



ASSESSMENT REPORT

Limited programme assessment

European Master in Renewable Energy

Academic Master programme

Full time

Hanze University of Applied Science

**De kracht van
kennis.**

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Limited programme assessment

European Master in Renewable Energy

Academic Master programme

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Hanze University of Applied Science

Croho registration: 25 BE 69299

Hobéon Certificering BV

Dated: 2 October 2017

Audit Committee

Ir. A.T. de Bruijn (chair)

Prof. Dr. F. Mulder

Dr. A.J de Graaf

T. Schoehuijs (student-member)

H.R. van der Made (secretary)

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1. GENERAL AND QUANTITATIVE DATA

General data

Institution

Name	Hanze University of Applied Science
Status	Funded
Outcome of Institutional Quality Assessment	Pass

Programme

Name of programme in Central Register of Higher Professional Education (CROHO)	European Master in Renewable Energy
ISAT-code CROHO	25 BE / 69299
Orientation and level	Academic Master
Number of credits	90EC
Variant(s)	fulltime
Eventual new name	n.a.
Specialisations	n.a.
Potential new specialisations	n.a.
Location(s)	Groningen
Special Quality Feature	n.a.

<i>Date of site-visit</i>	May 12 2017
<i>Contact person (name and e-mail address)</i>	C. (Carolien) van Holten BBA c.van.holten@pl.hanze.nl (project leader) Drs. N.J. (Nynke) Dijkstra n.j.dijkstra@pl.hanze.nl (policy advisor quality)

2. SUMMARY

The European Master in Renewable Energy is an international *academic* Masters programme that aims at educating energy transition professionals who will take a leading role in solving energy transition challenges.

Standard 1. Intended Learning Outcomes

The intended learning outcomes of the programme exceed standard quality. Hanze UAS has stated a clear vision on the academic domain for which it prepares its students and the set of intended learning outcomes distinctly reflects the expectations of the academic and professional field. They have been formulated at Masters level, are academically oriented and have been aligned within the European consortium of partnering universities. The course profile is regularly evaluated and updated if so required. The intended learning outcomes have been specified in a way that they give guidance to both the curriculum content and the assessments.

Not only do the intended learning outcomes of the course reflect Masters level and do they bear a distinct academic orientation, the course has also succeeded in adding its own 'regional flavour' to the qualifying statements which in particular makes them stand out. The panel therefore rates standard 1 as '**good**'.

Standard 2. Teaching and Learning Environment

The intended learning outcomes of the 90EC course are fully covered by and demonstrably interlinked with the learning outcomes at module level. The curriculum design is transparent and content-wise coherent. Students are furnished with academic and professional skills at Masters level and lecturers apply appropriate and student-centred educational methods. Entrance requirements fit the level and nature of the course and the faculty are highly and appropriately qualified. The School Campus features excellent accommodation and programme specific facilities; the programme's information services are up to par. A coaching system is in place, that also caters for students with a functional impairment.

Considering the fact that the programme features a consistent and well thought-out curriculum, executed by a highly qualified staff and conducted in an international environment on a campus with excellent research facilities, the panel rates Standard 2 as '**good**'.

Standard 3. Learning Assessment System

A review of assessed work of students convinced the panel that EMRE safeguards the validity and reliability of (interim) exams and assessments. To this end an extensive and convincing policy paper as well as a Teaching and Examination Regulations document was presented to the panel. Ongoing alignment between examiners and systematic deployment of four-eye judgements exemplify further quality reinforcement. Students experience full transparency before, during and after exams and also the (formative) assessments facilitate the student's learning process. The Examination Board observes its legal duties and is fully in position. With regard to the aforementioned aspects the course definitely meets the standard quality.

Having said this, the panel established there is still room for improvement with regard to the depth and breadth of some of the assessment formats, particularly in the foundation phase of the programme. Therefore the panel judgement on Standard 3 reads '**satisfactory**'.

Standard 4. Learning outcomes achieved

A review of randomly selected theses, learned the panel that the course undeniably achieves the intended learning outcomes.

The panel established that the overall research approach of the projects is solid and that all of the reviewed theses comply with the preconditions of academic rigour and robust results. Therefore the panel rates Standard 4 as '**good**'.

Key-recommendation for further improvement

The panel would recommend to seek ways of making the substantial expertise among the staff within the consortium available to the graduating students. In the panel's opinion the faculty in Groningen on its own is too small to provide proper content-based coaching to every graduating student, the more so when the student population will expand.

Also, in view of the programme's innovative and entrepreneurial ambitions the panel would suggest to offer more guidance in these fields. The audit committee is convinced that a more dedicated focus on these aspects in the thesis project would impact and further raise the output level of the course.

Overall conclusion

In accordance with NVAO's accreditation assessment rules the overall judgement on the European academic Masters programme in Renewable Energy of Hanze UAS reads **'good'**.

The panel recommends to the NVAO to provide accreditation to the EMRE programme for another six years.

2 October 2017



Ir. A.T. de Bruijn,
chair



H.R. van der Made,
secretary

3. INTRODUCTION

In this Chapter a brief introduction to the course is given, its position within the School of Engineering/the Hanze University of Applied Sciences (UAS) and the relevant historic and contextual information on the course is shared. A conclusive paragraph is dedicated to the key developments that have taken place in the wake of previous accreditation and/or internal audits.

Hanze University of Applied Sciences

Hanze University of Applied Sciences Groningen was founded in 1798. It is the oldest multi-sectorial university of applied sciences of the Netherlands. In 2017 the University offers 54 bachelor degree, 19 master degree and 8 Associate degree programmes, both fulltime and part-time, in the social, economic and technical domains and in the domains of health care and the arts. Hanze UAS is organised in 17 schools. The Master course in Renewable Energy is part of the School of Engineering, which currently offers one AD programme, four Bachelors and three Masters. The School of Engineering has 1800 students and employs 150 people, including faculty/research staff and overhead.

Based in the northern city of Groningen, the Hanze UAS has branches in Assen, Leeuwarden and Amsterdam, with 3,280 staff and 28,432 students. Applied research takes place in two Centres of Expertise and four Research Centres, with a total of 50 professorships, more than 280 lecturers and 116 PhD students.

Within the framework of Energy Academy Europe (EAE), which is an initiative of both the Hanze UAS and the University of Groningen (UoG) together with a number of large businesses in the region, energy education in the north has developed strongly. By 2022 the Hanze UAS foresees to have realised a coherent set of four Energy Masters with associated Bachelor routes, two of which are fully operational in 2017. By 2020 the programme targets to have 1100 students.

European Master in Renewable Energy

The European Master in Renewable Energy (EMRE) which is subject of the assessment, is a single degree Academic Master (MSc). The programme is government funded and taught in English. The 90 EC programme features a core curriculum of 30EC, a 30EC specialisation and a thesis trajectory of also 30EC. At least one semester should be taken in another European country than the one that offers the student's core programme.

Consortium

De Master programme is offered within a European consortium of partner-universities either providing the core programme and/or its specialisations. Hanze University of Applied Sciences is one of the core providers together with MINES-Paristech, France, Loughborough University, UK, University of Zaragoza, Spain, and Oldenburg University, Germany. Specialisations are offered by the National Technical University of Athens, Greece (wind), the University of Northumbria, UK (Photovoltaics), the University of Zaragoza, Spain (RE Grid Integration), the University of Perpignan, France (Solar Thermal), Instituto Superior Tecnico, Portugal (Ocean Energy) and the Hanze University of Applied Sciences (Sustainable Fuel Systems for Mobility).

Since its initial accreditation (TNO) in 2012 three alterations within the consortium have occurred: (i) Kassel University in Germany stopped being a specialisation provider due to an internal strategy adjustment. Meanwhile the Technical University of Lisbon, Portugal acceded to the consortium as a specialisation provider and succeeded to contribute to the fields of study and to reinforce the European dimension of the project. The Hanze UAS, too, became one of the specialisation providers.

Eurec

The European Master in Renewable Energy is executed under the authorization of EURIC, the European Renewable Energy Research Centres that sits in Brussels. This close linkage to EUREC enables faculty and students to acquire first-rate academic research assignments at the 45 R&D EUREC Centres in Renewable Energy.

EUREC has a steering committee that annually evaluates and endorses programme units and sets the harmonized learning outcomes for the core-semester, thus enabling students to follow any specialisation at every single partner-university. The steering committee also draws up graduation protocols and issues the EUREC certificate of equivalence to students who adequately present their thesis before the EUREC-jury and have obtained at least a pass for their research report from the examiners at their home-university.

The quality of the participating universities is also safeguarded by the selection system of EUREC, supported by regular audits and an annual student survey.

In addition to EMRE the Hanze UAS within the EUREC-framework also offers the Academic Master in Sustainable Energy System Management.

In the wake of initial accreditation

At the initial review of the course by the Dutch and Flanders Accreditation Organisation (NVAO) concerns were expressed about the balance between students' technological knowledge on the one hand and their socio/political skills and knowledge – being one of Hanze's features – on the other. Also the NVAO indicated that the complexity of the thesis supervision system should be addressed, the decision taking on grades in particular.

In response to these concerns the course has outlined the electro-technical content more specifically and expanded the corresponding expertise within the team while in its core programme maintaining the broad technical base with Hanze-specific socio/political aspects. The second issue was addressed by adjusting the assessment form which now includes the marking scheme.

Furthermore, at the School level a vision on research and research skills was developed and implemented, the learning environment has been further developed and the programme recently moved to the new building of the EAE where energy education and research in Groningen are pooled.

With regard to the assessment system within the EUREC network a peer-review was held on the assessment quality in the specialisation, further improvements were implemented in the thesis manual, the Examination Board drew up criteria for examiners and a Masters Chamber of the Examination Board was installed to reinforce the focus on the quality assurance of the Masters.

With regard to Standard 4, achievement of the intended learning outcomes, the main focus has been on quality assurance. The quality of the programme was, among others, safeguarded by assessment-alignment sessions with examiners, adjustments to the criteria of the research project plan, the strict deployment of the four-eye principle in assessment procedures, a go/no go at the start of the thesis project and the introduction by 2017-2018 of rubrics in order to add more transparency to the assessor's judgement and to serve as a common framework for examiners.

The current audit process included the evaluation of the aforementioned improvements. Whenever applicable, the panel will report its findings and judgements thereof in Chapter 4.

The Masters programme was evaluated within the same time-frame as Hanze's Centre of Expertise Energy. Both evaluation committees were chaired by the same person. By raising in both audits the issue of the impact the Centre's research has on education with the same or a comparable set of discussion partners, the Hanze UAS attained a certain degree of efficiency in the execution of both site visits.

4. FINDINGS AND JUDGEMENTS

This chapter deals with the panel members' findings and judgements based on the documents delivered by the course staff and the subsequent discussions during the site-visit. The text is ordered according to the four standards of the applicable NVAO assessment framework.

4.1. Intended learning outcomes

Standard 1: The intended learning outcomes of the programme have been concretised with regard to content, level and orientation; they meet international requirements.

Explanation: As for level (Bachelors or Masters) and orientation (professional or academic), the intended learning outcomes fit into the Dutch qualifications framework. In addition, they tie in with the international perspective of the requirements currently set by the professional field and the discipline with regard to the contents of the programme. Insofar as is applicable, the intended learning outcomes are in accordance with relevant legislation and regulations.

Findings

The European Master in Renewable Energy is an academic Masters programme that aims at educating energy transition professionals ('change agent in the renewable energy industry') to act as reflective practitioners in the sense that they possess flexible, adaptive and resilient skills at an academic Masters level enabling them to take a leading role in solving energy transition challenges.

The Masters programme is conducted under the supervision of EUREC (see Chapter 3). The EUREC steering committee is strongly involved in setting the harmonized learning outcomes for the core-semester thus safeguarding alignment and equivalence within the European consortium of the intended learning outcomes with respect to their orientation, content and level.

Based on several minutes of their meetings and the audit discussions the panel concludes that the Professional Board of the course as well as its Academic Board are firmly involved in the programme; they deliver input and regularly screen and endorse the qualifying set of competences. In addition, the audit committee noticed a strong commitment to the programme of the Hanze Centre of Expertise on Energy (KCE) and its three professorships relevant to the Master.

The Hanze-specific socio/political aspects are adequately highlighted in the competences that feature *contextual orientation* and *integration*. The School's vision on research is aimed at furnishing their students with the capabilities to conduct high qualified research in order to create innovations and add scientific value to the RE domain. This objective has been detailed further under *academic learning outcomes*.

The competence profile of the programme is subdivided into the following domain specific and generic learning outcomes:

Domain specific learning outcomes:

- **Academic learning outcomes:** Good and applicable knowledge of, and skills in, analytical and research methodology relevant for current and future (use of) renewable energy sources; being able to conduct applied research, which combines scientific rigor and practical impact, in complex professional 'real life' situations.
- **Application-oriented learning outcomes:** Good and applicable knowledge of different renewable energy sources. 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).
- **Context-oriented learning outcomes:** Basic understanding of issues in energy strategy and politics at different levels of context (local, regional, national, global).
- **Integrative learning outcomes:** Good ability to integrate technical knowledge and skills with technological, strategic, social and economic issues; ability to handle complexity.

Generic learning outcomes:

- **Communication learning outcomes:** The ability to communicate appropriately and perform efficiently in international, multidisciplinary teams.
- **Professional Development learning outcomes:** The ability to learn independently and reflect on oneself in a professional context.

Each of the previous programme learning outcomes have been adequately specified in concrete learning outcomes that give direction to the module learning outcomes of each of the study units of the programme and the assessments thereof. One of the academic learning outcomes is e.g. the ability *'to formulate a problem definition, employ specific research and analysis methods and plan and conduct research on real-life non-routine problems.'*

During their on-site enquiry the panel members observed a technical Masters programme executed within a broader context. Students very much appreciate its hybrid character and the panel agrees that the EMRE Masters programme delivers added value to the domain.

Considerations and Judgement

On the basis of the document study, the EUREC Competence Profile, the Study Guide and the outline of the Research Skills Track in particular, the panel members conclude that the programme's intended learning outcomes tie in well with the criteria for basic quality and even exceed these. Compliance with basic quality on Standard 1 implies that (i) the programme states a clear vision on the academic domain for which it prepares its students, (ii) the intended learning outcomes reflect the demands of and were validated by a qualified representation of the academic/professional field and refer to international standards, (iii) the intended learning outcomes clearly reflect Masters level and are academically oriented, (vi) the programme profile is up-to-date and evaluated on a regular basis, (vii) the intended learning outcomes have been detailed in such a way that they give direction to the programme content and the assessment system.

Not only do the intended learning outcomes of the course reflect Masters level and do they bear a distinct academic orientation, but the course has also succeeded in adding its own 'regional flavour' to its final qualifying statements.

Considering the intended learning outcomes surpass the standard quality requirements, the panel rates standard 1 as **'good'**.

4.2. Teaching and Learning Environment

Standard 2: The curriculum, staff and programme-specific services and facilities enable the incoming students to achieve the intended learning outcomes.

Explanation: The contents and structure of the curriculum enable the enrolled students to achieve the intended learning outcomes. The quality of the faculty and of the programme-specific services and facilities is essential to that end. Curriculum, staff, services and facilities provide a coherent teaching-learning environment to the students.

Findings

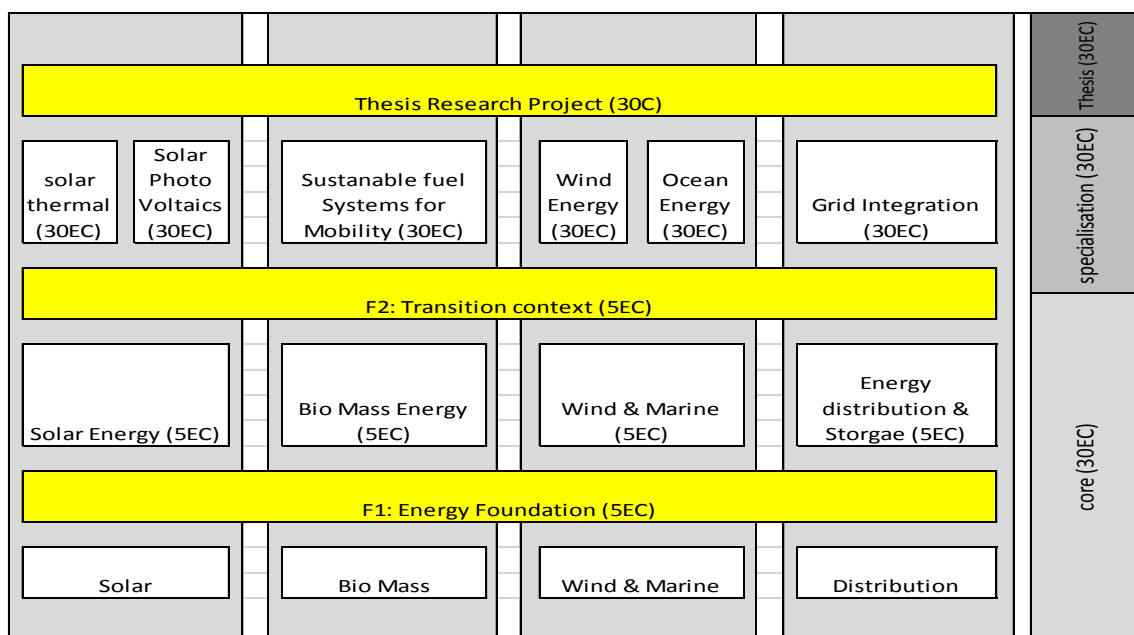
Programme

The Masters programme of 90EC is structured in three semesters. It comprises a core semester, a specialisation semester and a thesis research project of 30EC each. The semesters are subdivided into 'learning modules'. Admission requires a Bachelor degree in engineering or in a scientific discipline like physics, chemistry or mathematics. Also, applicants with relevant work experience equivalent to the academic admission requirements are accepted. Admission is carried out through a strict EUREC admission procedure and the Hanze selection process as laid down in the Teaching and Examination Regulations. Seven of the 27 students who enrolled for the 2017 course have the Dutch nationality.

Students follow the EMRE programme at at least two EUREC partner-universities in different countries so as to give a boost to the international nature of the programme. On entry students choose one of the six specialisations and may alter their choice in the first month.

The core semester provides basic knowledge at Masters level in four main RE areas: Biomass, Wind & Marine, Solar and Storage & Distribution. The specialisation semester connects with, and focuses in depth on one of these areas. Students can choose from the specialisation modules offered by one of the EUREC/EMRE partners: Thermal, Photovoltaic, Wind, Ocean, Grid Integration and Sustainable Fuel Systems for Mobility (SFS). Grid Integration is the students' favourite choice.

Graduation builds upon the competences developed during the specialisation semester and leads to further expertise within the chosen RE subject. The present EMRE curriculum is structured as follows:



To the audit committee the cohesion between the three components of the curriculum (core, specialisation and final project) appeared difficult to grasp at first, but became evident as the audit continued.

The horizontal bars in the diagram represent the components through which integrated learning is embedded in the curriculum. Through *Research Methodology* students learn to conduct research and evaluate the significance of the outcomes of their research for the professional practice. *Professional Skills & Mentoring* teaches students to set their own learning goals, monitor their learning process and create a Personal Development Plan. Mentoring is provided throughout the entire programme, in person during the core semester, online during the specialisation and again in person during the thesis research project.

Currently the Hanze UAS itself is offering a specialisation in Sustainable Fuel Systems for Mobility (SFS). It comprises four modules, i.e. (i) Processes, models and modelling sustainable fuel production and supply chain(s), (ii) Biochemical & Thermo-chemical Conversion, (iii) Power2Hydrogen and (iv) New Business.

A close review of the Study Guide featuring all of the study units of the course, and a supporting diagram indicating the relationship between the intended programme learning outcomes and those at module level, learned the panel that the content and learning objectives of the EMRE programme provide full coverage of all of the intended learning outcomes of the programme.

The panel noticed that in the foundation semester a substantial amount of time is spent on synchronizing students' educational backgrounds. The panel would suggest to consider a more tailored approach to these remediating activities for the benefit of time-saving and a more in-depth and Masters worthy start of the course.

Students experience that the EMRE programme places high demands on them and causes a considerable study load. Meanwhile they do not complain as they consider this a matter of course. The panel agrees with the students when they express their appreciation for the solid balance in the curriculum between the acquisition of academic skills and the application thereof. Overall the students characterise the course as 'demanding', 'highly topical' and 'innovative'. The panel's observations are in tune with the students' observations.

Faculty

The core-faculty consists of 20 lecturers who at least hold a MSc degree. In addition experts in specific RE content, e.g. energy markets and law, are recruited from the professional field and partner universities. Appointed lecturers are usually senior researchers with professional experience, are often nationally and internationally renowned, have a broad knowledge of the RE sector, expertise in one or more specific field(s) and have an excellent command of English. Thesis supervisors are PhD qualified and trained coaches.

The audit committee was pleased to meet a proud, committed and highly motivated faculty. Lecturers appear to put a lot of effort and expertise into the programme; it is hardly surprising that their students hold them in high esteem. Staff resumes as well as programme evaluations support their dedicated quality, their cohesion as a team, their accessibility and their high commitment. And as one of the lecturers put it during the audit: 'I don't mind working overtime as long as it is for EMRE'.

Facilities

The EAE building offers energy students, faculty and professional partners an infrastructure to meet and create new knowledge through education and research. Practical research activities are mainly carried out in the laboratory facilities of EnTranCe. Facilities at the School of Life Science & Technology and the School of Engineering offer further possibilities for conducting research, and benefitting from specific networks.

The panel believes that EMRE is equipped with state-of-the-art facilities. Part of the audit was devoted to a tour of the campus which demonstrated that EMRE greatly benefits from the applied research environment of the Centre of Expertise in Energy that coalesces in the Energy Transition Centre (EnTranCe). Equipment especially useful for energy students and EMRE in particular, include a Solar Cell tester, an Educative Wind Tunnel, Biogas Laboratory and Storage Equipment e.g. Adsorption Storage Test Equipment and H2 Hybrid Fuel Development Equipment.

The panel members were impressed by the level of the facilities which clearly facilitate high-end academic research. Both students and lecturers expressed their consent with the learning and teaching environment and described it as 'inspiring and challenging'.

Considerations and Judgement

On the basis of the document study and the audit discussions on-site, the panel members conclude that the programme's teaching and learning environment fully complies with the criteria for basic quality and even exceed these. The fact that the programme meets the basic quality standards for Standard 2 means that (i) the intended learning outcomes are fully covered by and demonstrably interlinked with learning outcomes of each of the educational units, (ii) the curriculum shows a clear design and is coherent in content, (iii) through the programme students develop academic and professional skills at Masters level, (iv) the programme applies appropriate and student-centred educational methods, (v) the programme has aligned the entry requirements with the nature of its intended learning outcomes, (vi) both the quality and quantity of the faculty are up to par, (vii) the accommodation as well as the programme specific facilities meet the requirements of the course, (viii) students, also those who have a functional impairment, receive proper coaching, (ix) the information services to students is adequate.

Considering the fact that the programme features a consistent and well thought-out curriculum, conducted from a truly international perspective and furnished with high-end research facilities, the panel rates Standard 2 as **'good'**.

4.3. Assessment

Standard 3: The programme has an adequate assessment system in place.

Explanation: The tests and assessments are valid, reliable and transparent to the students. The programme's Examination Board safeguards the quality of the interim and final examinations.

Findings

The assessment system at EMRE is governed by a programme specific assessment policy document. Among other things this policy document – which is derived from Hanze UAoS' institutional policy on assessments – describes the structure, organization and quality assurance of the tests, assessments and the final exam. Quality criteria include reliability, validity, selectiveness and transparency.

EMRE tailors the assessment modes to the nature of the module learning outcomes, resulting in (a combination of) a written/oral examination to evaluate knowledge and application of theory, an oral presentation, a written report, a lab report or an essay.

Following the initial accreditation in 2012 which brought to light a few concerns in the area of assessment, the assessment system of the programme evolved in several ways. Apart from the fact that assessors and examiners are now officially appointed by the Examination Board, the thesis research project is graded by two independent assessors, a harmonized marking scheme between all partner institutions is in place for the thesis research project, regular alignment sessions between assessors are held to encourage growing consensus about the interpretation of assessment criteria, resulting in rubrics that further support examiners in grading the thesis research project. The programme is seeking further alignment of assessment policies at the EUREC level in a peer review, which should eventually lead to a high degree of alignment within the consortium as to the modus operandi in assessments.

Quality assurance related to assessments and (interim)exams is foremost conducted by the Master Chamber of the Examination Board. Not only does the Board appoint qualified examiners, it also reviews the thesis manual and study guides from the perspective of conformity with institutional and EUREC assessment and quality guidelines. The Board assigned an Assessment Committee to carry out an annual review of conducted assessments, the outcomes of which are incorporated in the Board's annual report.

In its discussion with the members of the Examination Board the panel ascertained that it is foremost the Academic Board that actually safeguards the final level of the programme. The Examination Board itself appears to primarily take a formal approach and exercises its regulatory powers by enforcing the Teaching and Examination Regulations. Still, in the combination of the two – Examination Board and Academic Board – the panel at present experienced a solid safeguard for the quality of the assessment system and the achievement of the intended learning outcomes in particular.

The panel reviewed a variety of written assessments that were on display during the audit. From the design perspective the sample demonstrated assessments are conducted in a sound manner. However, the panel would suggest to deploy a broader, more inspiring and more challenging scope of test formats. In some instances the panel would argue that tests and assessments at an earlier stage of the programme be implemented which appeal to the higher learning domains of Bloom's Taxonomy, such as creation, evaluation and analysis. Considering the programme's innovation objectives, the panel believes this aspect is particularly important. It was pleased to learn that both the faculty and the Examination Board acknowledge these imperfections and meanwhile are preparing a thorough overhaul.

Although students in general express their satisfaction about the degree of transparency in the system and the alignment between content of assessments and modules, they maintained that examination results are sometimes overdue.

Considerations and judgement

Both the study of documents, a close review on site of (interim)examinations, as well as the discussions with the faculty and the Examination Board as part of the audit, led the panel to the conclusion that the EMRE programme delivers basic quality on this Standard. Specifically, (i) EMRE has adopted an examination policy that will safeguard the validity and reliability of (interim) exams and assessments, (ii) the programme has provided samples of students' examination work and has presented methods of test design and control (such as alignment between examiners and the deployment of four-eye judgement), demonstrating that the validity and reliability of exams is indeed safeguarded, (iii) students experience full transparency before, during and after exams, (iv) the assessments demonstrably contribute to the student's learning process (formative/differentiated testing), (v) the programme has drawn up Education and Examination Regulations that at least state the legal requirements with regard to assessments and examinations, (vi) the Examination Board operates independent of management, is adequately facilitated to execute its (legislative) duties, but can still be strengthened with regard to its positioning, its actual performance and expertise.

Considering that the overall quality of EMRE's assessment system meets the basic standards, but that there is still room for improvement with regard to the depth and breadth of some of the assessment formats and the functioning of the Examination Board, the panel judgement on Standard 3 reads '**satisfactory**'.

4.4. Achieved Learning Outcomes

Standard 4: The programme demonstrates that the intended learning outcomes are achieved.

Explanation: The level achieved is demonstrated by interim and final tests, graduation projects and the performance of graduates in actual practice or in further education.

Findings

The thesis research project comprises the drawing up of a thesis report and a summary. Also a public thesis presentation of research outcomes is given before a board of EUREC lecturers in Brussels. All three components of the thesis research project are graded on the basis of the EUREC marking scheme featuring criteria directly derived from the programme learning outcomes. The report makes up 70%, the summary 10% and the presentation 20% of the final grade.

Over the last few years the programme made adjustments to the graduation scheme in the sense that among others (i) the four-eye principle has been enhanced by explicitly appointing a first and second supervisor as assessors, the first having expertise in the thesis topic, (ii) stricter guidelines have been imposed on the research proposal and (iii) a more transparent grading procedure has been implemented.

The programme monitors their graduates as to how many students find jobs, in which sector of the labour market they are employed and how many of them continue for a PhD. In the audit labour market representatives spoke passionately about the professional and academic abilities of the alumni.

Prior to the audit the panel reviewed a selection of the research projects delivered by students of the last two cohorts of graduates. In order to meet the basic standards of educational quality: (i) the course should have a transparent graduation programme in place which covers all of the intended learning outcomes, (ii) the course should systematically demonstrate Masters level and the attainment of the intended learning outcomes through a representative sample of distinctive graduation products/performances emerging from the graduation programme, (iii) domain representatives, alumni inclusive, are satisfied with the actual performance of the graduates and appreciate their added value to the academic/professional field.

Considerations and Judgement

On the basis of the Thesis Module Manuals, the random selection of theses, the panel discussions and the additional work from students as displayed in the audit, the panel established that the course undeniably meets the basic quality requirements.

On top of that the panel established that the overall research approach of the projects is solid. All of the reviewed projects comply with the preconditions of academic rigour and generate robust results.

With regard to the coaching of thesis projects the panel would recommend to think of ways to make the substantial expertise among the staff within the consortium available to the thesis projects. With the broad variety of thesis topics the panel considers it unlikely – if not impossible – for the relatively small staff in Groningen to provide proper content-based coaching to each student. Secondly, in view of the programme’s ambitions the panel would suggest to offer more guidance when it comes to true innovations and entrepreneurial capabilities, or the combination of the two. The panel is convinced that a more dedicated focus on these aspects in the thesis project would raise the output level of the course further and would take it to its projected level of ambition, i.e. excellence.

As it now stands, on the basis of the aforementioned findings the panel rates Standard 4 as **‘good’**.

5. OVERALL CONCLUSION

The European Master of Renewable Energy conducted by Hanze University of Applied Sciences is an ambitious academic programme with hybrid features. It is embedded in a vibrant scientific and professional environment and operates at the forefront of education and research in renewable energy. It does so with a clear international vibe. As the programme placed high ambitions, it will take ample time to attain them. The panel believes that meeting its ambitions across the board will be one of EMRE's major future challenges.

Observing NVAO's accreditation assessment rules, the overall judgement on the European Master of Renewable Energy of Hanze UAS reads **'good'**.

The panel recommends to the NVAO to provide accreditation to the EMRE programme for another six years.

6. RECOMMENDATIONS

The panel would like to make the following recommendations for the further development of the course.

- Seek ways of making the substantial expertise among the staff within the consortium available to the graduating students. In the panel's opinion the faculty in Groningen on its own is too small to provide proper content-based coaching to every graduating student, the more so when the student population will expand;
- Offer more guidance to students in the fields of innovation and entrepreneurship. The audit committee is convinced that a more dedicated focus on these aspects in the thesis project would impact and further raise the output level of the course;
- Design education materials aimed at synchronizing students' educational backgrounds, so as to increase the Masters level and the assessment thereof of the core semester;
- Make sure to address the social-economical and geo-political context of energy transitions once the core semester is finalised.

ANNEXES

ANNEX I Overview of judgements

Overview of judgements on the Scientific European Master in Renewable Energy (fulltime) of the Hanze University of Applied Science	
Standard	Judgements
Standard 1. Intended Learning Outcomes	G
Standard 2. Teaching and Learning Environment	G
Standard 3. Assessment	S
Standard 4. Learning Outcomes Achieved	G
Overall judgement	G

ANNEX II Programme of site-visit and audit approach

Programme of site-visit

Datum: vrijdag 12 mei 2017
 Locatie: Entrance, Zernikelaan 17
 Interviewruimte visitatiepanel: 1^e verdieping, ruimte E.1.21
 Bespreekruimte visitatiepanel: 1^e verdieping, ruimte E.1.22
 Ontvangstruimte gasten: 1^e verdieping, ruimte E.1.32
 Accreditatie panel: Hobéon

Panelleden:

- Ir. A.T. (Fred) de Bruin, *voorzitter*
- Prof. Dr. F.M. (Fokko) Mulder, *panellid*
- Dr. A.J. (Aart-Jan) de Graaf, *panellid*
- T. (Tom) Schoehuijs, *panellid*
- H.R. (Rob) van der Made, *secretaris*

Ceremoniemeester: drs. N.J. (Nynke) Dijkstra

Tijd	Gesprekspartners (incl. functies/rollen)	Gespreksonderwerpen
08.15 – 08.30	Ontvangst panel door Drs. P. (Peta) de Vries, <i>Dean</i> en J.E. (Anke) Carter – de Poorte MSc, <i>Head of Education Masters</i>	- Welkom
08.30 – 08.45	Meet & Greet alle betrokkenen en Pitch door Ir. G. (Gerrit) Kuiken, <i>Programma Manager</i>	- Kennismaking - Korte presentatie opleiding
08.45 – 09.00	Vooroverleg panel met opleidingsmanagement: Drs. H.J. (Henk) Pijlman, <i>Voorzitter College van Bestuur</i> Drs. P. (Peta) de Vries, <i>Dean</i> J.E. (Anke) Carter – de Poorte MSc, <i>Head of Education Masters</i> Ir. G. (Gerrit) Kuiken, <i>Programma Manager</i>	- Vaststellen agenda
09.00 – 10.15	Vooroverleg auditpanel	- vooroverleg - bestudering documenten digitaal op de community
10.15 – 10.55	Docent-onderzoekers Dr. F. (Folkert) Faber Dr. A. (Andras) Perl MSc Drs. M. (Marietta) de Rooij <i>PhD Candidate</i> Drs. E.J. (Evert Jan) Hengeveld <i>PhD Candidate</i> Lector Dr. Ir. W.J.T. (Wim) van Gemert, <i>Leading lector Centre of Expertise Energy</i> Dr. Ir. J. (Jan-jaap) Aué, <i>Directeur Centre of Expertise Energy</i> Professional Boardleden Dr. G. (Gerard) Martinus, <i>Gasterra</i> Dr. G.P. (Paul) Wyers MBA, <i>ECN (Solar Energy)</i>	<u>Profilering van kennisinfrastructuur Energie</u> - voorbeelden van de onderwijsvisie: vervlechting/verbinding onderwijs-onderzoek-beroepspraktijk;
10.55 – 11.35	Studenten J. (Jochum) Douma via Skype – English J.A. (Oscar) Berrio via Skype – English G. (Gonzalo) Diez Sanmartin (SFS) – English N. (Nadège) Hervieux (SFS) – English	- kwaliteit van de onderwijsleeromgeving
11.35 – 11.45	Pauze / Intern overleg auditpanel	- intern overleg bestudering documenten digitaal op de community

Tijd	Gesprekspartners (incl. functies/rollen)	Gespreksonderwerpen
11.45 – 12.25	Docenten (waaronder afstudeerbegeleiders en -beoordelaars) Dr. F. (Folkert) Faber (SRC chair) Dr. ir. J. (Jan) Bekkering Dr. Ir. J.G. (Gerard) Schepers Prof. dr. A.W. (Arthur) Weeber	<i>Samenhangende onderwijsleeromgeving:</i> - eigen inkleuring programma - internationale component - aansluiting instromers - relatie docenten beroepenveld - eigen deskundigheid docenten - opleidingsspecifieke voorzieningen - toetsen en beoordelen - borging niveau
12.25 – 12.40	Open spreekuur Materiaalinzage via laptop in E.122	- bestudering documenten digitaal op de community
12.40 – 12.45	Panel met de waterstofbus naar Energy Academy Europe Met Dr. Ir. J. (Jan-jaap) Aué, <i>Directeur Centre of Expertise Energy</i> en Dr. K.J. (Klaas Jan) Noorman, <i>Lector Energietransitie</i>	
12.45 – 13.00	Rondleiding Energy Academy Europe /lessituaties Door Dr. Ir. J. (Jan-jaap) Aué, <i>Directeur Centre of Expertise Energy</i> en Dr. K.J. (Klaas Jan) Noorman, <i>Lector Energietransitie</i>	- verificatie opleidingsspecifieke voorzieningen - bezoek specifieke lessituaties/bijwonen van lessen o.i.d.
13.00 – 13.25	Lunch auditpanel bij Energy Academy Europe	- intern overleg
13.25 – 13.30	Panel met de waterstofbus naar Entrance Met Dr. Ir. J. (Jan-jaap) Aué, <i>Directeur Centre of Expertise Energy</i> en Dr. K.J. (Klaas Jan) Noorman, <i>Lector Energietransitie</i>	
13.30 – 14.10	Opleidingsmanagement (inclusief directeur CoE Energy) Drs. H.J. (Henk) Pijlman, <i>Voorzitter College van Bestuur</i> Drs. P. (Peta) de Vries, <i>Dean</i> J.E. (Anke) Carter – de Poorte MSc, <i>Head of Education Masters</i> Ir. G. (Gerrit) Kuiken, <i>Programma Manager</i> Dr. Ir. J. (Jan-jaap) Aué, <i>Directeur Centre of Expertise Energy</i>	- eigenheid opleiding / positionering & profilering - ambities - wo-niveau/oriëntatie - relatie beroepenveld - internationale oriëntatie - onderzoekdimensie
14.10 – 14.20	Pauze / Intern overleg auditpanel	- intern overleg - bestudering documenten digitaal op de community
14.20 – 15.00	Examencommissie F.H. (Francoise) van der Boom-Binkhorst Dr. Ir. J. (Jan) Bekkering Dr. C.B. (Corina) Vogt Leden Academic Board Dr. Ir. J.P.H. (Jan Peter) Nap, (Life Science and Technology HUAS) – chairman Prof. Dr. H.C. (Henk) Moll, (RuG) Prof. Dr. W.C. (Wim) Sinke (ECN) Leden EUREC – Engels Mw. N. (Nathalie) Richet, M.A. (Master Program Manager EUREC, Brussels)	- bevoegdheden, taken en rollen - relatie tot het management en andere gremia - kwaliteitsborging toetsen en beoordelen - kwaliteitsborging afstuderen
15.00 – 15.10	Pauze / Intern overleg auditpanel	- intern overleg - bestudering documenten digitaal op de community - bepalen pending issues

Tijd	Gesprekspartners (incl. functies/rollen)	Gespreksonderwerpen
15.10 – 15.50	<p>Alumni R. (Rory) Quinn MSc – English J. (Juliana) Montoya Cordona MSc – English H. (Habib) Rahmeh MSc (SRC member) – by Skype in English</p> <p>Professional Boardleden Drs. C. (Kees) Alberts, Gasunie Dr. Ir. J. (Jörg) Gigler, TKI Gas</p> <p>Partner-instelling: specialisatie-aanbieder Professor Luís Gato, Technical University of Lisbon - by Skype in English</p>	<p><u>Output/impact</u></p> <ul style="list-style-type: none"> - kwaliteit en relevantie van de opleiding (programma, docenten) - functioneren in de praktijk of vervolgopleiding - actuele ontwikkelingen en doorvertaling naar programma - andere wensen vanuit het werkveld - eigen inkleuring opleiding - onderzoekscomponent - gerealiseerd niveau
15.50 – 16.00	<p>Pending issues (<i>alle gesprekspartners zijn hiervoor beschikbaar</i>)</p>	<ul style="list-style-type: none"> - (indien van toepassing)
16.00 – 17.00	Intern overleg auditpanel	<ul style="list-style-type: none"> - bepaling voorlopige beoordeling
17.00	<p>Terugkoppeling Drs. H.J. (Henk) Pijlman, <i>voorzitter College van Bestuur</i> Drs. P. (Peta) de Vries, <i>dean</i> J.E. (Anke) Carter – de Poorte MSc, <i>Head of Education Masters</i> Ir. G. (Gerrit) Kuiken, <i>program manager</i> Dr. Ir. J. (Jan-jaap) Aué, <i>directeur Centre of Expertise Energy</i> Dr. K.J. (Klaas Jan) Noorman, <i>lector Energietransitie</i></p>	

Audit approach

Selection of the delegations / the auditees

In compliance with the NVAO regulations the audit panel prior to the audit decided on the composition of the delegations (auditees) in consultation with the course management and on the basis of the points of focus that had arisen from the panel's analysis of the course documents.

An 'open consultation session' was scheduled as part of the site-visit programme. The panel verified that the scheduled times of the consultation session had been made public to all parties involved in the school community in a correct and timely manner. No students or staff members attended the open consultation session.

Auditing process

The following procedure was adopted. The panel studied the documents regarding the programme (Annex III: Review of documents) and a selection of theses. The panel secretary organised input from the auditors and distributed the preliminary findings among the panel members prior to the audit. A preparatory meeting of the panel was part of the site-visit.

The panel formulated its preliminary considerations and judgements per standard immediately after the site-visit. These were based on the findings during the site visit, and building on the assessment of the programme documents.

A first version of the assessment report was drafted by the secretary and circulated among the members of the panel for review and comments. The final draft was subsequently forwarded to the programme management to correct factual inaccuracies. The panel finalised the report on October 2, 2017.

Assessment rules

The assessment panel evaluates the programme against the standards of the applicable assessment framework using a four-point scale: unsatisfactory - satisfactory - good - excellent. For a positive final conclusion regarding the programme, each theme must at least be judged satisfactory.

The final outcome of the programme assessment will always be "unsatisfactory" if standards 1, 3 or 4 are judged "unsatisfactory". In case standard 1 is considered unsatisfactory, no improvement period will be assigned and the programme is forced to close down.

The final conclusion regarding a programme can only be "good" if at least two standards are judged "good", one of which must be standard 4.

The final conclusion regarding a programme can only be "excellent" if at least two standards are judged "excellent", one of which must be standard 4.

ANNEX III Review of documents

- Critical Reflection;
- Policy and strategy documents;
- Internal organisation, annual report Examination Board, minutes Student Programme Committee, minutes Academic Board and Professional Board, TER 2016-2017;
- Staff, overviews of employees, allocated staff, boards and committees, organisation chart EMRE/School of Energy, staff resumes;
- Position paper EMRE; several documents on education and research;
- Quality assurance plans and evaluations;
- Samples of assessments with corresponding assessment criteria and requirements (answer models) and a representative selection of actual tests administered
- representative selection of final projects, selected by the panel, of the past two years with corresponding assessment criteria and requirements;
- Reference books, booklists and other study materials;
- List of 15 final projects/papers examined prior to the audit¹:

1	327558
2	336342
3	337514
4	342026
5	342282
6	342299
7	342452
8	344391
9	344988
10	345095
11	349571
12	350505
13	351200
14	351588
15	327876

¹ Following NVAO regulations student enrolment numbers have been denoted here. For reasons of privacy names of students and projects are known to the panel members and panel secretary only.

ANNEX IV Composition of the audit panel

Panel members	Expertise					
	auditing and quality assurance	education	professional field	discipline	International	student-related
Ir. A.T. (Fred) de Bruijn, chair	x	x				
F. (Fokko) Mulder, expert member	x	x	x	x	x	
A.J (Aart-Jan) de Graaf, expert member		x	x	x	x	
T. Schoehuijs student member						x

co-ordinator/certified secretary H.R. van der Made

Succinct CVs of panel members

Ir. A.T. de Bruijn	Mr. De Bruijn is partner at the Evaluation Agency Hobéon and has chaired numerous accreditation audits in Higher Education since 2004.
Prof. Dr. F.M. Mulder	Mr. Mulder is professor in Chemical Engineering at the Faculty of Applied Science of the Technical University Delft.
A.J. de Graaf, PhD	Mr. De Graaf holds a professorship in control systems engineering at the University of Applied Science Arnhem and Nijmegen (HAN).
T. Schoehuijs	Mr. Schoehuijs is a first year student of the Master in Sustainable Energy Technology at the TU Delft.

On 24 May 2017 the NVAO endorsed the composition of the panel to assess the European Master Renewable Energy of the Hanze University of Applied Science Groningen, registration #005513.

Prior to the audit all panel members undersigned declarations of independence and confidentiality which are in possession of the NVAO. This declaration certifies, among other things, that panel members do not currently maintain or have not maintained for the last five years any (family) connections or ties of a personal nature or as a researcher/teacher, professional or consultant with the institution in question, which could affect a fully independent judgement regarding the quality of the programme in either a positive or negative sense.



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