ΕΛΛΗΝΙΚΗ ΔΗΜΟΚΡΑΤΙΑ
HELLENIC REPUBLIC

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Ανώτατης Εκπαίδευσης
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for Higher Education

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Accreditation Report

for the Undergraduate Study Programme of:

Materials Science and Technology

Institution: University of Crete

Date: 12 December 2020

Ευρωπαϊκή Ένωση
Ευρωπαϊκό Κοινωνικό Ταμείο

Επιχειρησιακό Πρόγραμμα
Ανάπτυξη Ανθρώπινου Δυναμικού,
Εκπαίδευση και Διά Βίου Μάθηση
Με τη συγχρηματοδότηση της Ελλάδας και της Ευρωπαϊκής Ένωσης

ΕΣΠΑ 2014-2020

enqa.

Report of the Panel appointed by the HAHE to undertake the review of the Undergraduate Study Programme of **Materials Science and Technology** of the **University of Crete** for the purposes of granting accreditation

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PART A: BACKGROUND AND CONTEXT OF THE REVIEW

I. The External Evaluation & Accreditation Panel

The Panel responsible for the Accreditation Review of the Undergraduate Study Programme of **Materials Science and Technology** of the **University of Crete** comprised the following four (4) members, drawn from the HAHE Register, in accordance with Laws 4009/2011 & 4653/2020:

1. **Prof. Themis Lazaridis (Chair)**
   Department of Chemistry
   City College of New York, New York, USA

2. **Prof. Georges Hadziioannou**
   Department of Chemistry
   Université de Bordeaux, Bordeaux, France

3. **Prof. Georgia Papaefthymiou**
   Department of Physics
   Villanova University, Villanova, Pennsylvania, USA

4. **Prof. Emeritus John Vlachopoulos**
   Department of Chemical Engineering
   McMaster University, Hamilton, Ontario, Canada

II. Review Procedure and Documentation

The Panel received information about the Accreditation procedure and relevant documents on November 6, 2020.

The received documents included:

1. The accreditation proposal of the department's undergraduate program
2. The Quality Assurance policy of the department
3. The study guide for undergraduate students
4. The internal regulations of the department (for undergraduate studies, laboratory safety, laboratory courses, computer operation, internships, diploma thesis, Erasmus)
5. The course outlines
6. The department's Quality Goals
7. Course and study program questionnaires together with processed results
8. The findings of the internal university evaluation of the department for 2020
9. Data for the department and the undergraduate program for the last four years
10. Additional information regarding actions taken after the external evaluation of 2011, international ranking results, the department brochure, a list of publications, data for degree completion rates, and information for incoming students
11. The external evaluation of the department in 2011
12. Quality indicators for the department and the undergraduate program for the last four years
13. Principles and guidelines for accreditation

The entire accreditation process took place via teleconferencing. On November 30, 2020 the External Evaluation and Accreditation Panel (EEAP) members attended an online orientation session with Dr. Christina Besta, managing director of the HAHE, who discussed general procedures and guidelines of the accreditation process. On December 1st, the first day of the virtual site visit, EEAP members had a number of meetings. First, Vice Rector of Academic Affairs and Head of the University Quality Assurance Unit (ΜΟΔΙΠ) (Georgios Kosioris) together with the Head of the Department (Prof. Anna Mitraki) gave the EEAP members a brief overview of the University and the Department. Next, Prof. M. Vamvakaki and other members of the Internal Evaluation Committee (OMEA) presented the Department's Accreditation proposal, i.e., explained how the Department complies with the 10 Accreditation Principles. Following that, faculty members of various ranks (Prof. George Petekidis, Assoc. Prof. George Kioseoglou, Assoc. Prof. Maria Kafesaki, Assoc. Prof. Nikos Pelekanos, Assist. Prof. Emmanouela Filippidi, Assoc. Prof. Maria Chatzinikolaidou, and Assoc. Prof. Constantinos Stoumpos), laboratory instructors (EDIP; Dr. Tyllanakis & Dr. Varouchakis), and temporary instructors (Dr. E. Trichas & Dr. O. Tsilipakos) discussed many aspects of the Department's operation, including teaching load, professional development opportunities, mobility, research activities etc. Finally, seven

undergraduate students at different stages of their studies discussed their satisfaction with their studies, possible issues in the curriculum, and their professional prospects.

The second day of the virtual visit started with a virtual tour of the facilities of the Department (teaching laboratories, classrooms, computer rooms, and offices), led by Assoc. Prof. D. Papazoglou and other faculty members. This meeting also included an interaction with three administrative staff members. Then the EEAP members met with ten graduates of the department following careers in both industry and academia. All graduates had continued to obtain a PhD degree. Two were in Greece and the rest in other European countries. Following that, a meeting was held with external stakeholders: a representative of the Region of Crete, the Director of FORTH (Greece's largest research institute, which has close ties with the University of Crete), and three employers from the private sector, who discussed internships and hires from the Department. The day concluded with a meeting with members of OMEA and MODIP who answered questions that arose during the previous meetings.

III. Study Programme Profile

The department was established in 1999 and admitted its first students in 2001. The goal of the undergraduate program is to provide high quality education in the interdisciplinary field of Materials Science and Technology, which is relatively new in Greece. The Department aims to provide a solid foundation in Physics, Chemistry, and Biology which is then applied to understanding, analysis, and innovation in Optoelectronic and Magnetic materials, Polymers, and Biomaterials.

The undergraduate curriculum extends over 8 semesters and provides 240 ECTS. The courses are split into three tiers: An Introductory Stage (semesters 1-3), a Basic Stage (semesters 4-6) and an Advanced Stage (semesters 7-8). 29 courses (182 ECTS) are obligatory. 24 ECTS are assigned to elective-obligatory courses. A further 34 ECTS are to be obtained from a large number of elective courses, which are offered based on demand. A 2-month Practical Training session and a Diploma Thesis are optional.

The Department has 19 faculty members (32% women), 8 support staff (EDIP/ETEP), 4-5 contract instructors per year, and 5 administrative staff. The department admits each year 180 students, much more than the 50 officially requested. However, many do not register or transfer to other Universities, resulting in an annual intake of 100-135 students. The scores of the students admitted (via the Panhellenic Exams) tend to be low (as low as 4,000 out of 20,000), which is a cause of concern. Although the nominal duration of the studies is 4 years, the median completion time is close to 6 years, with a substantial fraction of students requiring more than that. The current number of undergraduate students is about 900, and the number of undergraduate alumni is about 400. The proportion of graduates to the total number of students registered up to 4 years ago is 42%. 146 students have received Masters and PhD degrees. Its facilities (offices, classrooms, research and teaching labs) are distributed to 5 buildings in the Voutes campus, 6 km from the centre of Heraklion.

As the field of Materials Science and Technology has no established employment rights in the public sector in Greece, the career paths open to the graduates are within the private sector and academic research by furthering their studies to the Doctoral level.

PART B: COMPLIANCE WITH THE PRINCIPLES

Principle 1: Academic Unit Policy for Quality Assurance

INSTITUTIONS SHOULD APPLY A QUALITY ASSURANCE POLICY AS PART OF THEIR STRATEGIC MANAGEMENT. THIS POLICY SHOULD EXPAND AND BE AIMED (WITH THE COLLABORATION OF EXTERNAL STAKEHOLDERS) AT ALL INSTITUTION'S AREAS OF ACTIVITY, AND PARTICULARLY AT THE FULFILMENT OF QUALITY REQUIREMENTS OF UNDERGRADUATE PROGRAMMES. THIS POLICY SHOULD BE PUBLISHED AND IMPLEMENTED BY ALL STAKEHOLDERS.

The quality assurance policy of the academic unit is in line with the Institutional policy on quality, and is included in a published statement that is implemented by all stakeholders. It focuses on the achievement of special objectives related to the quality assurance of study programmes offered by the academic unit.

The quality policy statement of the academic unit includes its commitment to implement a quality policy that will promote the academic profile and orientation of the programme, its purpose and field of study; it will realise the programme's strategic goals and it will determine the means and ways for attaining them; it will implement the appropriate quality procedures, aiming at the programme's continuous improvement.
In particular, in order to carry out this policy, the academic unit commits itself to put into practice quality procedures that will demonstrate:

a) the suitability of the structure and organization of the curriculum;
b) the pursuit of learning outcomes and qualifications in accordance with the European and the National Qualifications Framework for Higher Education;
c) the promotion of the quality and effectiveness of teaching;
d) the appropriateness of the qualifications of the teaching staff;
e) the enhancement of the quality and quantity of the research output among faculty members of the academic unit;
f) ways for linking teaching and research;
g) the level of demand for qualifications acquired by graduates, in the labour market;
h) the quality of support services such as the administrative services, the Library, and the student welfare office;
i) the conduct of an annual review and an internal audit of the quality assurance system of the undergraduate programme(s) offered, as well as the collaboration of the Internal Evaluation Group (IEG) with the Institution's Quality Assurance Unit (QAU).

Study Programme Compliance

The University of Crete has established quality assurance policy and the corresponding unit (MODIP), which follows high standards for its undergraduate programmes. The Department of Materials Science and Technology (MST) has a quality assurance policy in agreement and compliance with the University policy for high standards. The Panel received well documented

evidence that the faculty members and support staff of MST are committed to quality procedures and policies that ensure high standards of quality comparable to the best international practice and in full compliance with the European and National Qualifications Framework.

The faculty members have excellent academic and research qualifications and are committed to continuous improvement. They have established procedures for promotion of quality through annual assessments in collaboration with MODIP, OMEA and students. The Committee of the Undergraduate Programme of Studies, which coordinates policies and procedures, identifies problems and proposes solutions. The quality assurance policies and procedures are available in the departmental website and efforts are made to inform also verbally current and incoming students. There appears to be a collegial atmosphere in the department and excellent communication between faculty, administrative/technical staff and undergraduate students.

Course evaluation is conducted in every course, however, only a small percentage of the students respond to the questionnaires. Research is linked to teaching through examples in every course and through elective courses. There are links with the job market though internships for practical training. There are contacts with some of the more successful alumni employed in Greece and other EU countries.

Panel Judgement

Principle 1: Institution Policy for Quality Assurance	
Fully compliant	**X**
Substantially compliant	
Partially compliant	
Non-compliant	

Panel Recommendations

The department should develop better procedures for distributing and collecting increased number of responses to the evaluation questionnaires.

Principle 2: Design and Approval of Programmes

INSTITUTIONS SHOULD DEVELOP THEIR UNDERGRADUATE PROGRAMMES FOLLOWING A DEFINED WRITTEN PROCESS WHICH WILL INVOLVE THE PARTICIPANTS, INFORMATION SOURCES AND THE APPROVAL COMMITTEES FOR THE PROGRAMME. THE OBJECTIVES, THE EXPECTED LEARNING OUTCOMES, THE INTENDED PROFESSIONAL QUALIFICATIONS AND THE WAYS TO ACHIEVE THEM ARE SET OUT IN THE PROGRAMME DESIGN. THE ABOVE DETAILS AS WELL AS INFORMATION ON THE PROGRAMME'S STRUCTURE ARE PUBLISHED IN THE STUDENT GUIDE.

Academic units develop their programmes following a well-defined procedure. The academic profile and orientation of the programme, the objectives, the subject areas, the structure and organisation, the expected learning outcomes and the intended professional qualifications according to the National Qualifications Framework for Higher Education are described at this stage. The approval or revision process for programmes includes a check of compliance with the basic requirements described in the Standards, on behalf of the Institution's Quality Assurance Unit (QAU).

Furthermore, the programme design should take into consideration the following:

- *the Institutional strategy*
- *the active participation of students*
- *the experience of external stakeholders from the labour market*
- *the smooth progression of students throughout the stages of the programme*
- *the anticipated student workload according to the European Credit Transfer and Accumulation System*
- *the option to provide work experience to the students*
- *the linking of teaching and research*
- *the relevant regulatory framework and the official procedure for the approval of the programme by the Institution*

Study Programme Compliance

The Department of Materials Science and Technology (MST) started its undergraduate programme in 2001 and the postgraduate one in 2004. The initial design of the undergraduate program was based on international standards. The department currently has 19 faculty members with excellent research accomplishments and keen interest and abilities for providing very high-quality education.

MST offers an undergraduate degree which requires 240 European Credit Transfer System (ECTS) Units. The Diploma (Ptychion) is expected to be completed in 4 years. However, most students require 5, 6 or more years to complete their degree. The long duration of studies is mainly due to the low entry level of a significant part of the student body. Students entering with Panhellenic Exam scores less than 10,000 (out of 20,000) can easily be left behind and take longer to complete their studies. The weaker students seem to be also left behind due to chains of prerequisites («αλυσίδες»), although all recognise that prerequisites are necessary. The

department has taken some steps to mitigate this problem by offering exemptions from the prerequisites for students that are advanced enough in their studies.

The curriculum is offered via traditional lectures and laboratories. There is good communication between instructors and students. Of course, there can be limited attendance of the students in traditional courses offered in the lecture style, especially due to the large numbers of students admitted. Attendance in courses offered is of the order of 30% and those interested do participate by asking questions and completing homework assignments. It must also be said that the faculty members are cognizant of the low level of a significant fraction of the class participants and make every effort, even beyond the call of duty, to help the students with weak background from high school and low entrance examination marks. In fact, there have been success stories of students entering with poor educational background who completed their Ptychion and continued on to PhD and subsequent gainful employment.

Teaching and research are linked through classroom examples and assignments and contacts with the FORTH (ITE) research establishment. The students become well acquainted with the research of faculty members and some of them opt for careers in research. The internship program provides an excellent vehicle for students to become familiar with the needs of their industry. Such links frequently lead to permanent employment. The alumni noted certain gaps in the curriculum, for example lack of instruction in metallurgy and processing of materials. Also, the students complained that the Fall semester tends to be harder than the Spring semester. Indeed, the third semester seems particularly heavy to the Panel.

Panel Judgement

Principle 2: Design and Approval of Programmes	
Fully compliant	**X**
Substantially compliant	
Partially compliant	
Non-compliant	

Panel Recommendations

- Examine if the chains of prerequisites can become more flexible so that the time of completion of studies be shortened without reduction of quality.
- Efforts should be made to increase the number of students participating in the internship programme.
- Alumni and external stakeholders should be consulted in the evaluation and improvement of the curriculum.
- The balance of workload between fall and spring semesters should be re-examined for the purpose of making it more even for the students.

- The department should establish an Industrial Advisory Board, for receiving better feedback and advice from future employers.

Principle 3: Student-centred Learning, Teaching and Assessment

INSTITUTIONS SHOULD ENSURE THAT THE UNDERGRADUATE PROGRAMMES ARE DELIVERED IN A WAY THAT ENCOURAGES STUDENTS TO TAKE AN ACTIVE ROLE IN CREATING THE LEARNING PROCESS. THE ASSESSMENT METHODS SHOULD REFLECT THIS APPROACH.

Student-centred learning and teaching plays an important role in stimulating students' motivation, self-reflection and engagement in the learning process. The above entail continuous consideration of the programme's delivery and the assessment of the related outcomes.

The student-centred learning and teaching process

- *respects and attends to the diversity of students and their needs, enabling flexible learning paths;*
- *considers and uses different modes of delivery, where appropriate;*
- *flexibly uses a variety of pedagogical methods;*
- *regularly evaluates and adjusts the modes of delivery and pedagogical methods aiming at improvement;*
- *regularly evaluates the quality and effectiveness of teaching, as documented especially through student surveys;*
- *reinforces the student's sense of autonomy, while ensuring adequate guidance and support from the teaching staff;*
- *promotes mutual respect in the student - teacher relationship;*
- *applies appropriate procedures for dealing with students' complaints.*

In addition :

- *the academic staff are familiar with the existing examination system and methods and are supported in developing their own skills in this field;*
- *the assessment criteria and methods are published in advance;*
- *the assessment allows students to demonstrate the extent to which the intended learning outcomes have been achieved. Students are given feedback, which, if necessary is linked to advice on the learning process;*
- *student assessment is conducted by more than one examiner, where possible;*
- *the regulations for assessment take into account mitigating circumstances;*
- *assessment is consistent, fairly applied to all students and carried out in accordance with the stated procedures;*
- *a formal procedure for student appeals is in place.*

Study Programme Compliance

The undergraduate program at MST has been designed with student-centred approaches from the very start and a collegial atmosphere has been developed. There was plenty of evidence not only from the discussions with professors and students, but also from the fact that there exists an MST Alumni Association, even though there is not one for the entire University of Crete.

Courses are taught in the traditional lecture style, but with provision of books, lecture notes and computer support as may be required. There is training for instructors to become familiar with modern methods of course presentation. Information about the courses and corresponding

expectations is provided both verbally by each instructor and in the internet webpages which are devoted for each one of the courses. The MST department is well equipped with computers easily accessible to students.

Laboratories are well equipped, and each student is trained either individually or in small groups with the help of instructor(s). The instructors make special efforts to help students in improving their laboratory skills and understanding the physicochemical principles behind each experiment.

Every student has a designated student advisor/mentor for guidance and help.

The students are informed, well in advance, of how their academic performance is assessed. The student guide is comprehensive. There is opportunity for appeal and also opportunity to upgrade their academic record by being re-examined in a course that they have passed, or by retaking it.

Diversity is respected in compliance with the rules of the University of Crete and in accordance with national, European and international guidelines. Complaints may be discussed with the Department Chair and a special committee for investigation may be formed in serious occurrences.

Students give feedback, not only through the formal course evaluations, but also through the Undergraduate Studies Committee, the general assembly, the student club, and discussions with individual instructors. Also advanced students are used as teaching assistants in first year courses (following evaluation) and can gain up to 9 ECTS.

Internships are encouraged and there is evidence that many of them have been successful with both students and employers.

Student mobility, primarily through the Erasmus programme, is encouraged by providing all relevant information on the departmental website and having a dedicated staff member for helping the students. Unfortunately, very few students use this unique opportunity because they fear losing a semester in their curriculum. The number of incoming students is non-existent, presumably due to the language barrier.

Panel Judgement

Principle 3: Student- centred Learning, Teaching and Assessment	
Fully compliant	**X**
Substantially compliant	
Partially compliant	
Non-compliant	

Panel Recommendations

- Efforts should be made not only to encourage students to participate in ERASMUS, but also to accommodate them. This may necessitate some flexibility with respect to requirements for the completion of their studies and the establishment of collaborations with MST departments in other European countries. The 7^{th} and 8^{th} semesters, when students take electives, are especially appropriate for using the Erasmus program.
- To compensate for the lack of incoming Erasmus students, MST could consider ways of offering summer research experiences to European undergraduates.

Principle 4: Student Admission, Progression, Recognition and Certification

INSTITUTIONS SHOULD DEVELOP AND APPLY PUBLISHED REGULATIONS COVERING ALL ASPECTS AND PHASES OF STUDIES (ADMISSION, PROGRESSION, RECOGNITION AND CERTIFICATION).

Institutions and academic units need to put in place both processes and tools to collect, manage and act on information regarding student progression.

Procedures concerning the award and recognition of higher education degrees, the duration of studies, rules ensuring students progression, terms and conditions for student mobility should be based on the institutional study regulations. Appropriate recognition procedures rely on institutional practice for recognition of credits among various European academic departments and Institutions, in line with the principles of the Lisbon Recognition Convention.

Graduation represents the culmination of the students´ study period. Students need to receive documentation explaining the qualification gained, including achieved learning outcomes and the context, level, content and status of the studies that were pursued and successfully completed (Diploma Supplement).

Study Programme Compliance

The Department every year is obliged to admit 180 students even though it requests 50 entering students. The Panel finds that, this situation does not serve the purpose for a solid education since the subcritical resources available do not correspond to the international standards for university level education.

It is worth mentioning here that over the years the entrance academic level has been decreasing dramatically. As a result, the integration of the admitted students into the first year's curriculum is very problematic due to the deficiencies in essential knowledge in core subjects such as chemistry, physics and mathematics.

The new admitted students are welcomed by the administrative staff very efficiently and they are assigned, each one, to an Academic advisor, "the Mentor", for all their studies until their graduation. The faculty organizes every year one day cordial welcome providing useful information regarding the curriculum, the career possibilities, a general orientation for the studies, the life on campus and the various university services. The same information can be found also on the departmental web site during the entire student tenure.

The curriculum is designed in a manner that allows each student to progressively advance the academic level from basic to advanced in Materials Science and Technology. It comprises three stages going progressively from theoretical fundamental courses to advanced ones with a very good balance between the hard-core lessons of Materials Science and Technology and specialized ones. Also, there is a very good balance between theory and practical laboratory exercises. All in all, the curriculum is excellent and corresponds to the highest international standards in the field of Materials Science and Technology undergraduate education.

The Diploma thesis is optional. The Student Guide provides a comprehensive description of the quality requirements for the implementation of a thesis. The requirements are presented on the Departmental website. Up to 45% of the cohort of the students take this option. The evaluation is performed by a two-faculty member committee on the basis of a written report, in English or Greek, and an open public presentation. The thesis corresponds to 12 ECTS and if it leads to a scientific publication the student is granted another 5 ECTS. The Panel had the opportunity to review some of these Diploma Theses and came away very impressed with the high quality of the studies and the exposure of the students to many synthesis and characterization techniques of Materials useful for electronic and biomaterial applications. Furthermore, the Department offers opportunities for practical training with local and national socio-economical actors.

Student progression is monitored by the faculty mentors, by the progress indicators at the individual level and collectively by the statistics supplied by MODIP. Upon graduation, all students receive the Diploma Supplement (transcript).

Panel Judgement

Principle 4: Student Admission, Progression, Recognition and Certification	
Fully compliant	
Substantially compliant	**X**
Partially compliant	
Non-compliant	

Panel Recommendations

- It is advisable that the Department introduce crash remedial courses prior or concurrent to the first tier of the curriculum to cover basic deficiencies in chemistry, physics and mathematics.
- It is recommended that the Department develop strategies for the growth of the Practical Training programme by strengthening and expanding relationships with industry and public sector institutions.
- It is highly recommended that the Department adopt a policy of promoting and rewarding academic excellence. For instance, students with excellent academic records could be rewarded. Also, the same can be established for Faculty members for excellence in teaching.

The following recommendations are addressed to the State

- The overcapacity of admitted students in the first year has to be treated urgently. The State has to either increase the resources of the department (human, financial and infrastructural) or decrease the number of admitted students to better reflect the level of the available resources.
- The preparation level of the admitted students needs to be raised, thus a minimum score for admission, e.g., 10,000 out of 20,000, should be instituted. This would guarantee a

minimum of competence in Chemistry, Physics and Mathematics allowing a smoother integration of the incoming students into the curriculum of the first phase of the studies in the Department.

- High School candidates in the Medicine/Biology track should be allowed to select Materials departments, just as they are allowed to select Chemistry departments. These students might need some remediation in Mathematics.

Principle 5: Teaching Staff

INSTITUTIONS SHOULD ASSURE THEMSELVES OF THE QUALIFICATIONS AND COMPETENCE OF THE TEACHING STAFF. THEY SHOULD APPLY FAIR AND TRANSPARENT PROCESSES FOR THE RECRUITMENT AND DEVELOPMENT OF THE TEACHING STAFF.

The Institutions and their academic units have a major responsibility as to the standard of their teaching staff providing them with a supportive environment that promotes the advancement of their scientific work. In particular, the academic unit should:

- *set up and follow clear, transparent and fair processes for the recruitment of properly qualified staff and offer them conditions of employment that recognize the importance of teaching and research;*
- *offer opportunities and promote the professional development of the teaching staff;*
- *encourage scholarly activity to strengthen the link between education and research;*
- *encourage innovation in teaching methods and the use of new technologies;*
- *promote the increase of the volume and quality of the research output within the academic unit;*
- *follow quality assurance processes for all staff members (with respect to attendance requirements, performance, self-assessment, training etc.);*
- *develop policies to attract highly qualified academic staff.*

Study Programme Compliance

The Department of Material Science and Technology has succeeded since its inception to attract as Faculty members top level Scholars with extensive experience in teaching at top institutions world-wide with which they kept strong links. Moreover, these Scholars established at the University of Crete and the FORTH research institute top level research attracting much competitive funding from EU and Greece. The permanent Faculty members are aided in the theoretical teaching and the practical exercises by 4 to 5 contractual teaching staff (PhD's) selected very carefully in regard to their high-level qualification with research/teaching experience for executing the missions assigned. Moreover, the Department benefits extraordinarily by the regular visits of Professors from abroad who are contributing to the teaching of advanced courses. Finally, the department has for its teaching mission and laboratory operations extensive help from Graduates (PhD's and MSc's) as teaching assistants under the supervision of a faculty member.

The Department encourages the faculty members to take advantage of the available programmes for professional development. The culture of sabbatical leave is also promoted. The University has instituted optional seminars that discuss best teaching practices.

The typical faculty teaching load is 6 hours per week, which is commensurate with international practice and the Greek Law.

The faculty actively integrates state-of-the-art research developments into their teaching. Each member of teaching staff specializes in an area of research.

Teaching staff assessment is performed by student feedback through course evaluations that are conducted at the end of each semester.

Panel Judgement

Principle 5: Teaching Staff	
Fully compliant	**X**
Substantially compliant	
Partially compliant	
Non-compliant	

Panel Recommendations

None

Principle 6: Learning Resources and Student Support

INSTITUTIONS SHOULD HAVE ADEQUATE FUNDING TO COVER TEACHING AND LEARNING NEEDS. THEY SHOULD –ON THE ONE HAND– PROVIDE SATISFACTORY INFRASTRUCTURE AND SERVICES FOR LEARNING AND STUDENT SUPPORT AND –ON THE OTHER HAND– FACILITATE DIRECT ACCESS TO THEM BY ESTABLISHING INTERNAL RULES TO THIS END (E.G. LECTURE ROOMS, LABORATORIES, LIBRARIES, NETWORKS, BOARDING, CAREER AND SOCIAL POLICY SERVICES ETC.).

Institutions and their academic units must have sufficient funding and means to support learning and academic activity in general, so that they can offer to students the best possible level of studies. The above means could include facilities such as libraries, study rooms, educational and scientific equipment, information and communications services, support or counselling services.

When allocating the available resources, the needs of all students must be taken into consideration (e.g. whether they are full-time or part-time students, employed or international students, students with disabilities) and the shift towards student-centred learning and the adoption of flexible modes of learning and teaching. Support activities and facilities may be organised in various ways, depending on the institutional context. However, the internal quality assurance ensures that all resources are appropriate, adequate, and accessible, and that students are informed about the services available to them.

In delivering support services the role of support and administrative staff is crucial and therefore they need to be qualified and have opportunities to develop their competences.

Study Programme Compliance

MST does not yet have a vested building infrastructure of their own. Thus, from the start they share facilities, for classrooms, undergraduate/research labs, offices (staff, grads, visitors), meeting rooms, at the buildings housing the Departments of Mathematics, Computer Science, Chemistry, Physics, Biology and IESL-FORTH. Construction of their own building of a total surface area of 8000 m^2 is planned for the near future. The buildings are relatively new, well-kept, and free of the graffiti and vandalism that plague other Greek universities.

Laboratory work is supported by a dedicated team of technical staff. Facilities are distributed fairly and in accordance with the needs of each course. However, all these facilities are distributed at buildings housing the Chemistry, Physics and Mathematics Departments. Auxiliary facilities are also available and accessible to students at the Department and University. Students are well informed and have access to all services. The Department is well supported by dedicated administrative staff. Computer technologies that facilitate teaching and administration appear to be very good.

Student housing, currently under construction, is a welcome development that will facilitate the better integration of the students into the University life.

Panel Judgement

Principle 6: Learning Resources and Student Support	
Fully compliant	**X**
Substantially compliant	
Partially compliant	
Non-compliant	

Panel Recommendations

None

Principle 7: Information Management

INSTITUTIONS BEAR FULL RESPONSIBILITY FOR COLLECTING, ANALYSING AND USING INFORMATION, AIMED AT THE EFFICIENT MANAGEMENT OF UNDERGRADUATE PROGRAMMES OF STUDY AND RELATED ACTIVITIES, IN AN INTEGRATED, EFFECTIVE AND EASILY ACCESSIBLE WAY.

Institutions are expected to establish and operate an information system for the management and monitoring of data concerning students, teaching staff, course structure and organisation, teaching and provision of services to students as well as to the academic community.

Reliable data is essential for accurate information and for decision making, as well as for identifying areas of smooth operation and areas for improvement. Effective procedures for collecting and analysing information on study programmes and other activities feed data into the internal system of quality assurance.

The information gathered depends, to some extent, on the type and mission of the Institution. The following are of interest:

- *key performance indicators*
- *student population profile*
- *student progression, success and drop-out rates*
- *student satisfaction with their programme(s)*
- *availability of learning resources and student support*
- *career paths of graduates*

A number of methods may be used for collecting information. It is important that students and staff are involved in providing and analyzing information and planning follow-up activities.

Study Programme Compliance

The administration of the department has established procedures to collect all relevant information regarding student body, teaching methods, student progression, employability and career paths of graduates.

The department makes use of the Integrated National Quality System (ΟΠΕΣΠ) for the collection of data. Students have access to an online platform for anonymous, private and secure evaluation of courses and instructors. Surveys are conducted regularly. However, low student participation in course and faculty evaluation is indicated.

Information on the number of evaluated courses annually is available and up to date on the website. Collected data is carefully analysed by OMEA and discussed in the General Assembly meeting for implementation of improvements. Appropriate graphs demonstrating trends and allowing direct interpretation and comparisons were presented during our visit. Furthermore, the department evaluates its needs in experimental infrastructure, social services and IT facilities and is very active in trying to locate resources to fulfil these needs.

Panel Judgement

Principle 7: Information Management	
Fully compliant	**X**
Substantially compliant	
Partially compliant	
Non-compliant	

Panel Recommendations

The department must devise ways and means to encourage or even compel student participation in the evaluation process; for example, by filling out the questionnaires in class or requiring the filling out of the questionnaires before registering for the following semester.

Principle 8: Public Information

INSTITUTIONS SHOULD PUBLISH INFORMATION ABOUT THEIR TEACHING AND ACADEMIC ACTIVITIES WHICH IS CLEAR, ACCURATE, OBJECTIVE, UP-TO-DATE AND READILY ACCESSIBLE.

Information on Institution's activities is useful for prospective and current students, graduates, other stakeholders and the public.

Therefore, institutions and their academic units provide information about their activities, including the programmes they offer, the intended learning outcomes, the qualifications awarded, the teaching, learning and assessment procedures used, the pass rates and the learning opportunities available to their students, as well as graduate employment information.

Study Programme Compliance

Key information regarding the academic unit and its operation, such as structure, mode of attendance, criteria for assessment, degree requirements, teaching staff's CVs, etc. are available on the departmental website. Course outlines, including those of online courses and courses offered by the "Open University" component of the department, are available online. The department has put in place a two-member committee responsible for updating the website content frequently.

The department also maintains a Facebook page and a Twitter account. Additionally, the department uses printed media such as leaflets to describe their program and course offerings. Furthermore, the department hosts visits from local high schools to publicize the field of Materials Science to young, aspiring scientists.

Panel Judgement

Principle 8: Public Information	
Fully compliant	**X**
Substantially compliant	
Partially compliant	
Non-compliant	

Panel Recommendations

None

Principle 9: On-going Monitoring and Periodic Internal Review of Programmes

INSTITUTIONS SHOULD HAVE IN PLACE AN INTERNAL QUALITY ASSURANCE SYSTEM FOR THE AUDIT AND ANNUAL INTERNAL REVIEW OF THEIR PROGRAMMES, SO AS TO ACHIEVE THE OBJECTIVES SET FOR THEM, THROUGH MONITORING AND AMENDMENTS, WITH A VIEW TO CONTINUOUS IMPROVEMENT. ANY ACTIONS TAKEN IN THE ABOVE CONTEXT SHOULD BE COMMUNICATED TO ALL PARTIES CONCERNED.

Regular monitoring, review and revision of study programmes aim to maintain the level of educational provision and to create a supportive and effective learning environment for students.

The above comprise the evaluation of:

- *the content of the programme in the light of the latest research in the given discipline, thus ensuring that the programme is up to date;*
- *the changing needs of society;*
- *the students' workload, progression and completion;*
- *the effectiveness of the procedures for the assessment of students;*
- *the students' expectations, needs and satisfaction in relation to the programme;*
- *the learning environment, support services and their fitness for purpose for the programme*

Programmes are reviewed and revised regularly involving students and other stakeholders. The information collected is analysed and the programme is adapted to ensure that it is up-to-date. Revised programme specifications are published.

Study Programme Compliance

Internal evaluation or self-assessment procedures occur annually. The most recent comprehensive self-study found on the website was for 2008-2009 reported on Feb. 2009 as a periodic internal evaluation prepared in anticipation of the most recent external evaluation of 2011. Outcomes of the self-assessments are properly recorded and submitted to the QAU/MODIP system of the UoC. Such information is up to date within the QAU/MODIP system of the University.

Self-assessment results lead to action plans for improvement of the Curriculum. Most recently the implemented action plan led to the addition of courses on Nanomaterials for Energy and the Environment, Crystal Chemistry and Solid-State Chemistry and novel courses on Innovation, Entrepreneurship and Intellectual Property. The program of study is constantly adjusted according to student expectations and changing needs of the society.

Panel Judgement

Principle 9: On-going Monitoring and Periodic Internal Review of Programmes	
Fully compliant	**X**
Substantially compliant	
Partially compliant	
Non-compliant	

Panel Recommendations

None

Principle 10: Regular External Evaluation of Undergraduate Programmes

PROGRAMMES SHOULD REGULARLY UNDERGO EVALUATION BY COMMITTEES OF EXTERNAL EXPERTS SET BY HAHE, AIMING AT ACCREDITATION. THE TERM OF VALIDITY OF THE ACCREDITATION IS DETERMINED BY HAHE.

HAHE is responsible for administrating the programme accreditation process which is realised as an external evaluation procedure, and implemented by a committee of independent experts. HAHE grants accreditation of programmes, with a specific term of validity, following to which revision is required. The accreditation of the quality of the programmes acts as a means of verification of the compliance of the programme with the template's requirements, and as a catalyst for improvement, while opening new perspectives towards the international standing of the awarded degrees.

Both academic units and institutions participate in the regular external quality assurance process, while respecting the requirements of the legislative framework in which they operate.

The quality assurance, in this case the accreditation, is an on-going process that does not end with the external feedback, or report or its follow-up process within the Institution. Therefore, Institutions and their academic units ensure that the progress made since the last external quality assurance activity is taken into consideration when preparing for the next one.

Study Programme Compliance

As mandated by National Law, an external evaluation of the Department took place in 2011. Although the overall evaluation was positive, a number of weaknesses were noted. The Department and the University have taken action to address most of the weaknesses and follow the External Panel's suggestions. The University is planning a new 8,000 m^2 building for the Department. The Department has added new courses and new faculty members suggested by the Panel and started a process for collecting information on its alumni. The process is not yet complete (there are still no employment statistics) but the progress is substantial. Equipment has been upgraded, most PhD students are supported, student progress monitoring has been instated, and the number of prerequisites has been reduced. Sadly, the recommendations addressed to the Greek State have been totally ignored.

Panel Judgement

Principle 10: Regular External Evaluation of Undergraduate Programmes	
Fully compliant	**X**
Substantially compliant	
Partially compliant	
Non-compliant	

Panel Recommendations

None

PART C: CONCLUSIONS

I. Features of Good Practice

The Department of Materials Science and Technology of the University of Crete (MST) has established quality assurance mechanisms in accordance with national and European requirements. A large amount of data on every aspect of the department's operations is collected and analysed annually. MST conducts these exercises not as a bureaucratic burden but with a genuine interest in improving itself. Faculty recruitment practices appear broad and merit based. The undergraduate curriculum has been designed based on international standards. The information provided to the students is comprehensive and the support they receive for their success is excellent. Facilities are also very good, albeit dispersed in various buildings. The web site is up to date and highly informative.

II. Areas of Weakness

The main weaknesses of the program are the large number of slots offered and the low level of admitted students. While entrance exam scores are not perfect predictors of academic success, the prevalence of weak students in a class makes instruction very difficult and risks lowering of the standards. There are two main reasons for the low attractiveness of the department: a) the incomplete designation of professional rights for materials scientists in Greece, and especially the inability to teach in secondary education and b) certain inflexibilities in the national university entrance system that prevents qualified students in the Biology/Medicine track from selecting the department, despite the fact that one of the prominent orientations of the department is on biomaterials and biomedical applications that are destined to change the practice of Medicine in the 21st century. Remediation of the aforementioned weaknesses is beyond the Department's control.

III. Recommendations for Follow-up Actions

The recommendations that have been made in each of the ten sections of this report are here compiled and rearranged:

- It is advisable that the Department introduce crash remedial courses prior or concurrent to the first tier of the curriculum to cover basic deficiencies in chemistry, physics and mathematics.
- Examine if the chains of prerequisites can become more flexible so that the time of completion of studies be shortened without reduction of quality.
- The balance of workload between fall and spring semesters should be re-examined for the purpose of making it more even for the students.

- The department must devise ways and means to encourage or even compel student participation in the evaluation process; for example, by filling out the questionnaires in class or requiring the filling out of the questionnaires before registering for the following semester.
- Efforts should be made to increase the number of students participating in the internship programme by strengthening and expanding relationships with industry and public sector institutions.
- Alumni and external stakeholders should be consulted in the evaluation and improvement of the curriculum.
- The department should establish an Industrial Advisory Board, for receiving better feedback and advice from future employers.
- Efforts should be made not only to encourage students to participate in ERASMUS, but also to accommodate them. This may necessitate some flexibility with respect to requirements for the completion of their studies and the establishment of collaborations with MST departments in other European countries. The 7th and 8th semesters, when students take electives, are especially appropriate for using the Erasmus program.
- To compensate for the lack of incoming Erasmus students, MST could consider ways of offering summer research experiences to European undergraduates.
- It is highly recommended that the Department adopt a policy of promoting and rewarding academic excellence. For instance, students with excellent academic records could be rewarded. Also, the same can be established for Faculty members for excellence in teaching.

Recommendations to the Greek State:

- The graduates of Materials Science Departments should be given the ability to teach in Secondary Education and other reasonable professional rights.
- High-School candidates in the Medicine/Biology track should be given the option to select Materials Science departments, just as they have the ability to select Chemistry departments.
- The number of students admitted to each department needs to be rationalized.
- The ability of students to take an exam unlimited times without cost is detrimental to the Greek Higher Education system.

IV. Summary & Overall Assessment

The Principles where full compliance has been achieved are:

- Principle 1: Academic Unit Policy for Quality Assurance
- Principle 2: Design and Approval of Programmes
- Principle 3: Student-centred Learning, Teaching and Assessment
- Principle 5: Teaching Staff
- Principle 6: Learning Resources and Student Support

- Principle 7: Information Management
- Principle 8: Public Information
- Principle 9: Ongoing Monitoring and Periodic Internal Review of Programmes
- Principle 10: Regular External Evaluation of Undergraduate Programmes

The Principles where substantial compliance has been achieved are:

- Principle 4: Student Admission, Progression, Recognition and Certification

The Principles where partial compliance has been achieved are: None

The Principles where failure of compliance was identified are: None

Overall Judgement	
Fully compliant	**X**
Substantially compliant	
Partially compliant	
Non-compliant	

The members of the External Evaluation & Accreditation Panel

Name and Surname **Signature**

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