ASIIN Seal

Accreditation Report

Master's Degree Programme
Environmental Engineering and Management
Sustainable Energy Engineering and Management

PhD Programme
Environmental Engineering and Management
Sustainable Energy Engineering and Management

Provided by
Regional Centre for Energy and Environmental Sustainability, University of Energy and Natural Resources, Sunyani, Ghana

Version: 15.01.2024

Table of Content

A About the Accreditation Process

Name of the degree programme (in original language)	(Official) English translation of the name	Labels applied for [1]	Previous accreditation (issuing agency, validity)	Involved Technical Committees (TC)[2]
MSc Sustainable Energy Engineering and Management	MSc Sustainable Energy Engineering and Management	ASIIN	November 23, 2018-2023 (GTEC)	02, 06
PhD Sustainable Energy Engineering and Management	PhD Sustainable Energy Engineering and Management	ASIIN	November 23, 2018-2023 (GTEC)	02, 06
MSc Environmental Engineering and Management	MSc Environmental Engineering and Management	ASIIN	November 23, 2018-2023 (GTEC)	03, 06
PhD Environmental Engineering and Management	PhD Environmental Engineering and Management	ASIIN	November 23, 2018-2023 (GTEC)	03, 06
Date of the contract: 26.01.2022 **Submission of the final version of the self-assessment report:** 21.07.2023 **Date of the onsite visit:** 31.08.2023–01.09.2023 **at:** Sunyani Campus				
Expert panel: Prof. Dr. sc. techn. Dirk Dahlhaus, University of Kassel Prof. Dr.-Ing. Richard Korff, University of Applied Sciences Münster Prof. Dr. Dr. h.c. Andreas Knorr, German University of Administrative Sciences Speyer Martin Holzwarth, Independent Consultant				

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[1] ASIIN Seal for degree programmes.

[2] TC: Technical Committee for the following subject areas: TC 02 - Electrical Engineering/Information Technology; TC 03 - Civil Engineering, Geodesy and Architecture; TC 06 - Engineering and Management, Economics.

Emmanuel Arthur, Student at Kwame Nkrumah University of Science and Technology, Kumasi	
Representative of the ASIIN headquarter: Dr. Andrea Kern	
Responsible decision-making committee: Accreditation Commission for Degree Programmes	
Criteria used: European Standards and Guidelines as of May 15, 2015 ASIIN General Criteria, as of December 10, 2015 Subject-Specific Criteria of Technical Committee 02 – Electrical Engineering/Information Technology as of December 9, 2011 Subject-Specific Criteria of Technical Committee 03 – Civil Engineering, Geodesy and Architecture as of September 28, 2012 Subject-Specific Criteria of Technical Committee 06 – Engineering and Management, Economics as of September 20, 2019 ASIIN Additional Criteria for Structured Doctoral Programmes as of March 15, 2021	

B Characteristics of the Degree Programmes

a) Name	Final degree (original/English translation)	b) Areas of Specialization	c) Corresponding level of the EQF[3]	d) Mode of Study	e) Double/Joint Degree	f) Duration	g) Credit points/unit	h) Intake rhythm & First time of offer
Sustainable Energy Engineering and Management	MSc		7	Full time and part time	-	4 semester (full time) and 6 semester (part time)	54 Ghana credits	Annually / 2015/2016 Academic Year
PhD Sustainable Energy Engineering and Management	PhD		8	Full time and part-time	-	6 semester (full time) and 10 semester (part time)	78 Ghana credits	Annually / 2015/2016 Academic Year
MSc Environmental Engineering and Management	MSc		7	Full time and part time	-	4 semester (full time) and 6 semester (part time)	54 Ghana credits	Annually / 2015/2016 Academic Year
PhD Environmental Engineering and Management	PhD		8	Full time and part-time	-	6 semester (full time) and 10 semester (part time)	78 Ghana credits	Annually / 2015/2016 Academic Year

The University of Energy and Natural Resources (UENR) in Sunyani was established in 2011; it started in 2021 offering two study programmes in 2012 and a total number of 154 students. It is a public university with an emphasis on leadership and management of energy and natural resources. It aims to be a centre of excellence in these critical areas across whole Ghana. Despite its focus on these two topics, UENR today approaches studies and research in an interdisciplinary manner, offering collaborations in economics, law, policy, management, science, technology, engineering as well as social and political issues affected by energy and natural resources. The core topics of the university is defined by UENR's mandate, which defines the offered study programmes by a committee. UENR has inherited their campus in Sunyani by the Kwame Nkrumah University of Science and Technology, which includes a high number of buildings still in use.

Today, UENR has eight schools divided into one campus in Sunyani (School of Engineering, School of Energy, School of Sciences, School of Natural Resources, School of Arts and Social

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[3] EQF = The European Qualifications Framework for lifelong learning

Sciences, School of Mines and Built Environment, and the School of Graduate Studies) and one campus in Dormaa (School of Agriculture and Technology, School of Geoscience). The university is currently offering 49 undergraduate programmes and 22 graduate programmes. Since the year 2023, the student population has exceeded to 12,000 students with a number of 26 international students. The number of academic staff is about 330 across all study programmes. In addition to teaching, the university operates ten research centres, which conduct research in topics relevant to energy and natural resources and provide community engagement and consultancy to the local and rural communities. The university currently has set their vision to become an excellent institution for generating, advancing and applying knowledge in energy and natural resource sciences. In this regard, UENR has presented the following core value on their webpage:

1. Promote innovation, creativity, freedom of thought and creative expression
2. Operate with integrity, commitment and transparency
3. Respect for conservation of energy and the environment
4. Partnership with stakeholders in skills and knowledge generation and application

Since 2019, the world band has selected UENR to host an Africa Centre of Excellence (ACE), labelled as the Regional Center of Energy and Environmental Sustainability (RCEES). Associated with the RCEES, the university submitted four study programmes for review. While the master and doctoral study programmes *Sustainable Energy Engineering and Management* are organized by the School of Energy at the Department of Renewable Energy, the master and doctoral study programmes *Environmental Engineering and Management* are hosted by the School of Engineering, Department of Civil Engineering and Environmental Engineering.

For the master degree programme *Sustainable Energy Engineering and Management*, the institution has presented the following profile on the webpage:

„The MSc. Sustainable Energy Engineering and Management is run in the Department of Energy and Petroleum Engineering, under the School of Engineering. The programme aims to produce graduates with advanced knowledge and skills in energy engineering and management; this will be by providing high-level teaching and research, in an interdisciplinary approach, to deliver a set of skills and competencies in sustainable energy systems. All these are gear towards enabling students to participate in the successful introduction, appraisal, and management of sustainable energy systems including aspects of efficiency, availability, safety, and evaluation."

For the doctoral degree programme *Sustainable Energy Engineering and Management*, the institution has presented the following profile on the webpage:

"The Phd. Sustainable Energy Engineering and Management is run in the Department of Energy and Petroleum Engineering, under the School of Engineering. The programme aims to produce graduates with advanced knowledge and skills in energy engineering and management; this will be by providing high-level teaching and research, in an interdisciplinary approach, to deliver a set of skills and competencies in sustainable energy systems. The structure of the Ph.D. course is designed to produce graduates with rigorous research and analytical skills, who will be exceptionally well-equipped to go onto teaching, Postdoctoral research, or employment in industry and the public service."

For the master degree programme *Environmental Engineering and Management*, the institution has presented the following profile on the webpage:

"The environmental engineering and management graduate degree programme has been designed for students wishing to enhance their career prospects in environmental engineering and management. The programme aims to provide advanced training for both engineers and scientists concerned with protecting the environment and human health through the provision of services such as water supply, sanitation, wastewater treatment and municipal solid waste and hazardous waste management, resource recovery from waste materials, etc."

For the doctoral degree programme *Environmental Engineering and Management*, the institution has presented the following profile on the webpage:

"The Environmental Engineering and Management graduate degree programme has been designed for students wishing to enhance their career prospects in environmental engineering and management. The programme aims to provide advanced training for both engineers and scientists concerned with protecting the environment and human health through the provision of services such as water supply, sanitation, wastewater treatment and municipal solid waste and hazardous waste management, resource recovery from waste materials, etc.

PhD postgraduate programme in Environmental Engineering and Management is to provide students with the knowledge towards the interactions between humans and their environment and the planning, design, and control of systems for environmental quality management for water, land, and air environments."

C Expert Report for the ASIIN Seal[4]

1. The Degree Programme: Concept, Content & Implementation

> **Criterion 1.1 Objectives and Learning Outcomes of a Degree Programme (Intended Qualifications Profile)**

Evidence:

- Self-assessment report
- Study regulations
- Webpage UENR https://uenr.edu.gh/
- Webpage RCEES https://rcees.uenr.edu.gh/
- Webpage of the Ma SEEM https://rcees.uenr.edu.gh/msc-seem/
- Webpage of the PhD SEEM https://rcees.uenr.edu.gh/phd-seem/
- Webpage of the Ma EEMA https://rcees.uenr.edu.gh/eema/
- Webpage of the PhD EEMA https://rcees.uenr.edu.gh/phd-eema/
- Study regulations
- Handbook for Graduate Students
- Objectives-module matrix of each study programme
- Discussion during the audit

Preliminary assessment and analysis of the experts:

During the review of the submitted documents, the experts learn that the study programmes were initially offered back in the academic year of 2015/2016. The last changes in the curriculum were adapted in the year 2021/2022, which coincide with the establishment of the RCEES. The university states that each study programme allows its graduates to integrate core knowledge, technical skills and professional competences to excel in their field. The experts recognize UENR's strategy to operate an interdisciplinary approach in the

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[4] This part of the report applies also for the assessment for the European subject-specific labels. After the conclusion of the procedure, the stated requirements and/or recommendations and the deadlines are equally valid for the ASIIN seal as well as for the sought subject-specific label.

four study programmes under review. They consider the study programs cover various topics relevant for the modern society of this region from the perspective of technology as well as management.

All study programmes under review have an applied scientific orientation. The aim for competences in creativity, innovation, entrepreneurship, leadership, life-long learning as well as subject-specific skills. In the discussion, the representatives of the rector's office point out that the four study programmes are still quite young; nevertheless, the programmes are at the heart centre of the university's mandate. The interviewees point out that the program "Renewable Energy" was one of the first topics the university focused on, which made them the first university across Ghana to select this subject. Similarly, UENR was the first university in Ghana to start the bachelor programme "Environmental Engineering" which is the basis for the master and doctoral programmes "Environmental Engineering and Management". As their motivation to develop the study programmes under review, the representatives of the rector's office mention the need for experts in these particular fields for the development of the country. This is equal to the need for experts, who have an understanding of engineering as well as management. Next to providing education for young students, the focus of these programmes is also suitable for educating people already working in relevant industry. The programme coordinators point out that the study programmes are associated with the RCEES, but officially belong to UENR departments (Department of Energy and Department of Engineering). These departments manage the programmes and are responsible for administering all related quality assurance processes. The experts support the universities strategy for these four programmes and acknowledge that these programmes contribute to the infrastructure development across Ghana.

In the master programme *Sustainable Energy and Management (Ma SEEM),* the students learn to engage, evaluate and manage sustainable energy systems including aspects of efficiency, availability, and safety. The study programme allows its graduates to show advanced knowledge and skills in energy engineering and management. UENR describes the following objectives for this study programmes in their self-assessment report:

1. "To enable students to analyse current and future trends in sustainable energy development and delivery at global, regional, and local levels.
2. To equip students with the ability to identify, evaluate, and respond to complex energy systems problems involving technical, environmental, and socioeconomic components.
3. To enable students to apply advanced systems analysis tools in a multi-disciplinary setting to plan, analyse, design, and implement solutions to energy systems problems.

4. To train students in the application of existing energy tools and techniques in integrated sustainable practices.

5. To train students to innovate and develop new tools and techniques for sustainable energy applications.

6. To provide students with the skills to analyse the complex interactions between energy system solutions and their implications on a larger scale (regional, national, global).

7. To equip students with research skills to enable them to identify the critical research areas in sustainable energy engineering and management."

The university has presented the following programme learning outcomes (PLOs) for the *Ma SEEM*, which are divided into knowledge, skills and competencies.

Knowledge	PLO1	Describe the different energy resources and explain their respective advantages and disadvantages including environmental impacts (e.g., climate change), health issues, usage, safety, and energy security, and their share in the energy mix at the local, national and global levels.
	PLO2	Discuss the concept of energy efficiency and sufficiency and how socio-technical strategies and policies affect them.
	PLO3	Describe how policies can influence the development of energy supply and demand.
	PLO4	Explain the processes and institutional arrangements in the energy sector and describe the structure of the energy market.
Skills	PLO5	Analyse, compare, and communicate different energy-efficient technology options for use by stakeholders in the energy sector.
	PLO6	Conduct computational modelling and energy simulation.
	PLO7	Cooperate and collaborate with others to transfer and adapt energy technologies to different contexts and to share energy best practices.
	PLO8	Apply innovative and entrepreneurial skills to identify and recognize business opportunities for new products, processes, and systems.
	PLO9	Examine and make appropriate use of advanced information and communication technologies in their professional activities.
	PLO10	Work in a team of people with diverse educational and cultural backgrounds.

Competencies	PLO11	Identify, analyse, formulate, and solve problems in a location in collaboration with the local community and stakeholders.
	PLO12	Design and deliver energy solutions in a safe, reliable way taking into consideration relevant sustainable development goals.
	PLO13	Develop energy-efficient strategies in the design and construction of buildings in collaboration with building professionals.
	PLO14	Evaluate different business models in the energy sector and select suitable ones for a given socio-economic context.
	PLO15	Conduct, socio-economic, techno-economic, and environmental studies of energy systems.
	PLO16	Formulate the research problem, plan and execute the research and communicate the findings to the targeted audience.
	PLO17	Execute their duties ethically and professionally, examine their obligations to society.
	PLO18	Develop their learning through lifelong learning approaches using e-learning tools.

UNER describes that graduates from the _Ma SEEM_ programme can work in various fields. The most common professions of graduates are employed include: (1) Renewable Energy Engineer, (2) Renewable Energy Systems Designer, (3) Renewable Energy Resource Analyst, (4) Energy Efficiency and Management Consultant, and (5) Energy Systems Engineer. In addition, students can continue to study in the PhD programme SEEM.

In the doctoral programme _Sustainable Energy and Management (PhD SEEM)_, the university aims to train the students in advanced knowledge and skills in the areas of energy engineering and management. This includes competencies in teaching to disseminate their expertise as well as skills in interdisciplinary research related to sustainable energy systems.

For the programme _PhD SEEM_, UENR has presented the following objectives in the self-assessment report:

1. "Provide a period of a sustained in-depth study of sustainable energy engineering and management;
2. Create an environment that encourages the student's originality and creativity in their research;

3. Equip students with the skills to enable them to critically examine the background literature relevant to their specific research area;
4. Equip students with the skills to formulate and test hypotheses, develop new theories, plan and conduct research;
5. Equip students with practical research skills, to enable them to learn state-of-the-art techniques used in sustainable energy engineering and management;
6. Create an environment in which to develop skills in written work, oral presentation, and publishing the results of their research in high-profile scientific journals, through constructive feedback of written work and oral presentations;
7. Offer an academic framework to enable students to exhibit their creativity and innovation with a focus on entrepreneurship and leadership."

The PLOs of the programme _PhD SEEM_ contain:

1. "Formulate and test hypotheses, develop new theories, plan and conduct research.
2. Apply quantitative, qualitative, and mixed methods approach to research
3. Write scholarly manuscripts and publish in high-profile scientific journals, through constructive feedback of written work and oral presentations.
4. Analyse and critically critique published research.
5. Develop their creativity and innovation with a focus on entrepreneurship and leadership."

According to UENR, graduates can be employed in various companies related to renewable energy including wind, solar, biomass and hydro systems or energy-efficient building constructions. Furthermore, graduates can continue their career in academia at research institutions. UENR considers the following occupations are the most likely for graduates of the programme _PhD SEEM_: (1) Renewable Energy Engineer, (2) Renewable Energy Systems Designer, (3) Renewable Energy Resource Analyst, (4) Energy Efficiency and Management Consultant, (5) Energy Systems Engineer and (6) Academic researcher.

The experts further get to know more about the master programme _Environmental Engineering and Management_ (_Ma EEMA_). The study programme focuses on the environmental engineering aspects considering water, land and air, as well as the interaction of humans and environment. The university has defined the following objectives:

1. "Identify and formulate and solve complex environmental engineering problems by selecting and applying appropriate tools and techniques.
2. Synthesize advanced technical knowledge in traditional or emerging area of knowledge in the environmental engineering.

3. To produce graduates that are productive and contributing members of the environmental engineering profession as practitioners, entrepreneurs and researchers or lecturers.
4. Execute duties in an ethical and professional way, examine obligations to society.
5. Formulate research problem, plan and execute the research and communicate the findings to targeted audience.
6. Work in a team of people with diverse educational and cultural backgrounds.
7. Pursue advanced studies if qualified and interested."

The study programme aims to provide education for both, engineers and scientists. The courses address environmentally related subjects and allow the students to choose electives starting from the second semester.

The self-assessment report lists the following generic competences for graduates in the programme *Ma EEMA*:

1. **Complex problem solving:** apply experimental design, conduct data analysis, and perform modelling.
2. **Effective leadership and management**: take up leadership positions and manage them effectively.
3. **Innovation and Entrepreneurship:** demonstrate a creative and innovative mind-set and apply innovative and entrepreneurial skills to provide needed services in their communities.
4. **Good attitude and excellent ethics**: apply good moral principles to their field of profession. develop the ability to examine sets of obligations in their profession to society, to their clients, and to the profession. Work with different people from diverse backgrounds and with various skills.
5. **Good communication skills**: communicate effectively with different audiences and changing the style as appropriate. These skills are seen through an effective Power-Point presentation, creating an effective 'pitch' and writing a business proposal, thesis writing, technical reports, and scientific papers, actively participating in group discussions, writing a resume and networking among stakeholders.
6. **Lab & Field safety skills:** conduct independent field or lab work with adequate safety measures in place.
7. **Research ability:** conduct scientific research in understanding and appreciation of the philosophical bases, methodologies, and characteristics of scholarship and creative work, publish."

In addition, UENR has described the following PLOs:

Knowledge	PLO1	Gain advanced knowledge in the principles of environmental engineering underpinning sustainable development.

	PLO2	Understand and appreciate current issues and debates in the field of environmental engineering and management.
	PLO3	Understand and appreciate the philosophical bases, methodologies, and characteristics of scholarship, research and creative work in the environmental engineering and management field.
Skills	PLO4	Demonstrate mastery of theoretical knowledge and to reflect critically on theory and professional practise in environmental engineering and management
	PLO5	Investigate, analyse, evaluate and synthesize complex information, problems, concepts and theories and to apply established theories to different bodies of knowledge or practise in the environmental engineering and management.
	PLO6	Build capacity for critical, conceptual and reflective thinking, creativity and originality
	PLO7	Exhibit Intellectual openness and curiosity
	PLO8	Exhibit Intellectual Integrity, Respect for truth and for the ethics of research and scholarly activity
	PLO9	Make appropriate use of advanced information and communication technologies
	PLO10	Communicate effectively with range of audiences
	PLO11	Apply innovative and entrepreneurial skills to identify and recognise business opportunities in the environmental field
	PLO12	Work in a team of people with diverse educational and cultural backgrounds.
Competencies	PLO13	Identify, analyse, formulate and solve problems in a location in collaboration with local community and stakeholders.
	PLO14	Design and deliver environmental solutions/interventions in a safe, reliable way taking into consideration relevant sustainable development goals (e.g., SDG 6, 7, 11, 13, 17. Agenda 2063, Aspiration No. 1).
	PLO15	Develop environmentally efficient strategies in the design and management of environmental systems.

	PLO16	Conduct environmental and social impact and health-risk assessment of infrastructure and projects.
	PLO17	Formulate research problem, plan and execute the research and communicate the findings to targeted audience.
	PLO18	Execute duties in an ethical and professional way, examine obligations to society.
	PLO19	Develop their own learning through lifelong learning approaches including the use of e-learning tools.

According to UENR, graduates from the programme *Ma EEMA* work in the following professions: (1) NGOs working in the environmental sector, (2) Donor and multinational agencies, (3) Ministry of Land and Natural Resources, (4) Ministry of Sanitation and Water Resources, (5) Metropolitan, Municipal and District Assemblies, (6) Sector Agencies (Environmental Protection Agency, CWSA, GWCL), (7) Ministry of Environment, Science and Technology, (8) Teaching and Research institutions, (9) Mining companies, (10) Consultancy firms, and (11) Waste management companies. Furthermore, the master degree graduate are eligible to continue their doctoral studies.

UENR defines the PhD programme *Environmental Engineering and Management* (*PhD EEMA*) as a programme to combine knowledge for the interaction between humans and the environment with planning, designing and controlling systems for environmental quality management for water, land, and air. In their self-assessment report, UENR has describe the following objectives for this programme:

1. "Identify and formulate and solve complex environmental engineering problems by selecting and applying appropriate tools and techniques
2. Synthesize advanced technical knowledge in traditional or emerging area of knowledge in the environmental engineering
3. To produce graduates that are productive and contributing members of the environmental engineering profession as practitioners, entrepreneurs and researchers or teachers
4. Execute duties in an ethical and professional way, examine obligations to society
5. Formulate research problem, plan and execute the research and communicate the findings to targeted audience. Work in a team of people with diverse educational and cultural backgrounds"

The doctoral programme shall allow the students to enhance their career prospect in the respected field. The programmes provides advanced training for scientists and engineers concerned with protecting the environment and human health through the provision of services such as water supply, sanitation, wastewater treatment and municipal solid waste and hazardous waste management, resource recovery from waste materials, etc.

Next to the generic competences listed for the master programme, the following PLOs are defined in the self-assessment report:

Knowledge	PLO1	Gain advanced knowledge of the principles of environmental engineering underpinning sustainable development.
	PLO2	Understand and appreciate current issues and debates in the field of environmental engineering and management.
	PLO3	Understand and appreciate the philosophical bases, methodologies, and characteristics of scholarship, research and creative work in the environmental engineering and management field.
Skills	PLO5	Demonstrate mastery of theoretical knowledge and to reflect critically on theory and professional practise in environmental engineering and management
	PLO6	Investigate, analyse, evaluate and synthesize complex information, problems, concepts and theories and to apply established theories to different bodies of knowledge or practise in the environmental engineering and management.
	PLO7	Build capacity for critical, conceptual and reflective thinking, creativity and originality
	PLO8	Exhibit Intellectual openness and curiosity
	PLO9	Exhibit Intellectual Integrity, Respect for truth and for the ethics of research and scholarly activity
	PLO10	Make appropriate use of advanced information and communication technologies
	PLO11	Communicate effectively with range of audiences
	PLO12	Apply innovative and entrepreneurial skills to identify and recognise business opportunities in the environmental field

	PLO13	Work in a team of people with diverse educational and cultural backgrounds.
Competencies	PLO14	Identify, analyse, formulate and solve problems in a location in collaboration with local community and stakeholders.
	PLO15	Design and deliver environmental solutions/interventions in a safe, reliable way taking into consideration relevant sustainable development goals (e.g., SDG 6, 7, 11, 13, 17. Agenda 2063, Aspiration No. 1)
	PLO16	3Develop environmentally efficient strategies in the design and management of environmental systems.
	PLO17	Conduct environmental and social impact and health-risk assessment of infrastructure and projects.
	PLO18	Formulate research problem, plan and execute the research and communicate the findings to targeted audience.
	PLO19	Execute duties in an ethical and professional way, examine obligations to society.
	PLO20	Develop their own learning through lifelong learning approaches including the use of e-learning tools.

Reportedly, graduates from this programme find most commonly occupations as: (1) NGOs working in the environmental sector, (2) Donor and multinational agencies, (3) Ministry of Land and Natural Resources, (4) Ministry of Sanitation and Water Resources, (5) Metropolitan, Municipal and District Assemblies, (6) Sector Agencies (Environmental Protection Agency, CWSA, GWCL), (7) Ministry of Environment, Science and Technology, (8) Teaching and Research institutions, (9) Mining companies, (10) Consultancy firms, (11) Waste management companies, (12) Gas and oil companies, and (13) Self-employment.

The representatives of the rector's office cite a high demand on the job market for graduates of the four study programmes under review. Upon the questions by the experts, they state that similar programmes are offered at other universities, naming especially by one of its main competitors, the Kwame Nkrumah University of Science and Technology in Kumasi. However, in the field of environmental engineering, UENR is the only institution offering it as a full bachelor programme. They add that due to UNER's close partnership with industry, they are aware of the demands of the job market. They also perform a market analysis in Ghana for the re-accreditation of the programme every five years to confirm the job opportunities in the related fields, particularly in the field of environmental engineering. The experts ask how this data is collected. Although no classical market analysis was

performed, the programme coordinators explain that they identified the gap in the area of renewable energy knowing the industry landscape; this was confirmed to them in discussions with the industry stakeholders. The industry partners emphasise the need to increase the competences for renewable energy as well as environmental engineering across the country. In addition, the presence of UENR in Sunyani fosters companies in the area. Especially in the central and northern region of Ghana, the access to energy resources as well as sanitation and water treatment in rural areas is limited. Thus, they explain to the expert that there is need to further develop the northern part of Ghana. The representatives of the rector's office add that similar results are also presented by several non-governmental organisations. Furthermore, they point out that their study programmes are labour market oriented; therefore, the feedback from the industry partners is crucial. The industry partners confirm their involvement in the development of the curriculum. They report that UENR has reached out to them asking for feedback. They admit that they have a contract, which ensures that they receive students every semester; however, they (as an individual) are not part of any committee of the university. In their opinion, UENR reached out to them based on their ongoing collaboration. The partners from the industry value their collaboration and consider that they have an impact on the curriculum. In the past, they ensured that several courses have a direct connection to the industry and that new courses were introduced to the curriculum. Further, they also discuss new ideas for study programmes with UENR if they consider it necessary, which has also led to the introduction of new programmes in the past.

Furthermore, the experts learn that all study programmes in Ghana need to undergo a five-year accreditation process by the board of the Ghanaian Tertiary Education Commission (GTEC). According to the self-assessment report and the discussions during the on-site visit, all study programmes are developed involving key stakeholders, including among other faculty members, industry experts, alumni, representatives from professional bodies and students. During the initial accreditation and the re-accreditations of every study programme, UENR needs to describe how each study programme contributes the development of new knowledge and benefits the job landscape of Ghana. According to the programme coordinators, this does also include new research methodologies. Next to the knowledge transfer from teachers to students, the programmes need to contribute to a transfer to the communities across Ghana.

The experts notice the high similarity in the objectives and PLOs between the master and doctoral programmes and wonder how the study programmes differ, especially considering their scientific aspects. The representatives of the rector's office explain that the wording might be similar but the content represents different levels of education and research. In fact, based on its interviews with lecturers, the expert team are able to verify that in the

PhD programme, the type of research and the applied tools strongly differ from the ones in the master programmes. Courses on a PhD level are more complex focusing on advanced techniques, methodologies and content. The students further point out the difference of the master and doctoral study programmes. According to them, the study programmes address aspects of a problem and therefore represent different levels. They highlight that they aim to include methods to enable modern research including modelling and, recently, data science as well as artificial intelligence. They admit that the research topics of the students sometimes require methods and tools outside their curriculum. In these cases, the students receive an additional supervisor, who is knowledgeable on this subject (from inside the university or outside). Other commonly used tools are already included in the elective curriculum, e.g. the Geographic Information System. The teaching staff confirms that they always aim to provide the most modern methods for their students and prepare the students to be capable of applying them. However, the programme coordinators admit, that for some people, who are already working in the industry and continue their higher education, the aspect of publishing research is less important. For the future, they might consider to create a master of engineering or a master of philosophy, which allowed to directly addressing the need of the industry. The industry partners have an overall very positive impression of the students and graduates from the four study programmes under review. The students excel at bringing their theoretical knowledge to the practical work and have good skills in the application of software. Moreover, they show a high motivation to learn. The industry representatives specify that the students have to submit an application and pass an interview to demonstrate the desired attitude to be accepted for an internship. In the interview process, the students from UENR perform very well. Therefore, they are convinced that the graduates have good chances on the job market. The industry partners further mention that they are convinced of the quality of the study programmes; they add that they have previously send staff from their company to UENR to continue their education. They state that they value the knowledge the students and graduates bring to their company. The experts acknowledge the statements of the industry partner and consider the qualifications of the students and graduates are adequate to enter the job market.

Nevertheless, the experts insist that the PLOs are unclear and appear not well connected to the content of the study programmes in their opinion. The programme coordinators try to explain that they consider various aspects when defining the PLOs. This includes the knowledge, which students should acquire, the skills the students should learn in the specific courses as well as how these aspects are combined. The formatting they used in the submitted documents is based on a template issues by GTEC and therefore consider national requirements. They underline that they are required to justify the demand of each

study programme to GTEC and describe how the study programme will advance and disseminate knowledge in the field of energy and natural resources.

The experts conclude that UENR has defined objectives and learning outcomes (the intended competence profile) of each degree programme. These are transparently anchored and published online and thus are available to students, lecturers and interested third parties. In the opinion of the experts, the university clearly describes during the on-site visit that the intended competence profile and the level of research correspond to the level of qualification (according to the European Qualifications Framework). The experts confirm that content and qualification profile are regularly reviewed in a process that involves the relevant stakeholders (in particular from higher education and professional practice) and, if necessary, the objectives are revised accordingly. However, the experts continue to point out that the PLOs should be improved to clearly reflect the content and aims of the study programmes. They specify that the learning outcomes need to reflect the level of a master and doctoral programme and need to be formulated in a precise and brief way.

Criterion 1.2 Name of the Degree Programme

Evidence:
- Self-assessment report
- Webpage RCEES https://rcees.uenr.edu.gh/
- Webpage GTEC https://www.gtec.edu.gh/
- Documents from GTEC
- Sample diploma and transcript of records
- Discussion during the audit

Preliminary assessment and analysis of the experts:
In the discussion, UENR explains to the expert panel that all study programmes originally started in 2015/2016 with slightly different names. The programmes were renamed to emphasize the engineering focus of the programmes. In addition, UENR improved and revised the curriculum, which was approved by GTEC and is implemented since the semester 2021/2022.

The name of the master and doctoral programmes *Sustainable Energy Engineering and Management* centres upon sustainable practices in the field of energy engineering as well as management. The university emphasizes on renewable and clean energy technology, energy efficiency, and sustainable energy system design and operation. UENR states that

the name reflects the terminology used by the industry and within the relevant disciplines. The programmes cover a broad range of topics, including renewable energy systems, energy policy, markets and economics, energy and environmental sustainability. They aim to equip students with the advanced knowledge and skills needed to address complex energy challenges and contribute to the sustainable development of the energy sector.

The name of the master and doctoral programmes _Environmental Engineering and Management_ represents their focus to find engineering solutions and effective management practices for the current environmental challenges. The university explains to the experts that the used terminology reflects the industry standards and aligns with the current terminology of the subject-specific community and the discipline. The name summarises the various aspects of the curriculum, which cover water and wastewater treatment, air pollution control, waste management, environmental impact assessment, and sustainable development. This name reflects the content, which shall allow graduates to become experts in addressing environmental challenges, designing sustainable infrastructure, and implementing effective environmental management strategies.

The experts consider that the titles of all four degree programmes under review reflect their learning content as well as the intended objectives and learning outcomes. The names are consistently used in all documents and in the online representations.

Criterion 1.3 Curriculum

Evidence:
- Self-assessment report
- Webpage of the Ma SEEM https://rcees.uenr.edu.gh/msc-seem/
- Webpage of the PhD SEEM https://rcees.uenr.edu.gh/phd-seem/
- Webpage of the Ma EEMA https://rcees.uenr.edu.gh/eema/
- Webpage of the PhD EEMA https://rcees.uenr.edu.gh/phd-eema/
- Study regulations
- Objective-module matrix of each study programme
- Module handbook of each study programme
- Discussion during the audit

Preliminary assessment and analysis of the experts:
Content

UENR explains the content of the four study programmes under review to the experts during the on-site visit. The responsible department defines the curriculum of each programme.

The study programme *Ma SEEM* provides students with knowledge and skills necessary to address challenges and opportunities in the field of sustainable energy. The curriculum is designed to deepen the understanding of sustainable energy technologies, energy management strategies, and the integration of renewable energy sources into existing systems. The curriculum contains "Core technical course" which expand the students' knowledge on the basics in sustainable energy and engineering. These courses cover topics such as renewable energy technologies, energy conversion systems, energy storage, energy efficiency, and grid integration. In addition to the technical courses, the students take courses in the field of energy management and policy. The curriculum offers on energy economics, energy policy and regulation, energy markets, energy planning, and energy project management. These allow the students to broaden the perspective on social, economic, and policy aspects of sustainable energy systems. The content enables the students to gain knowledge in a specific field by selecting elective courses in subjects such as solar energy systems, wind power, energy storage technologies, energy modelling and simulation, sustainable transportation, or energy entrepreneurship. The curriculum contains a compulsory research project as a basis for the master thesis. In this project, students have to conduct independent research by applying advanced research methodologies to collect and analyse data, and develop innovative solutions in the field of sustainable energy. To provide the students practical experience off-campus, each student needs to complete an industrial attachment, where they spend at least one month in a company. Thus, the study programme emphasizes on technical knowledge, management skills, and policy understanding. The programme considers a compulsory master thesis at the end of their studies, encouraging the students to publish one research publication.

The curriculum of the study programme *PhD SEEM* contains four compulsory courses next to a range of electives. On one side, the compulsory courses ("core courses") give the students advanced training in research methodologies in "Advanced Research Methods and Academic Writing" and "Advanced Statistics." On the other side, the study programme offers courses to deepen the knowledge in the specific field such as "Renewable Energy and Storage Systems" and "Energy Efficiency and Management." The range of elective modules cover topics of technical nature such as "Power Grid Analysis" and "Advanced Energy Systems - Analysis, Design and Optimization" as well as courses on "Advanced Energy Policy, Economics and Markets" and "Energy and Environmental Sustainability." After completing these courses, the students proceed with their research. The final thesis has an amount of 24 credits and is accompanied by a PhD seminar. All students further have to participate in

a field trip and an industrial internship. The students are strongly encouraged to publish at least two research manuscripts in internationally indexed journals.

The programme *Ma EEMA* provides the students a comprehensive understanding of theoretical foundations, practical skills, and management strategies required to effectively address current and future environmental challenges. In their studies, students achieve skills and competences to analyse, design, and implement sustainable solutions in the field of environmental engineering. The experts identify that the curriculum in the *Ma EEMA* starts with a group of lectures labelled as "core technical courses" to establish strong foundations in environmental engineering principles and practices. These courses cover topics such as water and wastewater treatment, air pollution control, solid waste management, environmental modelling, and environmental impact assessment. The study programme has an "interdisciplinary approach"; therefore, additional courses ensure the students' foundations in related subjects including environmental chemistry, environmental law, and environmental policy allowing them so address complex problems from different perspectives. In addition to the compulsory courses, the students have to select elective courses to accommodate the interests and allow them to deepen their area of specialisation. The curriculum includes one elective course in the first and one in the second semester. The specialisations allow the students to focus on management or engineering. Included in the study programme is also a mandatory research project, which enables the students to do independent research in an area of their interest. In this project, the students need to apply research methodologies learned in their studies to collect and analyse data. An internship in the form of an industrial attachment is mandatory for each students to gain practical experience. Finally, they have to present their research and summarise their findings in a thesis. In addition, the curriculum considers field trips in the third and fourth semester. The university provides support to the students in publishing their research.

The curriculum of the programme *PhD EEMA* considers complimentary courses as well as electives. The curriculum enables students to deeper their competences in technical methods such as "Advanced Statistics" and "Remote Sensing and Geographic Information Systems (GIS)." In addition, students have to gain knowledge in "Water Resources Engineering and Management" and receive training in "Advanced Research Methods and Academic Writing" to enhance their competences to perform their own research and write scientific publications. Additional elective courses focus on environmental techniques such as "Sustainable and Life Cycle Assessment", "Water and Wastewater Treatment" and "Water Resource Engineering and Management" whereas other deepen the technical knowledge such as "Modelling of Water Systems" or "Climate Change modelling." Several courses address the intersection of humans and the environment including "Environmental and Social

Impact Assessment and Safeguards" and "Environmental Health & Safety and Risk Assessment" accompanied by courses such as "Environmental Law, Policy and Governance." After the students complete their set of courses, they advance to their personal research. This includes research work as well as an industrial attachment (internship) outside campus. After completing their research, students attend a PhD seminar and hand in their dissertations to finish their studies. The students draw the attention of the experts to their publication requirements. The programme coordinators explain to the experts that they strongly encourage the students to write at least two research publication before defending their thesis.

In the discussion with the representatives of the rector's office, they explain to the experts that they select key courses for the PhD programme in order to ensure a broadening of the knowledge for the doctoral students. Previously, they included a total number of fourteen courses (compulsory and elective), but they now have reduced the list to six courses, allowing the students to have more time for research. In contrast, in both master programmes, they focus on the need of the industry in Ghana; therefore, they include a higher number of courses. Students often give them personal feedback to the curriculum, which lead to the introduction of new elective courses in the previous years. One example is the new course on artificial intelligence ("Data Science and Artificial Intelligence"). Another example is based on the desire of the students to connect with people from the industry early in their studies. Thus, industry representatives were invited to the join various lectures. The students state in the discussion that they are strongly interested in the input from the industry because it allows them to solve real world problems. They characterise it as one of the most positive aspects of their study programmes. Additionally, they state that the amount of modern topics is sufficient for them in their curriculum. In contrast, some students would appreciate more competences in machine learning and working with computer simulations and models. The experts can understand both of their positions; they also consider the early insights from the industry as beneficial to the development of students. Further, they support the students' interest in modern topics and recommend the university to keep updating the curriculum in the future in this regard.

The programme coordinators also confirm that the industrial attachment (internship) is a mandatory part of each study programme under review. The students always have one supervisor at UENR and one supervisor in the company. To rate the work of the student at the company, the supervisors are in close contact to discuss the strength and weaknesses of the student. Visits at their company are performed if feasible. The experts are especially interested in the organisation of the internship. The programme coordinators state that this depends on the type of internship. In the case of a mandatory internship of the stu-

dents, the students receive a letter from UENR, which they have to send to the companies/agencies. Afterwards, the university and the company need to agree on a supervisor in the company, who will be involved in the assessment of the student. However, internships currently have no assigned credit points. Likewise, the internships are not graded. Still, the students have to write an internship report. The programme coordinators add that the company of the internship has be in relation to the content of their studies. In their letters to the industry, they further specify the qualifications of the students and demand that tasks are selected in accordance with their skills and their knowledge. Since the university has a strong connection to the industry, providing an internship at a company is not a problem. They state that more than 80% of the students spend their internship in one of their main partner companies. The long collaborations also ensure that the students are treated in accordance with the university regulations. The students confirm that they consider the internship as a very important part of their studies and that they value the experience outside campus. The students further confirm to the experts that the minimum duration of an internship is one month whereas the maximum is three months (in the master's programmes). They are free to apply for an internship in every off-semester period, which allows them to get more practical experience on a voluntarily basis. The partners from the industry add that they regularly receive students at their companies; most students collect data for their master thesis. Thus, they consider that the industrial attachment guides the students to finalize their research. They add that it is common that PhD students stay for up to six months in their company to conduct their research. One limitation on their side is providing students with accommodation, food and transport since their companies are usually in distance to the university. The collaboration between the university and their companies is based on a Memorandum of Understanding; examples were provided to the experts during the on-site visit.

The experts learn that the main soft skills addressed in the curriculum are related to entrepreneurship and innovation. Further, the programme coordinators state that they aim to focus on the understanding of management and sustainability in their different aspects. They integrate a large number of projects to foster the team-working skills of students. In addition, the students consider their training in leadership as very positive.

Moreover, the experts discuss with the students their involvement in research. They confirm that they have the capabilities to independently work on original research in their final projects. This includes that publishing their scientific research, in several cases already during their master studies. Upon the question of the experts, the students explain that according to their regulations, each person on the list of authors needs to have significantly contributed to the research paper. Therefore, they usually publish together with their supervisor(s). In the opinion of the students, the scientific work they perform at the university

is on an adequate level. However, they would appreciate if the research at the university would be organized in research groups allowing them to work on larger joint projects and in teams. They are certain that this would foster the research at the university.

The experts summarise that the curricula of the study programmes under review enable students to achieve the intended learning outcomes. They were handed documents showing the defined learning outcomes for each module, which enable the students to reach the overarching programme objectives. The experts consider the mandatory internship as positive and confirm that the university assumes responsibility for the quality of the internship in terms of its content and structure. The experts highlight that all compulsory courses of the study programmes are required to award credit points to the students. This includes the internship. The experts further recommend that the university continues to improve their curriculum in relation to modern topics including machine learning, artificial intelligence and modelling. This shall ensure that the students remain competitive on the job market and up to date with the modern development in science and technology.

Structure of the programme

The experts learn that at UENR, all master and PhD programmes can be studied as full time and part time. The study duration can be extended for part-time students. The two master programmes under review have a study duration of four semesters or two years for full time students and six semesters as part time programme. The master thesis contains scientific work, which covers two semesters. In each semester, the students have to complete a workload for 18 credit points for their thesis (total of 36 credits). One academic year at UENR has two semesters, which contains a 13-week period of lectures. The responsible department outlines the curriculum structure and defines courses for each semester, determining both core courses (mandatory courses) and electives. Each curricula requires approval by the Department, the School or School of Graduate Studies and the Academic Board of UENR. The students have to register to a prescribed number of units in each semester, differing between full-time and part-time students. Exceptions are possible with the approval of the Board of Graduate Students. All courses contain components of coursework and research. All courses are evaluated in terms of credit hours, which define the workload students have to complete. In order to start with the thesis research, the students have to pass all compulsory and elective courses with a grade point average (GPA) of at least 2.5. If a student does not obtain the minimum GPA, they are required to re-sit courses in order to raise the GPA until they pass the threshold.

In PhD programmes at UENR, students registered as full time are supposed to complete their program in six semesters whereas part-time students should finish after ten semesters. In the PhD studies, the students are supposed to complete a number of courses in the

first two semesters. These contain a set of courses specific for the study programs and recommended additional courses. Depending on the academic background of the student, the supervisor can suggest additional courses. The studies need to be completed with a GPA of at least 3.0 before the students are officially admitted as a PhD candidate. Students with knowledge in some of the courses can apply for a waiver to skip single modules. If the students fail to reach the GPA or fail one single course, they are allowed to re-sit these exams once. Exceptions are possible for PhD students with more than ten years of professional work experience. Nevertheless, their coursework usually contains five courses with three credits each (15 Ghanaian credits in total). PhD candidates are required to register for their Research Seminar and Thesis to continue their studies. The PhD programmes have mandatory internships, called "industrial attachment", where students spend time in collaborating institutions or companies for practical training and/or collecting research data. The supervisor remains in close contact with the students and visit them during their internships to assess the students' performance and progress. At the end of their attachment, students need to write a report on their activities and give a presentation on their experience.

The students highlight that they particularly enjoy the connection of their lectures and the industry. This also includes the involvement of people from the industry in their courses, which ensures that they can already solve real world problems during their studies. They further consider the aspect of sustainability as crucial in their programmes as they aim to solve problems affecting both, the environment and society.

In the discussion, UENR highlights that the structure of the PhD programs consider research and analytical skills, allowing postdoctoral research as well as employment in the industry and public service. The students value their courses on leadership as well as entrepreneurship. They confirm to the experts that they develop competences in innovation and have competences allowing them to creatively address problems.

The experts consider that the presented courses are well-matched units of teaching and learning. The structure of the study programmes allows the students to gain knowledge, skills and competences in each module. The order of the modules ensures that the learning outcomes can be achieved and that the programme can be completed within the standard period of study. By choosing electives, the internship, and their research work, the programmes allow the students to develop individual focal points and courses of study.

Student mobility

The experts learn that inside the four study programmes under review, the students originate from fourteen different African countries seeking to finish their studies at UENR. The programme coordinators describe to the experts that there is mobility within students from

West Africa, especially among the African Centres of Excellence. The experts see an advertisement to apply for exchange programmes on the webpage and social media when checking the online representative of the programmes under review. Visiting students are accepted at UENR as long as they fulfil the regular admission criteria of the study programme and are recommended to UENR by their host institution. The regulations are published within the student handbook, which the experts received during the review. In addition, they have ongoing exchange programs with Togo including students and staff programmes. In the discussion, the university mention several collaborations with international universities including among others the Technical University Berlin and the University of Oldenburg. RCEES also offers support for their students to spend time abroad. The experts are especially interested in the selection criteria, which the programme coordinators describe as linked to the study interest of the students of their success at academic level. In general, funding for student mobility is available with international funding agencies including Erasmus+ or DAAD.

Additionally, the students mention that they enjoyed a collaborative course with the University of Oldenburg on "Sustainable Energy", which was held online. Although they were not travelling to Germany, they highly appreciate the exchange during the course. Thus, the students would welcome more opportunities for online courses at foreign universities. The experts support the students' opinion and encourage the university to provide more opportunities for the students to enrol in long and short term courses abroad. This should include online and offline courses.

<u>Periodic Review of the Curriculum</u>

From the discussion, the experts confirm that the four study programmes under review are subject to periodic internal quality assurance including internal and external stakeholders. The curricular review takes place every five years to prepare the programme for re-accreditation by GTEC. This review includes the entire programme structure; it involves a series of meetings across the department to evaluate the changes in the relevant field and the demand on the job market. After the members of the department have worked out improvements in the study programme, the recommendations are transferred to the faculty and afterwards to their industrial partners and alumni for review. Feedback from all involved parties are considered to improve the curriculum of each programme. The final curriculum is then transferred to the Office of Quality Assurance, who reviews the document and prepares all paperwork for the official accreditation by GTEC. GTEC provides UENR with a report including recommendations on how to further advance the programme. Afterwards, UENR has to provide a report to GTEC on their suggestions and their implemented

improvements. The teaching staff confirms to the experts that each member of the department is involved in the curriculum revision process. For the PhD programmes, the staff members working on the curriculum updates are limited to those holding a doctorate.

Since the last accreditation, the number of courses in management was reduced because most students focused on the technical aspects. Therefore, UENR added more industry-related courses as electives to address e.g. grit issues ("Power Grid Analysis"). Now the programmes have received a good balance between management and engineering in the opinion of the programme coordinators. Another issue they have expanded in the curriculum is the link of the programmes to the society. This is connected to projects for energy access in rural areas, which is now stronger addressed in the classroom and during practical work.

Therefore, the experts conclude that the governmental restrictions provide a legal basis for a periodical review of the curricula of the study programmes under review. This includes the implemented programme objectives and curricular changes, which are documented.

Furthermore, the experts confirm that the review also includes whether the order of modules enables students to graduate within the standard period of study.

Criterion 1.4 Admission Requirements

Evidence:
- Self-assessment report
- Webpage RCEES https://rcees.uenr.edu.gh/
- Webpage of each study program
- Official admission regulations
- Discussion during the audit

Preliminary assessment and analysis of the experts:
UENR describes their admission criteria during the on-site visit to the experts. To be eligible to study in a master programme at their university, the applicant is required to hold a bachelor degree of a university accredited by GTEC in a related field. Exceptions are in place for international students as well as for people working in a related industry holding a diploma (equal EQF 5) with three years of experience. The official admission criteria are described in the student admission regulations, which are published online and included in the student handbook. UENR states that this process is transparent and accessible for everyone

interested. All study programmes are associated with RCEES, who promotes the study programs through various activities and information distribution platforms.

For the successful admission to the study programme *Ma SEEM* and *PhD SEEM* students need to provide proof for completed course content in a relevant field such as renewable energy engineering, electrical engineering, environmental engineering, mechanical engineering, or agricultural engineering. Admission is followed by a selection process based on a review of the students' qualifications considering in their full spectrum of their academic and personal achievements through examinations and/or an interview. Usually, the number of applications exceeds the maximum limit of students to be admitted; therefore, RCEES has issued criteria to grade the application. Criteria are identical for the master and doctoral programme:

Criteria	Marks
Applicants' background (Relevance of Field/Discipline)	20
Applicant's performance at Master/Bachelor Level	10
Applicant's understanding of the dimensions of research	20
Applicant's preparedness for graduate study (motivation, study leave, approval from employer and finance)	20
Applicants' idea of research to be conducted (proposal)	30

The admission criteria for the study programmes *Ma EEMA* and *PhD EEMA* require previous knowledge in the in civil, environmental, geological, chemical, agric, mechanical, materials, and sanitary engineering, chemical, biological, biochemical and environmental sciences, water supply and sanitation, natural resources management or any other relevant field. The regulations further specify that candidates have to be able to demonstrate an adequate intellectual capacity for independent work, maturity, and potential for effective decision-making and problem solving. Comparable to *Ma SEEM* and *PhD SEEM*, the number of applicants exceeds the maximum number of students to be admitted; therefore, a selection process is in place. The evaluation of the applications follows identical criteria as for the study programmes above.

Each study programme under review is limited to 25 new admissions each semester. However, the experts point out that the numbers presented by UENR show that the capacity is often not reached.

Table: Number of new students each academic year

ACADEMIC YEAR	PhD EEMA	MSc EEMA	PhD SEEM	MSc SEEM	Total
2015/2016	8	11	5	10	**34**

2016/2017	5	11	0	11	**27**
2017/2018	9	17	8	17	**51**
2018/2019	7	8	6	08	**29**
2019/2020	13	29	15	29	**86**
2020/2021	8	16	6	16	**46**
2021/2022	4	14	5	14	**37**
2022/2023	4	14	7	14	**39**
Total	**58**	**120**	**52**	**119**	**349**

The representatives of the rector's office are well aware of the low student numbers. They explain that a high number of applicants are based in Accra, where most of the industry companies are located in Ghana. The distance is a challenge for them to join the programmes despite the high interest to study at UENR. Moreover, the situation significantly changed once they could offer more scholarships due the ACE Impact project. Since 2019, they can now give scholarships to 50–80% of all students. The programme coordinators add that the number of students in the PhD programmes is also limited by their capacity to provide good supervision, which is central to ensure quality.

Although the experts can follow the arguments presented by UENR, they additionally consider that the admitted background of the students for the master and doctoral programmes are very wide. They want to know how the university ensures that all students have the required competences and how missing competences can be achieved. The representatives of the rector's office confirm that the background of the students is crucial for their success. In the best case, the students shall already bring experience in engineering and management to the study programmes. To select the students with the most suitable qualifications, UENR checks the transcript of records of each applicant. They consider each student's performance and experience in research and academia in relevance to the study programme based on their criteria. The experts specifically ask how students from e.g. agriculture engineering could meet the criteria of the program *Ma SEEM* or *PhD SEEM*. The programme coordinator admit that these students might not be suitable to specialize in all kinds of energy, but highlight that they are skilled to work in the area of biomass and bioenergy. They specify that for any engineering bachelor programme in Ghana, the first three years are shared among the different fields. Therefore, also students in the field of agriculture engineering receive a solid foundation in basic engineering, mathematics and natural sciences.

According to the programme coordinators as well as the teaching staff, they provide opportunities for students to compensate missing skills. In most cases, they organize short courses or offer tutoring for these students. They ensure that if a person lacks skills for their programme, they educate these students to be successful in their field. If students miss competences during their doctoral studies, the supervisors can alternatively suggest them to take courses from the master programme in addition to the courses required by the curriculum for their PhD programme. The students confirm that they were able to receive compensation for missing qualifications. They usually learn in study groups, where people with different backgrounds were teaching fellow students if "small" skills were missing. If they lack significant competences, the university organized workshops (e.g. for learning SPSS). The teaching staff adds that they also offer courses in English for francophone students prior to the start of their first semester and continue to support them during the semester with offering additional explanations outside the classroom. To receive a better understanding of the students' qualifications, the teachers usually use their first unit to socialize and learn about their backgrounds and motivations. Their conversations as well as the continuous assessment (e.g. quizzes) reveal to them, who is struggling and might need additional training. Further, they pair students with skills above and below average together during group work to foster learning of the weaker students. Moreover, the teaching staff states that they are available for students outside the classroom offering additional explanation and support (courses) if they or the students consider it necessary. Upon the question of the experts, the teaching staff admits that the level of the students differs among students from Ghana as well as students from abroad. Topics of most recent short courses they held includes "Solar panel design and installation", "Energy efficiency and management", "Computational fluid dynamics" or "Statistical tools/software." Usually, these courses last between one and two weeks with eight hours per day. The students state that the teaching staff is engaging in these situations offering support. However, they admit that the organisation of the compensation of missing competences is organised on an informal basis.

In conclusion, the experts consider the admission requirements and procedures are binding and transparent. They ensure that students are in principle able to successfully graduate from the programme. Although the experts can confirm that UENR is taking action to compensate missing competences of students, they miss a formal basis for these actions. Therefore, they recommend UENR should update their admission criteria and ensure students that courses, workshops and tutorials are offered in case missing prior knowledge might decrease the success in study in the degree programmes.

Criterion 1.5 Workload and Credits

Evidence:

- Self-assessment report

- Module handbook of each study programme

- Conversion Ghanaian credits points to ECTS credit points

- Study regulations

- Discussion during the audit

Preliminary assessment and analysis of the experts:

During the on-site visit, the experts learn that UENR is using an input-based credit point system. All credit points are based on the contact hours between the instructor and students. The time used by the students to prepare for the lectures and exams is not integrated into this system. The study regulations presented by UENR clearly state that one credit hour is equivalent to one hour of lecture (or tutorial) or two hours of practical or laboratory work. The characteristics of the program outline a master programme with 54 credits, representing 108 ECTS credit points whereas each PhD programme has 78 Ghanaian credits or 156 credit points.

UNER presents a conversion between one Ghanaian credit to ECTS (European Credit Transfer and Accumulation System) credit points, where one UENR credit point represents two ECTS credit points.

In the discussion, the experts are interested how the workload is estimated according to their system. The programme coordinators state that at first, they define the scope of one course including the number of projects and assignments the students will have to work on. Then, they consider the number of hours the students have to work on each component to define the workload of one course. Similarly, if a project is done in collaboration with the industry, including final projects (theses), the supervisors, the student and the industry representatives meet in advance to define the number of working hours prior to the project start. Thus, all involved parties agree on the estimated workload. The students have room for remarks during the evaluation at the end of the semester, which also includes questions on the workload.

The experts can confirm that UENR has put in place a credit-based system in the four study programmes under review. Although the students consider the workload as adequate, the experts identify issues with the workload calculations. The experts acknowledge the effort of UENR to transfer the Ghanaian credit points to ECTS credit points, but detect some inconsistencies in the progress. This includes that UENR considers two ETCS points for one

Ghanaian credit point, which would approximately equal one hour of contact hours and one hour of self-study. However, this does not match the self-study hours listed in the module handbook. Therefore, the expert suggest UENR to develop a mechanism to trace the actual workload of the students in each module. This should also allow them to calculate an evidence-based conversion of their credit points to ECTS credit points following the ECTS user's guide. This workload should then be verified in the following years to balance the workload of the students in each module.

Furthermore, it is required that all compulsory modules are credited as they consider a mandatory part of the students' studies. This should also include modules such as "Field trip" or the "Industrial Attachment" as well as seminar lectures.

Criterion 1.6 Didactic and Teaching Methodology

Evidence:
- Self-assessment report
- Module handbook of each study program
- Discussion during the audit

Preliminary assessment and analysis of the experts:
After studying the documents submitted by UENR, the experts are informed that the university applies student-centred learning or problem-based learning. The university explains during the on-site visit that all the study programmes at UENR are practically oriented. This influences the lectures, which often contain hands-on practical demonstrations and training. In addition, laboratory work, fieldwork and industrial attachments (internships) are integrated in the programmes to strengthen the students' practical skills. In addition, the lecturers often use group projects, case studies, and discussions to engage with the students. A problem-based learning approach is applied whenever relevant.

During the discussion with the experts, the programme coordinators add that they have combined group work and field trips to the industry. Students are placed in small groups and send to different companies to work on a joint project. After gathering data and doing their analysis, the students give presentations on their experience and outcome.

The teaching staff explains to the experts that they started with defining the competences the students shall achieve when developing a course. The teaching methods and assessments (oral exams, projects, etc.) are determined based on the learning outcomes of the course. This includes the amount of practical training in the classroom, on campus or off-campus. They acknowledge that the access to the laboratories on campus is a challenge to

staff and students (see more criterion 3.2) but they try to find creative solutions so guarantee an excellent education. One solution for them was to create a mandatory industrial attachment for master and doctoral students as well as field work at companies to gather practical experience and research data.

The students emphasise that the teaching staff has adequate teaching skills and are competent in their field. They value that their knowledge is not book-centred but shows their understanding of actual problems in the field. In addition, they state that they especially enjoy the joint lectures by someone from UENR and the industry. The experts consider this a valuable aspect of their studies establishing an early connection to the various fields of the industry. In their opinion, the university should expand this approach when feasible.

The experts summarise that UENR applies a variety of teaching methods and didactic means to promote the achievement of the learning outcomes. The university supports student-centred learning and teaching. Based on the descriptions of the students, the experts conclude that the degree programme contains an adequate balance of contact hours and self-study time. The experts confirm that study programmes further introduce students to independent scientific work, which is an integral part of the study programme. The courses utilised learning and teaching methods supporting the achievement of the programme objectives. Furthermore, a regular review takes place to improve the teaching methods, which considers the feedback of the students during the end-semester evaluations.

2. Exams: System, Concept and Organisation

Criterion 2 Exams: System, Concept and Organisation

Evidence:
- Self-assessment report
- Examination regulations
- Webpage UENR https://uenr.edu.gh/
- Module handbook of each study programme
- Samples of exams viewed during the audit
- Discussion during the audit

Preliminary assessment and analysis of the experts:

The representatives of UENR explain to the experts that the mode of assessment of each course comprises various assessment methods. These include presentations, practical exams, quizzes, assignments (group and individual assignments), seminars and journal/notebooks. The mid-semester and final examinations are integrated in every course. According to the program coordinators, a written final exam is still mandatory based on Ghanaian regulations whereas a replacement of the mid-term final exam with oral exams or projects is also applied in the different study programs. The exam regulations define that the final examinations give the students at least two- and-a-half hour time to complete their exam. In the PhD programs, UENR puts a stronger focus on presentations, practical exams, assignments (group and individual work), seminars and written and oral exams for mid-semester and final examinations.

The examination regulations are included into the student handbook, which all students receive at the beginning of their studies. They are further published online and available for students and third parties. Students need to be present it at least 75% of all lectures to be allowed to take part in the final examinations. The minimum mark to pass one exam is 50% (grade D). Students can repeat courses they have failed at the next available opportunity. The students confirm that know about these regulations to the experts and add that there are no limitation on retaking the courses. However, each time they have to pay a fee.

The following grades are used in the four study programs under review:

Grade	Marks %	Interpretation
A	80-100	Excellent
B	70-79	Good
C	60-69	Satisfactory
D	50-59	Pass
F	-	Fail

The final grade of one course comprises the continuous assessment during the semester (quizzes, assignments, mid-term exam etc.) as well as the final examination. All assessments are graded with the grade and marks in percentages presented above. According to their examination regulation, the final grade considers the continuous assessment with 40% and the final examination with 60%. However, in the discussions, the experts learn that there is currently an ongoing discussion about the percentage weighing. During the COVID-19 pandemic, the grading of the examinations changed to 40% final exam and 60% continuous assessment, which some consider to be an advantage. The students confirm that the examinations changed during COVID-19 pandemic with a larger amount of projects. The experts consider this discussion as very interesting; in their opinion, the ratio

should reflect the workload of the module and consider the types of final examination (e.g. written exam vs. project).

The experts address the topic of oral examinations and if they is integrated in the study programmes under review. The programme coordinators explain that the final examination in Ghana needs to be in written form due to governmental regulations. However, they can be more flexible for the mid-term exam and the continuous assessment. Especially the mid-term examination is often replaced by projects, where students have to do work individually or as a team before they have to give a presentation in front of the class followed by questions from the students and teacher(s). The teaching staff confirm that oral examinations are also used but less widespread in their study programmes. Rare exceptions also exist to replace the final written exam, such as in the module "Environmental Engineering Master Plan" in *Ma EEMA* and "Master Plan-Integrated Project" in *Ma SEEM*, where students work on small scientific projects in teams, followed by reports and presentations. The programme coordinators state that they are currently reviewing their examination regulations to further diversify the assessment methods throughout the semester. The experts are interested to know, how the teaching staff ensures that every students is contributing to the teamwork. On one hand, the teaching staff relies on the ethics of the students since they have already reached the master or doctoral programmes; on the other hand, they choose who is going to present which part of their work in the last minute. They also ask questions to the students about any part of the teamwork project. They add that their aim is to educate students as mature individuals, who act responsible towards their colleagues and society. Furthermore, they also encourage students to delete the students' names who did not contribute to their work. The experts consider these practices as adequate.

In the examination regulations, UENR has defined that examination questions and marked scripts from all postgraduate courses are subjected to external moderation. This includes the rules and regulations regarding the final thesis. External examiners for the final thesis and dissertation are required in order to award the degree. In both, the masters and doctoral programmes, the thesis/dissertation needs to be submitted at least three months before the expected completion (defence) to the Head of the Department and the Dean of School of Graduate Studies. The examination regulations consider at least one internal and one external examiner for every master thesis and one internal and two external examiner for each PhD thesis. The internal examiner is appointed from a related discipline inside the same department or outside. The final oral examination will be conducted in front of an examination panel, which is approved by the Board of the School of Graduate Studies on the basis of the draft thesis. Whereas the final oral examination for master students is restricted, the examination for PhD thesis is open. The panel combines the Dean of the School of Graduate Studies (chairperson), the Head of the Department, the external examiner(s),

the main supervisor and the additional internal examiner. The Dean of the School of Graduate Studies and the Head of the Department are responsible to determine the final grade of the student's oral final examination. All members of the examination panel are required to actively take part in the examination. Regulations are in place if the Dean of the Graduate Studies is either the main supervisor or the internal examiner of the thesis. The result can include the following outcomes:

1. That the degree be awarded without further amendments to the thesis;
2. That the degree be awarded after minor corrections or amendments have been made (and shall list those items to be corrected/amended);
3. That the thesis is re-examined after major corrections/revisions would have been carried out ((referred) and they specify the defects);
4. That the degree not be awarded (failed) for specific reasons.

Minor or major corrections need to be handed in within three months; these will undergo internal review by the internal examiners before it can be accepted.

The experts question the involvement of supervisors from the industry in the grading process of master and doctoral theses. The programme coordinators confirm that supervisors from the industry are part of the grading team. One requirement is an adequate qualification, which is checked by an internal committee at the School of Graduate Studies. UENR has published guidelines on how to assess students, which are shared with their partners from the industry before they take part in a project. The programme coordinators value the personal interaction with people from the industry, who provide research topics for the majority of theses at RCEES. Upon the question of the experts, the programme coordinators describe the process of selecting topics for master theses and dissertations. First, the students have to submit a preliminary synopsis on the research project they would like to conduct. Parallel, the faculty members collect topics among themselves and from their industry partners. Afterwards, they try to match the topics of the students with available research projects from the faculty and the industry. Remaining available topics will further be presented to all students. Topics outside the core expertise of the teaching staff is encouraged only during PhD studies. Such projects require additional supervisors from outside UENR. Once the students have decided a topic, the university refers them to their supervisors unless the students prefer to choose their own supervisor. Supervision is shared at UENR; usually next to the main, a secondary and tertiary supervisor are assigned. For example, if the project is connected to an externally funded project, the principle investigator needs to be one supervisor. Finally, the supervisor(s) and the students sign a supervision contract. International supervision is welcome, but is limited to representatives of a

university or university of applied sciences. The students confirm that they have the possibility to suggest topics by themselves or work together in projects of lecturers or in collaboration with industry partners. The partners from the industry confirm that they collaborate with UENR in master and dissertation projects. Upon the questions of the experts, the students comment that they consider it as beneficial to have multiple supervisors and that they consider it easy to remain in good contact with all of them.

The experts learn that UENR has examination regulations in place that relate to specific modules. The assessment methods allow the students to receive feedback on the competencies they have already acquired. The experts confirm that in all four study programmes under review, a final thesis is included, which demonstrate that the students are able to work independently on a task at the intended level of the degree programme. The experts see evidence that transparent rules for make-up exams, non-attendance, and cases of illness are in place. The experts consider that the number and distribution of exams ensure an adequate workload as well as sufficient time for preparation. Furthermore, the exams are well organised. In the opinion of the experts, students have the opportunity to consult their lecturers about the results of their exams and are aware of the mechanism to appeal grades.

Although the students are informed about the type of assessment in each module in the classroom, the presented module handbooks do not give conclusive information to the applied assessment methods and criteria (see criterion 4.1).

However, the experts consider that the selection of the most suitable assessment methods needs to be in reference to the learning outcomes of the module. This is because the current approach is schematic and does not reveal any criteria for identifying suitable assessment methods to ensure if the learning outcomes are achieved. Further, the experts recommend increasing the number of oral examinations in all four degree programmes under review.

3. Resources

Criterion 3.1 Staff and Staff Development

Evidence:
- Self-assessment report
- Staff handbook

- Policy "Appointments and promotions criteria for senior members"

- Webpage RCEES

- Discussions during the audit

Preliminary assessment and analysis of the experts:

UENR explains to the experts the composition of their teaching staff. They remark that the majority of courses are shared between two members of the teaching staff, who are experts in different area to provide the students a broader knowledge on one topic. In addition, the lecturers are able to discuss the course and students among themselves, which fosters a higher quality according to their personal experience. Some staff members are primarily associated with one of their sister universities.

The university presents the following numbers of teaching staff involved in the four study programmes under review:

Ma and PhD SEEM		*Ma and PhD EEMA*	
Associate professor	3	Associate professor	4
Senior lecturer	5	Senior lecturer	3
Lecturer	6	Lecturer	5
External Faculty	2	External Faculty	2

The representatives of the rector's office state that newly hired staff commonly starts on the level of assistance lecturer or lecturer. Promotion at UENR is regulated in the "Appointments and promotion criteria for senior members" stating the criteria to advance in the ranks of teaching employee. The employee has to initiate the process by submitting their request for promotion and justifying their additional qualifications. The promotion of the academic staff members considers their scientific research as well as their externally funded projects, staff development, and additional services such as consultancy. Afterwards, a committee will decide on the outcome of the promotion. The programme coordinators state that promotion to professor takes time; therefore, the number is currently still low. On average, it takes about two years for an assistant lecturer to become a lecturer, about four more years to advance to the rank of senior lecturer. It requires at least four more years to be promoted to assistant professor. The experts learn that the representatives of the rector's office support promoting their staff, which they consider as positive.

The experts raise the topic of new recruitment in their discussion. The university acknowledges the importance of hiring new qualified staff members for their programmes. They explain that as a public university, each job opening has to be approved by the government

of Ghana as the government pays the salary. Achieving this governmental clearance can be a challenge to hire more staff. Once they have clearance from the government, the university publishes the job on their webpage and distributes it to relevant channels to ensure a wide range of applications. The application considers both, the expertise in the field of study as well as the relevant teaching and research experience. In addition, RCEES employs members from other universities as well as representatives from the industry to facilitate this connection in the study programmes under review.

UENR further explains that they provide opportunities for professional staff development to enhance teaching and research skills. UENR encourages its staff to participate at international conferences, workshops, and seminars. Each faculty member also receives support to prepare applications for external research funding by their Grants, Research and Innovation Centre. New faculty members are supported by one mentor to foster the teaching capabilities and guide them in all university matters. The teaching staff confirm this statement and adds that the university offers events to introduce the new staff members. In their experience, they have strongly benefitted from the peer monitoring. They add that UENR conducts regular performance evaluations and personal feedback sessions to allow the staff members to identify areas for improvement and receive guidance for their professional growth.

The experts also ask the teaching staff about their teaching load. The teaching staff explains that the legal requirement is twelve hours of teaching each week for lecturers with the exception of nine hours for deans and six hours for the Head of the Department. Additional duties include student supervision, community service, and their involvement in committees. They add that they are allowed to teach extra hours and that these hours are on a paid basis. The teaching staff states that they are very committed to the university; therefore, they can manage their workload. Nevertheless, they admit that in some departments, teaching average can reach between 15 to 20 hours, which represents four to five courses. Thus, they would welcome an increase in teaching staff but acknowledge that they are governmentally regulated. The experts emphasise that the high teaching load can generate problems in the future; however, they acknowledge that this is governmentally controlled. Since the students positively mention the shared teaching by staff members and representatives from the industry, the experts suggest to expand the collaboration to reduce the teaching load of the lecturers in these courses and provide the students' an early perspective in the industry.

During the on-site visit, the experts learn that the teaching staff involved in these study programmes are further engaged in teaching courses at foreign universities demonstrating their international network. The teaching members further have the possibility to take sabbaticals, preferable abroad. The teaching staff specifies that one need to have worked at

UENR for more than seven years to be entitled to take part in sabbatical; therefore, this only qualifies as few people in the discussion. Still, one person is on a sabbatical right now. The teaching staff also mentions to the experts that RCEES has recently established the centre for professional development. This centre also offers courses on teaching capabilities as well as how to write a grant proposal or a scientific publication. The universities plan is to bring in externals inside UENR to give the teaching staff easy access to professional training. In addition, they took part on further education at European universities in e.g. "e-Learning." Concerning the staff development, the representatives of the industry would welcome if staff members intensified their collaboration by joining conferences from the industry and staying at their companies for a "staff internship." The experts consider this an interesting idea to foster the joint work.

In conclusion, the experts consider that the composition, professional orientation and qualification of the teaching staff are suitable for successfully delivering the degree programmes under review. This is supported by the research and development of the teaching staff. The experts confirm that the lecturers have the opportunity to further develop their professional and didactic skills. However, the experts consider the high teaching load as critical for providing support and supervision of students and working on their administrative tasks. Therefore, the experts request the UENR to provide a concept how the teaching load in the four study programmes under review is managed without any structural overload. This should include the concept how teaching of the core course of the curriculum is ensured.

Criterion 3.2 Funds and equipment

Evidence:

- Self-assessment report

- List of available equipment

- Collaboration agreements

- Discussion during the audit

Preliminary assessment and analysis of the experts:
The experts acknowledge that UENR is a publically funded university and therefore receives their major financial support from the government of Ghana. In addition, UENR generates funds through tuition fees, research grants and donations. The representatives of the rector's office state that from the entire university funds, 62% are governmental funds, 28% tuition free, and 10% externally generated research grants. The amount of donations is

currently very low. The main source of funding for the RCEES is the ACE Impact project providing in total 6.4 million USD. The experts are interested, how the finances are managed inside the university. The representatives of the rector's office remind the experts that the study programs are part of two departments, who receive the tuition fees from the students. When they applied for the ACE Impact project, the two schools were still one joint school, thus they inherited these projects. Now the shares are based on the number of students; each department receives funds of which 20% are kept at the school level and 80% are transferred to the department. This division of the money is regulated based on an internal written agreement.

In terms of facilities, RCEES is undergoing a transition from previous facilities to a newly built RCEES building. From the entire funds from the world bank, 25% are for the construction of new buildings. During the on-site visit, the construction of the new building was almost complete, allowing the experts to visit the new lecture halls, seminar rooms as well as future laboratories, library and further support structures. Previously, lectures were held at the Science Block in the School of Engineering or the School of Energy as well as the shared facilities of the School of Graduate Studies and the French Lab. Laboratories classes included the Renewable Energy Lab, as well as the chemistry and biology laboratories. The programme representatives confirm to the experts that additional equipment for the laboratories was already delivered to the campus, but could not yet be installed. The experts notice a large amount of new boxes of equipment as well as several containers stored on campus. During the on-site visit, the experts approve that the full list of available equipment for the laboratories are suitable for the four study programmes under review. The students describe to the experts in their discussion that they did not experience major problems with the availability of equipment. Upcoming issues included limited access to the laboratories due to multiple users and a busy laboratory schedule. When facilities were not available on campus, students visited either laboratories in companies/agencies in proximity to the campus or they were provided with an exchange opportunity to a more distant partner company or research institution to conduct experiments. They are aware that UENR is currently working on finalizing collaborations with new institutions abroad to give them access to different laboratories enabling them to expand their range of research. Nevertheless, the students admit that UENR is challenged when it comes to facilities and that they look forward to the new RCEES building.

The experts learn that next to the laboratories, also a subject-specific library will be placed in the new RCEES building. The main library on campus is available to students in the main university building. The experts verify that the university offers basic access to books and journals as well as student study places and access to computers, copy machines and more.

Furthermore, the university library gives access to students and staff to the e-library supporting ScienceDirect, Scopus and additional platforms. Both, students and staff confirm to the experts that their online access to journals and books is sufficient to support their learning and research. Additional student learning spaces are available in various buildings and across the campus. Designate new student learning spaces are also considered in the RCEES building constructions. The visit of the new RCEES building further considered structures for the physically challenged. UENR states that the campus provides access to in the majority of buildings.

In the discussion, the programme coordinators further mention the dormitories, where two master students share one room while PhD students receive a single room.

In the opinion of the experts, the financial resources are a sustainable basis for delivering the degree programmes under review. The experts acknowledge that the funding of RCEES is currently strongly connected to external funding contributing to the development of their facilities. The on-site visit took place during the construction, thus the final facilities could not yet be inspected. This included the laboratory facilities, which are essential. The experts have studied the submitted list of equipment, which they consider adequate to provide the students practical training. The experts learn that currently the lack of laboratory access is compensated by collaborations with the industry, which they consider as suitable.

4. Transparency and Documentation

Criterion 4.1 Module Descriptions

Evidence:
- Module handbook of each study programme
- Discussion during the audit

Preliminary assessment and analysis of the experts:
UENR has submitted a module handbook based on the template provided by ASIIN. However, it appears that there are several misunderstandings in the terminology and the extent of the information required. In the four study programmes under review, the teaching staff uses syllabi, which gives the students an overview about the course outline as well as the

content of each lecture. The syllabi also include the teaching materials, examination methods and the applied grading system. Further, UENR states that the reading materials are made accessible to all students.

The initially presented module handbooks include information on the module name and code, the module designation, and the semester in which the module is taught according to the study plan. In addition, they list the course language, the person(s) responsible for the module, the teaching methods as well as the number of credits and the workload divided into the contact hours and self-study time. In case no pre-requisites are required, the field is left blank. In addition, the learning outcomes/objectives are listed, a short description of the content next to the reading list for this module. Although examination forms are given, they commonly contain an enumeration of exam forms ending with "ect." This information does inform the students adequately on the actual assessment methods used in the courses and does not provide the applied grading scale. Furthermore, the listed number of credits does not match the numbers given in the curricular overview. The experts further positively remark that the presented workload shows contact hours and self-study; however, credits according to the ECTS system are missing. In the discussion with the programme coordinators, the experts learn that they use different course outlines on a daily basis in the study programmes, which are presented to the experts. These include a detailed version with the content of each session. Nevertheless, this version does not include information required by the ASIIN criteria concerning workload, assessment, and the number of ECTS credit points. Therefore, the experts recommend combining the information from both module handbooks and complete it with the additional information according to the ASIIN criteria. Moreover, the module handbooks appear to be incomplete because they miss for example a module description for the thesis/dissertation, seminars, industry attachments (internship), field trips and thesis research.

Finally, neither a curricular overview nor the module handbook is not published online. The experts suggest providing both on the webpage of each study programme to transparently present the content of the programme to everyone interested.

Criterion 4.2 Diploma and Diploma Supplement

Evidence:
- Example diploma
- Example transcript of records
- Discussion during the audit

Preliminary assessment and analysis of the experts:

UENR states that it issues a diploma (degree certificate) together with a transcript of records shortly after graduation. The documents provide information on the students' qualifications profile and individual performance as well as the classification of the degree programme with regard to the respective education system. The marks of individual modules are presented and the way in which the final mark is calculated is explained. However, the transcript of records does not provide a conversion of the Ghanaian credit points to ECTS credit points or statistical data as set forth in the ECTS Users' Guide.

UENR does not issue a diploma supplement yet, which is requested according to ASIIN criteria. The diploma supplement is a document to give information that makes it easier for employers and education institutions to understand the students' qualification. This applies especially if students want to apply for a job or studies abroad. The diploma supplement shall explain to third parties, what the students have learned in in their studies. It contains information confirming the type and level of awarded qualification, the institution that issued the qualification, the content of the study programme, the specialisation the student had chosen, and possibly details of the national education system.

Criterion 4.3 Relevant Rules

Evidence:

- Self-assessment report
- Student handbook for graduate studies
- Webpage School of Graduate Studies https://sgs.uenr.edu.gh/
- Discussion during the audit

Preliminary assessment and analysis of the experts:

The experts confirm that the student handbook for graduate studies is available online on the webpage of the School of Graduate Studies. This document clearly states the students' and university responsibilities and presents all relevant information to the students. The main topics covered in the student handbook include, among others, information on the study programmes, registration, examinations, and graduation. Additional information is available for supervision, monitoring of the student process as well as policies for sexual harassment, and others.

In summary, the experts confirm that the rights and duties of both the higher education institution and students are clearly defined and binding. All relevant course-related information is available in the language of the degree programme and accessible for anyone involved.

5. Quality management: quality assessment and development

Criterion 5 Quality management: quality assessment and development

Evidence:

- Self-assessment report
- Quality Assurance Policy
- Webpage E-GRM https://grm.ace.aau.org/
- Example course evaluation questionnaire
- Discussion during the audit

Preliminary assessment and analysis of the experts:

UENR has establish quality management at the university as an essential part to improve the quality of higher education. This includes improving the quality of teaching, learning, research and any other services provided by the university summarised in a quality assurance policy. The main unit responsible is the Quality Assurance and Planning Unit, which is directly associated with the pro-vice chancellor. The unit contains the head of quality assurance, as well as an assistant head and a secretary. Further division consists of the Institutional Planning, Monitoring and Evaluation Section, the Quality Assurance and Accreditation Section, the Research, Conferences and Publication or Publicity Section and the Management Information System Section.

The Quality Assurance Policy sets the principles of an evidence-based assessment as well as internal and external peer reviews. It highlights the importance of a good staff-student partnership in order to ensure the quality of teaching and research. This aspect refers to the assurance of mentoring and supervision. Additional duties of quality assurance include the collaboration and partnerships of industry as well as research and educational institutions.

The representatives of the rector's office discuss with the experts that they are in the process of re-structuring their Quality Assurance and Planning Unit; currently, the quality management is limited to the university level. This centralized quality management oversees the entire university and all its study programmes. At the school level, there already exist Quality Assurance Committees, which are comprised of representatives of the various departments of the school. Each department devices the representative for the committee by themselves. However, within one school, the departments have subject-specific problems, which are often too complex to discuss within one committee. Therefore, UENR is developing mechanism to decentralize the quality management by establishing quality management units at the department level. During the on-site visit, the experts can review a draft for the change of the organisation structure at UENR. This draft establishes "Departmental Quality Assurance Officers", who shall be appointed by the dean and monitor and regularly assess teaching and learning at the departmental level. The experts consider this a strategy as positive.

In this context, RCEES is conducting several pilot projects to support new developments in the area of quality management. As stated in criterion 1.3., UENR consider external feedback from industry and alumni in the revision of study programmes. A similar process is necessary to initiate a new study programme. UENR conducts course evaluations in the form of questionnaires at the end of each semester to ensure the quality of the module and the lecturer. Afterwards, the quality management summarises the results and transfers them to the pro-vice chancellor, who sends it to the responsible department after review. The results of the evaluation are the basis for improvements performed at least once a year. A sample questionnaire is shared with the experts during their review, which contains various questions to the course content, the mode of delivery and interaction, the assessment of materials taught, and teaching assistance. The evaluations are organized online via the students' accounts. This digital evaluation is one of the new developments inside RCEES, which can be expanded later to all units at UENR. The students confirm that they take part in the evaluations at the end of the semesters. Although they are aware of actions being taken because of their feedback, they do not get informed on the results. Some get to know details based on personal contact to the student representative, who affirmed them that the evaluations are part of the discussions on the management level. The experts share the opinion of the students and recommend the university to share the results of the evaluation with the students and adequately inform them on the actions taken if issues were identified.

In addition, the students are encouraged by their lecturers to give feedback on a timely basis if problems arise so that these can be addressed as quickly as possible. RCEES therefore provides the students with a "grievance box" (grievance redress mechanism or E-

GRM). In this system, RCEES collects, resolves, and deals with the concern and complaints of stakeholders within the framework of the ACE Impact project. In addition, the students also have a student leader, who is a member of the management at RCEES and therefore involved in regular meetings and decision-making processes. The experts ask the programme coordinators to specify the chain of communication in case of grievances. If the students directly talks to a lecturer or submits their complaint online in the grievance system; afterwards the issue is brought to the Head of the Department. Consequently, the issue will be added to the next meeting of the faculty, where the decision is made how to address this situation. Similarly, if the evaluations at the end of the semester reveal issues in one course or/and one lecturer, the Head of the Department needs to take action to address this issue. In addition, there is counselling by independent representatives available at the level of the department and university to support the students in personal issues. The students confirm to the experts that they are aware of the opportunities for counselling on campus as well as the grievance online system. They are also aware of their student representative at RCEES and know how to contact them. In addition, they add that the Graduate Student President as support, who has previously also organized open events to discuss students' concerns. Nevertheless, they state that they mainly address their concerns in person as they consider the lecturers as approachable and susceptive for new suggestions. As examples, they name courses on data science and new software, which were recently integrated into their courses. Further, the students complained about non-sufficient computing capacities to run their simulations. As a result, UENR has purchased two high computing machines to support their research. The teaching staff adds that it holds regular personal sessions with students under supervision to discuss their progress on their research. The teachers also have a chance to address any issues they had noticed during the students' meeting; similarly, the students can comment on any topic. After the supervision meetings, the students can also evaluate the lecturer's interaction based on their new online system.

The experts address the topic of student representation in the university bodies. They are told by the programme coordinators that there are students involved into certain decision making bodies such as the Board of the School of Graduate Studies (e.g. responsible to decide on external assessors) or at the University Council as well as their Senate. The programme coordinators add that the revision of their Quality Assurance Policy on its decentralization strategy considers a stronger student involvement in the quality assurance processes.

Although the current Quality Assurance Policy states that tracer studies should be conducted at least every three years, the experts learn that UENR is just doing their first tracer study. Therefore, no results on the satisfaction of alumni as well as their employability are

available. Similarly, UENR is not conducting teacher satisfaction surveys but holds annual meeting with the teaching staff to discuss their satisfaction and career development. The experts consider those as essential processes to ensure the quality of the programmes, which UENR needs to consider in the future.

The experts further raise the high drop-out rate of students in the four study programmes under review as well as the significantly longer duration to complete the studies.

Table: Number of graduates in the four programmes under review

ACADEMIC YEAR	PhD EEMA	MSc EEMA	PhD SEEM	MSc SEEM	Total
2015/2016					
2016/2017					
2017/2018		5	0	6	*11*
2018/2019		9	0	8	*17*
2019/2020	1	3	1	5	*10*
2020/2021	1	26	0	14	*41*
2021/2022	2	16	2	21	*41*
2022/2023	n/a	n/a	n/a	n/a	*1*
Total	**4**	**59**	**3**	**54**	***120***

The programme coordinators confirm that a certain number of students had to drop-out of the programme, mainly caused due to financial restrictions. Others, who were still working in industry, were not granted full study leave and were therefore unable to complete their studies. Since they started to support the students financially in 2019, the number of graduates has strongly improved. The financial support also resulted in a high number of students finishing their master degree in two years. In the opinion of the students, it is possible to finish the study programmes under review in the estimated study time. They comment that they know several people personally, who completed their studies in time. However, they also know students, who had to drop out due to financial issues. The students confirm that they have clear timelines they should follow and that there are mechanisms in place to track the study progress. During their research period, they were additionally invited to give a presentation every two to three months in order to demonstrate the progress in their research. In the opinion of the students, UENR is seriously supporting its students to keep in time and checks on the reason for not meeting deadlines. They are also aware that students can lose their scholarships as a consequence for repeatedly not

meeting the requirements. The experts conclude that the university monitors their students during their research and writing of the final thesis. However, the experts continue to inquire if the university monitors the number of credits students receive in each semester to identify the main challenges. The programme coordinators describe that they do and that they are already aware that the main problem for most students is the research. This might include problems to find additional funding for research as well as time (in case of employment). In this regard, the location of the university in Sunyani is not beneficial since the number of companies in the area is limited and does not provide the students the opportunity to proceed with their preferred research in proximity to the university. Further problem arise in some cases, who take a long time to publish their research in the master and PhD programmes. UENR highly support the publication of research in internationally recognized journals (Web of Science, Scopus). This is also strongly encouraged by the experts.

During the on-site visit, the experts learn that there is no official training available for people in quality assurance at UENR. The employees themselves identify the need to have a subject-specific training in quality management to develop new methods at UENR and apply them efficiently. They acknowledge that their methods for conducting surveys until recently had needed improvements (switch form paper-based to digital) and therefore they welcome further suggestions on how to improve. The experts are pleased to hear this statement and support their opinion. They identify, that UENR is already developing their quality assurance strategy by exploring new organisation structures (e.g. quality management at department level) and methods (e.g. tracer studies). The experts illustrate that there is room for improvement in the quality management at the four study programmes under review; however, they acknowledge that the situation is in development right now. The experts therefore recommend enabling the people involved in quality assurance to receive suitable training, even allowing them to receive training in quality management abroad if necessary. They consider this the most effective way to support the university and their students by receiving up-to date training allowing UENR to develop IT-based surveys and analysis tools to monitor the progress.

D Additional Criteria for Structured Doctoral Programmes

Criterion D 1 Research

Evidence:

- Self-assessment report

- Samples of student first author publications

- Graduate student handbook

- Study and examination regulations

- Discussions during the audit

Preliminary assessment and analysis of the experts:

As described in criterion 1.3, students in the programmes _PhD SEEM_ and _PhD EEMA_ are required to complete a set of compulsory courses before they can begin the research for their thesis. After completing these courses, the students have to take part in a comprehensive examination of the research proposal. The research proposal needs to state specific research questions, which need to be defended before a panel of examiners at the department level. The examination shall prove that the student have a sufficient level of applied or practical knowledge in their area of expertise in order to continue their course of research. These regulations are included in the student handbook of the School of Graduate Students, which states two possibilities for the comprehensive examination:

1. "A written examination comprising five practical/applied questions for which PhD students are to answer any three questions; AND
2. Each PhD student shall present a research proposal on a specific research question (this could be the same as the student's intended thesis proposal) and defend same before a panel of examiners at the Department/School level. OR
3. Each PhD candidate shall be required to submit a review paper and defend same before a panel of examiners at the Department/School level".

The point (1) applies for all students while the choice of (2) or (3) is decided by the Departmental Graduate Studies Committee, the student and their main supervisor after completion of the course work. Afterwards, the student has officially proven their knowledge and skills in their research area, which officially grants them the status of a PhD candidate.

The compulsory courses contain content supporting the students' skills in academic writing and concerning scientific publication. Additional seminars and workshops are offered on a

voluntarily basis to strengthen their scientific expertise. RCEES offers weekly seminars, where speakers from national and international research institutions are invited. Doctoral students are especially encourages to attend these meetings, but everyone is welcome. During these seminars, also PhD students at RCEES are invited to present their research occasionally. The students comment that it would be a great addition if also speakers from the industry were invited to these seminars.

In the two doctoral programmes under review, all students are strongly encouraged to publish at least two manuscripts in a peer-reviewed journal before their thesis defence. The RCEES scholarship provides funding to pay potential costs for publishing research (including open access).

The experts ensure that in the study programmes under review, the core component is the advancement of knowledge through original research. The experts confirm that the graduates acquire advanced knowledge in their field in applied science. They are able to demonstrate, on the level of internationally recognised scientific research, a deep and comprehensive understanding of their research field. The graduates demonstrate the ability to design and carry out an original research project, contribute to the advancement of science, and are able to adequately present the results to different audiences. Furthermore, the experts highlight that the study programmes focus on local problems and therefore welcome the strong connection of UENR and the local industries. Still, they recommend to foster the collaboration by inviting speakers from the industry to the seminars to allow the students to learn about the research questions in the industry and have opportunities to form a network early on in their career.

Criterion D 2 Duration and Credits

Evidence:
- Self-assessment report
- Curricular overview of the study programmes
- Conversion Ghanaian credit points to ECTS credit points
- Discussion during the audit

Preliminary assessment and analysis of the experts:
In full time, the PhD programmes under review have a study duration of six semesters or three academic years. The programmes contains 72 Ghanaian credits, which UENR has converted to 144 ECTS credit points. During the first academic year, the students have to attend four compulsory courses and two electives courses, which have to be successfully

completed with a GPA higher than three. This is followed by the comprehension examination described in criterion D1. Afterwards, the students have time to conduct their research, accompanied by a field trip, industrial attachment and a PhD seminar.

For the student study duration, UENR has presented an average time to complete the studies of 12 semester in both the *PhD SEEM* and the *PhD EEMA*. The programme coordinators explain that most of their PhD students are working next to doing their research, which results in the long average study durations. However, they mention that the study duration of students receiving a scholarship are in accordance with the intended study duration. This is confirmed by the students met by the experts during the on-site visit.

In the opinion of the experts, it would be advisable to shorten the average study duration of the PhD programmes under review. Nevertheless, they acknowledge that students are able to finish in the considered time frame. The conversion from the Ghanaian credit point system to ECTS credit points should be revised (criterion 1.5) to ensure the estimated workload matches the real workload of the students.

Criterion D 3 Soft Skills and Mobility

Evidence:
- Self-assessment report
- Module handbooks of each study programme
- Discussion during the audit

Preliminary assessment and analysis of the experts:
During the on-site visit, the experts learn that UENR supports student mobility among the doctoral students for visiting academic and non-academic institutions to expand their skills in additional training and research opportunities. Before going abroad, the students need to have completed at least the first year of their studies. Recent student exchange includes stays at the University of Nigeria, Nsuka, the University of Jaen, the University of Aalborg and other institutions in Germany (through DAAD). The programme coordinators describe that over the last 5 years, about 10 students have taken advantage of such opportunities.

The RCEES scholarship provides the students with funds to attend international conferences. Additional funds are available for students without scholarship after successful publishing in a recognized international journal.

Therefore, the experts consider that the doctoral candidates at RCEES are offered a range of opportunities for their personal and professional development and take advantage of

institutional support for career development and mobility. Doctoral candidates are provided with opportunities for academic mobility and international collaboration within an integrated framework of cooperation between universities and other partners.

Criterion D 4 Supervision and Assessment

Evidence:
- Self-assessment report
- Sample supervision contract
- Student handbook of the School for Graduate Studies
- Discussion during the audit

Preliminary assessment and analysis of the experts:

In the discussion, the experts are informed that the supervisor(s) and the doctoral student agree on a supervision contract, which regulates the internal and external supervision. The contract specifies the nature of the responsibilities of the student and the institution, the duration of the project work and the channels of grievances.

PhD supervision is limited to the teaching staff holding a PhD but is not connected to their rank inside the university. Therefore, lecturers, senior lecturers as well as external lecturers are also allowed to supervise at the doctoral research next to all ranks of professors.

The student handbook for graduate studies further defines the principles of supervision. The document states that the quality of the research programme depends on many factors, among which the quality of supervision is critical. It outlines as one key principle the good interaction between the student and the supervisor through interactive guidance and constructive criticism. The handbook continues to emphasize on the importance of giving and receiving feedback to enhance learning and collaborative research.

In conclusion, the experts states that UENR has defined a transparent contractual framework of shared responsibilities between doctoral candidates, supervisors, the institution and their partners in the industry. A continuous support by their supervisors is provided by offering regular meetings and presentations to discuss their research (see criterion 5). The experts consider the assessment rules are clearly formulated and binding.

Criterion D 5 Infrastructure

Evidence:
- Self-assessment report

- Visit of the campus during the audit
- Discussions during the audit

Preliminary assessment and analysis of the experts:

During the on-site visit, the experts visited the campus in Sunyani, where the four study programmes under review are based. The university's infrastructure is still under development, showing much room for improvement. A big step forward in housing the study programmes, is the newly constructed RCEES building, which was nearly completed during the on-site visit in August 2023. Although the structure was already established, the infrastructure inside the building is just being installed. This includes laboratories and the newly purchased equipment, which will be shared with doctoral students once the construction is completed.

Recent improvements on campus concerned mainly the stability of power supply as well as the ICT infrastructure (information and communication technology). Since almost all doctoral theses of the two study programmes under review are conducted in relation to a company/agency, the students were provided with access to facilities with their partners. Consequently, no problems occurred to finish their research.

Thus, the experts confirm that the doctoral candidates are provided with an adequate research environment that allows them to appropriately carry out their research projects.

Criterion D 6 Funding

Evidence:
- Self-assessment report
- Discussion during the audit

Preliminary assessment and analysis of the experts:

UENR describes to the experts that funding and scholarships are crucial to the doctoral students. Scholarships are made available to the applicants through the programmes and projects by the staff. In the last four years, about four PhD scholarships (per programme) have been awarded through the ACE Impact project and the Waste to Energy project. Self-financing students are usually employed at a company and search for higher education. Other students have to demonstrate an academic scholarship to be accepted in the study programmes. The students confirm that studying on a postgraduate level is expensive to people in Ghana. Their scholarships vary based on their background; among other options, the scholarship can cover the tuition fee only or can give additional support for accommodation or stipends. If students do their research in the frame of one research project, they

can receive a salary instead. For people already working in industry, the situations differ between people on study leave with or without salary.

The following study fees currently occur for studying in the PhD programmes; these do not include research and additional costs.

	PhD (SEEM and EEMA) **(Ghs)**	PhD (SEEM and EEMA) **(EUR)**
Year 1	9,526.95	~780
Year 2	10,511.28	~860
Year 3	9,796.86	~800
Year 4	8,129.88	~670

The experts confirm that funding for PhD scholarships are available covering the costs for research and studying.

Criterion D 7 Quality Assurance

Evidence:
- Self-assessment report
- Student handbook of Graduate Studies
- Quality Assurance Policy
- Discussion during the audit

Preliminary assessment and analysis of the experts:

The programme coordinators state that the doctoral programmes undergo the same processes in curricular review and accreditation by GTEC as all other programmes at UENR. This includes searching feedback from industry and alumni on the curriculum every five years in addition to internal discussions at the level of the department, faculty and school.

The doctoral students have to attend the module "Advanced Research Methods and Academic Writing" which introduces the students to the concept of good scientific practice and research. In addition, UENR monitors the supervision of the students by their teaching staff to ensure monthly meetings take place on a regular basis. The programme coordinators add that they have recently developed and app, which allows the students to add the date of the meeting with their supervisor(s) and which allows them to specify the content and outcome. The supervisors have to submit reports to the School of Graduate Studies about the meeting with their students. Moreover, the doctoral students and their supervisor(s) receive a questionnaire each semester to summarise the events of the semester. Within this questionnaire, the doctoral students are also able to report on recurring issues or other problems in their studies. The key principles are further described in the student handbook

for graduate studies, which states "To improve one's performance as a learner or as an institution, one must use the evidence collected through the assessment to decide what should be the next step in the learning process or what should be improved in the institution. Giving and using feedback are central processes for improvement and quality enhancement. For all those involved in graduate studies, it is essential to always try to include formative aspects. There should, therefore, be a link between the critical process (pointing at problems) and the constructive one (suggesting possibilities)."

The experts confirm that UENR considers quality assurance methods to keep improving the quality of the two doctoral study programmes under review. The rights and duties of the students and the organisations are clearly stated in the student handbook, which is publically available on UNER's webpage. In the experts' opinion, the students receive adequate training in good scientific practice. The faculty collects data related to individual progression, net research time, completion rate, dissemination of research results, and career tracking and uses this data to continuously assess the quality of the structured doctoral programme.

E Additional Documents

No additional documents are requested.

F Comment of the Higher Education Institution

The institution did not provided a statement or additional documents to this report.

G Summary: Expert recommendations (13.11.2023)

Taking into account the additional information and the comments given by three the experts summarize their analysis and **final assessment** for the award of the seals as follows:

Degree Programme	ASIIN Seal	Maximum duration of accreditation	Subject-specific label	Maximum duration of accreditation
MSc Sustainable Energy Engineering and Management	With requirements for one year	30.09.2029	–	-
PhD Sustainable Energy Engineering and Management	With requirements for one year	30.09.2029	–	-
MSc Environmental Engineering and Management	With requirements for one year	30.09.2029	–	-
PhD Environmental Engineering and Management	With requirements for one year	30.09.2029	–	-

Requirements

For all degree programmes

A 1. (ASIIN 1.1) The defined objectives and learning outcomes need to represent the indented EQF level.

A 2. (ASIIN 1.4) Develop systematic mechanisms to compensate missing students' qualifications

A 3. (ASIIN 1.5) Ensure that the credits awarded for the modules correspond with the actual workload of the students (in line with the results of the teaching evaluation).

A 4. (ASIIN 1.5) Award credits for all compulsory modules, including the internship.

A 5. (ASIIN 3.1) Provide a concept of how the degree programme can be managed without any structural overload of the teaching staff and how the curriculum can be covered.

A 6. (ASIIN 4.1) Rewrite the module descriptions as to include information on the teaching formats and materials, assessment forms, ECTS credits and grades, frequency of offer, workload and duration of each module.

A 7. (ASIIN 4.2) Ensure to issue a Diploma Supplement containing detailed information about the educational objectives, intended learning outcomes, the structure and the academic level of the degree programme as well as about the individual performance of the student.

A 8. (ASIIN 5) Ensure that the students have access to the results of the evaluation.

Recommendations

For all degree programmes

E 1.   (ASIIN 1.3) It is recommended to offer the students access to (digital) workshops/courses at foreign universities.

E 2.   (ASIIN 1.3) It is recommended to continue to improve the curriculum in terms of big data (i.e. machine learning, AI, modelling).

E 3.   (ASIIN 1.3) It is recommended to consider the organisation of research groups on campus to allow several students to interact within large projects.

E 4.   (ASIIN 1.6, ASIIN 3.1 and D1) It is recommended to improve the interaction and exchange with the industry partners and teaching staff (joint conferences, exchange/internship). It is recommended to invite industry representatives to seminars.

E 5.   (ASIIN 2) It is recommended to review the selected assessment methods in reference to the learning outcomes. In addition, it is recommended to increase the number of oral exams in the assessment.

E 6.   (ASIIN 3.3) It is recommended to continue to install and improve the facilities (laboratories, library, etc.).

E 7.   (ASIIN 5) It is recommended to allow the personnel involved in quality management to take subject-specific advanced training.

E 8.   (ASIIN 5) It is recommended to improve the systematic collection of feedback from the industry.

H Comment of the Technical Committees

Technical Committee 02 – Electrical Engineering/Information Technology (24.11.2023)

Assessment and analysis for the award of the ASIIN seal:

The TC discusses the case and in particular the relatively high number of requirements and recommendations. They consider whether it is feasible for the university to fulfil all the requirements in one year. In the end, they agree that fulfilling the requirements will require a lot of effort, but is feasible as suggested by the experts, especially as many of them are formal requirements. In addition, they correct a typographical error in A1.

The Technical Committee 02 – Electrical Engineering/Information Technology recommends the award of the seals as follows:

Degree Programme	ASIIN Seal	Maximum duration of accreditation	Subject-specific label	Maximum duration of accreditation
MSc Sustainable Energy Engineering and Management	With requirements for one year	30.09.2029	–	
PhD Sustainable Energy Engineering and Management	With requirements for one year	30.09.2029	–	

Requirements

For all degree programmes

A 1. (ASIIN 1.1) The defined objectives and learning outcomes need to represent the intended EQF level.

A 2. (ASIIN 1.4) Develop systematic mechanisms to compensate missing students' qualifications

A 3. (ASIIN 1.5) Ensure that the credits awarded for the modules correspond with the actual workload of the students (in line with the results of the teaching evaluation).

A 4. (ASIIN 1.5) Award credits for all compulsory modules, including the internship.

A 5. (ASIIN 3.1) Provide a concept of how the degree programme can be managed without any structural overload of the teaching staff and how the curriculum can be covered.

A 6. (ASIIN 4.1) Rewrite the module descriptions as to include information on the teaching formats and materials, assessment forms, ECTS credits and grades, frequency of offer, workload and duration of each module.

A 7. (ASIIN 4.2) Ensure to issue a Diploma Supplement containing detailed information about the educational objectives, intended learning outcomes, the structure and the academic level of the degree programme as well as about the individual performance of the student.

A 8. (ASIIN 5) Ensure that the students have access to the results of the evaluation.

Recommendations

For all degree programmes

E 1. (ASIIN 1.3) It is recommended to offer the students access to (digital) workshops/courses at foreign universities.

E 2. (ASIIN 1.3) It is recommended to continue to improve the curriculum in terms of big data (i.e. machine learning, AI, modelling).

E 3. (ASIIN 1.3) It is recommended to consider the organisation of research groups on campus to allow several students to interact within large projects.

E 4. (ASIIN 1.6, ASIIN 3.1 and D1) It is recommended to improve the interaction and exchange with the industry partners and teaching staff (joint conferences, exchange/internship). It is recommended to invite industry representatives to seminars.

E 5. (ASIIN 2) It is recommended to review the selected assessment methods in reference to the learning outcomes. In addition, it is recommended to increase the number of oral exams in the assessment.

E 6. (ASIIN 3.3) It is recommended to continue to install and improve the facilities (laboratories, library, etc.).

E 7. (ASIIN 5) It is recommended to allow the personnel involved in quality management to take subject-specific advanced training.

E 8. (ASIIN 5) It is recommended to improve the systematic collection of feedback from the industry.

Technical Committee 03 – Civil Engineering, Geodesy and Architecture (20.11.2023)

Assessment and analysis for the award of the ASIIN seal:

The Technical Committee discusses the accrediting procedure and follows the assessment of the peers without any changes.

The Technical Committee 03 – Civil Engineering, Geodesy and Architecture recommends the award of the seals as follows:

The Technical Committee 03 – Civil Engineering, Geodesy and Architecture recommends

Degree Programme	ASIIN Seal	Maximum duration of accreditation	Subject-specific label	Maximum duration of accreditation
MSc Environmental Engineering and Management	With requirements for one year	30.09.2029	–	
PhD Environmental Engineering and Management	With requirements for one year	30.09.2029	–	

the award of the seals as follows:

Requirements

For all degree programmes

A 1. (ASIIN 1.1) The defined objectives and learning outcomes need to represent the indented EQF level.

A 2. (ASIIN 1.4) Develop systematic mechanisms to compensate missing students' qualifications

A 3. (ASIIN 1.5) Ensure that the credits awarded for the modules correspond with the actual workload of the students (in line with the results of the teaching evaluation).

A 4. (ASIIN 1.5) Award credits for all compulsory modules, including the internship.

A 5. (ASIIN 3.1) Provide a concept of how the degree programme can be managed without any structural overload of the teaching staff and how the curriculum can be covered.

A 6. (ASIIN 4.1) Rewrite the module descriptions as to include information on the teaching formats and materials, assessment forms, ECTS credits and grades, frequency of offer, workload and duration of each module.

A 7. (ASIIN 4.2) Ensure to issue a Diploma Supplement containing detailed information about the educational objectives, intended learning outcomes, the structure and the academic level of the degree programme as well as about the individual performance of the student.

A 8. (ASIIN 5) Ensure that the students have access to the results of the evaluation.

Recommendations

For all degree programmes

E 1. (ASIIN 1.3) It is recommended to offer the students access to (digital) workshops/courses at foreign universities.

E 2. (ASIIN 1.3) It is recommended to continue to improve the curriculum in terms of big data (i.e. machine learning, AI, modelling).

E 3. (ASIIN 1.3) It is recommended to consider the organisation of research groups on campus to allow several students to interact within large projects.

E 4. (ASIIN 1.6, ASIIN 3.1 and D1) It is recommended to improve the interaction and exchange with the industry partners and teaching staff (joint conferences, exchange/internship). It is recommended to invite industry representatives to seminars.

E 5. (ASIIN 2) It is recommended to review the selected assessment methods in reference to the learning outcomes. In addition, it is recommended to increase the number of oral exams in the assessment.

E 6. (ASIIN 3.3) It is recommended to continue to install and improve the facilities (laboratories, library, etc.).

E 7. (ASIIN 5) It is recommended to allow the personnel involved in quality management to take subject-specific advanced training.

E 8.   (ASIIN 5) It is recommended to improve the systematic collection of feedback from the industry.

Technical Committee 06 – Engineering and Management, Economics (23.11.2023)

Assessment and analysis for the award of the ASIIN seal:

The Technical Committee discusses the accrediting procedure and decides to make several changes. To emphasize the need for improvement of the requirement A1, the Technical Committee suggests clarifying the circumstances in a second part of the sentence. The Technical Committee further discussed if the use of the term "credits" or "credit points" is more suitable regarding the requirement A4. In this case, the Technical Committee favors the use of "credit points." Furthermore, the Technical Committee has reservation towards the recommendation E6. Because the facilities of the university were still under construction during the on-site visit, the Technical Committees decides to change the recommendation to a requirement to ensure the conditions concerning the facilities, especially the laboratories, are going to improve during the next year.

The Technical Committee 06 – Engineering and Management, Economics recommends the award of the seals as follows:

Degree Programme	ASIIN Seal	Maximum duration of accreditation	Subject-specific label	Maximum duration of accreditation
MSc Sustainable Energy Engineering and Management	With requirements for one year	30.09.2029	–	
PhD Sustainable Energy Engineering and Management	With requirements for one year	30.09.2029	–	
MSc Environmental Engineering and Management	With requirements for one year	30.09.2029	–	

Degree Programme	ASIIN Seal	Maximum duration of accreditation	Subject-specific label	Maximum duration of accreditation
PhD Environmental Engineering and Management	With requirements for one year	30.09.2029	–	

Requirements

For all degree programmes

A 1. (ASIIN 1.1) The defined objectives and learning outcomes need to represent the indented EQF level to distinguish clearly between the master and the PhD level of the degree programmes.

A 2. (ASIIN 1.4) Develop systematic mechanisms to compensate missing students' qualifications

A 3. (ASIIN 1.5) Ensure that the credits awarded for the modules correspond with the actual workload of the students (in line with the results of the teaching evaluation).

A 4. (ASIIN 1.5) Award credit points for all compulsory modules, including the internship.

A 5. (ASIIN 3.1) Provide a concept of how the degree programme can be managed without any structural overload of the teaching staff and how the curriculum can be covered.

A 6. (ASIIN 3.3) The university needs to provide access to laboratories to enable the students and researchers to conduct research.

A 7. (ASIIN 4.1) Rewrite the module descriptions as to include information on the teaching formats and materials, assessment forms, ECTS credits and grades, frequency of offer, workload and duration of each module.

A 8. (ASIIN 4.2) Ensure to issue a Diploma Supplement containing detailed information about the educational objectives, intended learning outcomes, the structure and the academic level of the degree programme as well as about the individual performance of the student.

A 9. (ASIIN 5) Ensure that the students have access to the results of the evaluation.

Recommendations

For all degree programmes

E 1.   (ASIIN 1.3) It is recommended to offer the students access to (digital) work-shops/courses at foreign universities.

E 2.   (ASIIN 1.3) It is recommended to continue to improve the curriculum in terms of big data (i.e. machine learning, AI, modelling).

E 3.   (ASIIN 1.3) It is recommended to consider the organisation of research groups on campus to allow several students to interact within large projects.

E 4.   (ASIIN 1.6, ASIIN 3.1 and D1) It is recommended to improve the interaction and exchange with the industry partners and teaching staff (joint conferences, exchange/internship). It is recommended to invite industry representatives to seminars.

E 5.   (ASIIN 2) It is recommended to review the selected assessment methods in reference to the learning outcomes. In addition, it is recommended to increase the number of oral exams in the assessment.

E 7.   (ASIIN 5) It is recommended to allow the personnel involved in quality management to take subject-specific advanced training.

E 8.   (ASIIN 5) It is recommended to improve the systematic collection of feedback from the industry.

I Decision of the Accreditation Commission (08.12.2023)

Assessment and analysis for the award of the subject-specific ASIIN seal:

The Accreditation Commission discusses the procedure and follows the changes of the Technical Committee 02 and 06 regarding the requirement A1 and A4. Moreover, the Accreditation Commission follows the Technical Committee 06 to change the recommendation of the experts E6 to the requirement A6. However, the Accreditation Commission considers the wording of the experts as more suitable and rephrases the requirement A6. Finally, the Accreditation Commission additionally clarifies the content of requirement A9.

The Accreditation Commission decides to award the following seals:

Degree Programme	ASIIN Seal	Maximum duration of accreditation	Subject-specific label	Maximum duration of accreditation*
MSc Sustainable Energy Engineering and Management	With requirements for one year	30.09.2029	–	
PhD Sustainable Energy Engineering and Management	With requirements for one year	30.09.2029	–	
MSc Environmental Engineering and Management	With requirements for one year	30.09.2029	–	
PhD Environmental Engineering and Management	With requirements for one year	30.09.2029	–	

Requirements

For all degree programmes

A 1. (ASIIN 1.1) The defined objectives and learning outcomes need to represent the intended EQF level to distinguish clearly between the master and the PhD level of the degree programmes.

A 2. (ASIIN 1.4) Develop systematic mechanisms to compensate missing students' qualifications.

A 3. (ASIIN 1.5) Ensure that the credits awarded for the modules correspond with the actual workload of the students (in line with the results of the teaching evaluation).

A 4. (ASIIN 1.5) Award credit points for all compulsory modules, including the internship.

A 5. (ASIIN 3.1) Provide a concept of how the degree programme can be managed without any structural overload of the teaching staff and how the curriculum can be covered.

A 6. (ASIIN 3.3) Continue to install the technical equipment and to improve the facilities (laboratories, library, etc.).

A 7. (ASIIN 4.1) Rewrite the module descriptions as to include information on the teaching formats and materials, assessment forms, ECTS credits and grades, frequency of offer, workload and duration of each module.

A 8. (ASIIN 4.2) Ensure to issue a Diploma Supplement containing detailed information about the educational objectives, intended learning outcomes, the structure and the academic level of the degree programme as well as about the individual performance of the student.

A 9. (ASIIN 5) Ensure that the students have access to the results of the teaching evaluations.

Recommendations

For all degree programmes

E 1. (ASIIN 1.3) It is recommended to offer the students access to (digital) workshops/courses at foreign universities.

E 2. (ASIIN 1.3) It is recommended to continue to improve the curriculum in terms of big data (i.e. machine learning, AI, modelling).

E 3. (ASIIN 1.3) It is recommended to consider the organisation of research groups on campus to allow several students to interact within large projects.

E 4. (ASIIN 1.6, ASIIN 3.1 and D1) It is recommended to improve the interaction and exchange with the industry partners and teaching staff (joint conferences, ex-

change/internship). It is recommended to invite industry representatives to seminars.

E 5.   (ASIIN 2) It is recommended to review the selected assessment methods in reference to the learning outcomes. In addition, it is recommended to increase the number of oral exams in the assessment.

E 7.   (ASIIN 5) It is recommended to allow the personnel involved in quality management to take subject-specific advanced training.

E 8.   (ASIIN 5) It is recommended to improve the systematic collection of feedback from the industry.

Appendix: Programme Learning Outcomes and Curricula

According to self-assessment report, the following **objectives** and **learning outcomes (intended qualifications profile)** shall be achieved by the master degree programme "Sustainable Energy Engineering and Management"

The specific objectives are:

1) To enable students to analyse current and future trends in sustainable energy development and delivery at global, regional, and local levels.
2) To equip students with the ability to identify, evaluate, and respond to complex energy systems problems involving technical, environmental, and socioeconomic components.
3) To enable students to apply advanced systems analysis tools in a multi-disciplinary setting to plan, analyse, design, and implement solutions to energy systems problems.
4) To train students in the application of existing energy tools and techniques in integrated sustainable practices.
5) To train students to innovate and develop new tools and techniques for sustainable energy applications.
6) To provide students with the skills to analyse the complex interactions between energy system solutions and their implications on a larger scale (regional, national, global).
7) To equip students with research skills to enable them to identify the critical research areas in sustainable energy engineering and management.

The university presents the following Programme Learning Outcomes:

Knowledge: At the end of this programme, the graduate should be able to:

1) Describe the different energy resources and explain their respective advantages and disadvantages including environmental impacts (e.g., climate change), health issues, usage, safety, and energy security, and their share in the energy mix at the local, national and global levels.
2) Discuss the concept of energy efficiency and sufficiency and how
3) socio-technical strategies and policies affect them.
4) Describe how policies can influence the development of energy

5) supply and demand.

6) Explain the processes and institutional arrangements in the energy sector and describe the structure of the energy market.

Skills: At the end of this programme, the graduate should be able to:

1) Analyse, compare, and communicate different energy-efficient technology options for use by stakeholders in the energy sector.

2) Conduct computational modelling and energy simulation.

3) Cooperate and collaborate with others to transfer and adapt energy technologies to different contexts and to share energy best practices.

4) Apply innovative and entrepreneurial skills to identify and recognize business opportunities for new products, processes, and systems.

5) Examine and make appropriate use of advanced information and communication technologies in their professional activities.

6) Work in a team of people with diverse educational and cultural backgrounds.

Competencies: At the end of this programme, the graduate should be able to:
1) Identify, analyse, formulate, and solve problems in a location in collaboration with the local community and stakeholders.

2) Design and deliver energy solutions in a safe, reliable way taking into consideration relevant sustainable development goals (e.g., SDG 7, 13, etc.).

3) Develop energy-efficient strategies in the design and construction of buildings in collaboration with building professionals.

4) Evaluate different business models in the energy sector and select suitable ones for a given socio-economic context.

5) Conduct, socio-economic, techno-economic, and environmental studies of energy systems.

6) Formulate the research problem, plan and execute the research and communicate the findings to the targeted audience.

7) Execute their duties ethically and professionally, examine their obligations to society.

8) Develop their learning through lifelong learning approaches using e-learning tools.

The following **curriculum** is presented:

Year One (Semester One)						
S/N	Code	Course Description	T	P	C	ECTS

1	SEEM 501	Renewable Energy	2	2	3	6
2	SEEM 503	Advanced Mathematical Tools and Simulation	2	2	3	6
3	SEEM 505	Energy Systems - Analysis, Design and Optimization	2	2	3	6
4	SEEM 507	Energy Operations and Supply Chain Management	2	2	3	6
5	SEEM 509	Energy and Environmental Sustainability	2	2	3	6
6	SEEM 511	Energy Policy, Economics & Markets	2	2	3	6
7	SEEM 510	Energy Seminar	0	0	0	0
Total Semester Credit			12	12	18	36
Year One (Semester Two)						
S/N	Code	Course Description	T	P	C	ECTS
1	SEEM 506	Statistics & Research Methods	2	2	3	6
2	SEEM 502	Energy Efficiency and Management	2	2	3	6
3	SEEM 504	Entrepreneurship, Project Management and Ethics	2	2	3	6
4	SEEM 508	Master Plan-Integrated Project	2	2	3	6
5	SEEM 1*		2	2	3	6
6	SEEM 2*		2	2	3	6
Total Semester Credit			12	12	18	36
Cumulative Credit			24	24	36	72
Year Two (Semesters 1 and 2)						
S/N	Code	Course Description	T	P	C	ECTS
1	SEEM 512	Field Trip	0	0	0	0
2	SEEM 500	MSc. Sustainable Energy Engineering and Management Project (Dissertation)	0	36	18	40

3	SEEM 510	Energy Seminar	0	0	0	0
Total credit			4	36	18	40
Total Credits for MSc			4	76	54	108

According to self-assessment report, the following **objectives** and **learning outcomes (intended qualifications profile)** shall be achieved by the doctoral degree programme "Sustainable Energy Engineering and Management"

The specific objectives are:
1) Provide a period of a sustained in-depth study of sustainable energy engineering and management;
2) Create an environment that encourages the student's originality and creativity in their research;
3) Equip students with the skills to enable them to critically examine the background literature relevant to their specific research area;
4) Equip students with the skills to formulate and test hypotheses, develop new theories, plan and conduct research;
5) Equip students with practical research skills, to enable them to learn state-of-the-art techniques used in sustainable energy engineering and management;
6) Create an environment in which to develop skills in written work, oral presentation, and publishing the results of their research in high-profile scientific journals, through constructive feedback of written work and oral presentations;
7) Offer an academic framework to enable students to exhibit their creativity and innovation with a focus on entrepreneurship and leadership.

The following Programme Learning Outcomes are presented:

1) Formulate and test hypotheses, develop new theories, plan and conduct research.
2) Apply quantitative, qualitative, and mixed methods approach to research
3) Write scholarly manuscripts and publish in high-profile scientific journals, through constructive feedback of written work and oral presentations.
4) Analyse and critically critique published research.
5) Develop their creativity and innovation with a focus on entrepreneurship and leadership.

The following **curriculum** is presented:

Year One (Semester One)

S/N	Code	Course Description	T	P	C	ECTS
1	SEEM 601	Advanced Research Methods and Academic Writing	2	2	3	6
2	SEEM 603	Advanced Statistics	2	2	3	6
3	SEEM 605	Renewable Energy and Storage Systems	2	2	3	6
4	SEEM 607	Energy Efficiency and Management	2	2	3	6
5	SEEM 1*		2	2	3	6
6	SEEM 2*		2	2	3	6
Total Semester Credit			12	12	18	36
Cumulative Credits			12	12	18	36
Year One (Semester Two)						
S/N	Code	Course Description	T	P	C	ECTS
1	SEEM 600	Ph.D. Energy Management Project (Dissertation)	0	24	12	24
2	SEEM 609	Field Trip	0	0	0	0
3	SEEM 611	PhD Seminar	0	0	0	0
Total Semester Credit			0	24	12	24
Cumulative Credits			12	36	30	30
Year Two (Semesters 1 and 2)						
S/N	Code	Course Description	T	P	C	ECTS
1	SEEM 609	Field Trip	0	0	0	0
2	SEEM 800	Ph.D. Sustainable Energy Engineering and Management Project (Dissertation)	0	48	24	48
3	SEEM 611	PhD Seminar	0	0	0	0
Total Semesters Credit			0	48	24	48
Cumulative Credits			12	84	54	120
Year Three (Semesters 1 and 2)						
S/N	Code	Course Description	T	P	C	ECTS
1	SEEM 800	Ph.D. Energy Management Project (Dissertation)	0	48	24	48
2	SEEM 710	Energy Seminar	0	0	0	
Total Semesters Credit			0	48	24	48
Total Credits for Ph.D.			12	132	78	156

According to self-assessment report, the following **objectives** and **learning outcomes (intended qualifications profile)** shall be achieved by the master degree programme "Environmental Engineering and Management"

The following specific objectives are being pursued:
1) Identify and formulate and solve complex environmental engineering problems by selecting and applying appropriate tools and techniques.
2) Synthesize advanced technical knowledge in traditional or emerging area of knowledge in the environmental engineering.
3) To produce graduates that are productive and contributing members of the environmental engineering profession as practitioners, entrepreneurs and researchers or lecturers.
4) Execute duties in an ethical and professional way, examine obligations to society.
5) Formulate research problem, plan and execute the research and communicate the findings to targeted audience.
6) Work in a team of people with diverse educational and cultural backgrounds.
7) Pursue advanced studies if qualified and interested.

The following Programme Learning Outcomes are described:

Knowledge: At the end of this programme, graduates should be able to: -
1) Gain advanced knowledge in the principles of environmental engineering underpinning sustainable development.
2) Understand and appreciate current issues and debates in the field of environmental engineering and management.
3) Understand and appreciate the philosophical bases, methodologies, and characteristics of scholarship, research and creative work in the environmental engineering and management field.

Skills: At the end of this programme, graduates should be able to: -
1) Demonstrate mastery of theoretical knowledge and to reflect critically on theory and professional practise in environmental engineering and management
2) Investigate, analyse, evaluate and synthesize complex information, problems, concepts and theories and to apply established theories to different bodies of knowledge or practise in the environmental engineering and management.
3) Build capacity for critical, conceptual and reflective thinking, creativity and originality
4) Exhibit Intellectual openness and curiosity
5) Exhibit Intellectual Integrity, Respect for truth and for the ethics of research and scholarly activity
6) Make appropriate use of advanced information and communication technologies
7) Communicate effectively with range of audiences

8) Apply innovative and entrepreneurial skills to identify and recognise business opportunities in the environmental field
9) Work in a team of people with diverse educational and cultural backgrounds.

Competencies: At the end of this programme, graduate should be able to:
1) Identify, analyse, formulate and solve problems in a location in collaboration with local community and stakeholders.
2) Design and deliver environmental solutions/interventions in a safe, reliable way taking into consideration relevant sustainable development goals (e.g., SDG 6, 7, 11, 13, 17. Agenda 2063, Aspiration No. 1).
3) Develop environmentally efficient strategies in the design and management of environmental systems.
4) Conduct environmental and social impact and health-risk assessment of infrastructure and projects.
5) Formulate research problem, plan and execute the research and communicate the findings to targeted audience.
6) Execute duties in an ethical and professional way, examine obligations to society.
7) Develop their own learning through lifelong learning approaches including the use of e-learning tools.

The following **curriculum** is presented:

Year One Semester One					
Course Code	**Course Title**	**Theory**	**Practical**	**Credits**	**ECTS**
EEMA 501	Environmental Chemistry	2	1	2	4
EEMA 503	Microbiology for Engineers	2	1	2	4
EEMA 507	Air Pollution	2	1	2	4
EEMA 505	Climate Change Management	2	1	2	4
EEMA 509	Solid and Hazardous Waste Engineering and Management	2	2	3	6
EEMA 511	Water and Wastewater Treatment	2	2	3	6
EEMA 513	Remote Sensing and GIS	1	2	2	4
Total Credit for Semester				**18**	**36**
Year One Semester Two					
Course Code	**Course Title**	**T**	**P**	**C**	**ECTS**
EEMA 502	Environmental Engineering Master plan	0	4	2	4

EEMA 504	Statistics & Research Methods	2	1	2	4
EEMA 506	Environmental and Social Impact Assessment and Safeguards	2	1	2	4
EEMA 508	Environmental Health and Safety	2	1	2	4
EEMA 510	Environmental Law, Policy and Governance	2	0	2	4
EEMA 512	Project Management, Entrepreneurship and Ethics	2	1	2	4
EEMA 514	Water Resources Engineering and Management	2	1	2	4
Total Credit for Semester				**18**	**36**
Cumulative Credits				**36**	**72**
Year Two					
Course Code	**Course Title**	**T**	**P**	**C**	**ECTS**
	Thesis	0	24	12	24
Total Credit				**12**	**24**
Cumulative Credits				**48**	**96**

According to self-assessment report, the following **objectives** and **learning outcomes (intended qualifications profile)** shall be achieved by the doctoral degree programme "Environmental Engineering and Management"

Specific objectives are being pursued to:

1) Identify and formulate and solve complex environmental engineering problems by selecting and applying appropriate tools and techniques
2) Synthesize advanced technical knowledge in traditional or emerging area of knowledge in the environmental engineering
3) To produce graduates that are productive and contributing members of the environmental engineering profession as practitioners, entrepreneurs and researchers or teachers
4) Execute duties in an ethical and professional way, examine obligations to society
5) Formulate research problem, plan and execute the research and communicate the findings to targeted audience. Work in a team of people with diverse educational and cultural backgrounds

The university defined the following Programme Learning Outcomes:

Knowledge: At the end of this programme, graduates should be able to:
1) Gain advanced knowledge of the principles of environmental engineering underpinning sustainable development.
2) Understand and appreciate current issues and debates in the field of environmental engineering and management.
3) Understand and appreciate the philosophical bases, methodologies, and characteristics of scholarship, research and creative work in the environmental engineering and management field.

Skills: At the end of this programme, graduates should be able to: -
1) Demonstrate mastery of theoretical knowledge and to reflect critically on theory and professional practise in environmental engineering and management
2) Investigate, analyse, evaluate and synthesize complex information, problems, concepts and theories and to apply established theories to different bodies of knowledge or practise in the environmental engineering and management.
3) Build capacity for critical, conceptual and reflective thinking, creativity and originality
4) Exhibit Intellectual openness and curiosity
5) Exhibit Intellectual Integrity, Respect for truth and for the ethics of research and scholarly activity
6) Make appropriate use of advanced information and communication technologies
7) Communicate effectively with range of audiences
8) Apply innovative and entrepreneurial skills to identify and recognise business opportunities in the environmental field
9) Work in a team of people with diverse educational and cultural backgrounds.

Competencies: At the end of this programme, graduate should be able to:
1) Identify, analyse, formulate and solve problems in a location in collaboration with local community and stakeholders.
2) Design and deliver environmental solutions/interventions in a safe, reliable way taking into consideration relevant sustainable development goals (e.g., SDG 6, 7, 11, 13, 17. Agenda 2063, Aspiration No. 1).
3) Develop environmentally efficient strategies in the design and management of environmental systems.
4) Conduct environmental and social impact and health-risk assessment of infrastructure and projects.
5) Formulate research problem, plan and execute the research and communicate the findings to targeted audience.
6) Execute duties in an ethical and professional way, examine obligations to society.
7) Develop their own learning through lifelong learning approaches including the use of e-learning tools.

The following **curriculum** is presented:

S/N	Code	Course Description	T	P	C	ECTS
Year One (Semester One)						
S/N	Code	Course Description	T	P	C	ECTS
1	EEMA 601	Advanced Research Methods and Academic Writing	2	2	3	6
2	EEMA 603	Advanced Statistics	2	2	3	6
3	EEMA 605	Remote Sensing and Geographic Information Systems (GIS)	2	2	3	6
4	EEMA 607	Water Resources Engineering and Management	2	2	3	6
5	EEMA 1*		2	2	3	6
6	EEMA 2*		2	2	3	6
		Total Semester Credit	**12**	**12**	**18**	**36**
Year One (Semester Two)						
S/N	Code	Course Description	T	P	C	ECTS
1	EEMA 600	Ph.D. Environmental Engineering and Management (Dissertation)	0	24	12	24
2	EEMA 609	Field Trip	0	0	0	0
3	EEMA 611	PhD Seminar	0	0	0	0
		Total Semester Credit	**0**	**24**	**12**	**24**
Year Two (Semesters 1 and 2)						
	Code	Course Description	T	P	C	ECTS
1	EEMA 600	Ph.D. Environmental Engineering and Management (Dissertation)	0	48	24	48
2	EEMA 611	PhD Seminar	0	0	0	0
		Total Semesters Credit	**0**	**48**	**24**	**48**
Year Three (Semesters 1 and 2)						
	Code	Course Description	T	P	C	ECTS
1	EEMA 600	Ph.D. Environmental Engineering and Management Project (Dissertation)	0	48	24	48

2	EEMA 611	Seminar	0	0	0	0
		Total Semesters Credit	**0**	**48**	**24**	**48**
		Total Credits for Ph.D.	**12**	**132**	**78**	**156**