

Doc. 300.1.2

Date: 28.01.2025

Higher Education Institution's Response

- **Higher Education Institution:**
University of Cyprus
- **Town:** Nicosia
- **Programme of study**
Name (Duration, ECTS, Cycle)

In Greek:

ΜΑΣΤΕΡ ΠΡΟΗΓΜΕΝΑ ΥΛΙΚΑ ΚΑΙ NANOTECHNOLOGIA

In English:

MASTER IN ADVANCED MATERIALS AND
NANOTECHNOLOGY (AMN)

- **Language(s) of instruction:** English
- **Programme's status:** Currently Operating
- **Concentrations (if any):**

In Greek: Concentrations

In English: Concentrations



The present document has been prepared within the framework of the authority and competencies of the Cyprus Agency of Quality Assurance and Accreditation in Higher Education, according to the provisions of the “Quality Assurance and Accreditation of Higher Education and the Establishment and Operation of an Agency on Related Matters Laws” of 2015 to 2021 [[L.136\(I\)/2015](#) – [L.132\(I\)/2021](#)].

A. Guidelines on content and structure of the report

- *The Higher Education Institution (HEI) based on the External Evaluation Committee's (EEC's) evaluation report (Doc.300.1.1 or 300.1.1/1 or 300.1.1/2 or 300.1.1/3 or 300.1.1/4) must justify whether actions have been taken in improving the quality of the programme of study in each assessment area. The answers' documentation should be brief and accurate and supported by the relevant documentation. Referral to annexes should be made only when necessary.*
- *In particular, under each assessment area and by using the 2nd column of each table, the HEI must respond on the following:*
 - *the areas of improvement and recommendations of the EEC*
 - *the conclusions and final remarks noted by the EEC*
- *The institution should respond to the EEC comments, in the designated area next each comment. The comments of the EEC should be copied from the EEC report without any interference in the content.*
- *In case of annexes, those should be attached and sent on separate document(s). Each document should be in *.pdf format and named as annex1, annex2, etc.*

1. Study programme and study programme's design and development (ESG 1.1, 1.2, 1.7, 1.8, 1.9)

Areas of improvement and recommendations by EEC	Actions Taken by the Institution	For Official Use ONLY
It was noted that the number of the available running elective courses is very small although in the programme of study a much larger number of elective courses are offered. Specifically, in the last three years only one elective course was delivered for reasons that were not clear to the EEC but seem to be related to the teaching staff being involved in other activities including administrative roles. It is therefore important to review the current situation and try to provide all the elective courses offered in the original programme curriculum.	<p>We do recognize that during the last 3 years the number of elective courses offered at the AMN postgraduate programs was very limited, as correctly identified by the EEC. This is attributed to the fact that some of the teaching staff involved in the program were/are involved in administrative positions or were/are absent on a sabbatical leave (e.g. Prof. I. Giapintzakis holds the position of the Vice Rector for International Affairs, Finance and Administration since October 2018, Prof. T. Krasia currently holds the position of the Dpt. Chairperson, Assoc. Prof. M. Zervos, Prof. Krasia and Prof. Kyratsi were on a sabbatical leave during the Spring semester 2021-2022, the Spring Semester 2022-2023 and 2022 (annual leave) respectively.</p> <p>Considering this gap, so far, our efforts were mainly focused in hiring special teaching staff to deliver the compulsory courses offered in the program. Moreover, due to the limited number of students enrolled in the PhD program and the limited number of teaching staff involved in the AMN graduate programs (that also contribute to the teaching load of the undergraduate program), it is not feasible to offer all elective courses appearing in the initial list on a regular basis. More precisely, due to the existing UCY regulations requiring the enrolment of at least 5 students per postgraduate course, we cannot offer all elective courses (some of them are cancelled because of the limited number of students enrolled). For this reason, the list of elective courses was revised and the updated list appears in Annex I.</p> <p>In January 2025, 4 compulsory courses will be offered namely: MMK508 (Research Methodology), MMK553 (Surface Engineering), MMK554 (Materials Characterization Methods) and MMK557 (Polymer Nanocomposites). From September 2025 onwards a balanced program will be applied, following the program structure appearing under https://www.ucy.ac.cy/mme/programmes/phd/amn/?lang=en.</p> <p>More precisely, the following courses will be offered in September 2025: MME505, MME506,</p>	Choose level of compliance:

	<p>MME555, MME567, MME516, MME518, MME512 and MME523.</p> <p>We should also notice that technical elective courses can also be selected from the list of courses appearing in Annex I, and from other departments of the Faculty of Pure and Applied Sciences and the Faculty of Engineering that are relevant to the students' research interests. This increases the number of available courses for the students to enroll.</p>	
<p>The EEC noticed that the interaction with the stakeholders is limited to research arrangements between the stakeholders and the individual academics involved. This is an area of improvement through increasing the involvement of the industrial stakeholders in the curriculum design satisfying the requirement of the industry needs including the local industry and develop feedback opportunities from industry to improve the overall running of the programme and the students learning and professional development experience. The EEC also recommends that it is necessary to create a steering committee dedicated to advise and review the activities of the programme, also involving a larger number of the key stakeholders including: i) international industrial stakeholders, ii) at least one other academic from an external university working in similar area of research and iii) one key professional association that has the capacity to comment on the compliance of the programme with the needs of the local industry.</p>	<p>Following the suggestion of the EEC Committee, a decision was reached at the 01/2025 departmental meeting that was held on the 22nd of January 2025, for creating a Steering Committee for the AMN graduate programs, consisting of 3-4 industrial stakeholders (local and external) and 2 academics from external universities working in similar area of research, who will be actively involved in the curriculum design and have the capacity to comment on the compliance of the programme with the needs of the industry. It is expected that this Action will be completed by March 2025.</p> <p>Proposed Names:</p> <p>Industrial stakeholders:</p> <ol style="list-style-type: none"> 1. Oerlikon Surface Solutions AG (Balzers/Lichtenstein) – Klaus Boebel, R&D Portfolio Manager 2. AmaDema Ltd. (local, design and manufacturing of advanced composite materials, Cyprus Entrepreneurship Award "Research and Innovation" winner 2023) – Dr. Vassilis Darkonakis, Managing Director and Co-Founder 3. Elysee Irrigation Ltd. (local, the largest plastics manufacturer in Cyprus) – Mr. Panos Protopapas, General Manager. <p>Academics:</p> <ol style="list-style-type: none"> 1. Prof. Urszula Stachewicz (Professor in Material Science at AGH University of Krakow, Poland) <p>Prof. Jochen M. Schneider (Professor and Chair of Materials Chemistry, RWTH Aachen/Germany)</p>	<p>Choose level of compliance:</p>
<p>The EEC noted that the programme admits students with diverse background. The design of the curriculum should take this factor into consideration, and it is</p>	<p>Following the suggestion of the EEC, a decision was reached at the 01/2025 departmental meeting that was held on the 22nd of January 2025, for including a new course in the list of elective courses of the AMN graduate programs</p>	<p>Choose level of compliance:</p>

recommended that an introductory course to Advanced Materials is also included within the context of the programme. This course should be compulsory at least for the students who do not have background in the field. These students will have to choose one Elective course to balance the obtained credits.	entitled: "Introduction to advanced materials". This course will be compulsory for the students who do not have a background in the field. An indicative syllabus is provided in Annex II . It is expected that this Action will be completed within the academic year 2025-2026.																																																																															
The committee noticed that statistics are not used to help with programme reviews and generally quality assurance is not applied to high standards. The UCY administrative staff could undertake this task.	<p>The following statistics were collected by the MME administrative staff, indicating a steady increase in the number of students enrolled in the AMN graduate programs from 2022-2025.</p> <table><tr><th>SEMESTER</th><th colspan="2">MSc</th><th colspan="2">PhD</th><th>TOTAL</th></tr><tr><td></td><td>FEMALE</td><td>MALE</td><td>FEMALE</td><td>MALE</td><td></td></tr><tr><td>Fall Semester 2022</td><td>0</td><td>0</td><td>0</td><td>1</td><td>1</td></tr><tr><td>Spring Semester 2022</td><td>0</td><td>0</td><td>0</td><td>1</td><td>1</td></tr><tr><td colspan="6"></td></tr><tr><td>Fall Semester 2023</td><td>0</td><td>2</td><td>0</td><td>1</td><td>3</td></tr><tr><td>Spring Semester 2023</td><td>0</td><td>0</td><td>0</td><td>1</td><td>1</td></tr><tr><td colspan="6"></td></tr><tr><td>Fall Semester 2024</td><td>2</td><td>2</td><td>0</td><td>0</td><td>4</td></tr><tr><td>Spring Semester 2024</td><td>0</td><td>2</td><td>0</td><td>0</td><td>2</td></tr><tr><td colspan="6"></td></tr><tr><td>Fall Semester 2025</td><td>2</td><td>4</td><td>0</td><td>1</td><td>7</td></tr><tr><td>Spring Semester 2025</td><td>2</td><td>0</td><td>0</td><td>0</td><td>2</td></tr></table> <p>Foreign Students, Years 2022 - 2023 -2024-2025: 5 No student dropouts during the years 2022-2025.</p> <p>Employment of AMN graduate students – examples: ALERGO Management consulting and engineering - Health and Safety Officer; R&D Engineer, Engineering Design & Prototyping (EDP) Division - Cyprus Research & Innovation Center Ltd; Research Scientist - Research Scientist, ATSP Innovations, USA; postdoctoral research associate – UCY; eBOS - Project Manager; Teaching Personnel – European University Cyprus, etc.</p> <p>Formalized procedures for quality assurance are applied at the departmental level including the following points:</p> <ul style="list-style-type: none">Students’ engagement in the improvement of the educational procedures, is realized through their representatives (5 in total – elected through student elections and may include both undergraduate <u>and postgraduate students</u>) in the Departmental Council.	SEMESTER	MSc		PhD		TOTAL		FEMALE	MALE	FEMALE	MALE		Fall Semester 2022	0	0	0	1	1	Spring Semester 2022	0	0	0	1	1							Fall Semester 2023	0	2	0	1	3	Spring Semester 2023	0	0	0	1	1							Fall Semester 2024	2	2	0	0	4	Spring Semester 2024	0	2	0	0	2							Fall Semester 2025	2	4	0	1	7	Spring Semester 2025	2	0	0	0	2	Choose level of compliance:
SEMESTER	MSc		PhD		TOTAL																																																																											
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	<ul style="list-style-type: none"> • Students' further participation in the Department's educational process assessment involves engagement participation on a fundamental level thus enhancing its efficacy. The Postgraduate Studies Committee organizes an annual meeting with the graduate students and discusses possible issues that need the Department's attention so as to improve the educational process. The last meeting took place on the 16th of October 2024. • Academic personnel has been actively involved in shaping (among others) the departmental strategy related to its postgraduate studies, through the preparation of its Strategic Plan. More precisely, at the 09/2020 departmental meeting (September 23, 2020), the department's academic personnel worked effectively and collaboratively on the finalization of the 2021-2025 Departmental Strategic Plan that was drafted by the members of the Strategic Plan Committee. For the continuous monitoring and periodic revisions (once per year) of the departmental goals set in the Strategic Plan related to its mission and vision, the Department at its 08/2024 meeting that was held on the 26th of May 2024, re-appointed the Strategic Plan Committee (consisting of 4 faculty members) https://www.ucy.ac.cy/mme/home/the-department/?lang=en. • The Departmental Council (08/2024 meeting; May 16, 2024) decided to establish an External Advisory Board (EAB). The EAB is teamed by 8 distinguished academics and investigators from abroad as well as investigators / executive personnel from the industry (members confirmed in December 2024 – invitation acceptance). The EAB will meet annually to internally assess the Department and suggest actions in order to meet the goals of the Department's Strategic Plan. The EAB will also foster links between the Department and the local (and international) industry while it will also serve to bridge the gap between the academia, the society and the market. 	
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	<ul style="list-style-type: none"> In 2023, the Department's Postgraduate Studies Committee evaluated the outcome of the Study Program evaluation results. Based on that, a document on the implementation of improvement actions in the graduate program of study was prepared and submitted to UCY's Internal Quality Assurance Committee after being approved by the Departmental Council (08/2023; November 8, 2023). The same process will be also applied for this year's study program evaluation results that were received in December 2024. <p>Concerning plagiarism, UCY provides antiplagiarism online tools <i>SafeAssign</i> and <i>Turnitin</i> to academic staff through Blackboard (https://help.blackboard.com/SafeAssign/Instructor/Language_Support; https://help.blackboard.com/Learn/Instructor/Ultra/Grade/Turnitin). UCY has well-established policies and procedures to safeguard the quality and the fairness of exams. Plagiarism cases are reported to the Disciplinary Committee for Student Issues, an institution-wide committee pertinent cases are thoroughly investigated. Penalties include the following: (a) verbal reprimand; (b) written reprimand; (c) graded penalties for offenses related to exams or assignments; (d) in-campus social work (unpaid); (e) suspension of student benefits, except benefits that affect learning.; (f) Imposition of a fine for partial or total compensation for damages caused to equipment or the buildings or any other property of the University (g) Expulsion from the University for a period of one or two semesters. (h) Removal from Student Register. (i) Combination of the aforementioned penalties. Non-compliance with a penalty is considered a disciplinary offense, while students who do not fulfill any sentence that it has been imposed on them, they don't get a degree.</p>	
<p>The committee also noted that the marketing of the programme is almost non-existent. There is a profound lack of strategy to attract international students. Although there is an effort from the teaching academic staff to promote the programme to the undergraduate students. This is not established and should be done on a regular basis and target undergraduate</p>	<p>The department advertises the AMN postgraduate programs in online platforms such as FindAUniversity Ltd. (FindAPhD.com/FindAMasters.com). In order to reinforce the marketing of the program and attract international students, a LinkedIn page was created specifically for the AMN graduate programs offered by the department. (https://www.linkedin.com/company/105986573/admin/dashboard/). It is expected that the new state-of-the-art premises of the School of</p>	<p>Choose level of compliance:</p>

students from other schools/departments too.	Engineering will attract new postgraduate students. To this end, research groups will be preparing short promo videos at the new facilities and research laboratories to be included in advertising platforms, social media etc. Moreover, during the last 2 years the department organizes on an annual basis (January) an Info Day aiming to inform its undergraduate students and students from other departments about the postgraduate programs the Department is offering (the invitation is sent to all departments of the School of Engineering and to all departments of the School of Pure and Applied Sciences). The day includes presentations from all faculty members on their research activities, followed by a poster session during which the students can actively interact with faculty members, postdoctoral researchers and postgraduate students. The latest Info Day took place on the 22 nd of January 2025.	
Although the programme has achieved the targeted number of students for this year and January 2025 entrance, the number of students is too low to secure the sustainability of the programme, and the EEC recommends that a significant effort should be placed in this particular issue.	By taking specific actions (as described above) in order to promote the AMN graduate programs within the University and also attract students from abroad, we will be targeting an increase of the number of students admitted from 10 to at least 20 within the next 3 years.	
There is a profound lack of sufficient technical support which has a significant impact on the students' learning experience because of the small available practical and hands-on labs offered in the courses. This will have a significant impact on the sustainability of the programme as well as its quality as it compromises the capability of the programme to reach its targeted potential and objectives.	<p>Practical, hands-on laboratories are already offered within the AMN postgraduate courses. Examples include the following:</p> <p>MME557: Polymer Nanocomposites</p> <ul style="list-style-type: none"> • Synthesis of polymer-coated metallic nanoparticles • Fabrication of magnetic electrospun polymer nanocomposite fibers • Fabrication of polymer/carbon fiber composites by 3D printing • Materials characterization: Mechanical testing, microscopy (SEM, AFM), UV-vis, FTIR. <p>MME554: Materials Characterization Techniques</p> <ul style="list-style-type: none"> • Powder X-Ray Diffraction • Scanning Electron Microscopy • Elemental Analysis via Energy Dispersive Spectroscopy • Thermal Analysis 	

	<p>MME553: Surface Engineering</p> <ul style="list-style-type: none"> • Mechanical and thermal surface treatments • Deposition of thin films and coatings • Tribological evaluation of surfaces and coatings • Analysis of morphology, topography and mechanicals properties <p>As pointed out by the EEC, for many years the department was lacking sufficient technical staff to support the large number of teaching and research laboratories that are available in the department. Fortunately, since March 2024, a new permanent position (technician-Machinery) was given to the department and very recently (December 2024) the 3rd permanent position (laboratory technician) was allocated to the department. The strengthening of the technical support in the department will certainly improve the quality of the AMN programs by enabling the introduction of new laboratory exercises/demos and ensuring effective technical support of the research activities of students and faculty on a daily basis.</p>	
<p>The EEC also noticed that there is not adequate career support for postgraduate students although career support is offered to undergraduate students. It is therefore recommended that appropriate career support is offered to all postgraduate students including the students of this programme.</p>	<p>All the services of the UCY Career Center are addressed to both, undergraduate and postgraduate students. More precisely the Center offers:</p> <ul style="list-style-type: none"> (a) career guidance services; (b) jobs and internships in companies and organizations in Cyprus and Europe (e.g. professional mobility through EURES, jobs in European institutions through EPSO), c) Career academy, seminars and workshops to develop professional and job search skills (e.g. resume, interview, etc.), (d) Networking activities with employers (eg Career Fairs, Meet the Employers). <p>More information can be found under: https://www.ucy.ac.cy/careercentre/?lang=en</p>	

2. Student – centred learning, teaching and assessment (ESG 1.3)

Areas of improvement and recommendations by EEC	Actions Taken by the Institution	For Official Use ONLY
Despite the low number of students can be positive for constructive teaching, it is also a limitation in terms of course viability. A manageable number of students would benefit the viability as well as meet the international standards for this type of programmes.	As previously mentioned, by taking specific actions in the near-future, we will be targeting towards an increase in the number of graduate students admitted in the AMN graduate programs from 10 to at least 20 within the next 3 years.	Choose level of compliance:
A larger number of students is necessary to apply modern teaching technology such as digital tools to improve lecture delivery and the learning experience of the students.	20+ graduate students (the number to be targeted in the next 3 years) is considered a manageable number for applying modern teaching technologies, such as digital tools. The latter promote active and collaborative learning, access to a wide range of scientific resources, enhanced communication between students and the instructor and a flexible learning environment. This group size can actually be ideal for personalized and interactive learning experiences which are enabled by such technologies. All the above emphasize on the necessity of increasing the number of admitted students within the next 3 years.	Choose level of compliance:
It is recommended to increase the practical content within the offered coursework to prepare the students for their future academic or industrial career development and employability.	As mentioned above, the new administrative personnel (technicians) hired/to be hired in the department will certainly improve the quality of the AMN programs by enabling the introduction of new laboratory exercises/demos and ensuring an effective technical support of the research activities of students and faculty on a daily basis.	Choose level of compliance:
There is space for improvements related to quality assurance of the assessment methods that include the use of rubrics (standardised grading) and introduction of consistent continuous assessment without relying 100% on exam outcomes.	The University of Cyprus (UCY) utilizes continuous assessment in all academic programs. According to the general rules of studies, a student's performance is evaluated in at least 2 different ways. One must be the final written examination that must not exceed 60%. Students are evaluated through various methods (besides midterm and final exams) including among others homework, oral and poster presentations, lab reports, team projects etc. For more information on the assessment methods employed in AMN graduate courses please visit – https://www.ucy.ac.cy/mme/programmes/phd/amn/?lang=en (course description/course details).	Choose level of compliance:

3. Teaching staff (ESG 1.5)

Areas of improvement and recommendations by EEC	Actions Taken by the Institution	For Official Use ONLY
The EEC noted that there are no visiting teaching staff, and it is recommended that visiting teaching staff could be included to ensure diversity of knowledge share from research backgrounds related to Advanced Materials but rich in interdisciplinary activities especially benefiting the elective courses.	We recognize the necessity of recruiting visiting teaching staff with an academic background related to Advanced Materials. In fact, the department offered such a position to a distinguished Professor from Australia to teach the course “ <i>MMK551–Nonlinear Mechanics of Solids and Structures</i> ” during the Spring Semester 2025, but unfortunately, in October 2024, he informed the department that he will not be able to travel to Cyprus due to personal reasons. The department will continue seeking distinguished visiting academic personnel that could share their knowledge and expertise through the teaching of both, compulsory and elective AMN graduate courses.	Choose level of compliance:
An effort should be made to retain the numbers of publication to the possible optimum numbers as this reflects on the productivity of the students and the teaching staff in the programme of study.	The number of publications appearing in the presentation that was held on the 8 th of November 2024, was calculated based on the publications of 5 members of the academic staff (T. Krasia, T. Kyratsi, I. Giapintzakis, M. Zervos, C. Rebholz). This number was re-calculated by also including the publications of Dr. Tzeranis and Dr. Vavourakis. The updated Figure is provided in Annex III .	Choose level of compliance:

4. Student admission, progression, recognition and certification (ESG 1.4)

Areas of improvement and recommendations by EEC	Actions Taken by the Institution	For Official Use ONLY
It is recommended and the EEC encourages the participation in Erasmus student exchange programmes to strengthen the international exposure of the programme and improve the students learning experience from different research environments.	<p>The MME faculty encourages the participation of graduate students in Erasmus student exchange programmes. Examples include:</p> <ul style="list-style-type: none"> The participation of Mr. Paraskevas Kyriacou (former MSc student in AMN MSc program and currently enrolled in the AMN PhD program) in an Erasmus student exchange program during Spring semester 2023 (Univeristy of Naples "Federico II) The participation of Ms. Georgia Maria Christodoulou (enrolled in the AMN MSc program) in Erasmus+ Internships during the summers of 2024 and 2025, for a period of six months in total (University of Leoben/Austria) The participation of Mr. Kyriacos Ioannou (enrolled in the AMN MSc program) in an Erasmus+ Internship during the summer of 2025, for a period of three months (Maria Curie-Sklodowska University, Lublin/Poland) 	Choose level of compliance:
The admissions criteria are not clear, for example, the entrance requirements should be made known to the applicants and be presented in an official document uploaded on the website of the programme study.	<p>The department follows the University regulations concerning the admission criteria set for postgraduate studies, as appearing under the following link: https://www.ucy.ac.cy/graduateschool/research/admission-requirements/?lang=en</p> <p>This link has been included on the website of the programme of study (see under Specific Admission Requirements).</p>	Choose level of compliance:

5. Learning resources and student support (ESG 1.6)

Areas of improvement and recommendations by EEC	Actions Taken by the Institution	For Official Use ONLY
Students could be mentored by external to the programmes academics who have extensive experience in mentoring students and postgraduate researchers to support their professional and personal skills development if the system of the University of Cyprus allows.	The University of Cyprus organizes several seminars addressed to postgraduate students for supporting their professional and personal skills development. Examples include several actions organized by the UCY Career Center as stated above, (recent examples can be also found in https://www.ucy.ac.cy/careercentre/news-and-events/), the Interdisciplinary Forum organized by the Graduate School, aiming to the strengthening of the dialogue between young scientists and the wider scientific community, etc. Moreover, as part of the course MME508 – Research Methodology (see course description in Annex IV), seminars are given by members of the Research and Innovation Foundation entitled “The Research Innovation Foundation and National Funding Opportunities for Young Researchers” and «European R&I Funding Opportunities for Young Researchers».	Choose level of compliance:

6. Additional for doctoral programmes (ALL ESG)

Areas of improvement and recommendations by EEC	Actions Taken by the Institution	For Official Use ONLY
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7. Eligibility (Joint programme) (ALL ESG)

Areas of improvement and recommendations by EEC	Actions Taken by the Institution	For Official Use ONLY
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B. Conclusions and final remarks

Conclusions and final remarks by EEC	Actions Taken by the Institution	For Official Use ONLY
Overall, the programme of study is of a high quality, and it is delivered by satisfying a good number of standards as described in the different sections in this report. There is no doubt that improvements can be made in several areas including the design of the curriculum, the assessment methods, the expanding in the number of running elective courses, the more effective involvement of stakeholders in the curriculum design improving learning experience and employability of students, the career support of students and the increase of the number of students in the programme by improving the marketing strategy and advertising the programme in both national and international levels.	The points appearing in Conclusions and final remarks have already been addressed in previous sections.	Choose level of compliance:

C. Higher Education Institution academic representatives

<i>Name</i>	<i>Position</i>	<i>Signature</i>
Theodora Krasia	Chairperson	
Theodora Kyratsi	Coordinator of the AMN Postgraduate Studies	
Triantafyllos Stylianopoulos	Coordinator of the MME Postgraduate Studies Committee	

Date: 28.01.2025

ANNEX I

Revised list of Technical Elective Courses

(AMN graduate program/MSc and PhD)

		ECTS
MME 505	Independent Study I (for MSc)	8
MME 506	Independent Study II (for MSc)	8
MME 605	Independent Study I (for PhD)	8
MME 606	Independent Study II (for PhD)	8
MME 555	Polymers in Medical Applications	8
MME 558	Fundamentals of Ceramics I	8
MME 559	Fundamentals of Ceramics II	8
MME 562	Semiconductor Processing Technology	8
MME 565	Physical Principles, Design and Fabrication of MEMS	8
MME 567	Materials for Energy Production, Storage and Conversion	8
MME 512	Advanced Engineering Thermodynamics	8
MME 516	Renewable Energy Technology	8
MME 517	Solar Energy Systems	8
MME 518	Theory and Applications of Incompressible Newtonian and Non-Newtonian Fluids	8
MME 523	Signal Processing	8
MME 524	Modelling and Analysis of Dynamic Systems	8
MME 525	Analysis and Control of Robotic and Autonomous Systems	8
MME 541	Manufacturing Process Automations	8
MME 551	Nonlinear Mechanics of Solids and Structure	8
MME 531	Continuum Mechanics	8

Students may also select up to two courses offered by other departments, with approval from their thesis advisor.

ANNEX II

Introduction to Advanced Materials – MME550

Course Purpose and Objectives: This advanced course in materials science provides a detailed exploration of modern materials with an emphasis on the fundamental principles governing their behavior and their applications in cutting-edge technologies. Students will study the latest developments in various material categories including nanomaterials, biomaterials, energy materials, and composite materials. The course will cover both theoretical concepts and experimental techniques used to characterize and manipulate materials at different scales.

Learning Outcomes

By the end of the course, students will:

1. Gain an in-depth understanding of the principles of advanced materials including their synthesis, processing, and characterization.
2. Learn about the relationship between the structure and properties of materials.
3. Explore the applications of advanced materials in various industries such as electronics, energy, aerospace, and healthcare.
4. Develop a critical understanding of the latest innovations in nanotechnology, biomaterials, and other cutting-edge material systems.
5. Enhance problem-solving and analytical skills in materials design and performance evaluation

Prerequisites: NO

Course Content: Introduction to Advanced Materials. Atomic Structure and Bonding in Materials. Nanomaterials and Nanotechnology. Polymers and Composite Materials. Functional Materials. Biomaterials. Energy Materials. Advanced Ceramics and Glasses. Metallic Alloys and High-Performance Metals. Materials for Additive Manufacturing. Sustainability and Green Materials. Future Trends in Advanced Materials.

Teaching Methodology:

Lectures, Use of audio and video tools, student presentations, class discussions

Communicative, collaborative

During the first week of the semester, the course syllabus is given by the instructor to the students, which includes information on the course content, expected learning outcomes, assessment and bibliography.

Assessment:

Midterm Exam (30%)

Final Exam (40%)

Homework assessments (20%)

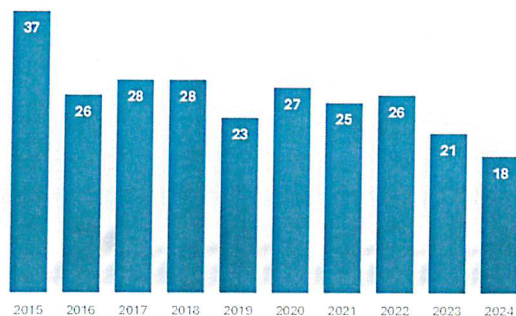
Class presentations (10%)

Bibliography

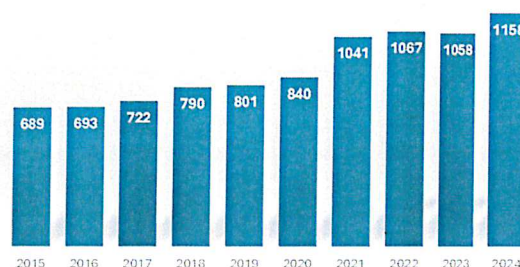
- "Materials Science and Engineering: An Introduction", William D. Callister, David G. Rethwisch (10th edition, Wiley).
- "Essentials of Modern Materials Science and Engineering"(Essentials of Modern Materials Science and Engineering, 1st Edition | Wiley)"
- Advanced Materials: An Introduction to modern materials science (Ajit Behera), Springer 2022.
- Selected scientific manuscripts and review papers

ANNEX III (Publications – updated list)

Publications



Citations



ANNEX IV

Course Title	Research Methodology				
Course Code	MME508				
Course Type	Compulsory for M.Sc / M.Eng / PhD Students				
Level	Postgraduate				
Year / Semester	1 st / fall semester				
Teacher's Name	MME Faculty, Visitors				
ECTS	8	Lectures / week	3 hours lecture & 1 hour tutorial	Laboratories / week	-
Course Purpose and Objectives	<ul style="list-style-type: none">- Develop a critical approach to scientific issues and the role of research.- Develop skills in different epistemological approaches for scientific research problems- Familiarise with basic research methods and project management.- Develop the skills needed for effective and clear communication of technical, scientific and professional information in academia, industry and the public- Develop competence in preparing and presenting scientific documents, scientific publications and proposals.				
Learning Outcomes	<p>Upon completion of the course, students will have acquired the basic skills for researching scientific problems, including:</p> <ol style="list-style-type: none">1. Develop critical thinking to choose and / or combine methodological approaches to tackle complex and interdisciplinary scientific and technical problems.2. Ability to critically approach data collection, codification, evaluation and data analysis3. Ability to critically approach basic methods of qualitative and quantitative research4. Ability for literary review5. Create confidence in speaking ability through practice in class and rehearsals in individual tutorials; ability to communicate technical, scientific and professional information in academia, industry and the general public6. Develop competence in writing scientific publications and proposals for effective and clear communication of research projects.				
Prerequisites	-	Required		-	
Course Content	<ol style="list-style-type: none">1. Introduction to Research Methodology (importance and purpose of scientific research, research approaches and interdisciplinarity)2. Literature review and methods of carrying it out				

	<ol style="list-style-type: none"> 3. Data collection and data analysis methods (statistical methods, statistical error determination, uncertainty analysis) 4. Field Research Design 5. Design of Laboratory Experiments and experimental layouts 6. Design of computational experiments 7. Research through Design 8. Social and human-centered approaches to research 9. Ethical Issues in Research and Publications 10. Oral presentation and presentation of research projects in poster format 11. Preparation of scientific publications: Structure and elements of publications, the art of scientific writing, preparation of figures and tables, citations, selection of journals, manuscript submission, reviewing and publication process 12. Introduction to Machine learning and AI – The role of AI & ML in scientific research
Teaching Methodology	<p>Class lectures; power point presentations; practical speaking/writing sessions</p> <p>During the first week of the semester, the Syllabus of the course is provided by the teacher, which includes information on the course content, expected learning outcomes, assessment, and office hours</p>
Bibliography	<p>Indicative Bibliography:</p> <ul style="list-style-type: none"> - Research Design: Qualitative, Quantitative, and Mixed Methods Approaches, 4th Edition, John W. Creswell - The Research Methods Knowledge Base, 3rd Edition, William M. K. Trochim, James P. Donnelly - Doing Your Research Project (Open Up Study Skills) 5th Edition, Judith Bell - The Essential Guide to Doing Your Research Project 2nd Edition, Zina O'Leary - Research Methods in Education 7th Edition, Louis Cohen, Lawrence Manion, Keith Morrison - The Foundations of Social Research: Meaning and Perspective in the Research Process, Michael J Crotty - Mike Ashby, How to Write a Paper, University of Cambridge, Cambridge, 6th ed., 2005. http://www-mech.eng.cam.ac.uk/mmd/ashby-paper-V6.pdf - Raymond Boxman, Edith Boxman, Communicating Science - A Practical Guide for Engineers and Physical Scientists, World Scientific, 2017. ISBN: 9789813144224 - Lecture notes; selected articles (scientific manuscripts, review articles)
Assessment	<p>written assignments (50%)</p> <p>Project presentation (50%)</p>
Language	English