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FINAL REPORT

NELSON MANDELA AFRICAN INSTITUTE OF SCIENCE AND TECHNOLOGY
(TANZANIA)

CLUSTER MATERIALS SCIENCE

MATERIALS SCIENCE AND ENGINEERING (MASTER)

MATERIALS SCIENCE AND ENGINEERING (PHD)

September 2023



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DECISION OF THE AQAS STANDING COMMISSION ON THE STUDY PROGRAMMES

- “MATERIALS SCIENCE AND ENGINEERING” (MASTER OF SCIENCE)
- “MATERIALS SCIENCE AND ENGINEERING” (PHD)

OFFERED BY NELSON MANDELA AFRICAN INSTITUTE OF SCIENCE AND TECHNOLOGY (TANZANIA)

Based on the report of the expert panel, the comments by the university and the discussions of the AQAS Standing Commission in its 18th meeting on 21 August 2023, the AQAS Standing Commission decides:

1. The study programmes “Materials Science and Engineering” (Master of Science) and “Materials Science and Engineering” (PhD) offered by the Nelson Mandela African Institute of Science and Technology (Tanzania) are accredited according to the AQAS Criteria for Programme Accreditation (Bachelor/Master) and the AQAS Criteria for Doctoral Programme Accreditation (PhD).

The accreditations are conditional.

The study programmes essentially comply with the requirements defined by the criteria and thus the Standards and Guidelines for Quality Assurance in the European Higher Education Area (ESG) and the European Qualifications Framework (EQF) in their current version. The required adjustments can be implemented within a time period of twelve months.

2. The condition has to be fulfilled. The fulfilment of the condition has to be documented and reported to AQAS no later than **30 September 2024**. The confirmation of the condition might include a physical site visit within the time period of twelve months.
3. The accreditation is given for the period of **six years** and is valid until **30 September 2029**.

Condition:

1. It is necessary to give evidence on the effectiveness of internal QA system for both programmes, e.g. by including evidence on overall programme feedback from alumni, course feedback from students, and overall student’s satisfaction.

The following **recommendations** are given for further improvement of the programmes:

1. It is recommended to establish coherence and consistency in the master’s programme through mapping the intended learning outcomes at both the programme level and the individual course level, thereby supporting a clear and logical progression of skills and knowledge throughout the programme.
2. With the aim of systematically integrating the intended learning outcomes on the programme level of the PhD programme into the curriculum and research activities, it is suggested to map the ILOs on the programme and course level.

3. To enhance the development and relevance of NM-AIST's programmes, it is recommended that the institute prioritise establishing and maintaining strong relationships with the labour market by actively engaging with employers.
4. To improve performance assessment, it is recommended that NM-AIST systematically collect more detailed data on the student body for each programme, including exam pass rates, average grades, statistics on course evaluations, and characteristics of student cohorts.
5. To enhance comparability and promote international collaboration, it is recommended that NM-AIST reconsider its credit system and strive for transparent comparability with standards, such as the European Credit Transfer and Accumulation System (ECTS).
6. It is recommended that NM-AIST establishes an institutional-level framework for Recognition of Prior Learning, as this would further anchor the recognition procedure and provide a standardised process for evaluating and accepting transferred credits.
7. To ensure access to fully equipped laboratories and support material sciences and engineering research, it is recommended that NM-AIST continues to engage in strategic planning and collaboration efforts.

With regard to the reasons for this decision the Standing Commission refers to the attached experts' report.

EXPERTS' REPORT ON THE STUDY PROGRAMMES

- MATERIALS SCIENCE AND ENGINEERING (MASTER)
- MATERIALS SCIENCE AND ENGINEERING (PHD)

OFFERED BY NELSON MANDELA AFRICAN INSTITUTE OF SCIENCE AND TECHNOLOGY (TANZANIA)

Digital Site Visit to the university: 17 – 19 August 2021 / Reconsideration May 2023

Panel of Experts:

Prof. Dr. Julius Mwabora	University of Nairobi (Kenya), Department of Physics
Dr. Udo Grabowy	TiXX Coatings GmbH / NTTF Coatings GmbH (Germany) (Labour market representative)
Dominik Kubon	RWTH Aachen University (Germany) (Student representative)
Coordinator: Patrick Heinzer	AQAS, Cologne, Germany

I. Preamble

AQAS – Agency for Quality Assurance through Accreditation of Study Programmes – is an independent non-profit organisation supported by more than 90 member institutions, higher education institutions (HEIs) and academic associations. Since 2002, the agency has been accredited by the German Accreditation Council (GAC). It is, therefore, a notified body for accreditation of higher education institutions and programmes in Germany.

AQAS is a full member of ENQA and also listed in the European Quality Assurance Register for Higher Education (EQAR) which confirms that our procedures comply with the Standards and Guidelines for Quality Assurance in the European Higher Education Area (ESG), on which all Bologna countries agreed as a basis for internal and external quality assurance.

AQAS is an institution founded by and working for higher education institutions and academic associations. The agency is devoted to quality assurance and quality development of academic studies and teaching in Higher Education Institutions. The activities of AQAS in accreditation are neither restrained to specific academic disciplines or degrees nor a particular type of Higher Education Institution.

II. Accreditation procedure

This report results from the external review of the master programme in “Materials Science and Engineering” and the PhD programme “Materials Science and Engineering” offered by Nelson Mandela African Institute of Science and Technology (Tanzania).

1. Criteria

The programme is assessed against a set of criteria for accreditation developed by AQAS. The criteria are based on the Standards and Guidelines for Quality Assurance in the European Higher Education Area (ESG) 2015. To facilitate the review, each criterion features a set of indicators that can be used to demonstrate the fulfilment of the criteria. However, if single indicators are not fulfilled, this does not automatically mean that a criterion is not met. The indicators need to be discussed in the context of the programme since not all indicators necessarily can be applied to a programme.

1. Approach and methodology

The initialisation

The university mandated AQAS to perform the accreditation procedure in February 2020.

The Nelson Mandela African Institute of Science and Technology produced a Self-Evaluation Report (SER). In July 2020, the institution handed in a draft of the SER together with the relevant documentation of the programmes and an appendix and statistical data on the programmes.

The appendix included, e.g.:

- Overview of statistical data of the student body (e.g. number of applications, beginners, students, graduates, student dropouts).
- CVs of the teaching staff/supervisors
- Information on student services
- Core information on the main library
- academic regulations

AQAS checked the SER regarding completeness, comprehensibility and transparency. The final version of the SER was handed in in October 2020.

The accreditation procedure was officially initialised by a decision of the AQAS Standing Commission in August 2020.

The nomination of the panel of expert

The composition of the panel of experts follows the stakeholder principle. Consequently, representatives from the respective discipline/s, the labour market and students are involved. Furthermore, AQAS follows principles for selecting experts of the European Consortium for Accreditation (ECA).

The Standing Commission nominated in July 2021 the expert panel. AQAS informed the university about the expert panel members, and the university did not raise any concerns against the composition of the panel.

The preparation of the site visit

Prior to the site visit, the experts reviewed the SER and submitted a short preliminary statement, including open questions and potential needs for additional information. AQAS forwarded these preliminary statements to the university and the panel members to increase transparency in the process and the upcoming discussions during the site visit.

The site visit

After reviewing the Self Evaluation Report, a digital site visit to the university took place from 17 – 19 August 2021. Due to Covid-19 restrictions, the panel and the university decided to carry out the site visit in a digital format. On-site, the experts interviewed different stakeholders, e.g. the management of the HEI, the programme management, teaching and other staff, and students and graduates, in separate discussions and consulted additional documentation and student work. The visit was concluded by presenting the preliminary findings of the group of experts to the university's representatives.

The report writing

After the site visit had taken place, the expert group drafted the following report, assessing the fulfilment of the AQAS criteria for the programme accreditation. The report included a recommendation to the Accreditation Commission. The report was sent to the university for comments.

The decision

The report, together with the department's comments, forms the basis for the AQAS Standing Commission to decide on the accreditation of the programmes. Based on these two documents, on 6 December 2021, the Standing Commission took its decision on the accreditation. AQAS forwarded the decision to the university. The university had the right to appeal against the decision or any of the imposed conditions.

Reconsideration

The university submitted to AQAS additional evidence for the reconsideration of the procedure. The expert's panel reviewed carefully the documentation in a paper-based procedure and updated the existing report into this final report. The AQAS Standing Commission took its decision on the accreditation on 21 August 2023.

In October 2023, AQAS published the report and the result of the accreditation, as well as the names of the panel of experts.

III. General Information on the University

The Nelson Mandela African Institution of Science and Technology (NM-AIST) was established in 2009 as a unique Institution for promoting Science, Engineering, Technology and Innovation (SETI) in Eastern and Sub-Saharan African. The institution is accredited by the Tanzania Commission for Universities (TCU). TCU has accredited all Programmes running by the institution.

NM-AIST's is headed by the Chancellor; the Council is the governing body of the university. The Vice-Chancellor oversees the day to day operations of the university. There are four schools, namely: Life Sciences and Bioengineering (LiSBE), Materials Energy Water and Environmental Sciences (MEWES), Computational and Communication Sciences and Engineering (CoCSE) and the school of Business Studies and Humanities (BuSH).

Currently, NM-AIST is running 26 graduate programmes. NM-AIST has a diverse number of students enrolled in all programmes. However, the current number of students for masters and PhD is 380 and 222, respectively, as per March 2020 records.

The considered programmes are hosted as follows:

- Master's and PhD in Materials Science and Engineering: Schools of Materials, Energy, Water and Environmental Sciences (MEWES), *Department of Materials and Energy Science and Engineering (MESE)*

Each school is under the Dean who is the head of academic and administrative activities. In addition, the Dean is the chairperson of the Board of the School.

IV. Assessment of the study programme(s)

1. Quality of the Curriculum / Aims and structure of the doctoral programme

Master degree	Doctoral Degree
<p><i>The intended learning outcomes of the programme are defined and available in published form. They reflect both academic and labour-market requirements and are up-to-date with relation to the relevant field. The design of the programme supports achievement of the intended learning outcomes. The academic level of graduates corresponds to the requirements of the appropriate level of the European Qualifications Framework.</i></p> <p><i>The curriculum's design is readily available and transparently formulated.</i></p> <p><i>[ESG 1.2]</i></p>	<p><i>The intended learning outcomes of the programme are defined and available in published form. They reflect both academic and labour-market requirements and are up-to-date with relation to the relevant field. The design of the programme supports the achievement of the intended learning outcomes. The academic level of graduates corresponds to with the requirements of the appropriate level of the national qualifications framework or the European Qualifications Framework.</i></p> <p><i>The curriculum's design is readily available and transparently formulated.</i></p>

Description

Curricula for Materials Science and Engineering (MaSE) are structured into four categories:

- Common core courses are offered to all students in the institution.

- Programme core courses offered to students registered in a particular programme which equip the students with respective know-how and advanced knowledge
- Speciality core courses offered to students in the area of their specialization within the programme provides a deeper understanding and mastery of the specializations, and
- Elective courses provide students with broader, more extensive and in-depth knowledge of theory and respective know-how. Graduate seminars are courses that enable students to develop a re-search topic, disseminate information, and respond to queries from various audiences.

1.1 Materials Science and Engineering (Master)

The duration of the programme is two (2) years that can be extended to three (3) years. Each year has two (2) semesters (a semester has 15 weeks). It is expected to admit 15 and 20 students for the academic year 2020/21 and 2021/22, respectively.

The Master's Programme aims to develop and strengthen human resources and institutional capacity in impact-oriented training and research in materials science to utilize the African natural resources best. The programme provides technical competence and critical thinking necessary to use modern materials science and engineering knowledge to help solve Africa's infrastructure, health care, and wealth creation through mineral processing. Fields of concentration include bioengineering, polymer science, metallurgy, ceramics, electronics, energy materials, structural materials, and photonic materials. The hands-on project-based curriculum also consists of courses in synthesis/processing, properties/structures, design and materials selection, heat and mass transfer, electrochemistry and corrosion, biomaterials, composites and computation materials science. The expected learning outcomes for this programme are described explicitly in a table in the SER.

Experts' Evaluation

a) Ex-post Situation

The panel of experts have been provided with information on the curriculum content. The documentation of the study programme contained course descriptions on the specific courses that have to be taken by the students. The documentation provided evidence that the Master's programme uses the categories "Knowledge and Understanding", "Applying knowledge and understanding", "Making judgements", and "Communication" as indicators for the intended learning outcomes on the programme level. The documentation outlined that the curriculum strives to equip students with principles, theories, and concepts of material sciences and engineering and fundamental knowledge of advanced material sciences and engineering. Graduates of the Master's programme are to be aware of the multidisciplinary nature of the discipline and will be able to apply tools of the discipline to solve current issues. However, when analysing the intended learning outcomes on the programme level for the Master's programme, the experts concluded that the definition of the intended learning outcomes for the programme does not fully reflect level 7 of the European Qualifications Framework (EQF). Students of programmes at level 7 are supposed to acquire highly specialised knowledge and have specialised problem-solving skills that can be used in research or innovation. The evidence provided during the site visit and the discussions clearly leaves no other conclusion that the programme level's current intended learning outcomes cover level 7 to an incomplete degree. A high focus is on general knowledge and understanding of concepts (five intended learning outcomes), whereas the application part of the intended learning outcomes on the programme level is currently underrepresented (one intended learning outcome). Thus, a level-oriented definition of ILOs on programme level following the European Qualifications Framework (EQF) according to level 7 is required for the Master's programmes, considering the respective level of subject-specific and interdisciplinary knowledge, skills, responsibility, and autonomy.

At the time of the site visit, no evidence was provided on how the combination of courses achieves the intended learning outcomes on the programme level. Starting with six common institutional courses offered by the College of Business Studies and Humanities, the curriculum consists of three programme core courses (with 11 credit points each), an elective course (11 CP), and three specialisation courses (with 11 CP each). After the course work, students are to take a graduate seminar (16 CP) and a Master's thesis (60 CP). However, the documentation did not include a clear study plan or matrix, making it hard to assess the curriculum's structure. The study plan provided to the experts indicated a mismatch between the study plan and the course descriptions. In fact, essential courses of the discipline such as composites materials (Course code: MaSE 6206) does not appear in the study plan although being listed in the course description for the programme. It is indicated that the curriculum provides specialisation options to students in structural materials and energy materials. The specialisation track for structural materials covers courses on environmental degradation of materials, ceramic materials, and fracture mechanics and failure analysis. The specialisation track on energy materials includes courses on sustainable energy resources and energy harvesting, thermoelectrics, and solar energy systems. Even though content wise the courses and the specialisations fit the discipline, it stays unclear how the combination of three programme core courses, three specialisation courses plus one elective course with a total of 77 CP out of 182 CP (which adds up to 770 hours of student work according to the Tanzanian credit system) complies with the respective level of the EQF. Therefore, further evidence on how to demonstrate the learner's progression and a clarification of how the (to be updated) intended learning outcomes on the programme level is translated into the curriculum must be provided.

Although meaningful to material sciences and engineering, the topics do not currently fulfil the labour market needs to the fullest. The labour market discussion clarified that no graduates of the study programme had been hired in the past due to a lack of practical skills. In some instances, the labour market prefers graduates from other programmes at NM-AIST as employees or interns. Thus, when updating the curricula, the labour market must be involved to align the intended learning outcomes on the programme level and with a clear reflection on the courses considering the current developments of the discipline.

The course descriptions are generally comprehensive and indicate information on the student workload, local credits, a differentiation between contact and independent study hours, the responsibilities for the course and literature used in the course. Despite a certain level of information, the experts believe that course descriptions must be redrafted. The descriptors of the intended learning outcomes on the course level do not reflect level 7 of the EQF. Therefore, the course descriptions must be reformulated, outlining skills, knowledge, and competencies that are to be acquired in the light of the ILOs on the programme level. A clear indication of the teaching method for the courses must be given to increase transparency. The current version of the course descriptions outlines the assessment methods in the courses, differentiating in formative assessment and summative assessments. This provides students with information on what will be done during the courses. The information concerning the final examination includes, in many cases, the composition of the final assessment with an indication of the distribution of the five levels of assessment. Information on the concrete examination methods in the courses is missing. In addition, it must be assured that the course code and outlined consistently in the course descriptions and in line with the study plan.

Nelson Mandela African Institute of Science and Technology is a postgraduate university that only offers Master's and PhD programmes. The site visit made it clear that students enrolled in the programme have a relatively broad background from different universities within Tanzania or neighbouring countries. In consequence, it was stated that the level of students might be different at the beginning. The programme management strives to approach this matter by offering two-week crash courses to level up students' competencies. From the expert's perspective, this is a manageable way to face the matter of being a postgraduate university. However, to support students better, structured bridging courses must be implemented to homogenise the student cohorts at the beginning of the study programme. One way to detect structural weaknesses of prospective

students will be to carefully assess students' backgrounds and define a set of competencies and skills that must be available when enrolling on the study programme.

b) Reconsideration evaluation

After the analysis of the updated documentation, evidence has been shown that the master's programme "Material Sciences and Engineering" is designed to provide graduates with a comprehensive understanding and knowledge of the principles, theories, concepts, and facts in the field. The programme's intended learning outcomes encompass various aspects that are crucial for success in the materials science and engineering discipline. Firstly, the programme aims to ensure that graduates can explain the principles, theories, concepts, and facts related to materials science and engineering. They are expected to have a deep understanding of advanced materials and their diverse applications. Additionally, graduates are encouraged to recognize and appreciate the multi-disciplinary nature of the field, demonstrating awareness of the program's cross-cutting aspects. Furthermore, the programme emphasises the acquisition and application of fundamental knowledge in materials science and engineering. Graduates should be able to apply materials and engineering tools to analyse problems effectively. They are also expected to possess the skills necessary to process materials based on specific applications and produce high-quality products from given materials. The ability to make informed judgments is another essential skill emphasized in the program. Graduates are encouraged to solve materials selection and design problems by integrating knowledge gained from the program's constituent courses. This involves selecting materials based on specific needs and applying statistical methods to ensure optimal outcomes. Developing such critical thinking and decision-making skills is vital for graduates to excel in their professional careers. In addition to technical expertise, effective communication skills are also deemed essential. The programme acknowledges the importance of graduates being able to convey their ideas and research findings clearly to both technical and non-technical audiences. Opportunities are provided for students to develop their communication skills through research presentations, manuscript writing, and the completion of a dissertation. These activities also contribute to the development of general transferable skills, including information technology, information retrieval, and effective communication. It reflects now the European Qualifications Framework (EQF) on level 7.

However, the connection between the intended learning outcomes on the programme level and the curriculum is still not fully visible. The experts want to point out that fostering learner's progression throughout a curriculum and transparently outlining the demonstration of that progression are essential components of effective education. These practices are vital for several reasons, as they ensure students' continuous growth, provide a clear roadmap for their development, and promote engagement and motivation. Transparently outlining the demonstration of learner's progression is equally important. When students have a clear understanding of the intended learning outcomes at each stage of the curriculum, they can set personal goals and track their progress. This transparency provides them with a tangible measure of their achievements and serves as a motivator to persist in their studies. Moreover, it helps students identify areas where they may need additional support, allowing educators to provide targeted assistance and interventions.

Based on the evidence provided, the curriculum is designed to provide students with a comprehensive education in the discipline. It consists of several components, including the Institutional Common Core Courses (two courses of 100 hours each), School Common Core Courses (two courses of 140 hours each), Programme Core Courses (seven courses of 140 hours each), Electives (each with 140 hours), Graduate Seminar (120 hours), and Research for the Master Dissertation (1200 hours).

The "Institutional Common Core Courses" comprises two courses: "Foundation of Law, Philosophy, and Ethics" and "Technological Innovation and Entrepreneurship Management." These courses lay the groundwork by introducing students to the legal, philosophical, ethical aspects of the field, as well as principles of technological innovation and entrepreneurship management.

The "School Common Core Courses" includes "Research Methods and Communication" and "Industrial Placement." "Research Methods and Communication" equips students with essential skills in research methodologies and effective communication. The "Industrial Placement" provides practical industry experience, enabling students to apply their knowledge in real-world settings.

The "Programme Core Courses" focuses on various aspects of Materials Science and Engineering. Courses such as "Thermodynamics and Phase Equilibria," "Materials Characterization," "Physical Metallurgy," "Composites Materials," "Nanomaterials Science and Engineering," "Physical Chemistry," and "Fracture Mechanics and Failure Analysis" delve into the fundamental principles, theories, and practical applications in these areas.

Students can also choose five elective courses to specialise in specific areas of interest. The list includes topics like "Programming Language in Materials Research," "Energy Simulation in Building Design," "Instrumentation Techniques in Nuclear Research," "Global Technology and Development," "Environmental Degradation of Materials," "Ceramic Materials," "Sustainable Energy Resources and Energy Harvesting," "Thermoelectrics," and "Solar Energy Systems." These courses allow students to tailor their education to suit their individual career goals and interests.

The Graduate Seminar provides a platform for students to present and discuss their research findings. It aims to enhance their presentation skills and engage them in scholarly discussions with their peers and faculty members. The culmination of the curriculum is the Research for the Master Dissertation. This component involves students conducting independent research under the guidance of a supervisor. Throughout this process, students deepen their understanding of a specific topic within Materials Science and Engineering and produce a high-quality master's dissertation.

Based on the documentation provided for the reconsideration, it can be stated that the NM-AIST have worked on the intended learning outcomes on the course level, while the intended learning outcomes on the programme level remain the same, which is good. Consequently, students will be exposed to a total of 1,680 hours of discipline-specific content. Still, the experts believe that an alignment between the intended learning outcomes on the programme level and the different courses is recommended (**Finding 1**). A matrix is a valuable tool for explaining how courses in a curriculum can achieve the intended learning outcomes on the programme level. It provides a clear and visual representation of the relationship between courses and the specific learning outcomes they are designed to address. This alignment and coherence ensure a cohesive and well-structured curriculum. By mapping the intended learning outcomes onto the courses, the department can ensure that each course contributes to the achievement of the programme-level learning outcomes. This comprehensive coverage ensures that all desired knowledge, skills, and competencies are addressed, leaving no important aspect overlooked. The matrix helps identify any gaps or redundancies in the curriculum, allowing educators to refine and enhance it accordingly.

While the critique of the experts was that the course descriptions lack clarity on the course descriptions, the experts now conclude that the department has worked intensively to clarify the documentation. The submitted documentation includes teaching methods for all courses, topics included in the courses, examination methods in the courses, and course codes.

The submitted documentation showed that the entry requirements for master's students have been adjusted, so that bridging courses are not longer needed, because the entry requirements ensure that sufficient knowledge, and skills are available to manage the master's programme.

Conclusion

The criterion is partially fulfilled.

1.2 Materials Science and Engineering (PhD)

The duration of the programme is three years that can be extended to 4-5 years. Each year has two semesters (a semester has 15 weeks). It is expected to admit 10 and 15 students for the academic year 2020/21 and 2021/22, respectively.

The PhD Programme in Materials Science and Engineering offered by NM-AIST aim to develop and strengthen human resources and institutional capacity with deep knowledge in impact-oriented training and Research in advanced materials science to best utilize the African natural resources.

In addition to the knowledge which can be gained in the Master Programme, graduates of PhD in Materials Science and Engineering will have acquired comprehensive and in-depth knowledge and understanding required to (i) Acquire a well-rounded education, preparing them to contribute effectively as an individual professional and as a team member in academia-industry and government. (ii) Acquire practical skills through experience obtained in laboratories, workshops, individual and group research work and working computer software; and (iii) Competently integrate engineering and materials design concepts with societal issues, including economics, ethics, quality and human values. PhD candidate will be assessed by his ability in Research and dissertation.

A PhD student under the programme of MaSE with specialization in Structural materials and Energy materials at NM-AIST shall be required to complete coursework and graduate seminar of a minimum of 171 credits. The 171 credits comprise five (5) common core courses if not taken before at NM-AIST. If a student studied Master's Degree at NM-AIST, she/he would be required to take any course to cover the credits of the Institution Common courses. For the other courses, the PhD students will choose courses from the course mapping that will comprise of two (2) Programme courses at the school level, two (2) speciality courses and a minimum of two (2) elective courses depending on the student's research area, and also a student should attend seminars to cover 24 credits; supervisor guides a student to take relevant courses. The remaining 370 credits will be covered from the student's dissertation to fulfil the minimum credits required for PhD Programme, which are 540 credits. Students shall also be required to complete the credits for the Graduate Seminar and do Research throughout the entire study period.

Experts' Evaluation

a) Ex-post Situation

The PhD programme of MaSE is a consecutive programme that builds upon the skills, knowledge and competencies of students coming in many cases from the Master's programme at NM-AIST. The description of the intended learning outcomes on the programme level presented in the documentation and confirmed during the site visit cover the categories "Knowledge and understanding", "Applying knowledge and understanding", "Making judgement", and "Communication". It became evident that the PhD programme strives to provide students with experimental, statistical, and computational methods that graduates can apply in research and the industry. However, the experts believe that the current description of the intended learning outcomes on the programme level is formulated in a much too broad sense without many discipline-specific areas. The current status of the ILOs on the programme does not reflect level 8 of the European Qualifications Framework (EQF). It does not outline the most advanced character of knowledge, skills and competencies, including the innovative and evaluative character of the level.

The curriculum is composed of five institutional core courses (29 CP) offered by the College of Business Studies and Humanities, three programme core courses (21 CP each), one elective course (34 CP), and three specialisation courses (21 CP each). The specialisations offered in the PhD programme are also structural materials and energy materials. After the course work, PhD students have to take a graduate seminar (16 CP) and write a PhD dissertation (378 CP), which sums up to a total of 541 CP according to the documentation

provided to the experts. Following the evidence provided in the annexe concerning the study plan, it is indicated that the institutional core courses are the same as for the Master's programme (marked as 6xxx courses instead of 7xxx courses, being the reference for PhD courses). This indicates that PhD students will either have to repeat the courses from the Master's level or not have to attend them. The institutional courses cover topics such as "philosophy, ethics, and social imperative", "foundations of law in science, engineering and technology", "innovation management and competitiveness", "entrepreneurship and management", and "research methods and communication". These courses are also implemented in the Master's programme. The experts believe that PhD students have to be supplied with advanced courses on the respective level because these courses support the PhD students in their academic and personal growth and are beneficial for their future careers. Therefore, specific PhD institutional core courses must be implemented in the PhD curricula. Special attention concerning the advanced character, in general, but specifically in methodological research, must be paid compared to the one's offered for Master students.

Concerning the programme core courses, which focuses on material sciences and engineering, the experts have been provided with evidence that the PhD programme includes a total of 160 CP of discipline-specific courses. In consequence, the discussion and the documentation clarify that students have a total of 1600 hours of discipline-specific contact during the PhD programme. Additionally, students will carry out discipline-specific research as a dissertation (378 CP or 3780 hours) after the courses. The experts acknowledge that the courses cover relevant topics in the range of the discipline; however, it stays unclear how intended learning outcomes on the programme level are translated into a discipline-specific curriculum that manifests a PhD degree in the discipline that is comparable to level 8 of the EQF. When looking at the course descriptions, it became clear that to give one example, the course on "Physical Chemistry" (Course code: MaSE 6210) have the same intended learning outcomes on the level of the course as the course "Modern Physical Chemistry" (Course code: MaSE 7205). Further evidence must be provided.

Parallel to the Master's programme, it became apparent that the programme management is currently not in an established exchange with the labour market. The discussion rounds indicate that a strategical decision is to be made in which direction the study programme will focus in the future and, in consequence, which labour market representatives will potentially employ graduates of the PhD programme. So far, the labour market seems to prefer graduates from other disciplines as employees. The discussion rounds clarified that the regional and local labour market faces many challenges currently. Therefore, a vital exchange between academia and the labour market is essential for the programme. Labour market considerations have to be implemented and aligned with the (to be updated) ILOs on the programme level, considering the latest developments in the field.

The course descriptions provided to the experts cover, as for the Master's programme, information on student workload, local credits, literature and responsibilities. When analysing the depth of the intended learning outcomes on the course level to create a synchronisation to the ILOs on the programme level, it became evident that the descriptors used do not reflect level 8 of the EQF. When reformulating the ILOs on the course level, it must be assured that skills, knowledge and competencies to be acquired in the courses reflect the advanced character. Besides, the specific teaching method must be outlined, which will be used to guarantee consistency throughout the semesters. As for the Master's programme, a clear indication must be given concerning the assessment method in the specific courses. Parallel to the course descriptions of the Master's programme, a consistent outlining of the course codes in line with the study plan must be assured.

b) Reconsideration evaluation

The experts analysed the documentation submitted during the reconsideration process. It became evident that the PhD programme "Material Sciences and Engineering" now focuses on the four levels highlighted in the European Qualifications Framework on level 8. The documentation demonstrates a comprehensive and in-depth level of knowledge and understanding. It covers a wide range of topics, equipping graduates with the

necessary expertise to contribute effectively as professionals in academia, industry, and government. The programme emphasizes an education, ensuring that graduates are equipped with a holistic understanding of their field. The programme also focuses on practical skills development through various means such as laboratory work, workshops, individual and group research projects, and computer software usage. This practical experience enables graduates to apply their knowledge effectively and develop the necessary skills required in real-world scenarios. Furthermore, the programme recognizes the importance of integrating engineering and materials design concepts with societal issues, including economics, ethics, quality, and human values. This aspect reflects a multidisciplinary approach that prepares graduates to consider the broader implications of their work, making them competent professionals capable of addressing real-world challenges.

In addition, the PhD programme aims to develop graduates who can convert materials into different products through creativity and innovation. This emphasis on practical application demonstrates the ability of graduates to employ their knowledge and understanding in a practical and innovative manner. By enabling students to convert materials into diverse products, the programme promotes critical thinking, problem-solving skills, and the ability to generate new ideas. Graduates are equipped to approach materials-related challenges with a creative mindset, driving innovation in the field.

Concerning judgement-making abilities, the PhD programme emphasizes the development of graduates who can make informed judgments by employing experimental, statistical, and computational methods. It also promotes the use of critical thinking skills to address and design solutions for complex problems in materials science and engineering. Graduates are equipped with the capacity to analyse, evaluate, and make sound decisions based on their expertise and understanding of materials science and engineering principles.

On the communicative side, the PhD programme emphasizes effective communication skills, both orally and in written form. Graduates are expected to communicate, debate, and defend their findings and insights clearly and systematically. They are also required to provide a rational underpinning of their work through oral and written presentations to diverse audiences, utilizing appropriate information and communication technologies.

Overall, the PhD programme in Materials Science and Engineering effectively reflects the European Qualifications Framework level 8. It provides graduates with comprehensive knowledge, practical skills, and the ability to apply their expertise to real-world scenarios. The programme encourages critical thinking, judgment, and effective communication, preparing graduates to contribute significantly as professionals in academia, industry, and government.

Based on the additional evidence submitted to AQAS, it can be stated that the department has implemented additional advanced courses for the PhD programme “Material Sciences and Engineering”. This recent implementation of advanced courses in the PhD programme reflects a proactive approach to enhancing the educational experience for PhD candidates. By incorporating advanced courses into the curriculum, the programme aims to cultivate a comprehensive understanding of the field, foster research skills, and promote academic growth. The courses offered to PhD students are designed to develop experts in specific areas of study, including courses in “Advanced thermodynamics and Heat transfer”, “Advanced Materials Characterization”, “Advanced Composites Materials”, “Applied Nanotechnology”, “Modern Physical Chemistry”, and “Powder Production”. In addition, the curriculum indicates that the courses offered to students play a vital role in equipping students with the necessary research skills and methodologies. The course descriptions have been updated accordingly and demonstrate the adequate intended learning outcomes on the course level for each course. However, the experts point out that for the future manoeuvring of the PhD programme, a matrix needs to be submitted to demonstrate the relationship between the ILOs on the programme level and the ones on the course level (**Finding 2**). From the expert’s perspective, a matrix serves as a valuable tool for curriculum design and revision. It provides a structured framework for evaluating the coherence and progression of intended learning outcomes across courses. By analysing the matrix, the department can identify areas where

the programme's intended learning outcomes may need further attention or where adjustments need to be made to ensure a comprehensive and integrated curriculum. The matrix also aids in identifying areas where interdisciplinary connections can be strengthened, promoting a holistic understanding of the subject matter.

The documentation provided to the experts indicate that the majority of students are already employed when enrolling at the PhD programme. However, it is stated that external stakeholders were involved in the national validation process in 2018. The evidence of this seems to be quite fruitful and cooperative. Due to that fact the experts still believe that regular meetings with potential employers of graduates will be a useful tool for the further development of the programme (see Finding 4).

Conclusion

The criterion is partially fulfilled.

2. Procedures for Quality Assurance

Master's degree	Doctoral Degree
<p><i>The programme is subject to the higher education institution's policy and associated procedures for quality assurance, including procedures for the design, approval, monitoring, and revision of the programmes.</i></p> <p><i>A quality-oriented culture, focusing on continuous quality enhancement, is in place. This includes regular feedback mechanisms involving both internal and external stakeholders.</i></p> <p><i>The strategy, policies, and procedures have a formal status and are made available in published form to all those concerned. They also include roles for students and other stakeholders.</i></p> <p><i>Data is collected from relevant sources and stakeholders, analysed, and used for the effective management and continuous enhancement of the programme.</i></p> <p><i>[ESG 1.1, 1.7 & 1.9]</i></p>	<p><i>The programme is subject to the higher education institution's policy and associated procedures for quality assurance, including procedures for the design, approval, monitoring, and revision of the programmes.</i></p> <p><i>A quality-oriented culture, focusing on continuous quality enhancement, is in place. This includes regular feedback mechanisms involving both internal and external stakeholders.</i></p> <p><i>The strategy, policies, and procedures have a formal status and are made available in published form to all those concerned. They also include roles for students and other stakeholders.</i></p> <p><i>Data is collected from relevant sources and stakeholders, analysed, and used for the effective management and continuous enhancement of the programme.</i></p> <p><i>[ESG 1.1, 1.7 & 1.9]</i></p>

Description

The university has developed a quality assurance policy, which focuses on sensitizing and mobilizing functional departments and sections in the entire institution in matters related to quality assurance. This policy exists in the context of other existing institution control tools and policies. As a minimum, the NM-AIST quality assurance system is anchored to The Quality Assurance General Guidelines and Minimum Standards for Provision of University Education in Tanzania (2019) issued by the TCU. The guidelines and standards guide various aspects of quality concerning the provision of university education in Tanzania. NM-AIST, one of the universities accredited by TCU, is obliged to use the guidelines and adhere to the standards. Also, other national and regional guidelines, such as the Inter-University Council of East Africa (IUCEA), can be complementary and supplementary used to support quality assurance mechanisms considering that they are not contravening with the national laws.



The curriculum review process is done following TCU guidelines, generally done after every five years under the descriptive stages: Need assessment which is done by involving the employers, graduates and other stakeholders, input from various stakeholders are considered based on resources available, development of science and technology, and market opportunity. At the end of the process, the programme is subjected to validation. Stakeholders involved in the need assessment stage are re-invited to see whether their suggestions were accommodated/ not accommodated in the curriculum. The Quality Assurance Unit then checks the curriculum to validate the compliances as per TCU guidelines, followed by endorsement by the school boards and Senate for Teaching and Learning Committee. The programme is then submitted to the Senate for approval. After internal assurance and validation, the programme is submitted to TCU for review and possible approval/accreditation. The purpose of involving various stakeholders in the need assessment and validation of the curriculum is to identify existing gaps in the market and develop a curriculum that will help students gain the required knowledge and skills and enhance their employability.

To ensure standards and compliances, it is a must for students to evaluate instructors through an anonymous online course evaluation system. The aim is to grasp areas of weakness and suggest a way of improvement. Evaluation reports are treated as essential matters by the institution.

To accomplish the mission and targets of the university, the following are used as key performance indicators that include - number of admitted students, number of graduates, number of publications, patents, products and prototypes emanated from students' research works. Also, research grants won, community engagement, outreach programmes and consultations. It also includes organizing, participating in international and local conferences.

In 2016, the university conducted a tracer study for 2013-2015 graduates, where it was observed that most graduates were employed in government and non-government organizations such as higher learning institutions, research organizations, ministries and industries.

Experts' Evaluation

a) Ex-post Situation

The quality assurance system of NM-AIST, which is applied to the programmes, covers many service areas of the university. Besides the internal QA procedures, the communication and external accreditation conducted by the Tanzania Commission for Universities (TCU), taking place every five years, is coordinated in the Quality Assurance Unit of NM-AIST. It became evident that the authoritative policy regarding quality assurance exists only in institutional control tools and policies. An independent, standalone policy regarding the programmes would be more suitable to inform internal and external stakeholders about the aims, mission and vision of quality assurance at NM-AIST.

At the time of the site visit, a description of the responsibilities of the quality assurance unit was found in the documentation and on the NM-AIST homepage. It was said during the site visit that course evaluations and national accreditation procedures (every five years) take place regularly. However, within the documentation and policies, a complete description of the implemented processes was not presented, and it could not be clarified how regularly and integrated processes are carried out. NM-AIST stated that the programmes are objective to feedback from the labour market on the quality and the current content orientation of the study programmes. Despite that, it appeared to the experts that meetings do not happen regularly, and the awareness of external stakeholders about the programmes is currently low. The expert panel considers the regular interaction with labour market representatives, the documentation of feedback on the study programmes, and the analysis thereof to be necessary. Potentially, one way could be to appoint a committee with labour representatives being represented.

NM-AIST uses some key performance indicators, such as the number of students enrolled and graduates. The documentation provided to the panel included data on the whole university (differentiating in gender and Tanzanian and international students). Also, experts received documents on the drop-out rates for the whole university on the macro level but without being specific on exam pass rates for the programmes on the micro-level. Although some of the information provides valuable information to NM-AIST, the experts believe that the Centre misses the opportunity to implement a quality-culture oriented quality assurance instrument for the programmes. A systematic collection of more specific data concerning the student body, including exam pass rates, average grades, statistics on course evaluations, or student cohorts, as well as a verification of student workload, is required. This will help the programmes to detect student enrollment trends, which might be an additional indicator for the perception of the study programmes in the region and gives valuable insights into the students' background. This is particularly important for sharpening the admission requirements of students (see chapter IV.3).

Despite the lack of data provided to the experts, it must be stated that the experts gained the impression that students perceive the atmosphere at the university as familiar and very supportive. The personal and informal contact between students and teaching staff was mentioned in many instances. The experts commend this positive atmosphere. Although being a strength of the programmes, the informality of the processes might also risk the programmes. The extent to which NM-AIST's quality assurance system covers some areas of learning and teaching, for instance, research work and dissertation, stay unclarified at this stage of the procedure. It must be demonstrated how the feedback obtained is processed and to what extent. If a need for action is identified, measures must be implemented and lead to further development of the quality of the study programmes. The communication with internal and external stakeholders concerning changes must be carried out systematically to close the PDCA cycle.

The study programmes follow the national regulation by TCU concerning the workload per credit. The discussions confirmed that the one local credit equals ten hours, leading to 182 CP for the Master's programme in "Material Sciences and Engineering", and 541 CP for the PhD programme in "Material Sciences and Engineering". The documentation stated that the TCU University Qualifications Framework (UQF) defines said workload of one credit, including lecturers, practical, research, independent studies, seminars, and alike. In addition, the minimum range of 180 CP is defined for Master's programmes and a minimum of 540 CP for PhD programmes. Therefore, the evidence clearly shows that the programmes comply with the national regulations in Tanzania. However, the documentation also clarified the relation between the local credits and ECTS. The documentation showed that the students' workload for the programmes on the Master's level is 1800 hours compared to 3000 to 3600 hours in Europe, and on the Tanzanian PhD level with 5400 hours (with a focus on the dissertation; 3780 hours). An apparent reference must be made to how the programmes can be contextualised within programmes using ECTS.

b) Reconsideration evaluation

The submitted documentation included the quality assurance policy of NM-AIST, which was not part of the documentation during the site visit. The experts analysed the content of the policy and its functionality for the programmes. The policy concerns quality assurance in monitoring and evaluation matters, the administrative structures at NM-AIST, and the strategies to implement the policies. The document indicates that the NM-AIST has established an Institution-wide Quality Assurance Unit (QAU) that operates directly under the office of the Vice Chancellor. The QAU has the responsibility of monitoring and guiding quality assurance processes across all units within the university. It maintains a close working relationship with these units, keeping them informed about emerging quality assurance issues that fall under their respective jurisdictions. This coordination ensures that the university maintains high performance standards. Furthermore, the QAU acts as the central hub for the university's quality assurance system. It provides technical advice on measures to be taken in order to uphold these standards, and it may even make technical presentations on behalf of the university

management. The policy includes responsibilities and duties, outlining that the functions assigned to the Quality Assurance Unit encompass various responsibilities. These include developing and implementing the Quality Assurance Policy, maintaining operational manuals and standards, evaluating the alignment between policies and quality assurance, formulating strategies for quality assurance, assessing resource availability, managing teaching programmes, conducting internal and external evaluations, fostering partnerships, and performing other related duties. Furthermore, the policy includes that there are regular surveys to collect student's feedback, including course content and teaching of staff. In addition, employer satisfaction surveys are collected to ensure the employer satisfaction of graduates of NM-AIST programmes. The interaction with Alumni and with academic and administrative staff is also included in the policies.

Based on the evidence provided to the experts, it can be concluded that the Nelson Mandela African Institute of Science and Technology (NM-AIST) is committed to maintaining high standards of quality assurance across all its academic programmes and activities. As an esteemed institution dedicated to fostering scientific research and education in Africa, NM-AIST recognises the importance of having robust quality assurance policies in place. These policies are designed to ensure that the institute's programmes meet rigorous academic standards and provide students with a valuable and rigorous educational experience. The submissions encompass regulations on self-assessment at the programme level, research integrity, and various stakeholders' surveys. While these documents highlight the institute's dedication to maintaining quality, it is important to note that specific evidence regarding the effectiveness of these regulations in the master's and PhD programmes "Material Sciences and Engineering" is still currently lacking.

The experts believe that the inclusion of regulations on self-assessment at the programme level is a positive step towards quality assurance. Such measures encourage continuous evaluation and improvement, ensuring that the programmes align with the changing needs of students and the industry. However, in order to fully assess the impact of these regulations, it is essential to have programme-specific evidence demonstrating their effectiveness in enhancing the learning experience, student outcomes, and overall programme quality in the master's and PhD programmes of "Material Sciences and Engineering" (**Finding 3**).

The experts have understood that the background of NM-AIST graduates is somehow different from other institutions, because they might already be working in universities. Therefore, it is understood that the follow-up is difficult. In addition, it is also agreed that the programmes receive input from the external world within the national accreditation procedures. However, it is crucial to emphasise that fostering a strong and continuous relationship with the labour market is highly beneficial for the further development of NM-AIST's programmes. First and foremost, consistent exchange with the external labour market ensures that NM-AIST's programmes remain relevant and aligned with the evolving needs of industries. By actively engaging with employers, industry professionals, and experts, the institute can stay updated on the latest advancements, emerging trends, and skill requirements in various sectors. This enables NM-AIST to continuously adapt and refine its curricula, ensuring that graduates possess the knowledge and skills that are in demand in the job market. Through sustained collaboration and exchange, NM-AIST can bridge the gap between academia and industry, producing graduates who are well-prepared for the challenges and opportunities of the labour market. Thus, a more consistent follow-up with relevant employers of graduates should be the target (**Finding 4**).

As already outlined, it is seen that NM-AIST utilises key performance indicators (KPIs) to assess its performance, including student enrolment and graduation rates. The comprehensive documentation provided to the panel encompassed data pertaining to the entire university, with a breakdown by gender and the distinction between Tanzanian and international students. Additionally, experts were presented with information on the overall drop-out rates at the macro level. However, the experts recommend a systematic collection of more detailed data on the student body for each programme. This would involve gathering information on exam pass rates, average grades, statistics on course evaluations, and characteristics of student cohorts (**Finding 5**).

The experts have seen that the programmes under accreditation uses the Tanzanian credit system, and the workload calculation differs from standards on other continents. The documentation showed that the comparison between ECTS and the Tanzanian credits is based on workload hours. Still, a reconsideration of making the programmes transparently comparable with a consistent underlying system of workload verification is recommended (**Finding 6**). By aligning with ECTS, NM-AIST enhances the comparability and compatibility of its credit system with European standards. This recognition can positively impact the reputation of NM-AIST and its programmes, attracting students and researchers from Europe and beyond. Secondly, adopting ECTS promotes student mobility and exchange, because ECTS provides a transparent and universally understood framework for transferring credits between institutions. By implementing ECTS, NM-AIST can establish smoother credit transfer mechanisms with European universities. This enables students to participate in exchange programmes, study abroad opportunities, or pursue joint degrees with European institutions, fostering cross-cultural understanding and academic collaboration. This might lead to further international partnerships and collaborations.

Conclusion

The criterion is partially fulfilled.

3. Learning, Teaching and Assessment of Students / Learning and Assessment of Students

Master degree	Doctoral Degree
<p><i>The delivery of material encourages students to take an active role in the learning process. Students are assessed using accessible criteria, regulations, and procedures, which are made readily available to all participants and which are applied consistently. Assessment procedures are designed to measure the achievement of the intended learning outcomes. [ESG 1.3]</i></p>	<p><i>The form of supervision and/or course structure is adequate and corresponds with the intended learning outcomes. Students are assessed using accessible criteria, regulations, and procedures, which are made readily available to all participants and which are applied consistently. Assessment procedures are designed to measure the achievement of the intended learning outcomes. [ESG 1.3]</i></p>

Description

The students' workload is defined and stipulated in the curriculum and prospectus regarding the number of courses a student must take to complete a programme and the course contents. The courses with more content, such as programme and speciality core courses, are given more contact and independent study hours. Students are also one of the key stakeholders during the curriculum review; one of the inputs needed from them is workload and relevance of course contents and learning outcomes. Students' inputs are vital in matching workload expectations between them and the teacher. The credit system used to gauge the workload involved in the programme is aligned with TCU University Qualification Framework, thus: (i) One credit shall imply 10 hours of lectures, practical, research, independent studies, seminars, tutorials or other assignments. (ii) A minimum of 180 credits are required to award a Master's degree, and a minimum of 540 credits are required for the award of a PhD degree.

After successfully completing coursework, students are subjected to defend the proposal and pass before the commencement of the research work. Dissertation/thesis is examined by internal and external to determine a candidate fate for oral defence or viva voce for master' and PhD, respectively. The final verdict of the panel may determine the fate of the candidate. All the examination and evaluation procedures mechanisms are



stipulated in the NM-AIST Academic Regulations, Guidelines for writing proposal and submission dissertation/thesis.

The university has structured strategies for assessing examinations across all programmes. Students are subjected to attend several assessments during coursework as described in the course module. Continuous assessments contribute to the final semester examination results. Semester results are approved through institution machinery, where courses are discussed and approved individually. Where moderate or mass failure is experienced, individual assessment of the course is made.

Where unfair computation or misconduct during teaching is observed, the Institution may recommend alternative means. However, the failed student for the first seating is subjected to supplementary examination. If the candidate fails in the supplementary examination is also given another chance to repeat the failed course.

The teaching and learning methods designed for these programmes include Lectures, small group discussion, problem based-learning, industrial visits and attachments, practical works, mini-projects, e-learning, independent studies, seminars and assignments.

Also, the learning infrastructure like lecture theatre and laboratories are designed to accommodate students with disabilities who are admitted into these programmes.

Curricula include independent studies, assessment, mini-projects, and practicals to value student time in pursuance of the course. These tactics give students the skills and ability to activate the process of teaching and learning.

The Institution has an Academic Department as the overall coordinator of the teaching and learning activities. Among other activities, the department ensures that schools adhere to the structure and schedule of the course delivery mode. However, each school has the mandate to suggest any changes that need to be addressed for the smooth running of the programme. There is an Academic Officer dedicated to each school to coordinate academic matters at the school level. School academic officers are legible to report any cases regarding academic misconduct to the central Academic department.

Experts' Evaluation

a) Ex-post Situation

After having analysed the documentation and discussed with the teaching staff of the programmes, the experts conclude that the teaching approach at NM-AIST offers a broad range that fosters the learning experience of students at different levels. The teaching methods cover a broad range, including lecturers, group discussions, problem-based learning, internships, visits to industry partners, practical works, mini-projects, seminars, and assignments. Despite the mismatch between the respective level of the programme and the intended learning outcomes on the programme level, the experts believe that the teaching methods listed in the documentation and discussed can potentially fulfil the intended learning outcomes on level 7 and level 8 of the EQF. Room is given for independent learning paths, including specialisations and additional elective courses. This fosters the diversity of students according to their needs. The programmes allow students to take an active part in the learning process. The courses indicate the independent learning time, which is included in the workload calculation (respecting the national qualifications framework).

It has been outlined that students on the Master's and PhD levels within the structured programmes will develop the final project concept during the courses. They will develop proposals in the first academic year and defend them at the end of the first academic year. In the second academic year, the programmes try to engage students in research activities. Once completed the course work, students will defend the proposal for the final project. After the course work and the successful defence of the proposal, students take graduate seminars with seminar presentations to further develop the final project. Before the final graduation project can be

submitted, Master students have to publish one paper, whereas PhD students have to publish two papers prior to the dissertation. The experts command that supportive approach of teaching staff with clear steps of support throughout the study programmes.

The programmes' assessment regulations follow clear regulations defined on the university level and are within the national regulatory framework in Tanzania. The requirements are transparently published to students and teaching staff via the university regulations. The documentation outlines that the examination process for the programmes applies the same pattern for the examinations implemented in the courses. Following the course description and the documentation, they cover the domains "Knowledge and Comprehension" (10%), "Application" (30%), "Analysis" (20%), "Synthesis" (20%), and "Evaluation" (20%). In relation to the course descriptions, it was clarified that the final examination covers only five questions, one of each per domain in nearly all instances. The experts conclude that the examination methods are not appropriate for intended learning outcomes on the programme level and the respective level of the EQF. When recomposing the curricula and the course descriptions, a clarification must be given about the spectrum of examination types and how the examination methods align with the intended learning outcomes on the course level and the programme level.

The Centre management administers the organisation of the examinations by the university's academic calendar. Students are informed about the time framework of the examination in advance at the beginning of the courses. Students have an option to re-sit the exam in case of failing the examination. The site visit shed light on the current appeal system for the programmes. The academic regulations outline that students have to report first to the Dean. The appeal will be then forwarded to the university's senate, who will communicate the results to students. However, it became evident that students are charged for the appeal procedure with 20 US Dollars for the administration procedure. The experts believe that this approach diminishes equal opportunities for students. Therefore, the university should reconsider the current appeal procedure.

b) Reconsideration evaluation

The experts have analysed the submitted documentation and course descriptions of the courses. The courses outline the examination modalities for the courses transparently. Hence, the experts believe that the course descriptions now promote clarity and understanding among students. In addition, these transparent course descriptions enhance now accountability and trust. By providing detailed information about examination modalities, NM-AIST is able to demonstrate their commitment to transparency and fairness in the assessment process. This cultivates trust among students, as they have a clear understanding of how their performance will be evaluated and can expect a consistent and objective assessment experience.

In regard with the appeal issue, the experts have seen positive developments in this matter. It has been documented that the Financial Planning and Deployment Committee (FPDC) reviewed the matter in April 2022 and acknowledged that appeal fees should not be seen as a source of income for the institution or act as a barrier for students to appeal. However, they also emphasized that students should not appeal solely because there is no cost associated with it. The committee proposed exempting students from paying the appeal fees to ensure equal opportunities. Consequently, this matter has been addressed.

Conclusion

The criterion is fulfilled.

4. Student Admission, Progression, Recognition and Certification / Legal Status, Admission and Certification

Master degree	Doctoral Degree
<p><i>Consistently applied, pre-defined, and published regulations are in place which cover student admission, progression, recognition, and certification.</i></p> <p>[ESG 1.4]</p>	<p><i>The institution is entitled to award a doctorate. Consistently applied, pre-defined, and published regulations are in place which cover student admission, progression, recognition, and certification.</i></p> <p>[ESG 1.4]</p>

Description

The admission criteria for Master's and PhD programmes at the NM-AIST are intended to provide candidates with diverse qualities to join the institution by expanding the scope for admission. Factors other than GPAs are also considered for admission. Criteria for admission vary from one programme to another.

To be admitted into a Master's Programme by Coursework and Dissertation at the NM-AIST, the following requirements will be taken into consideration: (i) Possession of at least a second-class Bachelor's degree with at least a GPA of 3.0/5.0 or its equivalent or a postgraduate diploma with at least a GPA of 4.0/5.0 or its equivalent in an appropriate area of study from an accredited university or similar institution of higher learning. An applicant holding unclassified degrees (e.g. M.D, BVM & DDS) should have at least an overall "C" grade and an average of "B" grade in the relevant subject or field of his/her specialization. The applicant may be expected to undergo an entry assessment by a panel appointed by the host School/Department,

To be admitted into a Master's Programme by Research and Thesis at the NM-AIST, the following requirements will be taken into consideration: (i) Possession of a Bachelor's degree from an accredited university or similar institution of higher learning with a GPA of at least 3.5/5.0 or its equivalent or a postgraduate diploma with at least a GPA of 4.0/5.0 or its equivalent in an appropriate area of study from an accredited university or similar institution of higher learning. Evidence of at least one year of working experience in a related field and at least one publication in an accredited peer-reviewed journal as the first author.

To be admitted into a PhD Programme by Coursework and Dissertation at the NM-AIST, the following requirements will be taken into consideration: (i) Possession of at least a second-class Bachelor's degree with at least a GPA of 3.0/5.0 or its equivalent or a postgraduate diploma with at least a GPA of 4.0/5.0 or its equivalent in an appropriate area of study from an accredited university or similar institution of higher learning. An applicant holding unclassified degrees (e.g. M.D, BVM & DDS) should have at least an overall "C" grade and an average of "B" grade in the relevant subject or field of his/her specialization. (ii) Possession of a Master's degree from an accredited university or similar institution of higher learning with a minimum GPA of 3.5/5.0 or its equivalent and at least an average of "B" in the relevant subjects or field of specialization. (iii) The applicant must satisfy the Programme and speciality specific requirements as specified by the respective School/Department hosting the Programme (iv) The applicant may be expected to undergo an entry assessment by a panel appointed by the host School/Department, which may take one of the following methods: (1) personal interview, (2) written assessment, or (3) interview plus written assessment.

NM-AIST Academic regulation has developed a mechanism of monitoring student progress as follows; A student shall be assigned a minimum of two supervisors appointed by the Senate on the recommendation of the relevant Department/School. Supervisors shall guide the student in formulating the research proposal and undertaking research and shall ensure that the student submits a progress report using research progress report form once every three months to the Senate through his/her respective department and School.

A student is permitted to transfer to the NM-AIST, credits equivalent of not more than 50% of all the credits for Master or PhD Programme of the respective University Qualification Framework (UQF) level coursework taken at another recognized academic institution.

The university promotes equal opportunity for all students. The advertisement for admission has space for the candidate to indicate their physical or medical challenge that the university can accommodate such candidates, such as hostel allocation as detailed in the newly approved house policy and student welfare policies. The university has a gender policy that ensures good gender equality at our university for both staff and students. The university is now mobilizing funds to build hostels for lactating students.

The documentation included examples of certificates for graduates, including the diploma and a transcript of records.

Experts' Evaluation

a) Ex-post Situation

The panel has been provided with evidence that concludes that the admission process is well organised. The students have confirmed the good personal attention to prospective students. The student selection procedure includes a written assessment, a personal interview (or a combination of both), which is an adequate procedure from the experts' perspective. Formal admission criteria and the selection procedures are listed on the Centre's webpage.

When analysing the admission requirements, the experts have noted that the general admission requirements cover defined GPAs for students, a Bachelor's, or for the PhD programme a Master's degree, in an appropriate area of study from an accredited university, and a demonstration of English proficiency (either if the previous degree was in English or by the TOEFL paper-based score of 550 (or higher), the computer-based score of 213 (or higher, or an internet-based score of 80 (or higher)). The documentation provided to experts outlines predefined degree courses for the study programmes, which clarifies what kind of general background is required from students. Despite that, the experts believe that the programmes must define clear minimum competencies for prospective students who strive to enrol for the Master's and the PhD programmes. It became, for instance, apparent that the specialisation tracks for the students are not considered in the admission requirements. The lack of these predefined requisites for prospective students dilutes the student body of the programmes and creates a situation where the teaching staff has to handle very heterogenic student bodies.

The selection procedure at NM-AIST follows a clear structure that shows cooperation between the admission office of NM-AIST, the relevant admission bodies and the school hosting the programmes. The procedure includes scrutinising all applications and selecting suitable candidates to be invited to the selection interviews. After that stage, the admission recommendations will be forwarded to the admission office. The results will be discussed by the admission committee and the senate teaching and learning committee. After the discussion, students will be informed about the outcome in due time. It has been stated that as of 2021, NM-AIST does not offer bridging courses to students who do not fulfil the requirements for the programmes.

The experts have been provided with guidelines concerning students research proposals and dissertations. This document contains important information about the role and responsibilities of the supervisors and the students. It includes information about the conduct and the requirements for dissertation and research proposals. A research progress report must be submitted by students every three months. This enables the Centre to monitor the individual status of the student's progress closely. The experts assess the instruments to follow the student's progression as adequate.

The site visit outlined that the university makes recognition efforts. Representatives have repeatedly stated it before enrolling on the programmes that the NM-AIST screens the applicants' profiles to support the recognition process of students. The students have confirmed this during the site visit. Although this seems to be a

promising approach in practice, the experts have not received an anchoring document on an institutional level that fosters this impression.

The experts have been provided with examples of certificates for the programmes and examples of the further documentation provided to students. This documentation is assessed to be satisfactory. They provide externals with sufficient information about the programmes and the courses taken by students.

b) Reconsideration evaluation

The submitted evidence clarified that the master’s and PhD programmes have adequate admission regulations. These included adequate prerequisites that ensure that potential students of the programmes may be successful. Thus, the experts testify that this matter has been clearly addressed.

Concerning the recognition efforts at NM-AIST, it is clearly understood that the Tanzanian higher education system does not have a specific framework for Recognition of Prior Learning. However, the documentation outlines that a student is allowed to transfer to NM-AIST and receive credit for up to 50% of the total credits required for a master's or PhD programme at the corresponding level in the University Qualification Framework (UQF). To initiate the transfer, the student needs to provide a verifiable recommendation from the programme coordinator at their previous institution and an official transcript confirming completion of the coursework. These documents must be endorsed by the Dean of the relevant School at NM-AIST and submitted to the Senate for approval. It is also mentioned that the content of the courses the student wishes to transfer should closely match at least 75% of the content of existing courses at NM-AIST since these will be reflected on the student's transcript. To ensure fairness, academic integrity and consistency, it is still suggested to anchor this procedure on an institutional level (**Finding 7**).

Conclusion

The criterion is fulfilled.

5. Teaching Staff / Academic Level of Supervisory Staff

Master degree	Doctoral Degree
<p><i>The composition (quantity, qualifications, professional and international experience, etc.) of the staff is appropriate for the achievement of the intended learning outcomes.</i></p> <p><i>Staff involved with teaching is qualified and competent to do so.</i></p> <p><i>Transparent procedures are in place for the recruitment and development of staff.</i></p> <p><i>[ESG 1.5]</i></p>	<p><i>The composition (quantity, qualifications, professional and international experience, etc.) of the staff is appropriate for the achievement of the intended learning outcomes.</i></p> <p><i>Staff involved with teaching is qualified and competent to do so.</i></p> <p><i>Transparent procedures are in place for the recruitment and development of staff.</i></p> <p><i>[ESG 1.5]</i></p>

Description

NM-AIST has established policies and systems on staff recruitment, remuneration, human resources management, health and safety. Open Performance Appraisal system (OPRAS) is implemented to stimulate academic staff to work with high calibre in doing research, teaching, and supervision. According to the SER, NM-AIST recruits staff based on the need proposed by the school/department concern. It employs staff who can establish and nurture productive relations with industry and are very practically experienced with technology development, commercialization and entrepreneurial activities.



Currently, the distribution of staff in the School of Materials, Energy, Water and Environmental Science (MEWES) is twenty-one (21) Resident faculty members and ten (10) Adjunct professors/faculty. Also, it has a combined fifteen (15) Laboratory technicians/scientists who serve at the university laboratories. The school also has two (2) Administrative staff to help the daily operation of the school.

The *Schemes of Service* also stipulate the criteria for promotion of staff and duties and responsibilities for each cadre/rank. Other criteria for staff recruitment and promotion are stipulated in various administrative instruments, including the *Standing Orders for the Public Service of 2009* and other policies and directives as issued from time to time by President's Office Public Service Management (PO-PSM), Treasury Registrar and Tanzania Commission for Universities (TCU).

The SER describes that NM-AIST staff are employed either on fixed-term contracts or permanent and pensionable terms depending on the provisions of the Public Service Act. The majority of academic staff at NM-AIST have PhD qualifications and are employed as Lecturers, Senior Lecturers, Associate Professors or Professors, while a few possess Master's degree qualifications. Holders of Master's degrees (Assistant Lecturers) are involved in tutorials and as assistants to senior academicians. The Assistant Lecturer position is considered a trainee position in the transition towards attaining a PhD, which is the minimum qualification for teaching staff for undergraduate students as stipulated in the TCU Guidelines. Staff recruitment is based on an open policy and involves public advertisement at positions in public media, including the NM-AIST website.

The staff are deployed to Academic Departments and are placed under the supervision of the Heads of Departments, and junior ones are placed under the mentorship of senior academic staff. Staff are also attached to research groups within the Department/School. There are still challenges to attract senior-level academicians such as Professors and Associate Professors.

NM-AIST being the research-based institution promotes the publication of research by faculty and students in highly reputable journals. It ensures that Schools and Departments hold annual or bi-Annual scientific conferences where results of research activities in all Schools are presented. The selected list of projects and publications are attached to the SER.

The Institution is obliged to develop a staff training and development programme that aims at improving organizational effectiveness and productivity by enhancing the knowledge, skills and competencies necessary for work-related success. To achieve this objective, NM-AIST has developed a Staff Training and Development Policy (2014) to guide the career development functions at the Institution. Currently, there are various staff attending long-term training in different institutions within and outside the country with the support of the Institution.

Academic staff who have no professional teaching backgrounds are exposed to pedagogical skills organized by the university and regulatory bodies, particularly Tanzania Commission for Universities (TCU).

Experts' Evaluation

a) Ex-post Situation

The experts have been provided with information on the teaching staff involved in the teaching for the programmes. The documentation included a list of staff descriptions of the rank position, the instructional area, and the respective programme's teaching hours. The experts conclude that, as of August 2021, the Materials Science and Engineering programmes have one full professor, two associated professors, four senior lecturers, and eight lecturers for the programme. When looking at the course descriptions provided to the experts, it became evident that eight courses within the whole master's programme are taught by staff holding an associated professor rank or above. A strong focus was noticed on the specialisation track in structured materials. On the Master's level, the teaching staff composition with the relevant expertise for this track might still be

sufficient. However, it must be assured that the master's programme at all specialisation tracks is covered by at least one staff member holding an associated professor rank or above.

In comparison to the Master's programme, it must be stated that only five courses are covered in total by staff members holding an associate professor rank or above for the PhD programme. These courses cover content in applied nanotechnology, advanced materials characterisation, modern physical chemistry, modern ceramics, and research methods and communication and focus filed-specifically only on two associated professors. Although the teaching staff who teaches the other courses might be well experienced and with a good reputation, the expertise and experience of staff members on an associated professor rank (or above), especially for the specialisation track in energy materials, must be stated currently missing. This is particularly crucial for the PhD programme because this expertise is required to impart consistent teaching on an adequate level.

It became evident that NM-AIST provides staff are equipped with pedagogical skills following the offers of the university. Examples have been given concerning training workshops organised by the Tanzanian Commission for Universities (TCU) in 2018 and 2019. Furthermore, a workshop has been held concerning the development of harmonised curricula for the whole Centre. Furthermore, an international workshop was organised with five Tanzanian higher education institutions and the Chinese Zhejiang Normal University (ZJNU) in the light of pedagogical programmes.

Staff recruitments follow the procedure that is used on the university level at NM-AIST. Open positions are announced on the university's homepage. The Centre openly discussed with the experts that one of the biggest challenges is to attract academicians at the senior level due to remuneration packages and incentive schemes being too unattractive for academicians with an adequate level of experience. When the Centre strives to recruit new staff members, they must submit the request to the President's Office Public Service Management, in charge of all Tanzanian universities. The screening process of applicants happens at the university level with the Human Resources Management Unit in cooperation with the respective schools and the Deputy Vice-Chancellors and Vice-Chancellors, who invite the relevant applicants for interview. It has been discussed that the whole process is documented and has to be submitted to the Appointments and Human Resources Management Committee and the Council to approve and finalise the recruitment process. The experts assessed this procedure to be transparent for prospective teaching staff.

b) Reconsideration evaluation

The newly submitted documentation showed evidence that the composition of the teaching body has improved since the postponement of the decision. It provides evidence that the programmes under accreditation now have one full professor, one professor emeritus, two adjunct professors from abroad, three associated professors, six senior lecturers, and six lecturers. The annexes provided evidence on the background of the teaching staff which is deemed to be sufficient in numbers and adequate in their expertise for the programmes.

Conclusion

The criterion is fulfilled.

6. Learning Resources and Student Support / Support and Research Environment

Master degree	Doctoral Degree
<p><i>Appropriate facilities and resources are available for learning and teaching activities.</i></p> <p><i>Guidance and support is available for students which includes advice on achieving a successful completion of their studies.</i></p> <p><i>[ESG 1.6]</i></p>	<p><i>Guidance and support are available for students which include advice on achieving a successful completion of their studies.</i></p> <p><i>Appropriate facilities and resources are available for learning and research activities.</i></p> <p><i>[ESG 1.6]</i></p>



Description

NM-AIST outlines in the SER that learning resources for students for all three programmes cover lecture rooms, a conference hall, computer laboratories, and a conference hall. Specifically, there are one lecture room with a capacity of 160 students, two rooms equipped with smart boards, projectors and computers and a white screen board (capacity for 60 students each), and four lecture rooms also equipped with smart boards, projectors and computers, and a white screen board (capacity for 48 students each). Also, the programmes can use video conference rooms which can accommodate 24 students each. These rooms are equipped with complete video conferencing systems and a particular audio-visual room for conferences. The SER enlists programme specific equipment such as ICP-MS, CHNS-O analyser, bomb calorimeter, Peltonen turbine training equipment, wind turbine kit, or Kjeldahl systems (all for the Materials Science and Engineering programmes).

Furthermore, NM-AIST students can use a library that holds both electronic and print materials. It is stated that the library aims to offer most of the relevant literature for the study programmes digitally to enable students to work remotely. As of July 2020, the library had approx. 1.000 text and reference books, online periodicals, fieldwork reports, theses, and dissertations. The library is subscribed to several databases, such as HINARI (Health Inter-Network Access to Research Initiative), AGORA (Access to Global Online Research in Agriculture), OARE (Online Access to Research on Environment), and TEEAL (The Essential Electronic Agricultural Library). The SER enlists, in addition, several open-access databases, to which the library is also subscribed.

To support students at the HEI, NM-AIST offers several consultation and introductory offers. After a successful enrolment process, the head of the respective departments welcome new students and introduce them by providing information on the NM-AIST, the study/PhD programme, social activities, and the teaching and learning environment. These offers aim to set a social and academic standard that is expected from students during their studies. Newly enrolled students have one week of orientation. To get more familiar with the local context, Swahili courses are offered to international students. Consultation of teaching staff is organised systematically via a schedule. Additional information is shared by sending e-mails, website information, or flyers.

Master and PhD students will be appointed to two supervisors (Master) or three supervisors (PhD). Following the explanation of NM-AIST, PhD students are encouraged to undergo joint supervision with international professors.

Experts' Evaluation

a) Ex-post Situation

In addition to the documentation in the self-evaluation report, the experts had the chance to see the facilities used in the programmes via live streaming. The live stream included lecture rooms, the overall facilities at NM-AIST, including the student rooms, conference rooms, the library and the laboratories for the programmes. The experts confirm that the facilities for lecturers and seminars suit the current student numbers. The programmes have access to a total of seven rooms with different capacities. The rooms are equipped with projectors, smart boards, and computers. The video conference rooms offer capacities to 24 students per conference room. These rooms are equipped with projectors and computers.

The library at NM-AIST offers seating capacities for 150 students, which fits the study programme's needs. Students have access to workspaces and computers at the library. The library resources presented include public access to 1,400 titles and 4,313 hard copy books for all programmes offered at NM-AIST. It has been clarified that students have access to electronic resources. The library has subscriptions to various databases, including HINARI, AGORA, OARE, TEEAL, and several open-access databases. The documentation included a list of literature that outlines the literature available and used in the courses. After discussing the current status quo of the library and in the light of programmes of highly developing disciplines, the experts conclude

that students currently have limited access to literature that cover the latest developments in the disciplines. It must be assured that access is given to this kind of literature.

Resources being crucial for the programmes were demonstrated during the online site visit. The experts understood that the programmes have current financial limitations, and the sustainability of the programmes is currently at risk. The programme's management is fully aware of this risk and strives to transfer products from the programmes' research into commercialisation. It has been explained to the experts that synergies between other universities cannot be built because, in many cases, study programmes on the postgraduate level are outside of East Africa. The demonstration of the resources provided evidence that the resource situation for the programmes is currently scarce and at a low level. For the master's and PhD programmes "Materials Science and Engineering", primary resources were available. The resources provided include analysers for materials or organic compounds, microscopes, wind turbines, electrochemistry related equipment (such as potentiostats or galvanostats), Kjeldahl systems, or Fluoride meters or spectrophotometers. For the master's programme, it might still be sufficient resources; however, especially in the light of the research-driven PhD programme, characterisation devices are currently not available to students. It has been stated that industry partners might help out with resources that the Centre is currently lacking, but no further evidence was provided during the site visit. Therefore, a procurement plan with substantial evidence must be presented to demonstrate how the essential resources for the programmes are made available to students. Furthermore, it must be demonstrated which resources are provided by external industry partners.

Newly enrolled students at NM-AIST receive a checklist and a timetable for the introductory week. The introduction week focuses on a quick adaption of students at the university. The heads of the departments will provide further insights concerning the learning environment and extracurricular activities for students during their time at NM-AIST. In addition, NM-AIST provides short courses in Swahili for international students. Consultation hours are arranged for students at defined schedules. However, the experts command that the students have confirmed good communication between students and staff, and an open-door policy is in place. This clearly supports the interaction and supports the learner's process. When enrolling at NM-AIST, Master students will be appointed to two supervisors and PhD students to three supervisors. These supervisors will be the primary contact person during the studies at NM-AIST. It has been discussed with the experts that joint supervision with professors from other universities is encouraged by the staff at NM-AIST, and possibilities are given to students with clear supervision agreements. In the past, the cooperation had covered specific periods for research abroad or by sending samples for analysis.

As displayed in the self-evaluation report and discussed during the site visit, the programmes strive to create a research environment (especially for PhD students) that allows students to participate actively in research. The supervision of students aims to prepare students to contribute to journals of good reputation and enable them to participate in conferences. The evidence provided to the experts shows that in the last years, a low level of research output was provided on an international scale, but more on national or regional conferences or journals.

b) Reconsideration evaluation

The analysis of the resubmitted documents indicates that the NM-AIST Library at Nelson Mandela African Institute of Science and Technology has improved its resources. It offers a diverse range of resources, with a primary focus on developing an electronic library. Currently, there are approximately 80% of the reading materials are available in electronic form, while the remaining 20% are in print. The library boasts over 1,000 text and reference books, along with online periodicals, fieldwork reports, theses, and dissertations. It subscribes to numerous online journals and databases, most of which provide full-text access to journal articles and books. These resources are made available through the Consortium of Tanzanian University Libraries (COTUL), of which NM-AIST is a member. It is stated that to facilitate access, the library provides computer workstations for students, allowing them to conveniently utilize electronic resources. The connectivity within the library is

established through a fibre optic cable system, complemented by an intranet and Wi-Fi. This ensures that all university teaching and administrative units can readily access the electronic resources. Moreover, students at NM-AIST, who predominantly possess laptops, have the added benefit of accessing electronic materials from the library outside regular operating hours. Wireless internet services are available at all hostels, enabling convenient access to electronic resources at any time. Given the emphasis on electronic resources and the ease of accessibility, the library's current staffing level is deemed sufficient to support the existing population of users.

Furthermore, to facilitate efficient management and access to these resources, the library employs the Library Management System. This system provides users with an online search functionality to explore the library's holdings and access a variety of services. In addition to its own collection, NM-AIST participates in various subscription databases, offering access to a wealth of scholarly materials. Notable subscriptions include HINARI (Health Inter-Network Access to Research Initiative), AGORA (Access to Global Online Research in Agriculture), OARE (Online Access to Research on Environment), ARDI (Access to science and technology), GOALI (Law and social sciences), and more. These databases cover a wide range of disciplines, ensuring that students and researchers have access to quality research from various fields.

NM-AIST also embraces the concept of open access and provides access to several open access databases. These include DOAJ (Directory of Open Access Journals), DOAB (Directory of Open Access Books), JSTOR, OpenDOAR (Directory of Open Access Repositories), Google Scholar, International Nuclear Information System, Journal of Sports Science and Medicine, HighWires, ArXiv-Cornell University Library, Scientific Electronic Library Online (SciELO), and others. These resources enhance the availability of scholarly materials and promote the dissemination of knowledge. Furthermore, the library is affiliated with the Royal Society, offering access to prestigious journals such as Philosophical Transactions of the Royal Society Series B, Proceedings of the Royal Society Series A and B, Biology Letters, and Notes and Records of the Royal Society. These journals contribute to the academic rigor and research output of the institution. In addition, the documentation indicates that further subscriptions have been made, e.g., Research4life. It is believed that the programmes under review often require a solid evidence base to inform decision making. Research4Life's resources enable access to peer-reviewed research articles and scholarly publications, providing the necessary evidence for informed decision making and policy formulation. Consequently, now it can be stated that NM-AIST collection of resources serves as a sufficiently developed hub of knowledge and research. It enables students and researchers with the necessary tools and access to academic materials to further their educational pursuits and contribute to the advancement of knowledge in material sciences.

The updated documentation included a procurement plan for the financial year 2022-2023. The procurement plan includes various goods, works, and (non-)consulting services necessary for supporting the organisation's operations. After reviewing the plan, the experts testify that a lot has been purchased in terms of goods (e.g., ICT equipment, laboratory supplies, or office equipment). Also, some but smaller-scale buildings have been constructed like the mini research lab or the training and business centre hub or industry donations have been installed (Cabin filter testing machine). In addition, the consultancy services serve as an additional source of income generation. The experts fully understand that funding of new resources and facilities might be difficult, and there may be limitations in terms of infrastructure and funding that could affect the establishment of fully equipped laboratories. The list provided includes a diverse range of resources that cover several important aspects of materials science and engineering research. However, strategic planning and collaboration is still highly recommended to enable full access to laboratories that can support research and provide valuable training opportunities for PhD students (**Finding 8**). There are several points that might be helpful here like securing support from the Tanzanian government, as it helps advocate for investment in scientific research and infrastructure development, or a gradual expansion of infrastructure as funding and resources become available. Also, building collaborative research networks within Tanzania and across African countries can

facilitate resource sharing, expertise exchange, and knowledge dissemination. Collaborations can also lead to joint funding applications and collective efforts in infrastructure development.

Conclusion

The criterion is fulfilled.

7. Public Information

Master degree	Doctoral Degree
<i>Impartial and objective, up-to-date information regarding the programme and its qualifications is published regularly. This published information is appropriate for and available to relevant stakeholders.</i> [ESG 1.8]	<i>Impartial and objective, up-to-date information regarding the programme and its qualifications is published regularly. This published information is appropriate for and available to relevant stakeholders.</i> [ESG 1.8]

Description

The HEI indicates that all potential applicants for the study programmes can find information about the learning outcomes, admission requirements, qualifications, and learning and assessment procedures on the NM-AIST homepage. The programmes are also advertised on the social media account of the HEI.

Support facilities available for prospective students include information on the programmes brochures, website and prospectus where students can find a list of academic staff, their contacts, areas of specialization and other information.

Experts' Evaluation

a) Ex-post Situation

Based on the evidence provided to the experts, it can be concluded that the primary source of information for externals is the homepage of NM-AIST. Specific subchapters concerning the schools lead to the study programmes with more specific information. The information includes information on admission, current research projects, staff of NM-AIST and the latest news. However, the programme's information does not include references to the curriculum, the intended learning outcomes on the programme level or the course level or the examination regulations. Also, it had been noted that the homepage was offline for a particular time during the accreditation process. This might have been the case due to server problems. However, the experts conclude that the level of information for the programmes has to be improved, providing clear evidence on the curriculum, the intended learning outcomes, the qualifications awarded, and the course descriptions. In addition, a mechanism to keep the homepage up-to-date must be implemented.

b) Reconsideration evaluation

The analysis of the new evidence submitted shows that the public information for the master's and PhD programmes "Material Sciences and Engineering" at NM-AIST has significantly improved transparency with the updated and accessible homepage. The homepage serves as a comprehensive resource, presenting programme information, faculty profiles, research areas, research facilities, and application details. The inclusion of contact information further enhances transparency by facilitating direct communication. These improvements empower prospective students, researchers, and other stakeholders to make informed decisions and engage effectively with NM-AIST's "Material Sciences and Engineering" programmes.

Conclusion

The criterion is fulfilled.

V. Recommendations of the panel of experts

The panel of experts recommends to accredit with one condition the study programme “**Materials Science and Engineering**” (Master) offered by **Nelson Mandela African Institute of Science and Technology (Tanzania)**.

The panel of experts recommends to accredit with one condition the study programme “**Materials Science and Engineering**” (PhD) offered by **Nelson Mandela African Institute of Science and Technology (Tanzania)**.

1. It is recommended to establish coherence and consistency in the master’s programme through mapping the intended learning outcomes at both the programme level and the individual course level, thereby creating a clear and logical progression of skills and knowledge throughout the programme.
2. With the aim of systematically integrating the intended learning outcomes on the programme level of the PhD programme into the curriculum and research activities, it is suggested to map the ILOs on the programme and course level.
3. It is necessary to further substantiate the effectiveness of its quality assurance regulations in the "Material Sciences and Engineering" master's and PhD programmes, including evidence on overall programme feedback from alumni, course feedback from students, and overall student's satisfaction.
4. To enhance the development and relevance of NM-AIST's programmes, it is recommended that the institute prioritise establishing and maintaining strong relationships with the labour market by actively engaging with employers.
5. To improve performance assessment, it is recommended that NM-AIST systematically collect more detailed data on the student body for each programme, including exam pass rates, average grades, statistics on course evaluations, and characteristics of student cohorts.
6. To enhance comparability and promote international collaboration, it is recommended that NM-AIST reconsider its credit system and strive for transparent comparability with standards, such as the European Credit Transfer and Accumulation System (ECTS).
7. To ensure fairness, academic integrity, and consistency, it is recommended that NM-AIST establishes an institutional-level framework for Recognition of Prior Learning, as this would further anchor the recognition procedure and provide a standardised process for evaluating and accepting transferred credits.
8. To ensure access to fully equipped laboratories and support material sciences and engineering research, it is recommended that NM-AIST continues to engage in strategic planning and collaboration efforts.