ASIIN Seal & EUR-ACE Seal

Accreditation Report

International Master Program in Energy and Green Hydrogen (IMP-EGH)

Provided by
RWTH Aachen and the University of Rostock in collaboration with the Universities of Abdou-Moumouni (UAM, Niger), University Cheikh Anta Diop (UCAD, Senegal), Université Felix Houphouet-Boigny (UFHD, Ivory Coast) and the University of Lome (UL, Togo)

Version: 27 June 2025

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A About the Accreditation Process

Name of the degree program (in original language)	Labels applied for	Previous Accreditation (issuing agency, validity)	Involved Technical Committees
International Master´s Program in Energy and Green Hydrogen	ASIIN Accredited by German Engineers European Accredited Engineering Seal („EUR-ACE“)	/	01, 02, 05, 06, 11
Date of the contract: 22.10.2024			
Submission of the final version of the Self-Assessment Report: 04.12.2024			
Date of the onsite visit: 02. – 08.02.2025			
At various locations: UL (Togo), UFHD (Ivory Coast), UCAD (Senegal), in combination with a virtual visit at UAM (Niger) and the University of Rostock			
Composition of expert panel: Prof. Dr.-Ing. habil. Olaf Wünsch, University of Kassel Prof. Dr.-Ing. Reiner Schütt, West Coast University of Applied Sciences Prof. Dr. rer.nat. habil. Stefan Wohnlich, Ruhr University Bochum Prof. Dr. Kay Pfaffenberger, University of Applied Sciences Flensburg Sheikh Ahmed Tijan Bah, Millennium Challenge Account – The Gambia Illiessa Sana, Student at Joseph KI-ZERBO’s University of Burkina Faso			

B Characteristics of the Degree Program

Name	Final degree (original/English translation)	Areas of Specialization	Corresponding level of the EQF2	Mode of Study	Double/Joint Degree	Duration	Credit points/unit	First time of offer
(1) International Master's Program in Energy and Green Hydrogen – Specialization Economics, Policy and Infrastructure	M.Sc.	Economics, Policy, and Infrastructure	7 - Master	Full time	Double Degree: RWTH Aachen University and Université Cheikh Anta Diop	4 semesters	120 ECTS/ CP	Winter Semester 2021/2022
(2) International Master's Program in Energy and Green Hydrogen – Specialization Photovoltaics	M.Sc.	Photovoltaics	7 - Master	Full time	Double Degree: RWTH Aachen University and Université Abdou Moumouni	4 semesters	120 ECTS/ CP	Winter Semester 2021/2022
(3) International Master's Program in Energy and Green Hydrogen – Specialization Energy System Analysis	M.Sc.	Energy System Analysis	7 - Master	Full time	Double Degree: RWTH Aachen University and Université Abdou Moumouni	4 semesters	120 ECTS/ CP	Winter Semester 2021/2022
(4) International Master's Program in Energy and Green Hydrogen – Specialization Georesources	M.Sc.	Georesources (Wind/Hydro)	7 - Master	Full time	Double Degree: RWTH Aachen University and Université Felix Houphouët Boigny	4 semesters	120 ECTS/ CP	Winter Semester 2021/2022
(5) International Master's Program in Energy and Green Hydrogen – Specialization Green Hydrogen Production and Technology	M.Sc.	Green Hydrogen Production and Technology	7 - Master	Full time	Double Degree: RWTH Aachen University and Université Felix Houphouët Boigny	4 semesters	120 ECTS/ CP	Winter Semester 2021/2022
(6) International Master's Program in Energy and Green Hydrogen – Specialization Bioenergy/Biofuels	M.Sc.	Bioenergy/Bio fuels	7 - Master	Full time	Double Degree: University of Rostock and University of Lomé	5 semesters	120 ECTS/ CP	Winter Semester 2021/2022

The International Master´s Program in Energy and Green Hydrogen is a pioneering educational program designed to address the urgent need for skilled professional in the rapidly expanding fields of energy management and green hydrogen technologies in West Africa. This unique international program is offered in collaboration with universities and research institutions across Germany and West Africa, including RWTH Aachen, University of Rostock, Science Centre Jülich (whose courses are offered under the umbrella of RWTH Aachen), University Cheikh Anta Diop in Senegal, Université Abdou Moumouni in Niger, Université Felix Houphouet-Boigny in Ivory Coast, and University of Lome in Togo.

This accreditation procedure is belonging to the category of an “ex ante”-accreditation procedure, although the educational program and its various specializations originated back in 2021. The partnering universities however are introducing important new features to this program, which in its new form will only commence at the end of 2025 and yet have to be formally ratified on various levels. It is this new program whose alignment with the accreditation criteria are evaluated by the ASIIN expert team. What are the most important changes to be implemented starting with the winter semester of 2025/2026?

Since the inception of the original program back in 2021, the West African partner universities have been the degree awarding institutions. Starting with the winter semester of 2025/2026, the program will now transition to a formal double-degree program, with each of the above-mentioned specializations jointly hosted by a West African and the RWTH Aachen (5) and the University of Rostock (1) respectively, as can be inferred by the above table.

Another fundamental change relates to the proposed structure of the program. In the past, the program started with a 4-month language for the students (English language courses in Accra for the Francophone students, French for the Anglophone Students in Ivory Coast). This was followed by a 14–15-month course work, which was until now divided in 4 semester of 5 months duration each. In the new version of the program, which is scheduled to become operational as of October 2025, an additional semester was added to a now 5 semester structure, which will be spent in Germany at RWTH Aachen or the University of Rostock depending on the chosen specialization (structured in altogether six different tracks: Track 1 deals with “Green hydrogen production and technology”, Track 2: Photovoltaics, Track 3: Economics, policies and infrastructure, Track 4: Bioenergy, Track 5 Geo-Resources and Track 6: Energy System analysis). This new semester is designed to further upgrade the competences of students and better prepare them for the execution of their Master thesis in the final semester. After the course work, students will use the remaining six month of the fifth semester for their field/lab work and for thesis writing in Germany either at the Research Centre (Forschungszentrum) Jülich, at RWTH Aachen or at the University of Rostock.

An interesting feature of the program is related to the fact, that during the first three semester taking place in various African countries, it relies almost exclusively on flying faculty, who are usually teaching in block seminars of no more than 1-2 weeks' time each with a full-time schedules from 8-5 p.m.. The lecturers from Africa cover mainly the first and second semester courses, while the much bigger number of German lecturers from FZJ, RWTH Aachen and Uni Rostock focuses on the third, fourth and fifth semester.

A further interesting characteristic of the programs lies in its "outsourced" quality assurance and various administrative processes, for which the West African Science Service Centre of Climate Change and Adapted Lands Use (WASCAL) headquarters in Ghana has been contracted. WASCAL is thus responsible for the program oversight and coordination, overseeing the overall structure and management of the program under review, trying to ensure consistency and adherence to the program´s objectives. It this function, WASCAL headquarters is supported by the Research Centre Jülich as well as the two German partner universities. WASCAL is also in charge of defining the eligibility criteria for applicants, establishing a standardized process for reviewing and selecting suitable candidates. WASCAL headquarters in addition manages the distribution of applications to the respective graduate schools in West Africa for review. Applications are grouped geographically, with each graduate school handling application from specific countries, ensuring efficiency and regional representation. As the administrator of the program, WASCAL channels the financial support of the German government to all students, which profit from a full stipend. This includes funding for tuition, living expenses, and the associated costs for the pre-program language courses mentioned above. WASCAL headquarters is furthermore involved in organizing regular evaluations and consultations with all relevant stakeholder groups. It thus plays a central role in driving program innovation. It collaborates with partner institutions to introduce new courses, refining curricula, and aligning the program with global academic and industry standards.

Overall, the program under review has been designed in support of the global energy transition, targeting specifically West-Africa, a region with significant renewable energy potential, reducing fossil fuel dependency while expanding the green hydrogen economy. In this respect, it aligns with German African energy cooperation goals promoting capacity building, innovation and sustainable energy solutions.

It is therefore not by chance, that the program since its inception has been fully financed by the German government and has graduated 59 students, with an additional cohort currently progressing. All students enrolled are from a full stipend by the German government. Program funding has however to be periodically renewed by a new commitment of the (new) German government, which poses a challenge to ASIIN´s rule, that the budget for the programs needs to be guaranteed for the entire duration of the accreditation period

(in this case 5 years). According to the latest information provided orally at the end of May, a financing of the three years for the third batch of students is currently under consideration by the BMBF.

As regards the implementation of this demanding accreditation visit for all parties involved, it consisted of ensuing on-site visits at the participating universities in Togo, Ivory Coast and Senegal. Additionally, to virtual audits were organized for Niger and the University of Rostock were orchestrated.

C Expert Report for the ASIIN Seal[1]

1. The Degree Program: Concept, Content & Implementation

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

Evidence:

- Website/ Homepage
- Diploma Supplement,
- "Objectives- Module-Matrices" in Tables 1 through 7, pp. 16-27 of the SAR
- Minutes of Faculty Meetings

Preliminary assessment and analysis of the experts:

The IMP-EGH program, scheduled to commence operations in its new 5 semester structure as of October 2025, is designed to develop highly skilled professionals with a comprehensive understanding of renewable energy systems and green hydrogen technologies. Graduates of the program according to the Self-Assessment Report will after graduation be prepared to address complex challenges of the energy transition, particularly in the African and international contexts, based on a solid foundation in scientific, technical, and socio-economic aspects of energy management.

The program submitted for ASIIN accreditation, reportedly aligns with the European Qualifications Framework (EQF) at level 7, ensuring that graduates possess the advanced knowledge and competencies required for professional roles and leadership positions in industry, academia, and government sectors.

In the self-documentation, provided to the expert team, the following program learning outcomes (PLO´s) are presented in the subsequently listed categories:

[1] 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.

1. **Scientific and technical expertise**: Graduates are equipped with robust scientific knowledge and technical skills in renewable energy systems, green hydrogen production, and energy systems integration.

2. **Systemic and analytical competence**: Graduates can analyse, design, and optimize complex energy systems, integrating renewable sources and hydrogen technologies to meet sustainability and efficiency goals.

3. **Policy and economic expertise**: Graduates have the capacity to develop a deep understanding of the socio-economic, regulatory, and policy contexts shaping the global energy transition, enabling graduates to contribute effectively to energy policy and economic development initiatives.

4. **Intercultural and collaborative skills**: Encourage a high level of intercultural competence and teamwork through an international, multi-campus learning experience, preparing graduates for work in diverse, interdisciplinary, and global settings.

More specifically, upon successful completion of the program, graduates will:

- Demonstrate an in-depth understanding of core principles in energy system technologies, including photovoltaics, wind energy, bioenergy, hydrogen production, and energy storage systems.

- Explain the science and engineering underlying key renewable energy technologies and the role of green hydrogen within the energy mix.

- Articulate the environmental, economic, and social implications of energy choices, particularly in developing and emerging economies.

- Design and simulate renewable energy systems for specific applications, employing tools and methodologies for system analysis, optimization, and performance assessment (e.g., system modelling, resource assessment, techno-economic analysis).

- Apply technical skills to manage renewable-based energy generation systems, with hands-on experience in labs and fieldwork across different energy technologies, including green hydrogen and biofuels.

- Integrate and evaluate the feasibility of green hydrogen within renewable energy systems to enhance system reliability, and sustainability and contribute to the achievement of sustainable development goals.

- Critically evaluate energy systems and their components, assessing technical, economic, and social factors that impact energy policy and project viability.

- Conduct lifecycle assessments and sustainability evaluations of energy systems, understanding the environmental and resource impacts across energy value chains.
- Analyse and interpret data from simulations and experiments to make informed decisions on system design, policy, or technological adaptation.
- Present complex technical, economic, and policy concepts in a clear and accessible manner to diverse stakeholders, including non-specialist audiences.
- Demonstrate effective communication and teamwork in multicultural, interdisciplinary settings, with the ability to collaborate on energy projects across various international contexts.
- Utilize language and communication skills developed through international study to navigate intercultural dynamics and promote inclusive and collaborative project environments.
- Commit to ethical practices in energy management, with an understanding of the principles of energy justice and the role of sustainable energy in social equity.
- Recognize the professional responsibilities associated with the deployment of renewable energy technologies in developing economies, including regulatory compliance and stakeholder engagement.
- Advocate for responsible energy practices and policies that contribute to climate change mitigation, environmental protection, and economic resilience in line with the Sustainable Development Goals (SDGs).

The experts confirm that the above enumerated vast list of intended learning outcomes of the program is published and presented in various official documents such as the program websites and marketing materials, ensuring clear communication of the program's objectives to students, faculty, and stakeholders. These objectives align with the needs of the clean energy sector, as documented in the module handbook, and are found to be in line with ASIIN's Subject- Specific Criteria (SSC). The module description and the overall program outline provide a cohesive narrative of competencies, students will acquire, preparing them for careers in renewable energy and green hydrogen.

The various competence profiles reportedly have been developed collaboratively by faculty from all 7 partner institutions and are regularly update based on feedback from students, alumni, and stakeholders in government and industry. The program coordinators present a broad array of "Objectives-Module-Matrices", mapping each module to specific competencies as formulated by ASIIN's subject specific competences (SSC) for energy-related

master's programs, covering technical knowledge, analytical skills, interdisciplinary collaboration, and professional ethics.

The learning outcomes are regularly reviewed, with recent evaluations resulting in a new curricular structure, leading to a fifth semester to enhance students' research preparation, introducing new modules, such as "Cost Benefit Analysis of Green Energy Projects," to reinforce practical skills and other changes to the design of the program mentioned above. As an interdisciplinary program, the program strives to integrate engineering, economics, policy analysis, and environmental science, preparing students to navigate the complexities of the green energy sector. Both students and faculty value the program's practical, interdisciplinary approach, with students particularly appreciating opportunities to address real-world energy challenges.

The program's competence profiles in the experts´ opinion aligns with the professional demands of the green energy and hydrogen sectors, particularly in West Africa. Alumni feedback highlights its impact on career advancement, with graduates moving into leadership roles in government, industry, and research. The program's alignment with market needs has contributed to high employability among graduates, demonstrating its effectiveness in preparing students for the evolving labour market in renewable energy. As professionals charged with tackling complex energy and sustainability challenges in an international context, students completing the program are well set contributing to the evolving energy landscape.

The experts confirm that the objectives and learning outcomes of the degree program are described concisely. They are transparently anchored and published and thus are available to students, lecturers and interested third parties. They are in line with the relevant Subject Specific Criteria of ASIIN and overall provide a suitable basis for a professional activity at level 7 of the EQF2), This verdict is further qualified in subsequent parts of this report.

As regards the relevance of the program for the labour market, thus far around 60 graduates from the program have graduated. Results from the only tracer studies reveal that a considerable number of graduates find employment in government institutions or enrol in international Ph.D. program continuing their educational pathways, but thus far provides only limited information. The experts therefore kindly ask, that the information for the second batch of students is also provided to them.

[2] The European Qualifications Framework (EQF)/ Europass

Criterion 1.2 Name of the Degree Program

Evidence:

- Study and Examination Regulation

Preliminary assessment and analysis of the experts:
During the interviews, the program coordinators argue that the program title “International Master´s program in Energy and Green Hydrogen” as well as the denominations for the various specializations have been chosen to encapsulate the core objectives and intended learning outcomes of the program. The name of the program correlates with its primary focus on energy and green hydrogen while alluding to its international nature and global relevance.

More specifically, the denomination “Energy” in the program´s name emphasizes the overarching focus on understanding energy systems, infrastructure, and policies in a dynamic, climate-changed context. The second part of the title “Green Hydrogen” reflects the program’s approach to exploring the potential of this emerging energy carrier and its role in the transition towards sustainability and a net-zero economy.

As regards the more specific titles for the 6 specializations, during the interviews the program coordinators minute the following rationales:

a) **Specialization “Economics, Policy and Infrastructure”**

According to the program coordinators, the specialization “Economics, Policy, and Infrastructure”, being taught collaboratively between the UCAD and RWTH Aachen University, signals a strong emphasis on the intersection of economics, policy, and the critical infrastructure required for sustainable energy systems. The choice of this specialization’s name is a response to the multifaceted nature of the field with “Economics” highlighting the critical role of economic principles and strategies in shaping energy markets, investment decisions, and the financial sustainability of green hydrogen projects; “Policy” underscoring the significance of governmental and institutional frameworks that play a pivotal role in guiding energy transitions, setting regulatory standards, and driving the adoption of sustainable practices; and finally “Infrastructure” accentuating the essential physical and logistical components, from energy production and distribution networks to storage facilities, that underpin the entire energy ecosystem.

b) Specialization “Photovoltaics for Green Hydrogen Technologies”

As regards the specialization "Photovoltaics for Green Hydrogen Technologies", it intends to reflect its comprehensive focus on the intersection of photovoltaic technology and green hydrogen production. Hosted by the Faculty of Sciences and Techniques at Université

Abdou Moumouni (UAM) in Niger in collaboration with RWTH Aachen, this specialization targets the critical areas of photovoltaics, green hydrogen production, storage, transport, and utilization. The choice of this specialization's name according to the program coordinators highlights the multifaceted nature of the field. Photovoltaics addressing the energy challenges related to hydrogen by focusing on the production, storage, and end-use of hydrogen technologies. It provides comprehensive insights into the renewables and hydrogen energy sectors at local, regional, and international levels, ensuring both basic and advanced understanding of the field.

c) Specialization "Energy Systems Analysis for Green Hydrogen Technologies"

As regards the specialization in Energy Systems Analysis for Green Hydrogen Technology, it strives to impart a comprehensive understanding of the decision-making processes involved in the development and management of a complete hydrogen energy system. The name of this specialization represents its focus on analysing the interactions between various elements of the hydrogen infrastructure, including production, delivery, storage, fuel cells, and the relevant safety standards and regulations. This specialization is again offered in collaborative partnership between Université Abdou Moumouni (UAM) and RWTH Aachen University.

d) **Specialization "Georesources"**

The denomination of the specialization "Georesources" has been chosen to encapsulate its comprehensive focus on harnessing natural resources, particularly water and wind, for renewable energy production. Hosted by Université Felix Houphouët-Boigny (UFHB), Ivory Coast, in collaboration with RWTH Aachen and the Research Centre Jülich, this specialization aims to address the pressing energy challenges faced by West Africa in the context of climate change and sustainable development.

The name "Georesources" is said to be rooted in the fundamental need to explore and utilize the Earth's natural resources to produce green hydrogen as a clean and renewable energy source. In a region where energy access, security, and sustainability are critical concerns, the specialization emphasizes the importance of water and wind as key resources in the transition to a low-carbon energy future. By focusing on these Georesources, the program aims to equip students with the knowledge and skills needed to tap into locally available renewable energy sources, thereby contributing to the region's energy independence and resilience.

e) **Specialization "Green Hydrogen Production and Technology"**

The specialization "Green Hydrogen Production and Technology" within the program has been named to reflect its comprehensive focus on the production and technological aspects of green hydrogen, which are critical for sustainable energy systems. Hosted by the Faculty of Sciences, Structures, Matter and Technology at Université Félix Houphouët-Boigny (UFHB), Ivory Coast in collaboration with RWTH Aachen University as well as various universities across Côte d'Ivoire, this specialization delves deeply into the essential areas of green hydrogen production and its related technologies. The selection of this specialization's name underscores its multifaceted nature, aimed at equipping students with a robust understanding of the field.

f) Specialization "Bioenergy/ Biofuel and Green Hydrogen Technology"

The name of the specialization "Bioenergy/Biofuel and Green Hydrogen Technology" within the program is in line with its dedication to the sustainable production of hydrogen through bioenergy, biofuels, and biomass, including organic waste. This program is hosted by the Faculté des Sciences at Université de Lomé (FDS-UL), in collaboration with the University of Rostock.

The expert team concurs, that the program's name is consistent with the terminology used in the field, in line with industry standards and the expectations of professionals in the energy and sustainability sector. It also aligns with its graduates' intended profile, reflects the intended objectives and learning outcomes, the teaching and learning content as well as the teaching language of the program. Its designation is used consistently in all relevant documents.

Criterion 1.3 Curriculum

Evidence:

- Module Handbook
- Study and Examination Regulation
- "Objectives- Module-Matrices"
- Results of Surveys

Preliminary assessment and analysis of the experts:

As part of the Self-Assessment Report and during the interviews on-site, the following curricular structure is presented to the ASIIN expert team.

After completing preparatory three-months language courses in English and French prior to commencing studies (see above), the program in its new curricular format follows a structured five-semester pathway:

The ***first two semesters*** are dedicated to core foundational courses offered at Université Abdou Moumouni (UAM) in Niger, although due to the military coup in this country, this introductory year was shifted to Togo. These initial courses are designed to provide essential knowledge in energy systems, economic analysis, and environmental sustainability, grounding students in core principles that underpin the program's more advanced coursework. Among the fundamental courses common to all specializations figure "Physics of Solids and Fluids", "Semiconductor, Electronic and Electrical Engineering", "Thermodynamics", "Electrochemistry" and "Atmospheric Sciences", "Green Hydrogen" and "Photovoltaics", "Energy Systems and Infrastructure" as well as "Energy Policy and Market". All students enrolled in the program are taking the same courses in these first two semester irrespective of the track/specialization, allowing for no variation or specialization through electives. This fact is lamented by students during the interviews on-site.

Starting with the ***third semester***, students specialize in one of the above mentioned six specializations.

The curriculum in the **specialization "Economics, Policy and Infrastructure" (1)** targets the intersection of economics, policy and the critical infrastructure needed for sustainable energy systems. It features modules around "Technology Management in Green Hydrogen, "Energy Economics", "Sustainability", "Energy Planning", "Modelling and Methods", "Green Hydrogen Policy and Infrastructure".

The curriculum in the **specialization "Photovoltaics for Green Hydrogen Technologies" (2)** covers the critical areas of photovoltaics, green hydrogen production, storage, transport, and utilization. It has been designed to provide students with comprehensive insights into the renewables and hydrogen energy sectors at local, regional and international levels. Upon graduation from this track, students should have a deep understanding of green hydrogen technologies and a solid foundation in the energy infrastructures of West Africa. Among the modules offered figure Photovoltaics-"and "Hydrogen" Technology, "PV and hydrogen", "Research methodology" as well as "Analysis and Data processing".

The curriculum in the **specialization "Energy System Analysis for Green Hydrogen Technologies (3)** provides a comprehensive understanding of the decision-making processes in the development and management of complete hydrogen energy systems. Modules in the area of "Energy System Modelling and Simulation", "Socio-Economic Assessment of Energy", "Creative, Innovative, Virtual Laboratory", "Research Methodology" target the inter-

actions between various elements of the hydrogen infrastructure such as production, delivery, storage, fuel cells and the relevant safety standards and regulations. Students are familiarized with the region's strengths and weaknesses in energy systems, energy policies, and practices, all within the context of the pressing challenges posed by climate change. The program also emphasizes the importance of seeking sustainable solutions through the integration of renewable energy sources.

The curriculum of the **Georesources specialization (4)** is designed to provide students with a deep understanding of the science behind climate change, the impacts on natural systems, and the methods for adaptation. It covers the technical aspects of energy production, delivery, and consumption, with a special emphasis on energy efficiency, management, and the innovative use of water and wind resources for green hydrogen production. Among the modules figure multiple courses around “Georesources” (Waterpower, wind energy, water flow etc.), “Green hydrogen production and technology” as well as “Bioenergy/Biofuels and Green hydrogen technology”. Students upon graduation are supposed to become leaders in the renewable energy sector, driving the adoption of green hydrogen technologies across West Africa and beyond.

The curriculum for the **Green Hydrogen Production and Technology specialization (5)** focuses on the production and technological aspects of green hydrogen, which are critical for sustainable energy systems. It includes modules on “Hydrogen and Materials”, “Hydrogen Applications”, “Nuclear Reactions and Hydrogen” as well as the “Production and Safety of H2”. Additionally, the program includes courses on energy efficiency and renewable energy regulations, to ensure that students are well-versed in current industry standards. Recognizing the importance of entrepreneurial skills, it features a module on research methodology and project financing for students with an interest to pursue self-employment opportunities within the green hydrogen sector.

The Curriculum for the specialisation in “Bioenergy/Biofuel and Green Hydrogen Technology” is dedicated to the sustainable production of hydrogen through bioenergy, biofuels and biomass, including organic waste. Course such as “Biomass to Energy”, “Green hydrogen production from waste/biofuels”, “System engineering for hydrogen production”, “Hydrogen utilization, storage and transport”, “Safety and security of hydrogen production system” are geared towards educating graduates to eventually become experts, who not only understand current technologies but also have the skillset to fully exploit the potential of bioenergy and biofuels.

The ***fourth semester***, a new addition to the program structure starting in the winter semester 2025/2026, allows students to continue their specialization coursework at either RWTH Aachen University or the University of Rostock. The allocation to either RWTH Aachen or

the University of Rostock is determined based on the specialization selected by the student at the time of application, which is subsequently confirmed upon admission. Students specializing in Bioenergy will travel to the University of Rostock, while students in all other specializations will travel to RWTH Aachen.

During this fourth semester, students choose from a selection of existing courses offered in the summer semester at the German universities hosting their specializations. This integration is designed to prepare students for independent research required for their master's thesis by strengthening their critical thinking and adaptability in a research-intensive environment. It is worth noting, that as part of the program's German collaboration, the courses taught by Jülich faculty are fully recognized as RWTH Aachen offerings.

In the ***fifth semester,*** students continue to be exposed to independent research, conducting a master's thesis in their chosen area of specialization.

The program coordinators in the Self-Assessment-Report and during the interviews present tables demonstrating the alignment of the program and its various specializations with ASIIN's competence profiles for energy-related master's programs across technical, analytical, and interdisciplinary domains.

The experts learn during the audit, that modules/courses during the first three semester in Africa are delivered as block seminars, designed for concentrated and immersive learning experiences. These block seminars of usually 2 weeks' time each are exclusively taught by flying faculty, the lecturers from Africa cover mainly the first and second semester courses, while the German lecturer from FZJ, RWTH Aachen and Uni Rostock focus on the third, fourth and fifth semester. This structure will only differ for the courses attended during the additional semester at RWTH Aachen or the University of Rostock as part of the program's transition to a double-degree structure, where regular semester formats will be applied.

One characteristic of the program under review is a modular structure, in which the modules consist of multiple small and at times unconnected courses of no more than 2-3 ECTS, for which teaching staff administers a multitude of individual examinations (what this implies for criterion 2 is documented in subsequent parts of this report).

Regarding quality assurance arrangements, the curriculum according to the information provided undergoes regular review by an advisory board consisting of faculty, industry experts, government representatives, and alumni to maintain relevance with industry standards and advancements. Program stakeholders meet regularly, typically every two months, to address any outstanding issues and make timely adjustments. After each cohort completes the program, a comprehensive evaluation process is conducted, involving multiple sessions: one with faculty from all participating institutions, another with students. As a

result for this internal QA process, numerous adjustments have been agreed on among the partners, some of which were already mentioned in the introductory part of this report. Examples of recent improvements include:

The transition to a double degree program, as feedback from students and faculty revealed the need for greater international recognition of the qualification. Furthermore, the introduction of specialized modules due to the fact, that alumni experiences indicated a demand for advanced training in economic and infrastructural aspects of green energy. As a result, two new modules – "Cost Benefit Analysis of Green Energy Projects" and "Infrastructure Management for Green Energy Technologies" have been introduced in the specialization "Economics, Policy and Infrastructure". The program coordinators hope that they can equip students with critical skills in financial assessment, project feasibility, and infrastructure planning, directly addressing competencies essential for leadership roles in renewable energy projects. These additions are supposed to reinforce the program's focus on practical, industry-relevant skills that enhance student's employability and adaptability in the energy sector.

Another important result of stakeholder discussion revealed the need for adding an extra semester for better research preparation. Performance evaluations and feedback for the first graduating cohort revealed that students faced challenges in independently conducting research for their master's thesis. To address this, an additional semester at RWTH Aachen and the University of Rostock will be introduced for the third batch of students of the program. Students will engage in advanced coursework designed to strengthen their research capabilities. This additional semester includes training in research methodology, data analysis, and critical thinking, providing students with the skills needed to formulate and execute complex research projects. By enhancing students' readiness for their thesis, this adjustment according to the program coordinators aims to improve research quality and reduce the academic pressures associated with the thesis-writing process.

In their summative assessment of the curriculum, the experts come to the following conclusions:

The ASIIN expert team commends the program coordinators and the representatives of the partnering institutions for the innovative and revolutionary design of the program. During the audit, the experts have witnessed their great passion to make this challenging educational project work. They laude that the inherently international and multidisciplinary character of the Master program, involving collaboration between different departments, schools, institutes, and faculties from universities in West Africa and Germany. The multilocation structure of the program in their opinion supports intercultural learning by enabling students to engage in diverse academic and professional settings in both West Africa

and Germany. Students during the interviews consistently identified this aspect as one of the program's greatest strengths, citing it as invaluable for building adaptability and collaboration skills essential for international work environments.

The curriculum of the program is in principle well designed to systematically support the program's objectives and intended learning outcomes, transitioning from core knowledge to specialized expertise and independent research skills over five semesters. Through a blend of foundational courses, specialization modules, and advanced research preparation, the program has the potential for graduates to assume leadership roles in renewable energy and green hydrogen sectors. The experts see however room for improvement by putting together short courses with very little ECTS to bigger units. This would contribute to reduce the excessive number of exams (again check criterion 2) and increase a systematic understanding of students enrolled in this program. In the latest discussions at the end of May, the program coordinators from the RWTH Aachen signal, that the experts´ proposal is currently considered and that efforts are under way to change the modular structure to bigger units.

They are positive, that by enrolling in this programs, future graduates will be equipped with the knowledge and skills necessary to advance the fields of bioenergy, biofuels, and green hydrogen technologies, contributing to a more sustainable and energy-secure future for West Africa, Germany and beyond.

As an interdisciplinary program, the program strives to integrate engineering, economics, policy analysis, and environmental science, preparing students to navigate the complexities of the green energy sector. Both students and faculty value the program's interdisciplinary approach, with students particularly appreciating opportunities to address real-world energy challenges. At the same time, there are repeated mentioning, that the practical elements in the program design could be strengthened; currently there are no/not enough internships part of the program, also the Master thesis usually is not conducted in a company, which might be a future option. To address this situation, the ASIIN expert teams recommends the creation of industrial advisory boards in the participating universities of partnering countries.

Being full of praise regarding the motivation and rationale behind the new double degree programs, the experts nevertheless see room for improvement and in some instances even the need to remove legal barriers, before the program under review can be accredited:

At least two prerequisites must be fulfilled and adjustments made in the interim. One legal barrier is related to the new the 5-semester structure, which is not in line with German regulations (the "Model Law Ordinance on the State Treaty on Accreditation for Studies" applies and which ASIIN must observe. These binding regulations stipulate that a Master

program (in this case the double degree programs of RWTH Aachen and Uni Rostock) cannot exceed two years' time in full study mode or 120 Credits. Both elements are violated in the current proposed structure, as the Master not only disposes of a 5-semester structure but also boasts 135 ECTS. In the discussions with the University of Rostock, reference is made to an "experimentation clause", which would theoretically provide a ministerial permission for a 5-semester structure, but as of now, there is no tangible evidence to this regard available.

There is a further issue regarding the legal stipulation, that all parts which are formally part of a study program, need to be credited, which in the current situation is not honored. (more regarding these points can be found under 1.4 of this report).

Another prerequisite is, that there needs to be a documented decision by those bodies within the two German universities, which are formally in charge of officially establishing a new (double degree) study program. At the time of the audit, this formal decision by the Universities/respective Ministries in the two German Länder concerned was not available. During the discussion with the representative of the rectorate of Rostock, it was clearly stated that the process of formally establishing a new study program (in the case of Rostock the double degree program would form part as an additional profile within the existing environmental engineering program) would take up to one year. The only evidence provided has been a decision by the faculty council in charge at the University of Rostock, with the Senate and rectorate thus far not being involved.

Apart from these legal considerations, there are some other points which in the expert´s eyes deserve further attention. During the discussion with student representatives in all four partnering African universities, there was a common wish expressed to change the "set up" of the first two semester at the University in Niger. The expert team agrees with the student´s opinion, that "the one size fits all". approach, obliging all enrolled students to follow the very same curriculum, irrespective of the nature of the preceding Bachelor program as well as the choice of their Master specialization, is not the best way forward. Instead, the experts strongly recommend allowing for more flexibility and introducing a certain number of electives, so that students can avoid duplicating courses which they already have taking in their Bachelor studies, while allowing for a compilation of modules, which are best suited for the specialization they are interested in.

A second observation, uniformly presented by student representatives in interviews at 4 different universities, concerns the block structure of the program mentioned above. The fact that in the first three semesters, students meet their professors only during a short and very intensive phase of two weeks poses considerable challenges for the teaching and learning process, ability for comprehension, preparing for the exams and achieving the

learning outcomes. In some instances, also the language qualifications of staff were cited. Most of these topics will be dealt with under different chapters in this report. Suffice to say, that the ASIIN experts' team before this background suggests reconsidering the exclusive" block structure" with flying faculty and to design instruments to allow for a less stressful and more efficient teaching and learning experience during the first three semester of this study program.

The experts finally have ample evidence that the curriculum is periodically reviewed by stakeholder discussion regarding the implementation of the program objectives and the curriculum. Curricular changes because of this internal QA process are adequately documented.

Criterion 1.4 Admission Requirements

Evidence:

- Study and Examination Regulation
- Admission Rules
- Statistical Data (progression, drop-out rates)

Preliminary assessment and analysis of the experts:
As was mentioned before, the definition of admission requirements and the selection process for the International Master Program in Energy and Green Hydrogen are centrally managed by WASCAL headquarters in Ghana. The review of applicants is conducted by the WASCAL graduate schools located in the partner countries. Applications are grouped geographically and assigned to specific graduate schools for evaluation. The distribution of applications is carried out by WASCAL headquarters.

As regards the admission criteria, eligible candidates for the program are citizens of 15 West African countries, including Benin, Burkina Faso, Cabo Verde, Côte d'Ivoire, Ghana, Guinea, Guinea Bissau, Liberia, Mali, Niger, Nigeria, Senegal, Sierra Leone, Gambia and Togo. Applicants according to the information provided must meet the following requirements:

1. *Academic Qualifications*: A minimum of a bachelor's degree (B.Sc.) or its equivalent in a scientific discipline or engineering, particularly in areas such as physics, (bio)chemistry, electrical or mechanical engineering, or equivalent technical fields.
2. *Age Limit*: Candidates must be no more than 35 years old by the end of December of the recruiting year.

3. *Language Proficiency*: While proficiency in English is an asset, it is guaranteed through a three-month language course provided before the start of the program. This course is included in the WASCAL scholarship and offers English training for Francophone students and French training for Anglophone students, ensuring all participants are adequately prepared.
4. *Commitment to Diversity*: Female candidates are strongly encouraged to apply to foster gender diversity and inclusivity.

As regards the selection process, it includes the following steps:

1. *Development and Advertisement of the Call:* WASCAL develops and harmonizes the call for applications, which is advertised for at least two months.
2. *Initial Screening by WASCAL Graduate Schools:* The WASCAL graduate schools involved conduct an initial review of applications to verify qualifications and shortlist candidates for interviews.
3. *Interview and Evaluation*: Graduate schools of the 4 participating universities interview shortlisted candidates to assess their academic background, English proficiency, and alignment with the program's goals. The interview includes identity verification, evaluation of certificates, and assessment of motivation.
4. *Final Selection and Ratification:* WASCAL headquarters compiles the results, finalizes the list of successful candidates and forwards it to the host universities for ratification.
5. *Scholarship Allocation*: WASCAL headquarters processes scholarships and issues contract letters to successful candidates.

The admission requirements and selection process reportedly are reviewed regularly by WASCAL headquarters in collaboration with the partner universities in West Africa and Germany ensuring that the criteria remain relevant and responsive to the program's goals and the evolving needs of the renewable energy and hydrogen sectors.

In their summative evaluation of this criterion, the ASIIN expert team comes to the following conclusions:

The experts consider the admission process to be highly competitive, many students across West Africa apply for a comparatively small number of study places. During the interviews they learn, that due to political reasons, study places are contingent, country quotas for 15 eligible West African countries (one student per country and specialization track) apply. This can lead to the unfortunate situation, lamented by staff and program coordinators

during the interviews, that some applicants better qualified than others are not selected, because their country of origin has already exhausted its quota.

A second concern voiced during the interviews regards the fact that students are recruited from very different prior Bachelor study programs, entering the program with heterogeneous entry qualifications, which is generally speaking frequently a challenge for any multidisciplinary study program. Especially in view of the first two semesters, this leads to considerable challenges in providing the same modules for students coming with a different disciplinary background. The experts in view of this formulate recommendations to this regard under different perspectives, e.g. introducing a more individualized study format in the starting phase, allowing for more electives and introducing the possibility to take more courses related to one´s chosen specialty. What is reassuring to the experts, however, is the feedback received during the interviews on-site. According to the interviewees, usually from semester 3 onwards, the necessary qualification level of students has been levelled and are considered adequate to successfully graduate from the program. It is also reassuring that almost all enrolled students successfully graduate and usually in the standard period of study except for delays related to the impact of the Corona crisis.

The ASIIN experts overall consider the admission process for the program to be robust, ensuring fairness and alignment with the program's academic objectives. WASCAL's structured framework for defining and reviewing admission criteria, combined with the comprehensive support mechanisms provided to students and further elaborated in subsequent parts of this report, is a suitable basis for students to graduate in a successful and timely manner from the program. They nevertheless recommend reconsidering the rigid country quotas in favor of admitting the most suited students independent of the national heritage. They also see value in opening the program for more students in access for those granted with a full stipend. And finally, for reasons of transparency, they ask the university to publish the admission criteria comprehensively on the websites of the participating institutions.

Criterion 1.5 Workload and Credits

Evidence:

- Module Handbook
- Study and Examination Regulation
- Discussions during the on-site visit

Preliminary assessment and analysis of the experts:

The new curriculum of the IMP-EGH, starting in the winter semester of 2025/2026, is designed with a total workload of 135 ECTS/CP. distributed across five semesters. However,

to maintain alignment with the double degree structure and international accreditation standards, both the African and German partner universities will officially recognize only 120 ECTS toward the master's degree. This decision to offer 135 ECTS but officially recognize only 120 ECTS responds to a requirement from the local West African universities (based on their national LMD system) to comply with their regulations, which stipulate that master's degree programs must be four semesters in length and offer 120 ECTS.

Specifically, RWTH Aachen University and the University of Rostock will only recognize 15 ECTS earned during the first semester at UAM in Niamey as part of the overall credit requirement, while the West African partner universities will only recognize 15 ECTS earned by students during the fourth semester at RWTH Aachen or the University of Rostock. This structure is the proposed solution for the recognized workload to remain within the internationally accepted framework for master's degrees, while allowing students to complete specialized coursework and gain additional knowledge and skills beyond the officially recognized 120 ECTS. The program coordinators argue that this program design avoids formal issues by ensuring that the officially recognized workload aligns with the requirements of both the African and German universities.

The ASIIN expert teams considers this regulation not in line with the legal requirements in Germany and with its own criteria on different accounts:

The stipulation that all compulsory components of the double degree study program are included is clearly violated. Credits are ***not*** awarded for every module based on the respective workload as they should be. In addition, the total number of credits, if this rule was correctly applied, would indeed amount to 135 credits, simultaneously exceeding the number of years (maximum of 2 years for a full-time Master study program) and credits (no more than 120 ECTS), which are defined by German legal stipulations in the "Model Law Ordinance on the State Treaty on Accreditation for Studies" ("Musterrechtsverordnung").

A potential solution could be that some of the introductory courses in the first semester of this double degree courses could be defined as "bridge courses", in analogy to the three-month preparatory language courses offered before the official start of the program. This approach in the experts´ opinion could make sense not only form a formalistic and numerical logic but also take account of the complaint of students in different on-site discussions regarding the uniform curriculum of the first two semester for students from a variety of different Bachelor qualifications. Those e.g., who have graduated from an economics bachelor usually lack basic knowledge in certain STEM fields, whereas those coming with an engineering or a natural science undergraduate study background might have to catch up in more social science, statistics or economic oriented modules.

Whereas the estimated workload is realistic and well-founded, structural peaks in the workload are hard to avoid in a course structure, which in the first three semester relies on flying faculty teaching in two-week block seminars. As was mentioned already, students during the interviews minute that they frequently struggle with the challenge of digesting a maximum amount of information in a minimum of time. The expert team therefore encourages the program coordinators of participating partner university to think about adapting and adjusting the mode of teaching and learning in the program.

Criterion 1.6 Didactic and Teaching Methodology

Evidence:

- Module Handbook
- Results of staff and student surveys
- Discussions during the on-site visit.

Preliminary assessment and analysis of the experts:

During the discussions on-site, the program coordinators and staff from partnering institutions minute, that the didactic approach and teaching methodology of the program are designed to foster deep understanding, interdisciplinary thinking, and practical skills in renewable energy and green hydrogen technologies. Teaching methods are said to be strategically aligned with the program's objectives, supporting both theoretical comprehension and hands-on application in laboratory sessions to meet the competencies outlined in ASIIN standards.

To ensure that teaching staff are well-equipped to apply these methodologies effectively, all instructors have access to ongoing training through the Centre for Teaching and Learning Services at RWTH Aachen University. This access is facilitated by the Memorandum of Understanding signed as part of the program's framework. Additionally, the program's advisory board organizes workshops on, e.g., intercultural communication, which are freely available to all teaching staff.

The program incorporates a blended learning approach, combining traditional lectures with interactive sessions, such as case studies, problem-based learning, and group discussions to engage students actively and applying theoretical concepts to real-world scenarios. Modules such as "Creativity Interactive Virtual Laboratory" and "Theory and Computation of Electrochemical Materials" are structured to include lectures alongside virtual exercises

and lab sessions, where students use simulation software, perform calculations, and engage in group problem-solving activities. These interactive sessions deepen their understanding of complex energy systems and reinforce skills needed for industry and research.

To cultivate analytical and critical thinking skills, the program employs problem-based learning (PBL) in key modules, encouraging students to tackle real-world energy challenges. One of the examples cited is the “Materials, Technologies and Systems for Electrochemical Energy Conversion” course, in the framework of which students are presented with industry-inspired problems that require an integrated application of thermodynamics, chemistry, and engineering principles. Through PBL, students develop collaborative problem-solving abilities and gain practical insights into sector-specific challenges, preparing them for professional roles that require interdisciplinary expertise.

Hands-on learning reportedly is a central component of the curriculum, especially in specialized modules. Laboratory sessions allow students to apply theoretical knowledge in controlled environments, enhancing their technical skills through experimentation and data analysis. Wherever possible, fieldwork is also integrated into the program, giving students exposure to energy systems in real settings. This practical focus is particularly relevant in specializations such as “Photovoltaics for Green Hydrogen Production”, where students work directly with biofuel production processes and hydrogen systems, bridging the gap between academic knowledge and industrial applications.

Given the program’s international and multi-location nature, intercultural competence is embedded within the teaching methodology. Group projects and collaborative assignments are deliberately designed to encourage students from diverse backgrounds to work together, enhancing teamwork and communication skills. During the fourth semester at RWTH Aachen University or Rostock University, students will have the opportunity to collaborate with German and other international peers, fostering an exchange of perspectives and knowledge. This intercultural exposure not only broadens students’ understanding but also prepares them for careers in international and multicultural contexts.

Program coordinators and staff of partnering institutions emphasize the development of research skills essential for the fifth-semester master’s thesis. Independent research projects are progressively introduced, starting with smaller research assignments and building to more complex projects in later semesters. This teaching methodology aspires to promote critical thinking and autonomy by guiding students through literature reviews, experimental design, data interpretation, and academic writing.

The program reportedly supports adaptive learning by incorporating continuous feedback mechanisms. Regular assessments, including quizzes, assignments, and presentations, provide students with formative feedback, enabling them to identify areas for improvement

and adjust their learning strategies. Faculty members also provide personalized guidance, so that students receive support tailored to their academic and professional goals.

The curriculum is said to emphasize problem-based learning, case studies, and laboratory work, bridging theory with hands-on application. For example, the “Sustainable Energy Technologies for Development” module integrates real-world case studies, providing students with direct experience in techno-economic assessment of local energy systems and policy analysis, which reinforces theoretical knowledge with practical application. By the final semester, students are said to be well-prepared for conducting original research in renewable energy and hydrogen technologies.

In their summative evaluation, the ASIIN come to the following conclusions:

The experts take note of the fact that students cum grano salis are satisfied with the quality of teaching and learning. This is supported by student satisfaction surveys signalling a general satisfaction regarding the teaching performance although with some reservations. One concern however regards the language qualifications of some staff members in various specialities and the complaint that some staff especially emanating from French countries are at times struggling with delivering their lecturers in English. During the interviews with these lecturers, they themselves acknowledge this fact and voice to receive more support for their own language capability. Efforts in the realm of language training not only for students, but also staff, should be therefore be intensified and strengthened. The same need applies to fostering practical elements in the program according to feedback received during the interview.

Final assessment of the experts after the comment of the Higher Education Institution regarding criterion 1:

The experts confirm that the objectives and learning outcomes of the degree program are described concisely. They are transparently anchored and published and thus are available to students, lecturers and interested third parties. They are in line with the relevant Subject Specific Criteria of ASIIN and overall provide a suitable basis for a professional activity at level 7 of the EQF).

The expert team concurs, that the program’s name is consistent with the terminology used in the field, in line with industry standards and the expectations of professionals in the energy and sustainability sector. It also aligns with its graduates' intended profile, reflects the intended objectives and learning outcomes, the teaching and learning content as well as the teaching language of the program. Its designation is used consistently in all relevant documents.

The ASIIN expert team commends the program coordinators and the representatives of the partnering institutions for the innovative and revolutionary design of the program. The curriculum of the program is in principle well designed to systematically support the program's objectives and intended learning outcomes. The experts see however room for improvement by putting together short courses with very little ECTS to bigger units. This would contribute to reduce the excessive number of exams and increase a systematic understanding of students enrolled in this program. In the interim, the program coordinators from the RWTH Aachen have submitted a new program structure, which foresees uniform bigger modules of 5 CPs duration each.

One of the findings during the on-site visit has been the need to strengthen the practical elements in the program; currently there are no/not enough internships part of the program, also the Master thesis usually is not conducted in a company, which might be a future option. To address this situation, the ASIIN expert teams recommends the creation of industrial advisory boards in the participating universities of partnering countries. It its response, the program coordinators announce, that they will follow up on this suggestion.

During the audit, the experts identified the following legal barriers for the accreditation of the program. One related to the 5-semester structure, which is not in line with German regulations (the "Model Law Ordinance on the State Treaty on Accreditation for Studies" applies). These binding regulations stipulate that a Master program (in this case the double degree programs of RWTH Aachen and Uni Rostock) cannot exceed two years' time in full study mode or 120 Credits. Both elements are violated in the current proposed structure, as the Master not only disposes of a 5-semester structure but also boasts 135 ECTS. In the discussions with the University of Rostock, reference is made to an "experimentation clause", which would theoretically provide a ministerial permission for a 5-semester structure, but as of now, there is no tangible evidence to this regard available. There is a further issue regarding the legal stipulation, that all parts which are formally part of a study program, need to be credited, which in the current situation is not honored.

In its response, the RWTH Aachen presents new study and examination regulations, which address these concerns, by introducing a 4-semester structure, not exceeding 120 credits, by defining bridge courses as entry requirements. In the new structure, all compulsory modules are now credited.

Another prerequisite for the program to be accredited is a documented decision by those bodies within the two German universities, which are formally in charge of officially establishing a new (double degree) study program. At the time of the audit, this formal decision by the Universities/respective Ministries in the two German Länder concerned was not available. During the discussion with the representative of the rectorate of Rostock, it was

clearly stated that the process of formally establishing a new study program (in the case of Rostock the double degree program would form part as an additional profile within the existing environmental engineering program) would take up to one year. As to the RWTH Aachen, new evidence was presented, with minutes of a meeting of the rectorate, signaling conditional consent.

Apart from these legal considerations, there are some other points which in the expert´s eyes deserve further attention. During the discussion with student representatives in all four partnering African universities, there was a common wish expressed to change the "set up" of the first two semester at the University in Niger. As the original first semester in Niger however is no longer a formal part of the RWTH Aachen curriculum, the experts have no a starting point to follow up. They however request that this new structure is clearly communicated to the third batch of students.

A second observation, uniformly presented by student representatives in interviews at 4 different universities, concerns the block structure of the program mentioned above. The fact that in the first three semesters, students meet their professors only during a short and very intensive phase of two weeks poses considerable challenges for the teaching and learning process, ability for comprehension, preparing for the exams and achieving the learning outcomes. The ASIIN experts' team before this background suggests reconsidering the exclusive" block structure" with flying faculty and to design instruments to allow for a less stressful and more efficient teaching and learning experience during the first three semester of this study program.

The experts finally have ample evidence that the curriculum is periodically reviewed by stakeholder discussion regarding the implementation of the program objectives and the curriculum. Curricular changes because of this internal QA process are adequately documented.

The ASIIN experts overall consider the admission process for the program to be robust, ensuring fairness and alignment with the program's academic objectives. WASCAL's structured framework for defining and reviewing admission criteria, combined with the comprehensive support mechanisms provided to students and further elaborated in subsequent parts of this report, is a suitable basis for students to graduate in a successful and timely manner from the program. They nevertheless recommend reconsidering the rigid country quotas in favor of admitting the most suited students independent of the national heritage. They also see value in opening the program for more students in access for those granted with a full stipend. And finally, for reasons of transparency, they ask the university to publish the admission criteria comprehensively on the websites of the participating institutions.

Whereas the estimated workload is realistic and well-founded, structural peaks in the workload are hard to avoid in a course structure, which in the first three semester relies on flying faculty teaching in two-week block seminars. As was mentioned already, students during the interviews minute that they frequently struggle with the challenge of digesting a maximum amount of information in a minimum of time. The expert team therefore encourages the program coordinators of participating partner university to think about adapting and adjusting the mode of teaching and learning in the program.

The experts take note of the fact that students cum grano salis are satisfied with the quality of teaching and learning. One concern however regards the language qualifications of some staff members in various specialities and the complaint that some staff especially emanating from French countries are at times struggling with delivering their lecturers in English. Efforts in the realm of language training not only for students, but also staff, should be intensified and strengthened. The same need applies to fostering practical elements in the program.

2. Exams: System, Concept and Organization

Criterion 2 Exams: System, Concept and Organisation

Evidence:

- Module Handbook
- Exam Regulation
- Samples of Master theses and exams provided to the expert team
- Discussions during the on-site visit
- Survey Results

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Preliminary assessment and analysis of the experts:

As regards the examination system in place for the study program under review, there are a variety of examination formats in place to assess students' performance of theoretical knowledge, technical skills, and practical application across diverse aspects of renewable energy and green hydrogen technologies. Exams and assessments reportedly are structured to align with the program's intended learning outcomes, covering a range of skills from foundational understanding to analytical skills, and specialized competencies essential for the energy sector.

Types of exams (with possible alternatives) are specified for each course in the module handbook. Students confirm to be informed about the conditions for completing the module (coursework, exams etc.) latest at the beginning of the module. There are transparent rules for make-up exams, non-attendance, cases of illness as well as compensation of disadvantages in the case of students with disabilities or special needs (e.g. pregnancy, childcare, caring for relatives) in the making (see below), but they still need to be formally passed prior to the commencement of the double degree program at the end of this year.

Written exams are the primary assessment method for core and specialized theoretical modules, such as “Physics of solids and fluids: Physics of solids” and “Power System Modelling, Simulation and Control”. These exams typically include a combination of multiple-choice questions, short-answer questions, and problem-solving tasks, evaluating students’ grasp of core principles and their ability to apply theoretical knowledge in structured, time-limited settings.

Modules with practical components, such as “Renewable Energy: Solar Energy”, “Renewable Energy: Wind Energy”, or “Photovoltaics I: Photo-electrochemistry fundamentals”, incorporate laboratory reports and practical assessments to gauge students’ hands-on skills. Practical assessments according to staff and program coordinators not only test technical proficiency but also critical skills in data analysis and experimental documentation, directly applicable to real-world scenarios.

In project-based modules, such as “Sustainable Energy Technologies for Development”, students undertake group projects that address complex, interdisciplinary energy challenges. These projects require collaborative problem-solving, research, and presentation skills, encouraging students to apply their knowledge in realistic contexts. Project assessments typically involve both written reports and oral presentations, assessing the ability to communicate complex technical information effectively.

Oral presentations are used in modules like “Green Hydrogen: Concept of Power-to-X” or “Fundamental of Scientific Research and Research Methodology: Social Statistics, Measurement Scaling for Field Research” to assess students’ communication skills and depth of understanding. In these assessments, students present their solutions to case studies, demonstrating their ability to analyse data, propose solutions, and defend their approaches. This format also enhances students’ skills in explaining technical information to both specialized and non-specialized audiences.

The master’s thesis, completed during the fifth semester, allows students to apply the knowledge and skills acquired throughout the program to a research topic within their specialization. Students begin developing their thesis topics during the third semester, their specialization semester. This coincides with courses on research methodologies, which

equip them with the skills needed to formulate research questions and design studies. Topics can be either suggested by teaching staff based on ongoing research activities or self-proposed by students based on their research interests. During topic development, students are supported by staff from their host universities, which depend on their specialization. Faculty members provide feedback to refine research questions and ensure feasibility

If a student selects a topic suggested by a faculty member, that faculty member automatically becomes one of the supervisors. For self-proposed topics, supervisors are proposed by the student and confirmed by the host university. Each thesis is co-supervised by two faculty members, one from the German partner university, and one from the corresponding West African partner university, ensuring regional relevance and interdisciplinary collaboration. Students and supervisors meet several times throughout the semester, but at least once every 4-6 weeks. These meetings are used to report on progress, discuss challenges, and address open questions.

At least three progress reports are submitted (usually in the form of short presentations but the format can vary depending on the supervisors' preferences) during the thesis semester, detailing ongoing work and addressing feedback from supervisors. The final thesis must be submitted both digitally and in printed form before the agreed deadline.

Each student's host university, depending on their specialization, appoints a thesis defence evaluation committee. This committee includes representatives from both the German and West African universities. Students present and defend their thesis findings before the evaluation committee. This includes a presentation of the research and a question-and-answer session. The committee evaluates the thesis based on predefined criteria, such as originality, research quality, methodological rigor, and the student's ability to articulate and defend their findings. The evaluation committee grades both the written thesis and the oral defence. Discrepancies between the supervisors' evaluations are resolved through discussion or by averaging the grades.

Specific study regulations provide details about the legal conditions and policies applicable to examinations. These regulations are currently being reviewed by all partner institutions and come into effect before the start of the winter semester 2025/2026. The problem to be solved is related to the fact, that in a number of partnering universities, this programs fall under the general examination regulations and it has to be made sure, that the subsequently enumerated stipulations apply in all HEIs, which are part of this Master program.

Among the most important program-specific regulations figure the following provisions:

The program allows re-sits for students who fail an exam or miss it due to illness. Students with disabilities or chronic illnesses may request accommodations, such as additional time for exams, to ensure fair assessment conditions.

Assessment criteria are made transparent to both students and teaching staff. At the latest during the first lecture of each module, instructors outline the exam format, expectations, and relevant regulations. Detailed exam forms and criteria are provided in advance, ensuring all participants understand the structure and requirements for each assessment.

As regards the aspect of academic integrity, the study program under review follows RWTH Aachen's guidelines and policies on academic honesty, including regulations on plagiarism and fraud ("Leitlinien und Verfahren zur Sicherung guter wissenschaftlicher Praxis"). These policies are communicated to students during the "Research Methods" module and reinforced throughout their master's thesis writing process.

During the on-site visit, it is communicated that Exam scheduling, correction timelines, and re-sits have not negatively affected student progress in the program. The alignment of exams with learning objectives is regularly evaluated through end-of-course student feedback forms. These evaluations assess whether exams accurately measure students' achievement of the intended learning outcomes and provide insight into any improvements needed in exam design. Feedback also covers whether students feel they had sufficient preparation time, enabling the program to adjust exam preparation periods as necessary.

In its summative evaluation of the examination system, the ASIIN experts come to the following conclusions:

The experts acknowledge that the program under review is currently in a transition phase with the new structure taking effect for the coming winter semester. They kindly request that the draft of the program specific examination regulation is finalized and officially passed by the responsible bodies of all universities, which participate in the delivery and execution of this double degree program. If participating universities are relying on their own general study regulations, WASCAL in cooperation with all partners must make sure that the individual stipulations of this program specific examination regulations are fully observed.

During the interview with different stakeholders, some additional points are brought to their attention: Regarding the process of identifying topics for the Master thesis, it is reported that until now the topics are primarily proposed by the German partners, which has a certain logic, as all Master theses are prepared and written during the final stage of the study program in Germany. African students and staff alike would however appreciate, if

the choice of topics would reflect to a greater degree the “African environment”, topics which are of relevance to West Africa.

Regarding the achievement level, the expert team reviews a representative sample of final student work during their on-site visits at various locations. They find that not all of it reach the desired qualification EQF level 7. Efforts should therefore be increased to make sure that the Master thesis in all instances represents a piece of independent, scientific research at the forefront of the discipline.

Another concern of students relates to the common practice to have exams immediately after the end of the “block courses” during the first three semesters. They would appreciate if there was always enough time to digest the bulk of information provided in these block modules and allow for sufficient time of preparation.

Finally, the expert team is concerned with the exceeding number of exams for students enrolled in the program. This point is closely connected to their remarks regarding the module structure, which consists of multiple small courses of 2-3 ECTS, each of which ends with its own examination. The experts recommend integrating these small-scale courses to bigger units and introducing examinations rather on the level of the modules, thereby alleviating the examination burden of students.

Final assessment of the experts after the comment of the Higher Education Institution regarding criterion 2:

The expert request that the draft of the program specific examination regulation is finalized and officially passed by the responsible bodies of the universities, which participate in the delivery and execution of this double degree program. If participating universities are relying on their own general study regulations, WASCAL in cooperation with all partners must make sure that the individual stipulations of this program specific examination regulations are fully observed.

Regarding the process of identifying topics for the Master thesis, the experts recommend that the choice of topics reflects to a greater degree the “African environment”, topics which are of relevance to West Africa.

Regarding the achievement level, the expert team reviews a representative sample of final student work during their on-site visits at various locations. They find that not all of it reach the desired qualification EQF level 7. Efforts should therefore be increased to make sure that the Master thesis in all instances represents a piece of independent, scientific research at the forefront of the discipline.

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In its response to this query, the RWTH Aachen has in the interim changed the module structure of the program, thereby signaling its commitment to reducing the number of exams per semester.

3. Resources

Criterion 3.1 Staff and Development

Evidence:

- Staff Handbook
- Student-Staff Ratio
- Status of Research Activities.
- Continuous Professional development of Staff
- Survey Results
- Discussion results with different stakeholders on-site.

Preliminary assessment and analysis of the experts:
During the interview, the program coordinators minute, that teaching staff for the Master program is carefully selected to ensure a dynamic interdisciplinary, and well-qualified team. The diverse expertise of the staff spans engineering, material sciences, chemistry, biochemistry, natural sciences, and economics, enabling the program to meet the complex demands of renewable energy and green hydrogen technologies through a comprehensive curriculum.

To maintain high educational standards and keep up with evolving industry trends, the program prioritizes professional development for its teaching staff. Each partner university in West Africa and Germany offers staff development opportunities. Furthermore, a Memorandum of Understanding between RWTH Aachen University, Research Centre Jülich, the

University of Rostock, WASCAL, and the four West African partner universities ensures access to additional professional development opportunities, which include:

- Pedagogical Development: Online and in-person workshops on innovative teaching methodologies and student engagement strategies, ensuring accessibility for all teaching staff, including those in remote locations.

- Intercultural Communication: Specialized workshops designed to enhance teaching staff's ability to work effectively in diverse, multicultural settings. These are particularly relevant to the program's international and interdisciplinary nature.

- Research Development: Sessions focused on publishing research, securing funding, and conducting collaborative research projects with industry and government stakeholders.

Many of these workshops and seminars are offered online, ensuring accessibility for faculty members from all partner institutions, including those in West Africa. The experts are provided with a sample of certificates evidencing the diverse development opportunities undertaken by staff from UAM only but would appreciate if similar evidence was presented for all local partner universities. There is mention of an upcoming intercultural training session, organized by Research Centre Jülich, available to all African and German staff involved in the program.

The recruitment of teaching staff at the four African partner universities reportedly follows a rigorous process to ensure candidates meet the academic and professional requirements necessary for the program's success. Staff accordingly must hold advanced degrees (Ph.D. or equivalent) in relevant fields such as renewable energy, green hydrogen technologies, or related disciplines. They must equally demonstrate adequate research capabilities, including a strong publication record in peer-reviewed journals or substantial contributions to industry-relevant projects. Finally, the must dispose of prior experience in higher education teaching, with a preference for innovative teaching methodologies and interdisciplinary instruction.

Teaching staff are subject to regular evaluations to ensure their alignment with the program's objectives and academic standards. These assessments include:

- Research Activities: Faculty members are encouraged to maintain an active research profile, with periodic reviews of their publications, research projects, and industry collaborations. While specific publication quotas are not mandated, faculty are expected to contribute meaningfully to the academic discourse in their fields.

- Teaching Effectiveness: Student evaluations, conducted at the end of each module, provide feedback on teaching quality, course delivery, and content relevance. This feedback is reviewed by program coordinators to identify areas for improvement.

- Professional Engagement: Faculty participation in workshops, conferences, and collaborative projects is monitored to ensure they remain at the forefront of developments in renewable energy and hydrogen technologies.

Guest lecturers are carefully selected for their expertise and subject matter relevance. Their contributions are regularly evaluated based on feedback from students, alignment with the module handbook, and observation by program coordinators. Should a guest lecturer's performance not meet the program's standards, targeted feedback and support are provided to address the issues. In cases of repeated non-compliance, the program may decide not to re-engage the lecturer.

In their summative evaluation of this criterion, the experts come to the following conclusions:

Based on the information provided in the staff handbook and a result of their interviews at all partnering institutions, they rate the composition, professional orientation and qualification of the teaching staff overall as suitable for successfully delivering the degree program under review. The research and development of the teaching staff contributes to the desired level of education. The results of student survey and from the discussion on site at various locations signal with few exceptions general satisfaction as far as quality of teaching and learning in the IMP-EGH is concerned.

The experts confirm that there are quality assurance mechanisms in place, which regularly review, whether the subject-specific and didactic qualifications of the lecturers contribute adequately to the delivery of the degree program.

Lecturers on first sight do have opportunities to develop their professional and didactic skills and are supported in using corresponding offers.

This verdict comes however with a certain number of reservations:

The experts request that African partner universities (apart from UAM) also present evidence on the professional development of their respective staff.

Some of the interviewed lecturers (especially from a French speaking educational environment) request further support for promoting their own language skills.

Most African colleagues in addition would appreciate the chance to visit Germany to engage face-to face with their German peers; thus far most of the interaction takes place online. The exports therefore recommend addressing these requests proactively.

Criterion 3.2 Student Support and Student Services

Evidence:

- Interview with Students
- Results of Student Surveys

Preliminary assessment and analysis of the experts:
According to the information provided in the Self-Assessment documentation and during the interviews, the Master program under review offers a range of student support services at various stages of the academic life cycle:

Prospective students accordingly receive detailed guidance on admission requirements and application processes, ensuring they are well-prepared to begin the program. If applicable, the selection committee identifies potential gaps in candidates' foundational knowledge during the admission process. Tailored preparatory courses may be offered to address identified gaps. All students participate in comprehensive orientation sessions that introduce them to the program's structure, academic expectations, and resources prior to studying in different countries. Special attention is devoted to preparing African students for their stay in Germany. Regarding continuous academic support, all students have access to academic advising, workshops, and tutoring throughout the program. There are study groups and peer-/alumni support networks in place, which foster collaborative learning.

Based on the information gathered on site during the interviews, the experts find that academic advising and mentorship are effective in supporting academic success. Students receive ongoing guidance from program advisors who assist them with academic challenges, and personal development goals. Often, thesis supervisors act as faculty mentors, available to offer personalized support, particularly as students approach complex projects or thesis work. The experts commend the program coordinators and staff for creating close bonds with their students. In terms of career counselling and listening to the interviewed students however, the partnering universities are encouraged to increase their efforts.

While they find the support system to be robust, the experts take note of the fact, that some stakeholders, including students express a desire for more formalized internship

placement assistance to facilitate hands-on experience in the field. Due to resource constraints and difficult economic conditions, establishing a formal internship placement program remains challenging. Nevertheless, the expert group encourages all initiatives to further explore partnerships with industry stakeholders and to expand hands-on learning opportunities for future cohorts. The establishment of industrial advisory boards recommended in prior parts of this report would assist in reaching these goals.

Overall, sufficient human resources and organisational structures are available for individual subject-specific and general counselling, supervision and support of students as well as administrative and technical tasks. The allocated advice and guidance (both technical and general) on offer assist the students in achieving the learning outcomes and in completing the course within the scheduled time.

Criterion 3.3 Funds and equipment

Evidence:

- Information provided by the SAR
- Financial Agreements
- Discussions on-site

Preliminary assessment and analysis of the experts:

The program is supported by substantial funding and well-equipped facilities that ensure the effective delivery of its academic and research components. The program benefits from financial resources allocated through German government grants, institutional support and partnerships with both West African and German institutions, allowing students to have adequate educational resources, laboratory equipment, and research facilities throughout the program.

The program in the past has been primarily funded by the Federal Ministry of Education and Research (BMBF) of Germany and supported by partner institutions in both Germany and West Africa. This funding model since 2013 (when the first Ph.D. programs were funded), at since 2021 (for the first two batches of Master students) until now has provided a reliable financial base that covers operational expenses, including faculty salaries, lab maintenance, and full student stipends. For the incoming first batch of students to be enrolled in the new double degree program, German government funds until now only cover expenses until 2026/2027. The expert team is informed that in anticipation of future funding needs, the program partners have proactively established a working group dedicated

to securing additional funding sources, including grants from the German Academic Exchange Service (DAAD), the European Union, and industry partnerships. The working group is composed of representatives from partner institutions. During the interviews with WASCAL representatives, there is also mention of a request of the West African Council of Ministers to make provisions and quotas for additional scholarships, but thus far no concrete action has materialized.

As regards the available infrastructure, thanks to the ongoing support by the BMBF and the support from German institutions such as RWTH Aachen University, University of Rostock, and Science Centre Jülich, all students are provided with a computer and the necessary software. The program leverages well-equipped laboratories, providing the basis that students receive hands-on experience in renewable energy and green hydrogen technologies. Key facilities include:

- Photovoltaics and Renewable Energy Laboratories: With equipment such as solar simulators and PV cell testers in Niamey and Jülich, these laboratories support particularly the modules within the specialization “Photovoltaics”, allowing students to conduct experiments related to solar energy conversion and efficiency analysis. This hands-on component reinforces theoretical knowledge with practical experimentation.

- Green Hydrogen and Fuel Cell Laboratories: The green hydrogen laboratories in Jülich and Aachen are equipped with electrolyzers, hydrogen storage systems, and fuel cells, supporting modules in, e.g., the specialization “Green Hydrogen Production and

Technology”. These facilities provide a controlled environment for students to develop technical competencies directly applicable to the green hydrogen industry.

- Bioenergy and Environmental Engineering Labs: Bioenergy-focused laboratories in Togo and Rostock support practical work in modules within the specialization of “Bioenergy/Biofuels”. Students gain experience with biofuel production processes, emissions monitoring, and feedstock analysis, bridging academic knowledge and real-world application.

- Computing and Simulation Facilities: High-performance computing resources and specialized software (e.g., MATLAB, HOMER Pro, SimaPro, etc.) available through RWTH Aachen University and/or the University of Rostock enable students to undertake complex modelling and system analysis in modules like “Sustainability Assessment Methods and Tools for Energy and Emerging Technologies”. Access to these computational tools is essential for training in energy system optimization, sustainability assessments, and scenario analysis.

Students in the program benefit from access to a range of library resources across the partner institutions, including digital access to journals, databases, and specialized publications relevant to renewable energy and green hydrogen. The academic support provided by RWTH Aachen and the University of Rostock also broadens students' access to internationally recognized academic content, supporting independent research and coursework.

While there is currently no dedicated fund for equipment upgrades and regular maintenance procedures beyond regular institutional budgets, partner institutions ensure that core laboratory facilities and equipment remain functional and state-of-the-art. Technical staff is trained to maintain equipment according to institutional safety and quality standards, supporting the program's practical and research components. The working group's efforts to secure additional funding partners also encompass plans for future investment in laboratory and technical resources, which would enhance the program's practical training capabilities.

The expert team acknowledges the proactive attempts aims to secure financial contributions from a range of new sources, thereby mitigating reliance on a single funding body and promoting financial resilience. Currently, the heavy reliance on German BMBF government spending, paying among other things for full stipends of students and staff salaries, is an area of concern to the experts, as there is no guarantee that this will continue in the future. During the virtual visit at the University of Rostock, the expert learns, that only in July, the BMBF will decide whether it is going to provide funding for the third batch of students for a period of three years.

The experts appreciate that the program coordinators have established a proactive diversified funding strategy to sustain its quality and growth. By leveraging institutional resources and pursuing additional financial partnerships, the program aims to provide stable, high-quality facilities and equipment. During their interviews with ministry and WASCAL representatives, they also find, that thus far the engagement of African countries is not substantiated by solid, written commitments, but thus far are rather lip services. They point to the insecurities surrounding a new German government with unknown spending priorities. In view of the ASIIN requirement, that the funding of a program including funding for equipment upgrades and regular maintenance procedures needs to be secured for the entire duration of the accreditation (for a maximum duration of five years in other words, as this is not a reaccreditation procedures with a duration of 7 years), they request further guarantees that the program can be fully substantiated beyond 2026 and that the announcements of West African governments to step up their financial support is adequately documented.

During the audit in Rostock, there is also mentioning of the plan, to bring the Technical University of Berlin as an additional partner on board. The (financial) impact of this potential plan however still needs to be substantiated.

Final assessment of the experts after the comment of the Higher Education Institution regarding criterion 3:

The experts rate the composition, professional orientation and qualification of the teaching staff overall as suitable for successfully delivering the program.

The experts confirm that there are quality assurance mechanisms in place, which regularly review, whether the subject-specific and didactic qualifications of the lecturers contribute adequately to the delivery of the degree program. Lecturers do have opportunities to develop their professional and didactic skills and are supported in using corresponding offers.

The experts request that African partner universities (apart from UAM) also present evidence on the professional development of their respective staff.

The experts demand that all lecturers (especially from a French speaking educational environment) are in full command of the English language.

They furthermore recommend increasing staff exchange opportunities for African staff.

The expert team acknowledges the proactive attempts aims to secure financial contributions from a range of new sources. Currently, the heavy reliance on German BMBF government spending, paying among other things for full stipends of students and staff salaries. During the virtual visit at the University of Rostock, the expert learns, that only in July, the BMBF will decide whether it is going to provide funding for the third batch of students for a period of three years. The expert team requests further guarantees that the program can be fully substantiated and that the announcements of West African governments to step up their financial support is adequately documented.

4. Transparency and Documentation

Criterion 4.1 Module Descriptions

Evidence:

- Module Handbook

Preliminary assessment and analysis of the experts:
As part of the Self-Assessment Report, the program coordinators provide the expert team with a detailed module handbook containing information on the following data:

- Module Title: Clearly defined titles that succinctly represent the content and focus of each module.
- Duration and Validity: Time required to complete the module and the version (i.e., validity) of the information provided in the module description.
- Content: Detailed descriptions of the topics and content covered within each module, providing a comprehensive understanding of the subject.
- Learning Outcomes: Clearly articulated learning objectives, outlining what students are expected to achieve upon completing the module.
- Knowledge Requirements: Indication of any prerequisite courses that students should have completed before taking the module, or fundamental concepts and theories that students are expected to be familiar with before delving into the module.
- Literature: A curated list of literature recommended for further reading, supporting students in expanding their knowledge on the module topics.
- Responsible Person(s): Identification of the individuals responsible for the module, ensuring clear points of contact for both students and staff.
- Credits and Workload: Transparent information regarding the credit/ ECTS allocation and expected workload, aiding students in planning their academic commitments.
- Form(s) of Examination and Grading: Explicit details on the forms of examinations utilized, along with explanations of how module grades are calculated, fostering transparency in assessment procedures.
- Form(s) of Teaching: Detail of the methods employed in the delivery of the module, offering insights into the instructional approach.

The experts affirm, that the module handbook is accessible to all students via each partner institution’s learning management system and is updated regularly to reflect any adjustments in curriculum or assessment methods. This transparency supports students in academic planning and in understanding the expectations and requirements associated with each module.

While in principle also acknowledging the informative quality of the module handbook, the experts see room for improvement/ask for revision in the following area:

The experts ask to pay renewed attention to clearly defining the prerequisites for enrolling in a course, especially for those starting with the third semester. They expect, that writing the Master thesis is added as a compulsory course to the module handbook with clearly defined learning outcomes and level of achievement.

Criterion 4.2 Diploma and Diploma Supplement

Evidence:

- Sample of Diploma Supplements

Preliminary assessment and analysis of the experts:
The program coordinators minute, that thus far no diploma supplements have been provided until now due to the transition to a double degree format only at the end of the year. They announce that future graduates starting with the student cohort of winter semester 2025/2026 upon successful completion of the program will receive a complete documentation package, including the diploma, diploma supplement, and transcript of records. This documentation aligns with European standards, enhancing the international portability and recognition of the degree. It also reflects the program's commitment to transparent and comprehensive academic records as the program transitions to a formal double-degree structure. A sample of the diplomas and future diploma supplements granted after completing the program and the specializations have been submitted to the experts, which have no further comments.

Criterion 4.3 Relevant Rules

Evidence:

- Relevant Study Regulations

Preliminary assessment and analysis of the experts:
In preparation for the program's transition to a double-degree format, the program has developed and submitted to the experts a comprehensive set of study regulations that standardize academic standards, degree requirements, and assessment policies across partner institutions. These regulations provide a cohesive framework that in the view of the applicants aligns with ASIIN accreditation criteria, ensuring consistent quality and clear academic guidelines for all students, regardless of their location or host institution.

These study regulations establish unified criteria for program completion while allowing for flexibility to respect the autonomy of each partner institution. This balance enables each partner to adhere to its institutional policies while maintaining a shared commitment to

the quality and objectives of the program. These regulations also ensure that all relevant course-related information is available in the program's primary language – English – and accessible to all stakeholders, including students, faculty, and administrative staff.

To ensure the continued relevance and accuracy of these regulations, program coordinators at RWTH Aachen University, Science Centre Jülich, WASCAL, and the University of Rostock are tasked with regularly reviewing and updating all related documents. This process ensures that any changes in academic or accreditation standards are promptly addressed, maintaining alignment with ASIIN requirements.

The ASIIN expert teams notes that some of these regulations are currently under review by all partner institutions and are scheduled to come into effect before the launch of the double-degree program in the winter semester of 2025/2026 and expects that the final version is formally passed prior to the commencement of the new double degree program.

They also request that all information, documents and regulations related to the start of this new program are transparently documented on the websites of the degree awarding German and ideally also on the websites of the African partners.

Final assessment of the experts after the comment of the Higher Education Institution regarding criterion 4:

The experts affirm, that the module handbook is accessible to all students via each partner institution's learning management system and is updated regularly to reflect any adjustments in curriculum or assessment methods. This transparency supports students in academic planning and in understanding the expectations and requirements associated with each module. While in principle also acknowledging the informative quality of the module handbook, the experts see room for improvement/ask for revision in the following area. The experts ask to pay renewed attention to clearly defining the prerequisites for enrolling in a course, especially for those starting with the third semester. They expect, that writing the Master thesis is added as a compulsory course to the module handbook with clearly defined learning outcomes and level of achievement.

In its response, the RWTH Aachen presents a revised version of the module handbook, addressing the concerns of the experts.

The ASIIN expert teams notes that important regulations are currently under review by all partner institutions and are scheduled to come into effect before the launch of the double-degree program in the winter semester of 2025/2026 and expects that the final version is formally passed prior to the commencement of the new double degree program.

They also request that all information, documents and regulations related to the start of this new program are transparently documented on the websites of the degree awarding German and ideally also on the websites of the African partners.

5. Quality management: quality assessment and development

Criterion 5 Quality management: quality assessment and development

Evidence:

- Results of Internal and External QA instruments.
- Sample of minutes of QA related meetings

Preliminary assessment and analysis of the experts:
The IMP-EGH Master program reportedly employs a structured quality management system based on the Plan-Do-Check-Act (PDCA) cycle to ensure the program meets academic standards, aligns with industry requirements, and supports students' academic and professional growth. This system has been implemented to promote continuous improvement based on feedback and measurable outcomes from students, faculty, and stakeholders.

The program partners use a broad range of QA instruments related to the assessment of curriculum delivery, instructional quality, and student outcomes. They include:

- **Standardized Course Evaluations**: At the end of each module, students provide feedback on content, instructional methods, workload, and assessment fairness. Until now, feedback collection methods varied - UAM in Niger used Google Forms, while UCAD in Senegal relied on printed forms. Moving forward, and with the transition to a double-degree program, evaluations will use the standardized forms from RWTH Aachen University or University of Rostock (for Bioenergy specialization). This unified approach hopefully will contribute to the compatibility of feedback across all partner institutions. A sample of evaluation forms is provided to the expert team.

- **Student Feedback Sessions**: Conducted at the end of the program, these sessions allow students to provide detailed input on their overall academic experience, workload management, and support services.

- **Alumni Surveys and Employment Tracking**: Alumni feedback is collected via dedicated surveys that include questions about professional development, employment loca-

tions, and the sectors where graduates work. To date, one alumni survey has been conducted, providing insights into the program's impact on graduates' careers and its relevance to the labour market. Furthermore, an alumni network has recently been established and is maintained by alumni hired as Research Assistants at the Chair of Management Accounting at RWTH Aachen University. These alumni actively reach out to graduates for updates on their career paths, further enriching the program's understanding of its outcomes. A summary of the results from the alumni survey is presented to the experts.

- **Stakeholder Consultations**: Consultations reportedly occurred monthly to bi-monthly during the first batch of the program. These sessions, organized primarily by Research Centre Jülich and/or WASCAL headquarters, take the form of online meetings with participation from representatives of all partner institutions, ensuring collective input into program development. Based on findings from evaluations and consultations, program coordinators and representatives from partner institutions meet to review results and develop targeted action plans for improvement.

Teaching staff and executive management at partner institutions regularly evaluate the program's quality assessment practices. Faculty use structured feedback mechanisms, such as student evaluations and stakeholder consultations, to refine teaching methods and align content with emerging industry needs. The program committee ensures that stakeholder input translates into actionable changes.

Stakeholders' involvement, including the advisory board, alumni, and industry and government partners have vastly contributed to the new curricular design/features of the double degree program, including the addition of an additional semester, new modules, improvements in research preparation etc.. These results demonstrate the program's responsiveness to labour market demands and its focus on enhancing graduate employability. Alumni testimonials highlight the program's effectiveness in fostering professional success.

The program's quality management approach incorporating feedback loops and responsive adjustments to address emerging needs. According to the interviewees. the program committee will continue to monitor the effectiveness of recent changes, including the transition to a double degree program, the integration of new modules, and the addition of the research preparation semester. Future improvements will be based on ongoing evaluations and alignment with ASIIN accreditation standards to ensure that the program consistently delivers high-quality, outcome-oriented education in renewable energy and green hydrogen.

The ASIIN experts in their appreciation of this criterion acknowledge the existence of a QA system in place, based on the PDCA cycle, which entertains a considerable number of

QA instruments generating a considerable amount of data. During the audit, they have repeatedly witnessed promising examples of a proactive approach to academic excellence, aligning curriculum and instructional strategies with the evolving needs of students, industry, and the global energy sector. These efforts after all resulted in the new set up of the IMP-EGH, to be launched at the end of the year. The experts also appreciate, that in the future standardized forms from RWTH Aachen University or University of Rostock (for Bioenergy specialization) will be implemented and used by all partnering institutions enhancing the compatibility of feedback across all partner institutions

The expert team nevertheless identifies room for improvement regarding the challenging and complicated *institutional set-up* of quality structures in this multinational, multicampus program. The experts understand that the overall responsibility for QA is vested with WASCAL in Ghana, contracted and charges with designing the QA system and instruments as well as collecting the rich feedback generated by the responses to questionnaires in the 6 participating universities. There is however no central governing QA board in place, in the framework of which a *specifically assigned WASCAL officer* in charge of this program regularly convenes with the program coordinator of the 6 participating universities to discuss and follow up on the outcomes of the manifold QA instruments.

After conducting the interviews with central WASCAL management as well as the QA units in the partner organization, the experts therefore see a need for and value in restructuring the institutional management of the QA assurance, personalizing and streamlining the responsibility within WASCAL in close cooperation with a QA steering committee, consisting of the 5 program coordinators/QA leaders. This in their view would greatly enhance the future development of the program under review.

Final assessment of the experts after the comment of the Higher Education Institution regarding criterion 5:

The ASIIN expert team confirms the existence of a QA system, based on the PDCA cycle, which entertains a considerable number of QA instruments generating a considerable amount of data. The experts also appreciate, that in the future standardized forms from RWTH Aachen University or University of Rostock (for Bioenergy specialization) will be implemented and used by all partnering institutions enhancing the compatibility of feedback across all partner institutions

The experts understand that the overall responsibility for QA is vested with WASCAL in Ghana, contracted and charges with designing the QA system and instruments as well as collecting the rich feedback generated by the responses to questionnaires in the 6 partici-

pating universities. There is however no central governing QA board in place, in the framework of which a *specifically assigned WASCAL officer* in charge of this program regularly convenes with the program coordinator of the 6 participating universities to discuss and follow up on the outcomes of the manifold QA instruments.

The experts therefore see a need for and value in restructuring the institutional management of the QA assurance, personalizing and streamlining the responsibility within WASCAL in close cooperation with a QA steering committee, consisting of the 5 program coordinators/QA leaders.

In their response, the program coordinators of RWTH Aachen indicate that this suggestion will be implemented and that a recruitment drive for a WASCAL coordinator will be launched.

D Additional Documents

Before preparing their final assessment, the panel ask that the following missing or unclear information be provided together with the comment of the Higher Education Institution on the previous chapters of this report:

- Establishment Decision (Einrichtungsbeschluss) of RWTH Aachen and University of Rostock and/or authorization of Länder ministries regarding the formal launch of the program
- Results of the second Tracer Study
- Documentation of the participation of staff in continuous education courses
- Strategic Plan
- Financial Plan
- Comment of the Higher Education Institution (30.05.2025)

On the 30th of May, the RWTH Aachen submits a detailed response with additional information and pieces of evidence.

It is announced, that among pending evidence to be submitted will figure

- A second tracer study will be handed in by March 2026
- Rostock study Regulations will be handed in by December 2025
- A list of mapped partners willing to participate in the Industrial Advisory Board will be submitted.
- A staff enrolment option will be submitted by May 2026
- That defined eligibility criteria will be submitted by January 2026
- That a documented Personal Development framework will be submitted by December 2026
- Attendance certificates/logs for professional development courses will be submitted by June 2025.
- Weg links to the corresponding sites will be submitted once live by October 2025
- A WASCAL QA officer appointment will be submitted by December 2025
- A Strategic Plan will be submitted by December 2025.

In addition, a small survey on career aspirations, conducted in Aachen on March 18th is handed in. According to the data provided by 33 participants, among the top career choices (multiple answers possible) figure the wish to continue in a PhD program and/or become

an employee at a research institute or in a company/industry. Around one third envisage becoming an entrepreneur, a small minority foresees a political career.

As a further document, a list of topics for Master theses I provided.

As regards the module handbook, the program coordinator of RWTH Aachen submits an addendum to the module handbook, in which the Master thesis is identified as a separate module with learning outcomes for the 4th semester.

In addition, program specific study regulations are handed in for the IMP-EGH) In this draft, a four-semester structure is fixed. The program has been restructured and now contains 5 CP modules per semester, merging all “micro-courses” and crediting a total of 120 CPs over four semesters. The initial 15 CP of fundamental courses are defined as formal entry requirements for the program but are credited as part of the first semester worksload at partner institutions.

New study plans for the various specializations (Track: Economics, Policies and Infrastructure, Photovoltaics, Energy Systems Analysis, Georesources, Green Hydrogen Production and Technology are handed in. Also, new entrance qualifications are defined in the area of Physics Thermodynamics and Electrochemistry with at least 5 CP each). The experts observe that in the document, a date of publication in the “Amtliche Bekanntmachung” der RWTH Aachen is however missing as is the signature of the Rector.

Furthermore, the RWTH Aachen hands in the minutes of the faculty council dated April 9th, 2025, in which it is denied that the faculty must invest additional resources and in which the program specific study regulations are passed. Further minutes are provided from a meeting of the RWTH Aachen rectorate, dating May 7th, in which consent to the further development of the study program is signalled under the condition that several points (which are not mentioned in the minutes) are clarify and that further discussions with faculties are conducted. It is also mentioned that in the future the name IMP-EGH should no longer be used within the RWTH Aachen.

As regards the University of Rostock, here a decision of the “Rat der Agrar- und Umweltwissenschaftlichen Fakultät, dating May 14th, 2025, is presented with a unanimous establishment decision and the decision to integrate the study program as a further program line with the existing study program “environmental sciences”. A decision of the rectorate however is not presented and the representatives of the rectorate during the virtual audit had clarified that this would take up to year to materialize. What is presented instead, is a general commitment of the rector of University of Rostock dating 17.07.2023.

The RWTH Aachen also submits a letter, in which a Visiting Scholar form Africa are welcomed.

As regards WASCAL, a letter of commitment to the continuation of the IMP-EGH is presented, dating 28th May 2025, signed by its executive director, Prof. Ramdé. According to the letter. WASCAL is “committed to ensuring the continued delivery of the program beyond the current funding phase, securing sustainable funding through diverse sources, including contributions from WASCAL´s member countries, partnerships with other governments, private sector and development partners maintaining academic excellence and alignment with international standards through QA mechanisms and periodic program reviews, etc.” In additional minutes of a meeting of the so-called “Funding Drive Committee IMP-EGH 3rd batch and beyond” further plans and ideas are generated regarding the future budgeting and financial sustainability”. The decisive meeting of the BMBF regarding the future financing of the 3rd batch of students will take place only in July.

E Summary: Expert recommendations (03.05.2025)

Taking into account the additional information and the comments given by the applying institutions, 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
Ma Energy and Green Hydrogen	With requirements for one year	30.09.2028	EUR-ACE®	30.09.2028

The expert team suggests a conditional accreditation with 9 requirements and 10 recommendations for 4 specialisations of the program, which are carried out by the RWTH Aachen.

For the double degree program with the specialization biofuels/bioenergy, executed by the University of Rostock and the University of Lomé, the expert suggest a denial of the accreditation.

Requirements:

For the IMP-EGH with all 4 specializations/double degree programs, for which the RWTH Aachen is responsibel:

RT 1 (ASIIN 1.3):

It is required that the recently revised new Study and Examination Regulations of the program specific examination regulation is finalized and officially passed by the responsible bodies of all universities, which participate in the delivery and execution of this double degree program. If participating universities are relying on their own general study regulations, the individual stipulations of this program specific examination regulations must be fully observed.

RT2 (ASIIN 1.3):

It is required that the applicants provide ASIIN with a formal and unconditional establishment decision (Einrichtungsbeschluss) of the responsible governing bodies of RWTH Aachen for the new double degree structure.

RT 3 (ASIIN 1.4):

It is required to inform the applicants of the incoming third batch of students about the conditions of enrollment and the fact, that the first semester has been transformed into “a bridge semester”, in the framework of which certain prerequisite courses must be successfully passed.

RT 4 (ASIIN 1.5):

It is required that all compulsory components of the double degree study program are credited.

RT 5 (ASIIN 2):

It is required that additional measures are taken so that the Master´s thesis consistently achieves the required scientific quality in all disciplines.

RT 6 (ASIIN 2):

It is required to reduce the number of exams per semester. thereby alleviating the excessive examination burden of students.

RT 7 (ASIIN 3.1):

It is required that the English language capabilities of all hired (French speaking) staff are sufficient to deliver the program.

RT 8 (ASIIN 3.3):

It is required to provide proof of sufficient financial funds for the duration of the accreditation period.

RT 9 (ASIIN4.3):

All information, documents and regulations (Admission criteria, study regulations, module handbook etc. related to the start of this new program must be transparently documented on the websites of the degree awarding German and ideally also on the websites of the African partners.

In addition, the experts have formulated the following recommendations:

Recommendations for IMP-EGH:

RN 1 (ASIIN 1.3):

It is strongly recommended to allow for more flexibility in the first year of study in Niger, introducing a certain number of electives, so that students can avoid duplicating courses which they already have taking in their Bachelor studies, while allowing for an individual selection of modules, which are best suited for the specialization they have chosen.

RN 2 (ASIIN 1.3):

It is recommended to reconsider the uniform 1-2 week " block structure" of the curriculum with flying faculty allowing for a less stressful and more efficient teaching and learning experience during the first three semester of this Master program.

RN 3 (ASIIN 1.3.):

It is recommended to foster practical elements in the curriculum, also establishing a critical mass of internship opportunities, e.g. by making best use of new industrial advisory boards in African universities.

RN 4 (ASIIN 1.4):

It is recommended reconsidering the rigid admission country quotas in favor of admitting the most suited students independent of their national origin.

RN 5 (ASIIN 1.4):

It is recommended opening the program for more students in access for those granted with a full stipend.

RN 6 (ASIIN 2):

It is recommended broadening the variety of Master theses´ topics, which should reflect to a greater degree also those which are of relevance to the West African environment-.

RN 7 (ASIIN 2)

It is recommended to find suitable examination times schedules for the "block courses" during the first three semesters allowing for enough time to digest the bulk of information provided and given sufficient time of preparation.

RN 8 (ASIIN 3.1):

It is recommended to engage in more staff exchange between African and German universities.

RN 9 (ASIIN 3.2):

It is recommended to reinforce career counselling to Master students during their studies.

RN 10 (ASIIN 4.3):

It is strongly recommended improving the institutional set-up of quality assurance structures in this multinational, multicampus program A specifically assigned WASCAL officer in charge of this program should regularly convene with the program coordinator of the 6 participating universities to discuss and follow up on the outcomes of the manifold QA instruments.

F Comment of the Technical Committees

Technical Committee 01 – Mechanical Engineering/Process Engineering (05.06.2025)

Assessment and analysis for the award of the ASIIN seal:

The Technical Committee follows the assessment of the experts without any changes.

Assessment and analysis for the award of the EUR-ACE® Label:

The Technical Committee deems that the intended learning outcomes of the degree programme do comply with the engineering specific parts of Subject-Specific Criteria of the Technical Committee 01 – Mechanical Engineering/Process Engineering.

The Technical Committee 01 – Mechanical Engineering/Process Engineering recommends the award of the seals as follows:

Degree Programme	ASIIN Seal	Accredited by German Engineers	Maximum duration of accreditation	Subject-specific label	Maximum duration of accreditation
Ma Energy and Green Hydrogen	With requirements for one year	With requirements for one year	30.09.2028	EUR-ACE®	30.09.2028

Technical Committee 02 – Electrical Engineering/Information Technology (05.06.2025)

Assessment and analysis for the award of the ASIIN seal:

The Technical Committee discusses the accreditation procedure in depth and agrees with the experts' overall assessment. However, they do not see Requirement A6 necessary or sensible, since reducing the number of exams would not necessarily mean reducing the student workload, as the scope of the material to be studied would be the same. As the ASIIN criteria do not specify the maximum number of exams per semester either, they suggest converting this requirement into a recommendation.

Assessment and analysis for the award of the EUR-ACE® Label:

The Technical Committee deems that the intended learning outcomes of the degree programmes do comply with the engineering specific parts of Subject-Specific Criteria of the Technical Committee 02 – Electrical Engineering/Information Technology.

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

Degree Programme	ASIIN Seal	Accredited by German Engineers	Maximum duration of accreditation	Subject-specific label	Maximum duration of accreditation
Ma Energy and Green Hydrogen	With requirements for one year	With requirements for one year	30.09.2028	EUR-ACE®	30.09.2028

Technical Committee 05 – Materials Science, Physical Technologies (05.06.2025)

Assessment and analysis for the award of the ASIIN seal:

The Technical Committee follows the assessment of the experts without any changes.

Assessment and analysis for the award of the EUR-ACE® Label:

The Technical Committee deems that the intended learning outcomes of the degree programme do comply with the engineering specific parts of Subject-Specific Criteria of the Technical Committee 05 – Materials Science, Physical Technologies.

The Technical Committee 05 – Materials Science, Physical Technologies recommends the award of the seals as follows:

Degree Programme	ASIIN Seal	Accredited by German Engineers	Maximum duration of accreditation	Subject-specific label	Maximum duration of accreditation
Ma Energy and Green Hydrogen	With requirements for one year	With requirements for one year	30.09.2028	EUR-ACE®	30.09.2028

Technical Committee 06 – Engineering and Management, Economics (13.06.2025)

Assessment and analysis for the award of the ASIIN seal:

The Technical Committee follows the assessment of the experts without any changes.

Assessment and analysis for the award of the EUR-ACE® Label:

The Technical Committee deems that the intended learning outcomes of the degree programme do comply with the engineering specific parts of Subject-Specific Criteria of the Technical Committee 06 – Engineering and Management, Economics.

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

Degree Programme	ASIIN Seal	Accredited by German Engineers	Maximum duration of accreditation	Subject-specific label	Maximum duration of accreditation
Ma Energy and Green Hydrogen	With requirements for one year	With requirements for one year	30.09.2028	EUR-ACE®	30.09.2028

Technical Committee 11 – Geosciences

Assessment and analysis for the award of the ASIIN seal:

The Technical Committee follows the assessment of the experts without any changes.

The Technical Committee 11 – Geosciences recommends the award of the seals as follows:

Degree Programme	ASIIN Seal	Accredited by German Engineers	Maximum duration of accreditation	Subject-specific label	Maximum duration of accreditation
Ma Energy and Green Hydrogen	With requirements for one year	With requirements for one year	30.09.2028	EUR-ACE®	30.09.2028

G Decision of the Accreditation Commission (27.06.2025)

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

The Commission discusses the accreditation procedure and follows the experts' assessment. They also agree that the University of Rostock's participation is not to be considered as part of the accreditation process due to the aforementioned deficits. Moreover, they do not adopt the Technical Committee 02's suggestion to convert requirement A6 (cf. number of examinations per semester) into a recommendation, as they agree with the expert panel that the number of examinations should be significantly reduced to alleviate the students' workload.

Assessment and analysis for the award of the EUR-ACE® Label:

The Accreditation Commission deems that the intended learning outcomes of the degree programmes do not comply with the engineering specific parts of Subject-Specific Criteria of the Technical Committees 01, 02, 05, and 06.

As one requirement relates to the level of the Master's theses and therefore a subject-specific deficit has been identified, the EUR-ACE label is suspended until requirement A5 has been fulfilled.

The Accreditation Commission decides to award the following seals:

Degree Programme	**ASIIN Seal**	**Accredited by German Engineers**	**Maximum duration of accreditation**	**Subject-specific label**	**Maximum duration of accreditation***
Ma Energy and Green Hydrogen (without specialization Bioenergy/Biofuels provided by U Rostock)	With requirements for one year	With requirements for one year	30.09.2028	EUR-ACE®	Suspension until A5 has been fulfilled.

*Subject to the approval of the ENAEE Administrative Council

Requirements

For the IMP-EGH with all 5 specializations/double degree programs, for which the RWTH Aachen is responsible:

RT 1 (ASIIN 1.3):

A 1. It is required that the recently revised new Study and Examination Regulations of the program specific examination regulation is finalized and officially passed by the responsible bodies of all universities, which participate in the delivery and execution of this double degree program. If participating universities are relying on their own general study regulations, the individual stipulations of this program specific examination regulations must be fully observed.

RT2 (ASIIN 1.3):

A 2. It is required that the RWTH Aachen provides ASIIN with a formal and unconditional establishment decision (Einrichtungsbeschluss) of the responsible governing bodies of RWTH Aachen for the new double degree structure.

RT 3 (ASIIN 1.4):

A 3. It is required to inform the applicants of the incoming third batch of students about the conditions of enrollment and the fact, that the first semester has been transformed into “a bridge semester”, in the framework of which certain prerequisite courses must be successfully passed.

RT 4 (ASIIN 1.5):

A 4. It is required that all compulsory components of the double degree study program are credited.

RT 5 (ASIIN 2):

A 5. It is required that additional measures are taken so that the Master´s thesis consistently achieves the required scientific quality in all disciplines.

RT 6 (ASIIN 2):

A 6. It is required to reduce the number of exams per semester thereby alleviating the excessive examination burden of students.

RT 7 (ASIIN 3.1):

A 7. It is required that the English language capabilities of all hired (French speaking) staff are sufficient to deliver the program.

RT 8 (ASIIN 3.3):

A 8. It is required to provide proof of sufficient financial funds for the duration of the accreditation period.

RT 9 (ASIIN4.3):

A 9. All information, documents and regulations (Admission criteria, study regulations, module handbook etc. related to the start of this new program must be transparently documented on the websites of the degree awarding German and ideally also on the websites of the African partners.

Recommendations

RN 1 (ASIIN 1.3):

E 1. It is strongly recommended to allow for more flexibility in the first year of study in Niger, introducing a certain number of electives, so that students can avoid duplicating courses which they already have taking in their Bachelor studies, while allowing for an individual selection of modules, which are best suited for the specialization they have chosen.

RN 2 (ASIIN 1.3):

E 2. It is recommended to reconsider the uniform 1-2 week ” block structure” of the curriculum with flying faculty allowing for a less stressful and more efficient teaching and learning experience during the first three semester of this Master program.

RN 3 (ASIIN 1.3.):

E 3. It is recommended to foster practical elements in the curriculum, also establishing a critical mass of internship opportunities, e.g. by making best use of new industrial advisory boards in African universities.

RN 4 (ASIIN 1.4):

E 4. It is recommended reconsidering the rigid admission country quotas in favor of admitting the most suited students independent of their national origin.

RN 5 (ASIIN 1.4):

E 5. It is recommended opening the program for more students in access for those granted with a full stipend.

RN 6 (ASIIN 2):

E 6. It is recommended broadening the variety of Master theses´ topics, which should reflect to a greater degree also those which are of relevance to the West African environment.

RN 7 (ASIIN 2)

E 7. It is recommended to find suitable examination times schedules for the “block courses” during the first three semesters allowing for enough time to digest the bulk of information provided and given sufficient time of preparation.

RN 8 (ASIIN 3.1):

E 8. It is recommended to engage in more staff exchange between African and German universities.

RN 9 (ASIIN 3.2):

E 9. It is recommended to reinforce career counselling to Master students during their studies.

RN 10 (ASIIN 4.3):

E 10. It is strongly recommended improving the institutional set-up of quality assurance structures in this multinational, multicampus program A specifically assigned WASCAL officer in charge of this program should regularly convene with the program coordinator of the 6 participating universities to discuss and follow up on the outcomes of the manifold QA instruments.

Appendix: Program Learning Outcomes and Curricula

According to self-assessment report, the following **objectives** and **learning outcomes (intended qualifications profile)** shall be achieved by the Master's degree program IMP-EGH:

"Program Objectives

1. Scientific and technical expertise: Equip graduates with robust scientific knowledge and technical skills in renewable energy systems, green hydrogen production, and energy systems integration.
2. Systemic and analytical competence: Foster the ability to analyse, design, and optimize complex energy systems, integrating renewable sources and hydrogen technologies to meet sustainability and efficiency goals.
3. Policy and economic expertise: Develop a deep understanding of the socio-economic, regulatory, and policy contexts shaping the global energy transition, enabling graduates to contribute effectively to energy policy and economic development initiatives.
4. Intercultural and collaborative skills: Encourage a high level of intercultural competence and teamwork through an international, multi-campus learning experience, preparing graduates for work in diverse, interdisciplinary, and global settings.

Intended Learning Outcomes

Upon successful completion of the program, graduates will be able to:

1. Understand and transfer their knowledge

   - Demonstrate an in-depth understanding of core principles in energy system technologies, including photovoltaics, wind energy, bioenergy, hydrogen production, and energy storage systems.
   - Explain the science and engineering underlying key renewable energy technologies and the role of green hydrogen within the energy mix.
   - Articulate the environmental, economic, and social implications of energy choices, particularly in developing and emerging economies.

2. Apply their practical skills

- Design and simulate renewable energy systems for specific applications, employing tools and methodologies for system analysis, optimization, and performance assessment (e.g., system modelling, resource assessment, techno-economic analysis).
- Apply technical skills to manage renewable-based energy generation systems, with hands-on experience in labs and fieldwork across different energy technologies, including green hydrogen and biofuels.
- Integrate and evaluate the feasibility of green hydrogen within renewable energy systems to enhance system reliability, and sustainability and contribute to the achievement of sustainable development goals.

3. Critically and analytically think

- Critically evaluate energy systems and their components, assessing technical, economic, and social factors that impact energy policy and project viability.
- Conduct lifecycle assessments and sustainability evaluations of energy systems, understanding the environmental and resource impacts across energy value chains.
- Analyse and interpret data from simulations and experiments to make informed decisions on system design, policy, or technological adaptation.

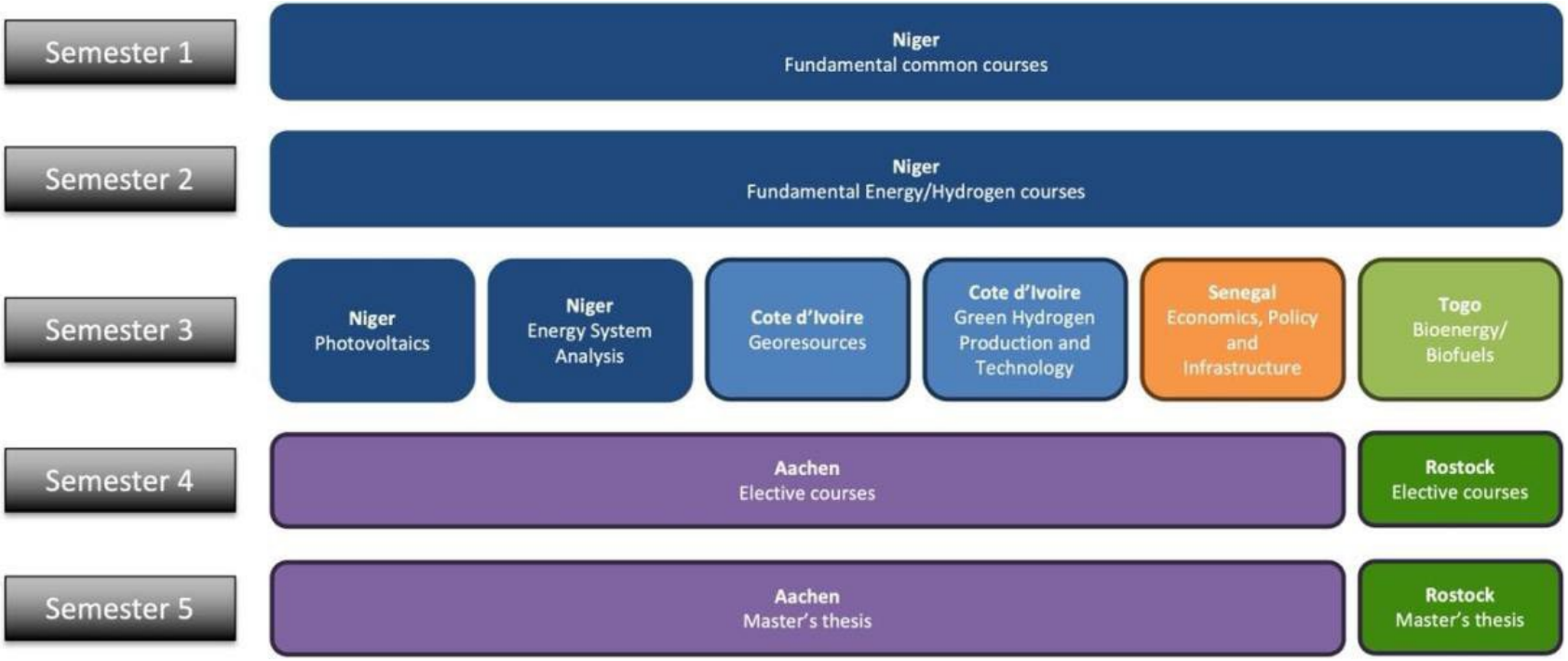
4. Communicate and work in intercultural teams

- Present complex technical, economic, and policy concepts in a clear and accessible manner to diverse stakeholders, including non-specialist audiences.
- Demonstrate effective communication and teamwork in multicultural, interdisciplinary settings, with the ability to collaborate on energy projects across various international contexts.
- Utilize language and communication skills developed through international study to navigate intercultural dynamics and promote inclusive and collaborative project environments.

5. Consider ethics and act professionally

- Commit to ethical practices in energy management, with an understanding of the principles of energy justice and the role of sustainable energy in social equity.
- Recognize the professional responsibilities associated with the deployment of renewable energy technologies in developing economies, including regulatory compliance and stakeholder engagement.
- Advocate for responsible energy practices and policies that contribute to climate change mitigation, environmental protection, and economic resilience in line with the Sustainable Development Goals (SDGs).”

The following **curriculum** is presented:



Curriculum for Semester 1 and 2 (All tracks)

University Abdou Moumouni of Niamey, Niger.

SEMESTER 1 (Fundamental Sciences All students)

	INTERDISCIPLINARY MASTER PROGRAM IN ENERGY AND GREEN HYDROGEN (IMP-EGH)							
	Study Load (Credits) of the Program Course Allocation							Lecturer
Code	Course	Module Name/Title	Module Code	Theory hours	Practical hours	Time for student	Total credits	
UE1.1	Physics of solids and fluids	Physics of solids	UE1.1-1	20		30	2	Prof. Dr. Frederic Ouattara
		Fluids dynamics	UE1.1-2	30		45	3	Prof. Habou DANDAKOUTA
			Sub-Total Credits				5	
UE1.2	Semiconductor, electrical and electronic engineering	Semiconductor physics	UE1.2-1	20		30	2	Dr. BONKANEY Abdou Latif
		Power Electricals and Electronics	UE1.2-2	30	10	60	4	Prof. SEIDOU HASSANE MAIGA Amadou
			Sub-Total Credits				6	
UE1.3	Thermodynamics	Thermodynamic principles	UE1.3-1	20		30	2	Prof. Makinta BOUKAR
		Thermodynamic in energy engineering	UE1.3-2	30	10	60	4	Prof. Habou DANDAKOUTA
			Sub-Total Credits				6	
UE1.4	Electrochemistry	Fundamental electrochemistry	UE1.4-1	20		30	2	Prof. Dr. FALL Modou
		Electrochemical energy systems	UE1.4-2	30	10	60	4	Prof. Boubié Guel
			Sub-Total Credits				6	
UE1.5	Atmospheric Sciences	West-Africa Atmospheric system	UE1.5-1	20		30	2	Prof. Moussa MOUNKAILA SALEY
		System and variability of renewable energy resources (Energy meteorology)	UE1.5-2	20		30	2	Prof. Arona Diedhiou
			Sub-Total Credits				4	
UE1.6	Climate Change and sustainable development	Greenhouse gases and Global warming	UE1.6-1	10		15	1	Prof. Rabani Adamou
		Climate change issues and sustainable energy	UE1.6-2	10		15	1	Prof. Borozé
		Climate Water-Energy-Food nexus	UE1.6-3	10		15	1	Ass. Prof. Dr. Ibrahim Boubacar
			Sub-Total Credits				3	
			Total Credits	270	30	450	30	

SEMESTER 2 (Fundamentals and Applications All students)

	INTERDISCIPLINARY MASTER PROGRAM IN ENERGY AND GREEN HYDROGEN (IMP-EGH)							
	Study Load (Credits) of the Program Course Allocation							Lecturers
Code	Course	Module Name/Title	c	Theory hours	Practical hours	Time for student	Total credits	
UE2.1	Conventional energy and Energy security	Conventional energy sources	UE2.1-1	20		30	2	Associate Professor KORGO Bruno
		Energy security	UE2.1-2	10		15	1	
			Sub-Total Credits				3	
UE2.2	Renewable Energy	Solar (thermal & photovoltaics) energy	UE2.2-1	10	20	22.5	1.5	Dr. BONKANEY Abdou Latif
		Hydroenergy	UE2.2-2	10		22.5	1.5	Prof Ing Eric Ofosu Antwi
		Wind energy	UE2.2-3	10		22.5	1.5	Dr. BONKANEY Abdou Latif
		Bio-energy	UE2.2-4	10		22.5	1.5	Ass. Prof. GODJO Thierry
			Sub-Total Credits				6	
UE2.3	Green Hydrogen	Principle of Hydrogen Production	UE2.3-1	10	10	30	2	Professor Atanasse COLY
		Introduction to fuel cells	UE2.3-2	10	10	30	2	Prof. Emeka Oguzie
		Concept of Power-to-X	UE2.3-3	10		15	1	Prof. Muritala Ibrahim Kolawole
		Green hydrogen safety	UE2.3-4	10		15	1	Prof. Muritala Ibrahim Kolawole
			Sub-Total Credits				6	
UE2.4	Photovoltaics I	Photoelectrochemistry Fundamentals	UE2.4.2	30		45	3	Prof. ADAMOU Rabani
		Fundamentals of photovoltaics	UE2.4.1	30		45	3	Prof. Uwe Rau
			Sub-Total Credits				6	
UE2.5	Energy systems and infrastructure	Energy systems analysis and simulation	UE2.5-1	20		30	2	Dr Yacouba Moumouni
		Energy storage battery	UE2.5-2	10	10	30	2	Dr. Damgou MANI KONGNINE
		Energy grid, transportation and distribution	UE2.5-3	10	10	30	2	Ass. Prof. GODJO Thierry
			Sub-Total Credits				6	
UE2.6		Energy economics and Market	UE2.6-1	10		15	1	Prof. Ramchandra Bhandari

	Energy Policy and Market	Business Plan and Entrepreneurship	UE2.6-2	10		15	1	Prof. Ramchandra Bhandari
		Legal Framework	UE2.6-3	10		15	1	Prof. Gbadamosi Kolawole T
			Sub-Total Credits				3	
			Total	**240**	**60**	**450**	**30**	

Curriculum for Semester 3 - Track 1: Economics, Policies, Infrastructures and Green Hydrogen Technology

		INTERDISCIPLINARY MASTER PROGRAM IN ENERGY AND GREEN HYDROGEN (IMP-EGH)						
		Economics, Policy and Infrastructure						Lecturer
Code	Course	Module Name/Title	Module Code	Theory hours	Practical hours	Time for student	Total credits	
UE3.1	Technology management of green hydrogen Accounting	Cost Management of Value Chains	UE3.1-1	30		45	3	Prof. Dr. Peter Letmathe
		Cost-benefit analysis of green energy projects	UE3.1-2	30		45	3	Dr. Assane BEYE
		Sub-Total Credits					6	
UE3.2	Energy Economics	Public economics	UE3.2-1	30		45	3	Prof. Aaron Praktiknjo
		Energy systems economics	UE3.2-2	30		45	3	Prof. Oliver Lorz
		Sub-Total Credits					6	
UE3.3	Sustainability	Sustainability assessment methods and tools for energy and emerging technologies	UE3.3-1	30		45	3	Prof. Dr. Maria Movsessian
		Sustainable development theories and 6 sustainable energy technologies for development	UE3.3-2	30		45	3	Prof. Dr.-Ing. Marzia Traverso, Ing. Rose Nangah Mankaa
		Sub-Total Credits					6	
UE3.4	Energy planning	Planning for 100% renewable energy systems	UE3.4-1	30		45	3	Prof. Dr. Maria Movsessian
		Participatory modelling for capacity building and agency	UE3.4-2	30		45	3	Prof. Sandra Venghaus
		Sub-Total Credits					6	
UE3.5	Modelling and methods	Research methods for master thesis	UE3.5-1	15		27.5	1.5	Marcel Kottrup, CFA, M.Sc.
		Literature review and scientific writing	UE3.5.2	15		27.5	1.5	Dr. Assane BEYE
		Sub-Total Credits					3	
UE3.6	Green hydrogen policy and infrastructure	Infrastructure management for green energy technologies	UE3.6-1	15		27.5	1.5	Dr.-Ing. Pierre Williams TAVARES
		Energy policy	UE3.6-2	15		27.5	1.5	Dr. DZAKPA Etse Yawo
		Sub-Total Credits					3	
		Total Credits					30	

Curriculum for Semesters 3 - Track 2: Photovoltaics for Green Hydrogen Technologies

	MASTER PROGRAM IN PHOTOVOLTAICS FOR GREEN HYDROGEN TECHNOLOGIES							
		Study Load (Credits) of the Program Course Allocation						
Code	Course	Module Name/Title	Module Code	Theory hours	Practical hours	Time for student	Total credits	
UE3.1	Photovoltaics Technology	Characterization and simulation of solar cells, modules, and systems	UE3.1-1	40		60	4	Prof. Dr. Uwe Rau
		Photovoltaic Systems I	UE3.1-2	40		60	4	Prof. Dr. Jürgen H. Werner
		Photovoltaic Systems I	UE3.1-3	40		60	4	Prof. Dr. Jürgen H. Werner
			Sub-Total Credits				**12**	
UE3.2	Hydrogen technology	Hydrogen production by Electrolysis	UE3.2-1	30		45	3	Prof. Emeka E. Oguzie
		Hydrogen storage technology	UE3.2-2	30		45	3	Prof. Muritala Ibrahim Kolawole
		Fuel cell technology	UE3.2-3	30		45	3	Prof. Muritala Ibrahim Kolawole
			Sub-Total Credits				9	
UE3.3	PV4H2 (Hands-on activity)	Lab Photovoltaic/Hydrogen	UE3.3		60	40	4	Prof. Dr. Moussa MOUNKAILA SOULEY
			Sub-Total Credits				**4**	
UE3.4	Research methodology	Literature review	UE3.4-1	10		15	1	Prof. Moussa HAROUNA
		Scientific writing (Proposal and master thesis)	UE3.4-2	20		30	2	Dr. Wolfram Laube
		Analysis and data processing	UE3.4-3	20		30	2	Dr. Inoussa ABDOU SALEY
			Sub-Total Credits				**5**	
			Total	***260***	***60***	***430***	***30***	

Curriculum for Semester 3 - Track 3: Energy Systems Analysis for Green Hydrogen

Semester 3 Track 2 Energy Systems Analysis for Green Hydrogen								
Code	Course	Module Name/Title	Module Code	Theory hours	Practical hours	Time for students	Total credits	
UE3.1	Energy System Modelling and Simulation	Power System Modelling, Simulation and Control	UE3.1-1	50		75	5	Andrea Benigni
		Power System Integration of Green Hydrogen	UE3.1-2	40		60	4	Prof. Muritala Ibrahim Kolawole
		Energy Systems Modeling & Scenarios	UE3.1-3	40		60	4	Dr. Heidi U. Heinrichs
			Sub-Total Credits				13	
UE3.2	Socio-economic Assessment of Energy	Participatory Modelling for Capacity Building and Agency	UE3.2-1	40		50	3	Prof. Sandra Venghaus
		Energy Markets	UE3.2-2	30		45	3	Dr. Amin Lahnaoui
		Social Assessment of Energy Systems	UE3.2-3	40		50	3	Dr. Amin Lahnaoui
			Sub-Total Credits				9	
UE3.3	Creativity Interactive Virtual Laboratory	Creativity Interactive Virtual Laboratory	UE3.3-1		30	45	3	Andrea Benigni
			Sub-Total Credits				3	
UE3.4	Research methodology.	Literature review	UE3.4-1	10		15	1	Prof. Moussa HAROUNA
		Scientific writing (Proposal and master thesis)	UE3.4-2	20		30	2	Dr. Wolfram Laube
		Analysis and data processing	UE3.4-3	20		30	2	Dr. Inoussa ABDOU SALEY
			Sub-Total Credits				5	
			Total	290	30	460	30	

Curriculum for Semester 3 - Track 4: Georesources (Wind/Water)

		INTERDISCIPLINARY MASTER PROGRAM IN ENERGY AND GREEN HYDROGEN (IMP-EGH)						
		M2 Georesources (Wind/Water)						Lecturer
Code	Course	Module Name/Title	Module Code	Theory hours	Practical hours	Time for student	Total credits	
UE3.1	Water power	Hydrology and hydraulic potential of ECOWAS Countries	UE3.1-1	20		30	2	Dr KOFFI Kouame Symphorien/ M. KOBENAN Angui Sylvain
		Design and operation of hydroelectric dams	UE3.1-2	30		45	3	Dr KOFFI Kouamé Symphorien
		Sub-Total Credits					**5**	
UE3.2	Wind energy	Wind energy potential of ECOWAS countries	UE3.2-1	10		15	1	Dr KOFFI Ekoun Paul Magloire/M. KOBENAN Angui Sylvain
		Wind turbine technology	UE3.2-2	30		45	3	Dr KOFFI EKOUN Paul Magloire
		Sub-Total Credits					**4**	
UE3.3	Water flow	Subsurface flow in saturated porous media	UE3.3-1	10		15	1	Prof. Dr. Harrie-Jan Hendricks-Franssen
		Subsurface flow in unsaturated porous media	UE3.3-2	10		15	1	Prof. Dr. Harrie-Jan Hendricks-Franssen
		Flow in streams and rivers	UE3.3-3	10		15	1	Prof. Dr. Harrie-Jan Hendricks-Franssen
		Sub-Total Credits					**3**	
UE3.4	Hydrometeorology and energy production from water resources	Hydrometeorology	UE3.4-1	10		15	1	Prof. Dr. Harrie-Jan Hendricks-Franssen
		Water resources for energy generation	UE3.4-2	10		15	1	Prof. Dr. Harrie-Jan Hendricks-Franssen
		Sub-Total Credits					**2**	
UE3.5	Electric motors	Single-phase electric motors	UE3.5-1	10		15	1	Dr Alexandre N'Guessan
		Three-phase electric motors	UE3.5-2	10		15	1	Dr Alexandre N'Guessan
		Other types of engines	UE3.5-3	20	10	30	2	Dr Alexandre N'Guessan
		Sub-Total Credits					**4**	
UE3.6	Energy efficiency and Renewable Energy Legislation	Energy efficiency	UE3.6-1	20		30	2	Dr KOFFI Aka Stéphane
		Renewable Energy Legislation	UE3.6-2	10		15	1	Dr KOFFI Aka Stéphane
		Sub-Total Credits					3	
UE3.7	Computer Exercises water resources	Groundwater flow modelling with MODFLOW and evaluation of sustainability of groundwater extraction	UE3.7-1	20		30	2	Prof. Dr. Harrie-Jan Hendricks-Franssen
		Unsaturated flow modelling with HYDRUS and assessment of groundwater recharge under different land use and climate change conditions	UE3.7-2	20		30	2	Prof. Dr. Harrie-Jan Hendricks-Franssen

		Water resources &Energy	UE3.7-3	20		30	2	Prof. Dr. Harrie-Jan Hendricks-Franssen
		Sub-Total Credits					6	
UE3.8	**Research methodology and funding**	Bibliographic research and scientific writing	UE3.8-1	10		15	1	Prof. Dr Essetchi Paul KOUAMELAN
		Methods, tools and data analysis	UE3.8-2	10		15	1	Dr Kouassi Kouadio Ignace
		Management and entrepreneurship	UE3.8-3	10		15	1	Prof. Konaté Souleymane/ Dr N'dri Kan David
		Sub-Total Credits					3	
		Total Credits					30	

Curriculum for Semester 3 - Track 5 : Green Hydrogen Production and Technology

	INTERDISCIPLINARY MASTER PROGRAMME IN GREEN ENERGY AND HYDROGEN (IMP-EGH)								
	M2 Green Hydrogen Production and Technology/								
Code	Course	Module Name/Title	Module Code	Theory hours	Practical hours	Time for student	credits	Total credit	Lecturer
UE3.1	**Hydrogen and Materials**	Hydrogen in metallic materials	UE3.1-1	30	0	45	3	6	**Prof. Dr. Ulrich Krupp PD. Dr. Srecko Stopic**
		Hydrogen in non-ferrous extractive metallurgy	UE3.1-2	30	0	45	3		
UE3.2	**Electrochemical energy conversion involving H2**	Materials, Technologies and Systems for Electrochemical Energy Conversion	UE3.2-1	30	0	45	3	6	**Prof. Dr.Rüdiger Eichel**
		Theory and Computation of electrochemical materials	UE3.2-2	30	0	45	3		**Prof. Dr. Michael Eikerling**
UE3.3	**Nuclear reactions and hydrogen**	Nuclear Reactions and Hydrogen	UE3.3-1	10	0	15	1	3	**Prof. Véronique Mambo**
		Hydrogen-based nuclear power generation	UE3.3-2	20	0	30	2		
UE3.4	**Energy efficiency and Renewable Energy Legislation(ENERGY POLICIES)**	Energy efficiency	UE3.4-1	20	0	30	2	3	**Dr AKA KOFFI**
		Renewable Energy Legislation	UE3.4-2	10	0	15	1		
UE3.5	**Hydrogen and applications**	General, properties, safety aspects and Hydrogen production	UE3.5-1	20	10	0	4	8	**Prof. AKA Boko**
		Hydrogen storage	UE3.5-2	20	0	30	2		
		Modes of energy restitution	UE3.5-3	20	10	30	2		
UE3.6	**H2 production and safety**	Safety of H2 production and use facilities	UE3.6-1	20	10	30	2	3	**Prof. AKA BOKO/ Dr LAGOBO Zomi Claude**
		Thermochemical production of H2 (gasification and pyrogasification)	UE3.6-2	10	0	15	1		
UE3.7	**Research methodology and funding**	Bibliographic research and scientific writing	UE3.7-1	10	0	15	1	3	**Prof. Konaté Souleymane**
		Methods, tools and data analysis	UE3.7-2	10	0	15	1		
		Management and entrepreneurship	UE3.7-3	10	0	15	1		
	TOTAL SEMESTER						30		

Curriculum for Semester 3 - Track 6 Bioenergy/Biofuel and Green Hydrogen Technology

INTERDISCIPLINARY MASTER PROGRAMME IN GREEN ENERGY AND HYDROGEN (IMP-EGH)									
M2 Bioenergy/Biofuel and Green Hydrogen Technology									
Code	Course	Module Name/Title	Module Code	Theory hours	Practical hours	Time for student	credits	Total credit	Lecturer
UE3.1	Biomass to energy	Biomass structure & composition	UE3.1-1	20	0	30	2	5	Prof. Dr. S. Narra/ Dr K. M. Novidzro
		Biomass and biofuels Energy Engineering (biogas, biofuels production technologies)	UE3.1-2	30	5	45	3		Prof. Tizane DAHO
UE3.2	Green H_2 production technologies from wastes/biofuels	Thermochemical conversion processes (gasification, pyrolysis, etc.) of biomass	UE3.2-1	30	5	45	3	6	Dr. Bruno Korgo/ Dr K. M. Novidzro
		Bio-refining, reforming technologies & Integrated biological H_2 production	UE3.2-2	30	5	45	3		Prof. Dr. S. Narra/Dr K. Agboka
UE3.3	System engineering for H_2 production from biomass -management and optimization of H_2 production systems		UE3.3-1	20	5		4	4	Prof. Dr. S. Narra/ Dr K. Agboka
UE3.4	H2 utilization, storage and transport		UE3.4-1	30	0	45	3	3	Prof. Dr. S. Narra
UE3.5	Safety and security of H2 production systems and utilization		UE3.5-1	30	0	45	3	3	Dr. Damgou MANI KONGNINE
UE3.6	Economic of H_2 production technologies from wastes/biofuel		UE3.6-1	30	0	45	3	3	Prof. Egbendewe
UE3.7	Fundamental of scientific research and research methodology	Social statistics, measurement scaling for field research	UE3.7-1	20	0	30	2	6	Prof. Dr. S. Narra
		Analysis and data processing	UE3.7-2	20	0	30	2		Dr. Pilo Mikemina
		Literature review, writing and scientific communication	UE3.7-3	20	0	30	2		Prof. Dr. S. Narra
	TOTAL SEMESTER						30		