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ΑΡΧΗ ΔΙΑΣΦΑΛΙΣΗΣ ΚΑΙ ΠΙΣΤΟΠΟΙΗΣΗΣ  
ΤΗΣ ΠΟΙΟΤΗΤΑΣ ΣΤΗΝ ΑΝΩΤΑΤΗ ΕΚΠΑΙΔΕΥΣΗ

HELLENIC REPUBLIC

H Q A

HELLENIC QUALITY ASSURANCE  
AND ACCREDITATION AGENCY

**Accreditation Report**  
**for the Undergraduate Study Programme**  
**(Integrated master) of:**

**Mechanical Engineering and Aeronautics**

**Institution: University of Patras**

**Date: 08.06.2019**

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Ευρωπαϊκή Ένωση  
Ευρωπαϊκό Κοινωνικό Ταμείο

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



EUROPEAN ASSOCIATION  
FOR QUALITY ASSURANCE  
IN HIGHER EDUCATION

Report of the Panel appointed by the HQA to undertake the review of the  
Undergraduate Study Programme (Integrated Master) of  
**Mechanical Engineering and Aeronautics of the University of Patras**  
for the purposes of granting accreditation

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## **PART A: BACKGROUND AND CONTEXT OF THE REVIEW**

### **I. The Accreditation Panel**

The Panel responsible for the Accreditation Review of the Undergraduate Study Programme (Integrated Master) of Mechanical Engineering and Aeronautics of the University of Patras comprised the following four (4) members, drawn from the HQA Register, in accordance with the Law 4009/2011:

1. Prof. Anthimos Georgiadis (Chair)  
Leuphana Universität Lüneburg, Germany
  
2. Prof. Ioannis Botsis,  
Ecole Polytechnique Federale de Lausanne, Switzerland
  
3. Prof. Nicholas Patrikalakis  
Massachusetts Institute of Technology, Cambridge, Massachusetts, USA
  
4. Assoc. Prof. Anastassios Perakis  
University of Michigan, Ann Arbor, Michigan, USA.

## II. Review Procedure and Documentation

The External Accreditation Committee visited the Department of Mechanical Engineering and Aeronautics (MEAD) of the University of Patras (UoP) during the period of June 03 to 08, 2019.

The Committee arrived at the University campus at Rio on Monday June 3 and met the next day with the Deputy Rector of Academic Affairs, the Department Head and the Deputy Department Head, the members of the Quality Assurance Unit (ΜΟΔΙΠ) and the members of the Department's Evaluation Unit (ΟΜΕΑ). After the introduction by the Vice Rector of UoP, the meeting continued by presentations from the members of the Quality Assurance Unit (ΜΟΔΙΠ) and the members of the Department's Evaluation Unit (ΟΜΕΑ). These presentations highlighted the Department's undergraduate and graduate programs, the past and on-going industrial collaborations, the research activities of the Department's Divisions (Τομείς), and those of each separate Laboratory (Εργαστήριο) within each Division. During these presentations, the Committee requested clarifications and additional information, to all of which the Department responded.

During the same day, the Committee met with teaching staff (primarily faculty members of the department) and listened to their point of view and concerns about the Department's teaching policy, teaching load, performance of students, and the 'upgrade' of TEIs to University level. Major concerns for the continuously increasing number of incoming new students, as well as the students not graduating even after 7 years of studies (n+2), were pointed out as obstacles in the efforts to improve quality. The issue of teaching support (from technical staff) especially in project-based activities was also raised.

The meeting with the teaching staff was followed by a discussion with 15 students (amongst which only one female student) from all 5 years of the program. The discussion was useful for the committee to better appreciate the studies program. The students are happy with their studies and pointed out that courses in nuclear energy and safety would be useful. They also wish to have more team-based learning activities. They are also happy with the means offered by the library to help their studies.

The meeting with the students was followed by online discussions with four graduates of the Department, which gave a very good impression to the committee of their success and the quality of the program.

The visit of this first day finished with another online discussion with two employers and a social partner (ΣΕΒ). The committee also found an overall satisfaction with the competence level of the graduates working in their companies.

The second day was devoted to visits of a computer room and a few selected research and teaching laboratories (due to lack of time) and included demonstrations of their capabilities with a series of presentations. In its deliberations, the Committee took into consideration the following documents provided by the Department:

The Department's accreditation proposal

The quality control policy

The programs' strategic objectives

Studies guide

Study rules of application

Course outlines

Data on personnel, finances on research and infrastructure, scientific output, etc.

Additional supplementary information

Hard copies and electronic copies of all presentations

The committee also drew additional information available on the Department's webpage. The Committee on several occasions requested additional clarifications, all of which were provided by the Department.

All meetings took place in a cordial and highly professional atmosphere in the Department main building. The faculty, students, and staff were extremely helpful, forthcoming and cooperative, and the overwhelming majority participated with enthusiasm in the evaluation process. The quality of documents and presentations was informative and detailed.

The Committee would like to express its appreciation to the Vice Rector Prof. N. Karamanos, the Department Head Prof. N. Anyfantis, and the Deputy Head, Associate Prof. D. Moutzis, Prof. G. Lampeas and all members of the MODIP for their efforts to facilitate the work of the Committee. The committee is also thankful to all individuals who participated in the discussions and presentations of the Department.

The input and organization of the HQA is greatly appreciated.

### III. Study Programme Profile

The Department was founded in 1967, as part of the Engineering School of the UoP and has provided curricula in Mechanical Engineering on a five-year basis since then. In 1995, the Department was expanded and started offering courses and specialization in Aeronautics.

The Department is structured in four Divisions as follows:

- Division of Applied Mechanics, Technology of Materials and Biomechanics
- Division of Energy, Aeronautics and Environment
- Division of Design and Manufacturing
- Division of Management and Organizational Studies

Research and teaching are organized under the following sixteen Laboratories:

- Laboratory of Applied Mechanics and Vibrations
- Laboratory of Biomechanics and Biomedical Engineering
- Laboratory of Technology and Strength of Materials
- Laboratory of Aerodynamic Design of Air-Vehicles
- Laboratory of Engineering
- Laboratory of Fluid Mechanics and Applications
- Laboratory of Internal Combustion Engines
- Laboratory of Thermodynamics and Statistical Applications
- Nuclear Technology Laboratory
- Laboratory of Manufacturing Systems & Automation
- Laboratory of Dynamics and Machine Theory
- Laboratory of Machine Dynamics
- Machine Design Laboratory
- Stochastic Mechanical Systems & Automation Laboratory
- Laboratory of Industrial Management
- Laboratory of Operations Research

A degree called Integrated Master is awarded after five years of studies and the successful accomplishment of a Thesis. At the post-graduate level, the Department offers programs leading to a Ph.D. degree in Mechanical Engineering and Aeronautics. The Department claims the equivalence of its Integrated Master to a Master's Degree. The Committee considers this claim to be justified by the number of ECTS hours, which is comparable to other major engineering schools in Europe, depth of the education offered, curriculum structure, teaching methodology, academic staff qualifications and infrastructure facilities including laboratory, computer, teaching and library facilities. The Department consists of 37 faculty members and has a total of 1720 or 1053 students if one includes only '(n+2)' students. This gives student to faculty ratios of 48.5 and 28.5, respectively. These numbers are considered reasonable for the Department and comparable to international averages.

Overall, the Committee was impressed by the level of competence of students and faculty, the quality and quantity of research output, the facilities, and, especially, their high "esprit-de-corps" despite the difficult socio-economic constraints.

The Accreditation Report (ACRP) was prepared by the Department's internal evaluation unit OMEA and was available to the Committee prior to its visit. The Committee feels that the ACRP provided a candid assessment and covered in sufficient detail the 10 principles outlined in the Mapping Grid as provided by the HQA. However, the committee noticed that some of the recommendations although discussed, did not lead to changes, i.e.,

- Course prerequisites
- Rewarding excellence in teaching
- Performance Based Faculty Evaluation
- Centralisation of Departmental technical staff
- Formulation of an Advisory Board



## 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

*Please comment on the compliance with the Principle.*

The University of Patras (UoP) as a whole has a well-established quality assurance policy and the corresponding mechanism (MODIP), which follows the standards of HQA. The quality assurance policy of the Mechanical Engineering and Aeronautics Department (MEAD) is fully in line with the University's policy on quality and its assurance. Moreover, MEAD has published its quality policy statements in its home page. A well-structured table presents their immediate goals, the corresponding steps and time for their fulfilment. The Department's' quality assurance policy

focuses on the achievement of dedicated objectives related to the study programmes offered by them. Furthermore, it provides the review and update of the existing courses. The update of the courses is ensured through the internal quality procedural steps on an annual basis. The required modifications are identified by the quality assurance process, which foresees engagement of the students, local authorities and industry as well as academic research, considering all timely feasible approaches and constraints on resources (institutional, finances, and policy). These procedures have led to a suitable structure and organization of the curriculum and learning outcomes and qualifications in accordance with the European and the National Qualifications Framework for Higher Education.

The Department uses the institutional IT system, which supports very well the IQAS processes available for the different status groups and the public. The quality assurance policy and the procedures are very well communicated to all parties. A closed loop of review starts with the students' questionnaire at each individual Departmental OMEAs, communicated to the Department board through the committee for the study programme and then to MODIP. The General Assembly of UoP approves significant changes or improvements proposed by the Department assembly. This presents a structure for continuous improvement of quality assurance processes. The UoP has a handbook that describes the IQAS processes, which also concerns the department. The detailed information for each process is described in MODIP's web pages allowing for their efficient and timely update (when required). The Department publishes all annual reports of the internal quality assurance in its home page.

The policy of the Department supports, in a remarkable way considering the significant financial constraints, the study programme of MEAD, the services and the infrastructure as well as the allocation of necessary resources for the successful operation of the IQAS, with financial support from the external research projects overheads. The leadership of the Department, as well as individual staff members, have taken on strongly and very successfully their responsibilities in the IQAS to achieve the continuous improvement of teaching and learning, research and innovation. The suitable study programme emphasises the integration of the students and staff in research projects and industry through training activities. Moreover, the Department follows successfully current developments in manufacturing through its leading participation to the European Institute of Innovation & Technology (EIT) that connects the leading manufacturing actors in Europe.

## Panel judgement

*Please tick one of the following:*

<b>Principle 1: Institution Policy for Quality Assurance</b>	
Fully compliant	<b>x</b>
Substantially compliant	
Partially compliant	
Non-compliant	

## Panel Recommendations

*Please provide your recommendations with regard to issues that need to be addressed, as appropriate.*

## 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

*Please comment on the compliance with the Principle.*

The Department has a well-defined procedure for the development of the study programme. The committee for undergraduate studies is responsible for proposing changes or improvements of the programme coming from staff members or divisions (Τομείς). The Department assembly takes responsibility in the next step in order to consider the overall issues of the academic profile and orientation of the programme, objectives, subject areas, structure and organisation, expected learning outcomes and the intended professional qualifications according to the National Qualifications Framework for Higher Education. The Institution's Quality Assurance Unit (QAU) and MODIP are also involved in the procedure. In the next step, the general assembly of the University approves the changes or major improvements. The procedure foresees the participation of students and external stakeholders from the labour market to the QAU and to the MODIP. The Department and the UoP in general anticipate student workload according to the European Credit Transfer and Accumulation System. There is strong evidence of providing work experience to the students through internships in industry and a remarkable number of students working in research laboratories. There is a strong link between teaching and research.

## Panel judgement

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

The Accreditation Panel agrees that this Programme leads to a Level 7 Qualification according to the National & European Qualifications Network (Integrated Master)	YES	NO*
	x	

*\*In case of negative judgement, please justify*

## Panel Recommendations

*Please provide your recommendations with regard to issues that need to be addressed, as appropriate.*

1. Encourage students and stakeholders to participate more actively in the programme's continuous development.
2. Create an advisory board consisting of academic and industrial experts.

### 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

*Please comment on the compliance with the Principle.*

As shown in its "Studies Guide" (Οδηγός Σπουδών), the Department's faculty and its OMEA claim that their program is definitely centered around the student, and utilizes different teaching techniques and evaluates them. It respects the differences between students, while caring for their various needs by adopting flexible learning methods.

Regarding the "Studies Advisor" (Σύμβουλος Σπουδών), the Department has decided to appoint a faculty advisor to each student, with emphasis to first-year students. All faculty members serve

as Faculty Advisors. The teaching relies on contemporary methods with practical examples and experiments wherever possible. Relevant bibliographic support is also provided and direct contacts with the teaching staff is encouraged.

The discussion with the students' representatives provided useful information on the teaching and student-teacher interaction. The students are kept informed on the course content, laboratory project/work and the course evaluations. They are encouraged to participate in additional support lectures and exercises. Equally important is the fact that they are informed and can discuss in detail the content of the elective courses with respect to their post diploma studies or career orientation with their faculty advisor.

Project based teaching is well appreciated by the students and should be continued. In addition, projects carried out by groups of students would be very beneficial in developing teamwork skills and enhance student-centered learning.

However, first and second year students feel that they have a heavy course load.

Concerning teaching evaluation, the committee finds that it is well done, although the participation is at present at the low end, which is attributed to the recently introduced electronic method of teaching evaluation. Thus, the Department and the teachers themselves should continue to encourage the students to participate in the online evaluations.

The committee supports the student request of offering a few general area seminars per year from prominent individuals in industry and academia.

Overall, the committee found that the teaching is sufficiently student-centered with an excellent student support system.

### Panel judgement

<b>Principle 3: Student- centred Learning, Teaching an Assessment</b>	
Fully compliant	<b>x</b>
Substantially compliant	
Partially compliant	
Non-compliant	

### Panel Recommendations

*Please provide your recommendations with regard to issues that need to be addressed, as appropriate.*

1. The committee recommends that additional effort is needed to advise students of the program's particularity in their first two years of study.
2. Regular seminars (e.g. every two weeks) on subjects concerning the research and industry problems related to the Department's mission would enhance the esprit-de-corps of the student body, provide greater motivation for enhanced student learning, lead to potential student project and thesis topics and relate students with laboratories and specific faculty members.

## 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

*Please comment on the compliance with the Principle.*

Following registration of incoming students in early October of each academic year, there exists a formalized welcome reception for such students including an overall presentation describing the Department by the Department Chair, followed by presentation of the program of study by Education Program Committee faculty and the Directors of Academic Divisions. This introduction is enhanced at the individual student level through the Studies Advisor, who is one of the principal points of contact of the faculty and students, providing academic support to each student separately. The role of advisor is paramount in explaining the transition from high school to University education, requirements and expectations, a role model of an academic and engineer, and one of the sources of information for student academic planning.

The Department has developed an academic records system (also adopted more generally by the UoP), that provides secure and unambiguous recording of the progress of each student in terms of class grades, possible completion of Practical Training outside the University, and the completion and grading of the Student Project and Diploma Thesis. This integrated IT system allows the Department to issue a bilingual Diploma Supplement in Greek and English that includes the subjects taken, their corresponding credit units, the grades achieved as well as the corresponding information for the Student Project and Diploma Thesis. Such supplement provides a unique reliable source of information for the detailed content of each student's program of studies as well as their level of scholastic achievement.

Student mobility is specifically encouraged by the Department via the opportunity of completion of part of their studies in another University in the EU or other countries, and the regulations of such student activity are clearly provided through the Erasmus page of the



online Student Guide. Two specific faculty members are assigned to assist students in this process.

The Student Guide explains the process of credit units transfer from another cooperating University to the UoP and applies across the entire curriculum. The process is both formalized and substantive with suitable steps of approval and certification.

The Diploma Supplement is automatically issued to each program graduate together with their Diploma by the Department's secretariat at the time of graduation. This applies to graduates starting in Academic Year 2014-2015 onwards.

The Department through its internal regulation and the Studies Guide has set requirements for student thesis that are explicit, well understood and implemented.

A practical training program is in place for seventeen years and is effectively administered via a Practical Training Committee and since AY 2015-2016 is recognized as an elective subject of the 8th semester. A network, including alumni of the Department with leadership roles on local industries in the N.W. Peloponnese, members of the Association of Hellenic Industries (Patras and Western Greece Chapters), play a crucial role in sustaining a professional, social and cultural network, supporting the Practical Training program. Students participating in this elective program frequently find permanent employment in industry in which they worked for their practical training upon their graduation. This contributes to the success and enhancement of this program.

The practical training program with a history of seventeen years is seen as a valuable part of the degree programme, develops job-specific skills connecting University training and industrial practice, as well as broader skills contributing to the transformation of engineering students to successful practicing engineers with a head-start in their overall careers.

Panel judgement

<b>Principle 4: Student Admission, Progression, Recognition and Certification</b>	
Fully compliant	x
Substantially compliant	
Partially compliant	
Non-compliant	

Panel Recommendations

*Please provide your recommendations with regard to issues that need to be addressed, as appropriate.*

Students in the first four semesters would benefit from stronger motivation of the basic of subjects covered using engineering examples analyzed in detail in upper-class years and related more closely to the professional engineer concerns. This will generate greater enthusiasm in the student body earlier on in their University studies and accelerate the transition from high school culture to that of the University, and greater coherence in the overall program.

## 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

*Please comment on the compliance with the Principle.*

The Department engages in the professional development of teaching staff following the national standards and available resources. Moreover, there is extensive evidence that substantial professional development opportunities exist for the teaching staff of the Department, including opportunities for the continuing involvement in EU projects that contributes significantly to education.

In particular, the Department is the lead coordinator of a new major 7 (plus 7) year multi-million euro EU project in the frame of the European Institute of Innovation & Technology (EIT). This major project provides many opportunities for coherent development of the Department and its degree programs in a Europe-wide area of a major global-challenge problem.

Teaching staff mobility is encouraged via promotion to higher academic ranks by rigorous review as foreseen by applicable laws and regulations, via research collaborations with local and major international companies, major manufacturing research centers, and leading universities across several EU, especially leading industrial, countries.

The teaching workload of the teaching staff follows existing applicable laws and regulations. The system also allows some flexibility by including a lower threshold to guarantee fairness. This is a significantly successful model that ensures connection of active research with continuous update of classroom and laboratory instruction.

There is strong evidence of significant linkage of research and teaching. This includes the use of research laboratories as teaching laboratories. This has many beneficial effects in terms of student motivation and enthusiasm, selection of important topics for student and thesis

projects that not only enhance the educational experience to greater depth but also contribute to the research mission of the Department. This also creates a novel “training factory” teaching environment in which faculty and other teaching staff, postdoctoral researchers, doctoral and other postgraduate students as well as pre-diploma students work in a common environment that eliminates balkanization of design and manufacturing and basic and applied research.

Initially, the Department regularly evaluated subjects and teaching staff through end-of-term in-class paper surveys (on a captive audience of lecture attendees). This has already fully transitioned to an online system that allows a more thoughtful response but, as expected, leads to smaller student participation. This is transmitted to the internal Quality Assurance Group of the Department (OMEA) that has the overview of the entire program of study and its overall quality assurance. This ensures process confidentiality as well as suitable constructive feedback for continues program improvement.

The Department already has a strong Europe-wide and international reputation in manufacturing system technologies and has a clear focused strategy to further enhance this area via strategic partnerships and involvement in a major multi-national flagship initiative. As identified above, this is based on the EIT Manufacturing 7 plus 7 year multi-million euro project that provides a solid foundation for the Department’s strategic development. The mission of this project involves six strategic directions, each of which form a major project in itself. All of the six strategic directions of the project have or will have an educational component to smaller or greater degrees at various levels of the educational spectrum; the Department would need to choose which aspects need to be included in future versions of its Integrated Master program.

### Panel judgement

Principle 5: Teaching Staff	
Fully compliant	
Substantially compliant	<b>x</b>
Partially compliant	
Non-compliant	

### Panel Recommendations

*Please provide your recommendations with regard to issues that need to be addressed, as appropriate.*

The panel recommends that:

1. The Department carefully consider which aspects of the EIT manufacturing project science and technology would find a suitable expression in a revised combined 5-year Integrated Master program. This requires careful study and should take into account the core disciplines of mechanical and aeronautical engineering, including new technologies in materials, fluid mechanics, novel manufacturing methods and systems,

information technologies (including big data, digitalization technologies and machine learning aspects applicable to the core mission of the Department).

2. The Department carefully deliberates about how the last two EIT Manufacturing objectives on ethics and environmental impact questions related to manufacturing, ought to find an expression in the educational program at the integrated Master's level suitable to the overall mission of the Department and its educational program constraints. This is an issue of greater and more general impact at the level of UoP and provide opportunities for leadership in these areas not only in University communities in the EU but in particular industrial sectors.

## 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

*Please comment on the compliance with the Principle.*

The review panel finds that the Department has adequate facilities to ensure an appropriate educational environment conducive to teaching and learning. Major classrooms were recently renovated and brought up to modern European standards. The IT infrastructure is modern and extensive, well maintained and easily accessible to all students. IT support staff are present to assist students and staff.

The Department has the policy of using research laboratories as educational laboratories and this has multiple substantive and pedagogical advantages. It allows transfer of the latest research approaches and ideas to the classroom and permits students to be involved in research projects early-on in their University education. It also serves as a strong motivational advantage for the students who are then able to connect theoretical knowledge with its use in research and development and to some extent in engineering practice.

The Department has a focus of research excellence in manufacturing and as a consequence of higher levels of activity in this area. Laboratories related to manufacturing, materials processing, robotics and production planning have greater emphasis and support the research endeavours of the Department. The Department also supports laboratories in more basic disciplines such as fluids, materials engineering, aeronautics-specific disciplines and associated

design, and therefore the review panel considers that overall the Department has a rational distribution of facilities. The panel has some specific recommendations to further improve the situation in this subtopic area.

UoP as a whole has suitable boarding, dormitory, career counseling, student welfare (e.g. psychological support services), sports and cultural facilities and a well-supported student life in a dedicated and well-designed campus. The Department in addition through the introduction of the Academic Advisor and Practical Training opportunities further supports the above university-wide services for its specific student subset.

Students are well informed of available services through a multitude of means, including internet resources, orientation presentations at the start of each academic year, personal contact to the Department secretariat, through the Academic Advisor and through the informal student networks and associations. The review panel found that students have many opportunities to find out about available services, and that the services are easily accessible.

The review panel was positively impressed not only by the sufficiency but also by the high competence and eagerness and enthusiasm of the administrative staff to be as helpful as possible in its role for student support in a variety of situations and eventualities.

### Panel judgement

<b>Principle 6: Learning Resources and Student Support</b>	
Fully compliant	
Substantially compliant	<b>x</b>
Partially compliant	
Non-compliant	

### Panel Recommendations

*Please provide your recommendations with regard to issues that need to be addressed, as appropriate.*

1. Laboratories involving heavy manufacturing machinery, factory style robots, need some redesign and upgrade providing clearly delineated inaccessible zones, greater safety, emergency exit, etc. This upgrading needs to take into account future development with mobile manufacturing robots and systems.
2. Some laboratories (such as fluid mechanics, strength of materials, aeronautics design) need a more extensive renovation, upgrade and hardware of a more modern form and functionality supplemented by available technologies including IT and computer visualization.

## 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

*Please comment on the compliance with the Principle.*

UoP and MEAD in particular, have a series of tools and systems in place, through which they collect information about students, faculty and staff, infrastructure, organization and quality of teaching, as well as availability and offering of services. The information system developed, abbreviated as “MODIP”, collects and offers, on a continuous basis, data for various indices, results of surveys and comparative evaluations.

During the last Department evaluation, in 2013-14, a new IT platform named “Digital Leap” («Ψηφιακό Άλμα») was under construction to simplify the administrative bureaucratic procedures. The system is currently fully operational and a major point of pride for the University. It serves as a register of all students and records all their grades and their overall trajectory during their studies. It records all courses and rules for the students, while offering the capability for the extraction of numerous and diverse statistical analyses, performance indicators, the profile of the student population, the percentages of on-time graduation or graduation delays by 1, 2 or more years, and dropouts.

Each semester, students fill out questionnaires, now electronically, vs the paper forms in the past, from which conclusions can be drawn about student satisfaction for the study programs they follow, availability of resources etc.

Each year MODIP receives the Annual Internal Report or EEE, which highlights the most important elements of the operation of MEAD during the previous academic year. The purpose of the EEE is keeping MEAD up to date on the quality of their work, based on objective criteria and accepted academic indices. Many more details are available (in Greek) by MEAD. To develop the EEE, it is necessary to have support from the faculty, staff and the students of MEAD. Then MODIP processes the data in the EEE and returns to MEAD the statistics and recommendations.

These data are recorded and codified by OMEA, an acronym for the Internal Evaluation Team of MEAD. OMEA publishes the results of last year's EEE to the MEAD chair, and the Chair announces them to the MEAD Assembly, where, after detailed discussions, corrective actions are proposed, if and where needed. The results are also used to update MEAD's strategic planning.

Finally, MEAD alumni are encouraged to register at the "office of social networking" of UoP alumni website.

### Panel judgement

Principle 7: Information Management	
Fully compliant	x
Substantially compliant	
Partially compliant	
Non-compliant	

### Panel Recommendations

*Please provide your recommendations with regard to issues that need to be addressed, as appropriate.*

UoP and MEAD in particular have done an outstanding job in this area. We only recommend that they keep up the good work and take advantage of what it offers to meet their other goals.



## 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

*Please comment on the compliance with the Principle.*

The MEAD website is available both in Greek and English and offers detailed information about MEAD and its teaching and research procedures, such as the faculty, teaching and research, the staff, the rules of its Studies programs. Student-relevant information such as the Faculty Advisor, Financial Aid to Students, prizes and scholarships is also available. The various Labs, Funded research projects, publications by MEAD personnel are also listed. Finally, Conference Announcements, New Faculty and other Employment Positions, as well as Library info, and a page for the Alumni, are provided. The site is continually updated.

The MEAD Studies Guide, in both Greek and English, is also on the above site, but it is also distributed to all first year students in a USB stick, along with other material.

About 5 in 6 courses at the MEAD program have each their own webpage, containing slides, exercises, old exams etc. for MEAD students.

Teaching material of a 'large number' of courses is also available to students and faculty of other Departments and Universities, as well as to the public at large, in PPT presentation form, developed under the Project "Open Academic Courses"

MEAD also organizes several lectures by distinguished Greek and international speakers, open to the public at large, and advertised at the MEAD webpage.

Starting from the 2019-20 Academic year, MEAD will also publish an electronic newsletter every three months, also sent by email to a long list of relevant recipients, as well as on the MEAD website.

MEAD places considerable emphasis to strengthen its relations with its alumni as well as the various former faculty, postdocs and technical staff. This is currently under development in a special webpage of the new website of MEAD.

MEAD also undertakes several ‘outreach’ activities, such as participating in the International Tech Exhibition PatrasIQ, in the “High Schools go to College” activity, Organizing Summer Schools, including that of the International Student Organization “BEST”, and many others.

### Panel judgement

<b>Principle 8: Public Information</b>	
Fully compliant	
Substantially compliant	<b>x</b>
Partially compliant	
Non-compliant	

### Panel Recommendations

*Please provide your recommendations with regard to issues that need to be addressed, as appropriate.*

The record here is very strong too, and the only reason we award a “Substantially Compliant” is that some of their many activities, by MEAD’s own admission, are not already available, but planned for 2019-20 and beyond.

## 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

*Please comment on the compliance with the Principle.*

The self-assessment procedure of MEAD's Integrated Master program takes place annually. OMEA reminds the MEAD faculty to fill out a 'census form' and a Faculty Questionnaire, and also reminds the administrative staff to fill out the "ADIP" tables of the Appendix of the Annual Evaluation Report or EEA. All these data are inserted into MODIP, under the relevant guidelines of PSDIP, which is an acronym for "Information System for Quality Assurance", as well as the "Guide for preparing annual internal reports of academic units of the UoP", available at the MODIP website.

At the OMEA meeting tasks are allocated among its members to prepare the EEA. Upon completion the EEA is submitted to the MEAD Chair right after the end of the Academic Year.

In the Department Assembly at the start of each academic year, the MEAD Chair briefs the Faculty on the EEA. After presentation and discussion, the Chair submits the EEA to MODIP, which approves of the EEA and then puts it on its webpage.

Central parts of the EEA are the student responses to each course's teaching evaluations, data on the performance of the students in each course, (success rate, grade distribution), and other relevant data (student numbers, active students, average graduation time, etc.).

MEAD also uses feedback mechanisms to observe and improve the studies program, based on the work and inputs of various MEAD committees. Using the above tools, the proposals by Faculty and divisions of MEAD about the courses, MEAD considers annual or 4-year, limited or major, revision of the Studies Program.

### Panel judgement

<b>Principle 9: On-going Monitoring and Periodic Internal Review of Programmes</b>	
Fully compliant	<b>x</b>
Substantially compliant	
Partially compliant	
Non-compliant	

### Panel Recommendations

*Please provide your recommendations with regard to issues that need to be addressed, as appropriate.*

## Principle 10: Regular External Evaluation of Undergraduate Programmes

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

*HQA is responsible for administrating the programme accreditation process which is realised as an external evaluation procedure, and implemented by a committee of independent experts. HQA 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

*Please comment on the compliance with the Principle.*

In 2013, MEAD underwent an external evaluation administered by the HQA. Additionally, the UoP as a whole had a positive institutional evaluation in 2015, thereby obtaining a certificate for institutional evaluation by the HQA. The panel verifies the strong awareness of the quality assurance issues and its importance within the members of MEAD and the contacted stakeholders. Students are aware about the importance of filling the questionnaire for the course evaluations. However, they were not aware of the follow-up procedure for quality assurance.

Concerning quality assurance, no other agency except HQA was referenced.

MEAD has implemented the majority of the recommendations made by the HQA external evaluation committee. However, some of them are not yet fulfilled, such as the formation of an Advisory Board for the study programme and faculty diversity.

## Panel judgement

<b>Principle 10: Regular External Evaluation of Undergraduate Programmes</b>	
Fully compliant	<b>x</b>
Substantially compliant	
Partially compliant	
Non-compliant	

## Panel Recommendations

*Please provide your recommendations with regard to issues that need to be addressed, as appropriate.*

## **PART C: CONCLUSIONS**

### **I. Features of Good Practice**

*Please state aspects of good practice identified, with regard to the Study Programme.*

1. The quality assurance process is in place, is properly functioning and revealed substantive results.
2. Involvement of undergraduate students in hands-on projects and research is successful.
3. The IT platform in place is very efficient and comprehensive.

### **II. Areas of Weakness**

*Please state weak areas identified, with regard to the Study Programme.*

1. A few laboratories, although serving the teaching activity of MEAD, need modernisation.
2. A weakness pointed out in the 2013 Department evaluation concerning the percentage of women faculty has not been addressed.

### **III. Recommendations for Follow-up Actions**

*Please make any specific recommendations for development.*

1. The Department should implement procedures for further involvement of the students into the follow-up of the course evaluation, such as “quality circle” in order to discuss and interpret the results and the comments of the questionnaires
2. To improve the awareness of the program to the students of the first two years, the panel recommends the establishment of teaching awards and pertinent seminars.
3. The establishment of an external advisory board is also recommended.
4. Every effort should be undertaken to increase the number of female faculty in the Department.

### **IV. Summary & Overall Assessment**

The Principles where full compliance has been achieved are:

Principles 1,2,3,4,7,9,10.

The Principles where substantial compliance have been achieved are:

Principles 5, 6 and 8.

The Principles where partial compliance has been achieved are:

none

The Principles where failure of compliance was identified are:

none

<b>Overall Judgement</b>	
Fully compliant	<b>x</b>
Substantially compliant	
Partially compliant	
Non-compliant	

<b>The Accreditation Panel agrees that this Programme leads to a Level 7 Qualification according to the National &amp; European Qualifications Network (Integrated Master)</b>	<b>YES</b>	<b>NO</b>
	<b>x</b>	



**The members of the Accreditation Panel for the Undergraduate Programme  
Mechanical Engineering and Aeronautics (integrated master) of the  
University of Patras**

Name and Surname

Signature

- **Prof. Anthimos Georgiadis (Chair)**, Leuphana University  
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- **Prof. Ioannis Botsis**, École Polytechnique Fédérale de  
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- **Assoc. Prof. Anastassios Perakis**, University of Michigan,  
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