materials will be provided in the syllabus

Title	Author	ISBN/ code school	Compulsory or recommended	remarks
Applied Data analysis & modelling for Engineers and scientists	T. Agami Reddy	9781441996121	R	Most of the study materials will be provided in the syllabus

Language	English
Details	The students should install R on their laptop and bring it for each lesson.
Contact	dr. C. Pelletier
Year of study	1
Period	1 / 2
Position in the curriculum	1.1

Field name	*Description*
Title Educational Unit	**Professional Skills and Mentoring**
Code	
Academic year	2013/2014
Study load	1 EC
Competencies	Communication

	Professional development
Group aimed at	Compulsory for EUREC MSc students in renewable energy
Prerequisites	-
Level	Advanced
Content	The module Professional Skills and Mentoring covers the guidance in the personal professional development of the student, in presentation skills and in project based working. The various aspects of the development of the professional skills are recorded in a personal development journal (PDJ). This PDJ is composed of: • a VCA Certificate (Safety, Health and Environment Checklist for Contractors), which has to be obtained by the student • a reflection of the students professional development, which is discussed with his mentor. This reflection will be based on the PDCA-approach. • a self evaluation report and re-orientation, based on the students progress during the core semester • an orientation on a Master thesis research project.
Type of course	Individual counselling Lecture / seminars Problem based learning (PBL) Supervision
Assessment type(s)	Other Portfolio assessment Report Written exam
Costs	See the book list on the EMRE Blackboard site.

Literature / study materials (for the latest info, go to the book list on the EMRE Blackboard site or the Blackboard course)

Title	Author	ISBN/ code school	Compulsory or recommended	Remarks
Project Management	Grit, R	978-9001790929	C	
Presentation Zen	Reynolds, G.	978-0321811981	C	
Safety for Supervisors			C	Tutorial opleidingen Enschede

Language	English
Details	
Contact	Drs. I.M.A. Hiemstra
Year of study	1
Period	1/2
Position in the curriculum	1.1/1.2

APPENDIX D - INFORMATION ON SPECIALISATIONS

Photovoltaics Univ. of Northumbria	ECTS credits/contact hours	Learning Outcomes	Teaching & learning methods	Assessment Methods
Photovoltaic Cell and Module Technology	10/ 51 hrs	Academic Application-oriented Integrative	Lectures, lab work, visits	Written examination extended laboratory report
Advanced Photovoltaic Cell Design	5/ 24 hrs	Academic Application-oriented Context-oriented Integrative	Lecture, private study	Literature and critical appraisal of chosen cell technology sector, carried out individually
Photovoltaics: Economics, Policy and Environment	5/ 24 hrs	Academic Application-oriented Context-oriented Integrative Professional	Lecture	Written assignment and oral presentation, carried out individually
Photovoltaic System Technology	10/ 54 hrs	Academic Application-oriented Context-oriented Integrative	Lecture Visits to PV systems	Written closed book examination Design project report
Solar Thermal Univ. of Perpignan	**ECTS credits/contact hours**	**Learning Outcomes**	**Teaching & learning methods**	**Assessment Methods**
Fundamentals	7/ 60 hrs	Academic Application-oriented Integrative	Lectures, tutorials, laboratory work	Written exam part 1 Written exam part 2 Extended laboratory report
Solar Low Temperature	7/ 60 hrs	Academic Application-oriented Integrative	Lectures, tutorials, laboratory work, visits	Written exam part 1 Written exam part 2 Extended laboratory report
Solar High Temperature	12/ 90 hrs	Academic Application-oriented Integrative	Lectures, tutorials, laboratory work, visits	Written exam part 1 Written exam part 2 Written exam part 3 Extended laboratory report
Thermal Energy Storage	4/ 30 hrs	Academic Application-oriented Integrative	Lectures, tutorials	Written exam
Wind Energy NTUA Athens	**ECTS credits/contact hours**	**Learning Outcomes**	**Teaching & learning methods**	**Assessment Methods**
Wind Potential, Aerodynamics & Loading of Wind Turbines	7.5/ 92 hrs	Academic Application-oriented Integrative	Lectures, tutorials	Written exam
Wind Turbine Design, Electrical & Control Issues, Certification	7.5/ 92 hrs	Academic Application-oriented Integrative	Lectures, tutorials	Written exam
Wind Farm Technology,	7.5/ 92 hrs	Academic Application-oriented	Lectures, tutorials	Written exam

Economics & Environmental Issues		Context-oriented Integrative Professional		
Mini Project	7.5/ 4 hrs	Academic Application-oriented Context-oriented Integrative Communication Professional	Project work, research work	Project report and presentation
Grid Integration Univ. of Zaragoza	ECTS credits/contact hours	Learning Outcomes	Teaching & learning methods	Assessment Methods
Distributed Generation	2/ 18 hrs	Academic Application-oriented Integrative	Lecture Laboratory Excursion Tutorials Subject Project/ Exposition,	Written exam Lab report
Generation & Storage Technologies	4.5/ 45 hrs	Academic Application-oriented Integrative	Lecture Laboratory Excursion Subject Project Exposition, Tutorials	Written exam Lab report
Control Techniques & RE Integration Systems	5.5/ 55 hrs	Academic Application-oriented Integrative	Lecture Laboratory Excursion Subject Project Exposition, Tutorials	Written exam Lab report
Power Grid Analysis and Studies	6/ 58 hrs	Academic Application-oriented Integrative	Lecture Laboratory Excursion Subject Project Exposition, Tutorials	Written exam Lab report
Smart grids	4.5/ 45 hrs	Academic Application-oriented Integrative	Lecture Laboratory Excursion Subject Project Exposition, Tutorials	Written exam Lab report
Standards and Electric Markets	2.5/ 25 hrs	Academic Application-oriented Context-oriented Integrative	Lecture Subject Project Exposition, Tutorials	Written exam Lab report
Project	5	Academic Application-oriented Context-oriented Integrative Communication Professional	Tutorials Team work Project presentations	Project report Project Presentation
Ocean Energy Technical University, Lisbon	ECTS credits/contact hours	Learning Outcomes	Teaching & learning methods	Assessment Methods

Ocean Energy Resources	6/50	Academic Application-oriented	Lectures Tutorials	Written exam Assignment
Modelling and Control of Ocean Energy Systems	6/56	Academic Application-oriented Integrative	Lectures Tutorials Laboratory	Written exams
Ocean Energy SystemsTechnologies	7.5/68.5	Application Context-oriented	Lectures Tutorials Laboratory	Written exam
Economics, Policy and Environment	4.5/37.5	Application-oriented Integrative	Lectures Tutorials	Written exam Assignment
Project	6/8	Academic Communication	Lectures Tutorials	Project presentation