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HELLENIC REPUBLIC

H.Q.A.

HELLENIC QUALITY ASSURANCE AND
ACCREDITATION AGENCY

EXTERNAL EVALUATION REPORT

DEPARTMENT: **MECHANICAL ENGINEERING**

TEI: **PIRAEUS**



European Union
European Social Fund



MINISTRY OF EDUCATION & RELIGIOUS AFFAIRS, CULTURE & SPORTS
MANAGING AUTHORITY

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TABLE OF CONTENTS

The External Evaluation Committee

Introduction

I. The External Evaluation Procedure

- Brief account of documents examined, of the Site Visit, meetings and facilities visited.

II. The Internal Evaluation Procedure

- Comments on the quality and completeness of the documentation provided and on the overall acceptance of and participation in the Quality Assurance procedures by the Department.

A. Curriculum

APPROACH

- Goals and objectives of the Curriculum, structure and content, intended learning outcomes.

IMPLEMENTATION

- Rationality, functionality, effectiveness of the Curriculum.

RESULTS

- Maximizing success and dealing with potential inhibiting factors.

IMPROVEMENT

- Planned improvements.

B. Teaching

APPROACH:

- Pedagogic policy and methodology, means and resources.

IMPLEMENTATION

- Quality and evaluation of teaching procedures, teaching materials and resources, mobility.

RESULTS

- Efficacy of teaching, understanding of positive or negative results.

IMPROVEMENT

- Proposed methods for improvement.

C. Research

APPROACH

- Research policy and main objectives.

IMPLEMENTATION

- Research promotion and assessment, quality of support and infrastructure.

RESULTS

- Research projects and collaborations, scientific publications and applied results.

IMPROVEMENT

- Proposed initiatives aiming at improvement.

D. All Other Services

APPROACH

- Quality and effectiveness of services provided by the Department.

IMPLEMENTATION

- Organization and infrastructure of the Department's administration (e.g. secretariat of the Department).

RESULTS

- Adequateness and functionality of administrative and other services.

IMPROVEMENTS

- Proposed initiatives aiming at improvement.

Collaboration with social, cultural and production organizations**E. Strategic Planning, Perspectives for Improvement and Dealing with Potential Inhibiting Factors**

- Short-, medium- and long-term goals and plans of action proposed by the Department.

F. Final Conclusions and recommendations of the EEC on:

- The development and present situation of the Department, good practices and weaknesses identified through the External Evaluation process, recommendations for improvement.

External Evaluation Committee

The Committee responsible for the External Evaluation of the **Department of Mechanical Engineering** of the Technological Educational Institute of **PIRAEUS** consisted of the following three (3) expert evaluators drawn from the Registry constituted by the HQAA in accordance with Law 3374/2005 :

1. Professor Nicos Ladommatos (President)
University College London (The University of London) (UK)

2. Professor Konstantin Lassithiotakis
Via University College (Denmark)

3. Professor Konstantinos Kontis
University of Manchester (UK)

N.B. The structure of the “Template” proposed for the External Evaluation Report mirrors the requirements of Law 3374/2005 and corresponds overall to the structure of the Internal Evaluation Report submitted by the Department.

The length of text in each box is free. Questions included in each box are not exclusive nor should they always be answered separately; they are meant to provide a general outline of matters that should be addressed by the Committee when formulating its comments.

Introduction

I. The External Evaluation Procedure

- Dates and brief account of the site visit

The visit took place over a period of three days when the Committee spent from approximately 9 am to 6 or 7pm at the TEI Piraeus, reviewing materials, inspecting laboratories, meeting and discussing courses and research with staff, students, graduates and employers of the TEI graduates.

- Whom did the Committee meet ?

The Committee met with all academic and technical staff of the Department of Mechanical Engineering, all administrative staff, the President and Vice-President/Director of Research of the TEI, staff of the Alumni and Careers Office (diasyndesis), a sample of current and graduated students (currently in employment) and approximately 10 employers of the TEI graduates. The Committee also visited the Library of the TEI and met the staff there, who demonstrated journal access systems as well as the Evdoxos book request system and other Library facilities (e.g. reading room). We also viewed the students common areas.

- List of Reports, documents, other data examined by the Committee.

The Committee inspected curriculum documents, subject and laboratory timetables, a folder for each subject (mathima/enotites) containing comprehensive information on the syllabus, lecture material, examination papers, marked scripts, laboratory instructions and exercise materials, and laboratory marked reports. The Committee also inspected a wide sample of books accompanying the lecture material (some written by TEI staff), statistical information on the TEI entry marks, student employment, success rates in examinations, student degree completion rates, student and staff mobility (e.g. Erasmus), research activity (e.g. internal and external competitive research income) publications for staff and students. The Committee also reviewed samples of research publications.

- Groups of teaching and administrative staff and students interviewed

The Committee interviewed all academic and technical staff of the Department of Mechanical Engineering in charge of and involved in the delivery of all the subjects (mathimata/enotites), all administrative staff handling student complaints, examinations and also queries, and staff involved in alumni and career affairs, the library information services, the President and Vice-President/Director of Research of the TEI, a sample of current and graduated students (currently in employment) and approximately 10 of the employers of the TEI graduates.

- Facilities visited by the External Evaluation Committee.

All laboratories of the Department were inspected in detail, lecture theatres, Library, career and alumni office, administrative and support services facilities, and student common and catering areas.

II. The Internal Evaluation Procedure

Please comment on:

- Appropriateness of sources and documentation used
All written documents and presented information were detailed and excellently prepared; all information requested by the Committee was promptly and readily made available by the Department's staff. All our interactions with all staff, students, alumni and employers were detailed, frank and all discussions were in a spirit of openness and transparency.
- Quality and completeness of evidence reviewed and provided
As explained above all documentation was appropriate, complete and of high quality.
- To what extent have the objectives of the internal evaluation process been met by the Department?
The internal evaluation process was reflective, and considered both detailed and strategic aspects of student learning and research. The internal evaluation provided an opportunity for the Department to collect and prepare comprehensive and detailed data and reports. The internal evaluation report itself was frank and honest and identified in a balanced manner both, strengths and weaknesses, threats, various operational and strategic constraints, as well as opportunities.

A. Curriculum

To be filled separately for each undergraduate, graduate and doctoral programme.

UNDERGRADUATE PROGRAMME

APPROACH

- What are the goals and objectives of the Curriculum? What is the plan for achieving them?
The goals of the curriculum are to provide the theoretical and practical knowledge, skills and competences of mechanical engineering and prepare the students comprehensively for employment and successful integration and career in mechanical engineering.
Special emphasis is placed on the practical aspects of mechanical engineering, through a substantial number of hands-on laboratories, current industry practices, supported by theoretical subjects, so as to prepare students for useful and productive employment upon graduation.
- How were the objectives decided? Which factors were taken into account? Were they set against appropriate standards? Did the unit consult other stakeholders?
The two sections of the Department have meetings when the taught subjects (mathimata) are discussed and allocated by consensus among the teaching staff. The individual subjects are well supported by the staff with comprehensive lecture notes and associated laboratory exercises and tutorials, bibliographies and allocation of books. We saw evidence in some individual subject content and teaching materials that they are revised regularly. Individual members of staff have active collaborations and exchanges and interactions with other academic staff within Greece and abroad and, as a result the content of these individual subjects is renewed, benefiting from best practices in the higher education sector. There is

regular contact with stakeholders other than students, such as employers, local authorities and other stakeholders, although a formal consultation process was not apparent.

- Is the curriculum consistent with the objectives of the Curriculum and the requirements of the society?
On individual subject (mathima) basis there is evidence of renewal and revision according to the goals of the Curriculum, it is less apparent how the integration of the individual subjects into a holistic curriculum takes place as a regular established formal process.
- How was the curriculum decided? Were all constituents of the Department, including students and other stakeholders, consulted?
Please see previous two replies above.
- Has the unit set a procedure for the revision of the curriculum?
Please see previous replies above. It should also be noted that the continuously changing legislation and economic constraints make the process of curriculum revision more difficult

IMPLEMENTATION

- How effectively is the Department's goal implemented by the curriculum?
The department makes strenuous efforts to implement its curriculum under difficult under-resources conditions. The student/staff ratio as well as the financial resources available to the Department to implement the curriculum are presently too adverse and it is only due to the strenuous efforts of the staff (both teaching and technical and administrative staff) that the curriculum can be implemented to a good standard. The lack of resources, nevertheless, means that the laboratory equipment has not been renewed for several decades, except through research contract resources, and several of the equipment is not available for classes due to either lack of spare parts or near-obsolence. Coupled with large student intakes, this means that some laboratories have rather long waiting lists. The Department was set up with permanent nominal teaching staff posts of 34 and today it has 13 teaching staff in place with two soon to be transferred to the Department of Mechanical Engineering from general science departments of TEI Piraeus which are to close. It should also be mentioned that the department employs temporary academic staff which together total approximately 12 full-time equivalent staff.
- How does the curriculum compare with appropriate, universally accepted standards for the specific area of study?
Government funding for laboratories and academic and support staffing is inferior to universally accepted standards for mechanical engineering at first degree level. The goodwill and major efforts of the staff of the Department (both teaching and support staff), sometimes at their personal financial expense, ameliorate to an extent the impact of these shortage. Despite these major efforts, a large gap still remains in terms of both financial and staff resources required for the delivery of the Department's courses.
- Is the structure of the curriculum rational and clearly articulated?
The structure is clear and well articulated. The emphasis is on thorough learning of individual subjects (mathimata). Greater emphasis on the integration of the individual subjects, for example through design (individual and group) projects would enhance the curriculum. Such projects would bring together the thorough knowledge and understanding, gained from individual subjects, and integrate them into the creation of engineering products.

- Is the curriculum coherent and functional?

The coherence and functionality of the curriculum could be improved by taking into consideration what has been said in the previous two bullet points (resources and integration).

Bearing in mind that legislation and custom in Greece does not require an external examiner system, the autonomy of the individual academic staff in setting and marking the subject (mathima) examination papers and laboratory assignments is out of line with accepted norms in many other EU higher education systems. A formal moderation system could be set up. One academic subject leader could moderate the examination papers and marked scripts and assignments of another subject leader, and this would achieve similarity of standards, avoidance of errors, and demonstrate to students and other stakeholders greater transparency in the assessment process. At the end of each semester (examinon) a system could be introduced, where each section of the Department meets formally to consider the examination achievements of the students. Consideration could be given to the percentage of students who pass a subject (mathima) on first attempt, or second attempt; reasons could be sought for high percentage of failures in individual subjects; and remedies, which are within the control of the Department, could be discussed and implemented to improve the student success rate.

- Is the material for each course appropriate and the time offered sufficient?

Generally, the materials are appropriate and efforts are made by staff to maintain the material current, for example through the inclusion of development in, energy, environmental and manufacturing technologies. In some instances, the material could be enhanced, for example through the coverage of polymers, polymeric or metal composites, ceramics and light alloys. Modern mechanical engineering products and systems are rarely purely mechanical, they often embody sophisticated electronic control systems and for this reason, the incorporation of courses and materials in courses on digital and analogue electronic systems and their control would enhance the students learning and employment prospects. To make teaching time available for these topics, the time spent for some current topics could be reduced e.g. reduction of the focus mainly on steel and reduction of fundamental science theory and laboratories.

- Does the Department have the necessary resources and appropriately qualified and trained staff to implement the curriculum?

These matters have been covered in some of the bullet points above. Although the Department has qualified and well trained staff to implement the curriculum, more staff are required. More laboratory resources are also required.

RESULTS

- How well is the implementation achieving the Department's predefined goals and objectives?

The 1st degree graduates of the Department are well prepared for employment, through practically useful education backed by theoretical understanding of mechanical engineering principles. However, they could be even better prepared to meet present and future developments of Greek industry, in an internationally competitive context, by some enhancements. Some of the subject (mathimata) material needs revision to include modern materials and advancements in technologies. There also needs to be greater integration of the individual subjects through design exercise and projects (throughout the four years not just in the final major degree project), where separate subject knowledge is brought together and integrated into engineering products and systems.

The staff take pride and praiseworthy responsibility for their subject areas but therein lies also a weakness of the Greek higher education context: The autonomy of the staff and laboratories does not encourage cross fertilisation of ideas and also impacts on the integration of the curriculum subjects.

- If not, why is it so? How is this problem dealt with?

Issues with achieving objectives and how these issues could be dealt with are discussed in the previous bullet point.

- Does the Department understand why and how it achieved or failed to achieve these results?

The Department has a raised awareness of these issues and we believe will be receptive to improvements suggested in this report.

IMPROVEMENT

- Does the Department know how the Curriculum should be improved?

The Department is fully aware and desires improvements to its courses; it has a history of improving its courses and this report includes suggestions and recommendations for further improvements.

- Which improvements does the Department plan to introduce?

We believe that the Department would be receptive to all the recommendations in this report.

A. Curriculum

To be filled separately for each undergraduate, graduate and doctoral programme.

GRADUATE PROGRAMME (MSc in Energy - Heriot Watt Univ.)

This MSc programme has been delivered by TEI Piraeus in conjunction with Heriot Watt University for eight years and has seen over 200 successful graduations from TEI Piraeus.

APPROACH

- What are the goals and objectives of the Curriculum? What is the plan for achieving them?

The goals of the curriculum are to provide the theoretical and practical knowledge and skills and competences of the students required for employment and successful careers in energy-related industries and research organizations.

- How were the objectives decided? Which factors were taken into account? Were they set against appropriate standards? Did the unit consult other stakeholders?

This MSc programme is accredited and in fact run concurrently in both TEI Piraeus and Heriot Watt University. The degree certificate is granted by Heriot Watt University, which has long experience in running academic degree programmes at Bachelors, Masters and Doctoral Levels and fully accredited by the UK Government. The programme is also accredited by the UK Institution of Mechanical Engineers as meeting the educational requirements for registration as Chartered Engineers, following completion of relevant industrial experience and status.

- Is the curriculum consistent with the objectives of the Curriculum and the requirements of the society?

The curriculum is fully consistent with the objectives of the Curriculum and the requirements of the energy industries and society needs in Greece.

- How was the curriculum decided? Were all constituents of the Department, including

<p>students and other stakeholders, consulted? The curriculum was set principally by Heriot Watt University with the international employment market in mind.</p> <ul style="list-style-type: none"> • Has the unit set a procedure for the revision of the curriculum? Yes, there are regular discussions with Heriot Watt University course director and academic staff regarding both the curriculum and its delivery.
<p>IMPLEMENTATION</p> <ul style="list-style-type: none"> • How effectively is the Department's goal implemented by the curriculum? The curriculum prepares MSc graduates who are readily absorbed by industry in Greece and engineering, research and development organisations. • How does the curriculum compare with appropriate, universally accepted standards for the specific area of study? The curriculum meets international standards of quality for Masters programmes. • Is the structure of the curriculum rational and clearly articulated? The structure is clear and well articulated. • Is the curriculum coherent and functional? The coherence and functionality of the curriculum has been well demonstrated to the Committee. • Is the material for each course appropriate and the time offered sufficient? Both the materials and time offered are sufficient. • Does the Department have the necessary resources and appropriately qualified and trained staff to implement the curriculum? The Department fully meets these requirements.
<p>RESULTS</p> <ul style="list-style-type: none"> • How well is the implementation achieving the Department's predefined goals and objectives? The achievements of the Department in this course are praiseworthy and very high. The course is taught concurrently at both in the UK by Heriot Watt and in Greece by TEI Piraeus, with common synchronised examinations. The examination results of the students taught at TEI Piraeus frequently exceed significantly those of the UK based student taught by Heriot Watt University. Furthermore, a significant number of the students at TEI Piraeus regularly publish the results of their MSc dissertations (thesis) in internationally leading journals and present them at national and international conferences. In total, 21 journal papers have been published over the last eight years and an additional 25 conference presentations have been made. The number of such journal and conference presentations published is significantly greater than those of the students based at Heriot Watt University (after taking into account the number of students in Greece and UK). In the experience of the Committee members, these large numbers of journal publications and conference presentations are among the highest someone would encounter, internationally, from MSc programme dissertations. • If not, why is it so? How is this problem dealt with? The Committee has not encountered significant problems or issues. • Does the Department understand why and how it achieved or failed to achieve these results? See replies to above two bullet points.
<p>IMPROVEMENT</p>

- Does the Department know how the Curriculum should be improved?

The Department regularly discusses and implements any improvements identified jointly with Heriot Watt University.

- Which improvements does the Department plan to introduce?

The curriculum and its implementation undergo continuous review and improvement, collaboratively, by the Department and Heriot Watt University.

A. Curriculum

To be filled separately for each undergraduate, graduate and doctoral programme.

GRADUATE PROGRAMME (MSc in Advanced Integrated Manufacturing Systems - Kingston University)

This MSc programme has been delivered by TEI Piraeus in conjunction with Kingston University for ten years and has seen some 205 successful graduations from TEI Piraeus.

APPROACH

- What are the goals and objectives of the Curriculum? What is the plan for achieving them?

The goals of the curriculum are to provide the theoretical and practical knowledge and skills and competences of the students required for employment and successful careers in manufacturing industry and research organizations; they include understanding of techno-economic issues and advanced manufacturing methods, competences in decision making and management of manufacturing companies.

- How were the objectives decided? Which factors were taken into account? Were they set against appropriate standards? Did the unit consult other stakeholders?

The MSc degree certificate is granted by Kingston University, which has long experience in running academic degree programmes at Bachelors, Masters and Doctoral Levels and fully accredited by the UK Government. The programme was part of an Institutional Audit of Kingston University, carried out by the UK Quality Assurance Agency for Higher Education in 2007.

- Is the curriculum consistent with the objectives of the Curriculum and the requirements of the society?

The curriculum is fully consistent with the objectives of the Curriculum and the requirements of the manufacturing industries and society needs in Greece.

- How was the curriculum decided? Were all constituents of the Department, including students and other stakeholders, consulted?

The curriculum was set principally by Kingston University with the international employment market in mind and periodically revised in consultation with TEI Piraeus.

- Has the unit set a procedure for the revision of the curriculum?

Yes, there are regular discussions with Kingston University academic staff regarding both the curriculum and its delivery. The Piraeus manufacturing section Head has been appointed Honorary Professor of Kingston University and this has facilitated further the doctoral and MSc collaborations between TEI Piraeus and Kingston University.

IMPLEMENTATION

- How effectively is the Department's goal implemented by the curriculum?

The curriculum prepares MSc graduates who are readily absorbed by industry in Greece and research and development organisations.

- How does the curriculum compare with appropriate, universally accepted standards for the specific area of study?
The curriculum meets international standards of quality for Masters programmes.
- Is the structure of the curriculum rational and clearly articulated?
The structure is clear and well articulated.
- Is the curriculum coherent and functional?
The coherence and functionality of the curriculum has been well demonstrated to the Committee.
- Is the material for each course appropriate and the time offered sufficient?
Both the materials and time offered are sufficient.
- Does the Department have the necessary resources and appropriately qualified and trained staff to implement the curriculum?
The Department fully meets these requirements.

RESULTS

- How well is the implementation achieving the Department's predefined goals and objectives?
The achievements of the Department in this course are also praiseworthy and very high. The course is taught concurrently at both in the UK by Kingston and in Greece by TEI Piraeus, with common synchronised examinations. A significant number of the students at TEI Piraeus regularly publish the results of their MSc dissertations (thesis) in internationally leading journals and present them at national and international conferences. In total, over 20 journal papers and conference presentations been published at the international level over the last three years alone. In the experience of the Committee members, these large numbers of journal publications and conference presentations are among the highest someone would encounter, internationally, from MSc programme dissertations.
- If not, why is it so? How is this problem dealt with?
The Committee has not encountered significant problems or issues.
- Does the Department understand why and how it achieved or failed to achieve these results?
See replies to above two bullet points.

IMPROVEMENT

- Does the Department know how the Curriculum should be improved?
The Department regularly discusses and implements any improvements identified jointly with Kingston University.
- Which improvements does the Department plan to introduce?

Improvements have been utilized in two levels:

The curriculum has been updated from academic year 2013-14 according to EU needs in the engineering sector.

The Department has approved a new 4 modules structure (instead of 8 modules) and jointly with KU implements it from academic year 2013-14.

B. Teaching

APPROACH:

Does the Department have a defined pedagogic policy with regard to teaching approach and methodology?

We have discussed various thoughts and ideas regarding teaching approaches and methodologies with individual academic staff and current undergraduate students. Individual staff are aware and in some cases implemented plans for improving student learning experience, for example increasing teamwork and interdisciplinary activities. We also encountered a case of good practice in electronically-assisted learning and assessment.

It should be recognized that the widespread severe lack of financial and staff resources discourages the development and introduction of new teaching methods, based on sound pedagogic policies; however, at the same time, abundance of resources does not by itself guarantee the introduction of new teaching methods. Greater consideration by the Department is needed of the development of a clearly articulated pedagogic policy and development of additional teaching methodologies.

Compared with some other EU and North American education systems, the total (cumulative) number of written, oral and coursework examinations and tests that students undergo, so that they can graduate successfully, appears to be far greater. There appears to be no clearly articulated pedagogical basis for such a large total number of assessments (especially written formal examinations).

IMPLEMENTATION

The student attendance at lectures appears to be low, therefore there is need for introducing learning incentives to attract and engage students to lectures. The Committee believes that it would not be an effective solution to make lectures compulsory.

The students informed the Committee that they would like to have more staff from industry being involved in giving talks and other contributions to their studies for example during project work. The students would also like to visit more industrial sites and see industrial processes taking place. The teaching staff is aware of the importance of linking research with teaching and there is significant linkage of student diploma projects with the research of academic staff. Equipment purchased for research projects are made sometimes available for teaching and diploma projects. The work in an impressive number of MSc theses is also published or presented in international journals and conferences.

The laboratory teaching resources are greatly inadequate due to serious underinvestment over many years, and this is impacting negatively on the teaching, through overcrowding of the laboratories and non-availability of equipment which are important to the students' learning. Some laboratories, such as the numerically-controlled machinery one, are barely able to provide teaching support due to the lack of funds to repair and renew teaching equipment. The Department has made substantial and praiseworthy efforts, with impressive success, to provide its students with opportunities to study at other EU universities under the Erasmus Scheme and a growing number of students are taking up these opportunities to their great benefit.

The great majority of academic staff contributes to research at the international level and has regular opportunities, through conferences and EU research projects, to meet academic staff from other countries. The two MSc courses, delivered collaboratively with two UK universities, provide academic staff with valuable opportunities to discuss teaching matters with their counterparts in these UK universities.

The Department has an established teaching/course content evaluation system by the students, via quantitative individual subject questionnaires. The filled questionnaires are

viewed by the member of academic staff responsible for the subject. It was not clear to the Committee that there is a policy or systematic process, whereby the results of the questionnaires are collated across subjects and used by the Departmental management committee to improve its processes of allocation of resources or review of its curriculum and teaching methods; it is also not clear if the students are informed regularly of improvements implemented as a result of the questionnaires.

RESULTS

Please comment on:

Bearing in mind the limited financial and staff resources the results of the TEI Piraeus in several respects are very impressive. The graduates are highly sought after by employers and graduates continue to find employment in Greek industry or proceed to further education without great difficulties, despite the substantial current problems of the Greek economy.

Despite the success of those students who graduate, too large a number of the students enrolled in the Department either fail to graduate and become inactive or take excessively long to graduate. For example, the Department has about 3000 students on its books, of which about 1500 are active. This corresponds to an intake of around 200, and if all these were successful the total number of students in the Department's books would have been about 800, bearing in mind the 4 year course. This is of course a somewhat simplified picture, with very rough numbers, but its purpose is simply to convey an impression of the generally low throughput of successful graduates. It should be borne in mind that is not at all unique to the TEI Piraeus but a systemic feature of the Greek AEI education system.

The Department's staff are aware of the student-centered reasons for the low diploma completion rate such student transfers (metagrafes) with lower entrance qualifications, lack of lecture attendance, severe lack of financial resources and shortage of staff, and students who have to work to support themselves, etc. At the same time, it is however incumbent on the Department to consider improvements to the curriculum and teaching methods that could help improve the diploma completion rate.

IMPROVEMENT

Despite the lack of resources, the Department is making some efforts to make improvements and is aware of the need, for example, to review its examination processes and policies. Nevertheless, there is a need for the Department to develop a policy and an action plan to help improve the throughput of successful diploma graduates. The introduction of the n+2 years system may improve the graduate throughput, however it is also the responsibility of the Department to continue to seek additional improvements in curriculum and teaching to improve the throughput further, while at the same time it continues to produce the sought after graduates that it produces now.

C. Research

For each particular matter, please distinguish between under- and post-graduate level, if necessary.

APPROACH

- What is the Department's policy and main objective in research?
The Department wishes to become research active, be involved in collaborative research programmes, peer-review processes and publish the results of their research.
- Has the Department set internal standards for assessing research?
The Department uses the universally acceptable standards already adopted by the international community.

IMPLEMENTATION

- How does the Department promote and support research?
The Department values and encourages individual research efforts.
- Quality and adequacy of research infrastructure and support.
The infrastructure for research is limited although there are opportunities which are often exploited by staff to utilise them for research. They have been successful in attracting external national and EU research grants, which have added in some cases to the facilities. The department has a number of commercial and in-house modelling and simulation tools.
- Scientific publications.
Bearing in mind the financial and infrastructure constraints, the publication record of the Department is very impressive which has resulted in recent years in an exponential increase in the number of publication in peer-reviewed journals and conferences attracting a large number of citations.
- Research projects.
Bearing in mind the existing constraints, the Department has been very successful in winning competitive national and EU funding. It is also impressive that several of the master's dissertations research project results have been published in peer-reviewed journals and conferences.
- Research collaborations.
The Department has good collaborations with national and EU organizations through research programmes such as those supported by the Ministry of Education, the General Secretariat of Research and Technology, the FP7 and projects such as those of ARCHIMEDES I, II, III, TEMPUS, PLATON etc.

RESULTS

- How successfully were the Department's research objectives implemented?
Most members of staff are involved in research and publish their results internationally.
- Scientific publications.
The publication record of the Department is very impressive which has resulted in recent years in an exponential increase in the number of publication in peer-reviewed journals and conferences attracting a large number of citations.
- Research projects.
The Department has been very successful in winning competitive national and EU funding.
- Research collaborations.
The Department has good collaborations with national and EU organizations.
- Efficacy of research work. Applied results. Patents etc.
The Department holds some patents and there are a number of knowledge transfer activities supported by the research that help local communities and municipalities.
- Is the Department's research acknowledged and visible outside the Department?
Rewards and awards.
Some of the Department's research has presence internationally through publication of research, collaborations with other national and international universities and organisations.

IMPROVEMENT

- Improvements in research proposed by the Department, if necessary.
They want to improve their publication record, enhance their success in research grants and attracting external funding, and promote knowledge transfer activities and consultancy.

- Initiatives in this direction undertaken by the Department.
There are ad-hoc initiatives and examples of good practice to implement the proposals above.

D. All Other Services

For each particular matter, please distinguish between under- and post-graduate level, if necessary.

APPROACH

- How does the Department view the various services provided to the members of the academic community (teaching staff, students).
The Department values the importance of the various services provided. The Department's administrative services are effective and efficient despite the large number of students on the Department's books and present financial constraints. The work of the Alumni and Career Office (Diasynthesis) provides excellent support to the Department staff and students, and industrial organizations seeking to recruit graduates and hire interns, and facilitates the collaboration between TEI and industry.
- Does the Department have a policy to simplify administrative procedures? Are most procedures processed electronically?
The Department has advanced electronic processing tools and is very responsive in simplifying administrative procedures, especially bearing in mind the shortage of administrative staff.
- Does the Department have a policy to increase student presence on Campus?
The Department encourages student presence on Campus.

IMPLEMENTATION

- Organization and infrastructure of the Department's administration (e.g. secretariat of the Department).
The administrative team of the Department is effective and efficient, and it is praiseworthy that such a small team of four can deal with such a large number of students enrolled in the Department.
- Form and function of academic services and infrastructure for students (e.g. library, PCs and free internet access, student counseling, athletic- cultural activity etc.).
The Committee visited the library and was very impressed by the organization of student support services and there was the demonstration of access tools to international journals and it was concluded that the students have the same breadth of access as students in other European universities. The demonstration of the Evdoxos systems was also very well received by the Committee. The library reading facilities were of a good standard. The students enjoy free internet access to the web and other facilities of TEI.

RESULTS

- Are administrative and other services adequate and functional?
The administrative and library facilities are functional and efficient but at the limit of being sustainable in the long term, due to severe shortage of staff and funding.
- How does the Department view the particular results.
The Department is aware of the staff shortage and financial problems, but their efforts to continue providing a good service to the students is especially praiseworthy.

IMPROVEMENTS

- Has the Department identified ways and methods to improve the services provided?
The Department is fully aware of what improvements are needed but this is highly

constrained by the lack of staff and funding.

- Initiatives undertaken in this direction.
Please see previous bullet point.

Collaboration with social, cultural and production organizations

Please, comment on quality, originality and significance of the Department's initiatives. The Department has collaborations with industry, research organizations, municipalities, local sectors, inland communities and other bodies (foreis). The Department has ambitious plans for establishing examples of green energy and water initiatives in some of the Greek islands and also for participating in schemes on sorting and recycling products from waste.

E. Strategic Planning, Perspectives for Improvement and Dealing with Potential Inhibiting Factors

For each particular matter, please distinguish between under- and post-graduate level, if necessary.

Please, comment on the Department's:

- Potential inhibiting factors at State, Institutional and Departmental level, and proposals on ways to overcome them.

At State: Funding for staff, facilities, infrastructure, consumables is far from adequate; critical facilities are no longer functional for delivering the Department's educational mission and programmes. TEI and the Department have a vital role to play in the Greek economy and society, working with municipalities, local industry and other bodies, and funding of enable and enhance such a role should be provided.

At Institution and Department: Although the Institution is able to verbalise its educational aims this needs to be formalised and implemented at the Department level. The current prescriptive legislation for higher education establishments discourages the taking of educational initiatives by individual TEIs and also results in a sector that lacks plurality, stimulus and external facing attitude. Nevertheless, taking into account these constraints, formalised processes at the Departmental level for formulating education and research strategies, and how to implement them, would be beneficial.

- Short-, medium- and long-term goals.

They have ambitious goals to be the best Mechanical Engineering Department of TEI in Greece, to be research active, and to graduate excellent students. To a large extent these goals are achievable but they are contingent on substantially increased in-flow of funding (both government and generated by TEI and Department), more enabling legislative framework for TEI, and more formalised processes within the Department for formulating strategies, policies, and encouragement of academic collaboration between laboratories.

- Plan and actions for improvement by the Department/Academic Unit

The Department has excellent staff and in good position to develop and implement plans and actions for improvement and they are aware of the improvements necessary.

- Long-term actions proposed by the Department.
Please see above.

F. Final Conclusions and recommendations of the EEC

For each particular matter, please distinguish between under- and post-graduate level, if necessary.

The visit took place over a period of three days when the Committee spent from approximately 9am to 6 or 7pm at the TEI Piraeus, reviewing materials, inspecting laboratories, meeting and discussing courses and research with staff, students, graduates and employers of the TEI graduates. The Committee has made the following conclusions and recommendations:

Undergraduate Programme

Government funding for laboratories and academic and support staffing is inferior to universally accepted standards for mechanical engineering at first degree level. The goodwill and major efforts of the staff of the Department (both teaching and support staff), sometimes at their personal financial expense, ameliorate to an extent the impact of these shortages. Despite these major efforts, a large gap still remains in terms of both financial and staff resource required for delivery of a modern high standard first degree course.

The structure is clear and well-articulated. The emphasis is on thorough learning of individual subjects (mathimata). Greater emphasis on the integration of the individual subjects, for example through design (individual and group) projects would enhance the curriculum. Such projects would bring together the thorough knowledge and understanding gained from individual subjects, and can integrate them into the creation of engineering products.

Bearing in mind that legislation and custom in Greece does not require an external examiner system, the autonomy of the individual academic staff in setting and marking the subject (mathima) examination papers and laboratory assignments is out of line with accepted norms in many other EU higher education systems. A formal moderation system could be set up. One academic subject leader could moderate the examination papers and marked scripts and assignments of another subject leader, and this would achieve similarity of standards, avoidance of errors, and demonstrate to students and other stakeholders greater transparency in the assessment process.

At the end of each semester (examinon) a system could be introduced, where each section of the Department meets formally to consider the examination achievements of the students. Consideration could be given to the percentage of students who pass a subject (mathima) on first attempt, or second attempt; reasons could be sought for high percentage of failures in individual subjects; and remedies could be discussed and implemented to improve the student success rate.

In some instances, the material could be enhanced, for example through the coverage of polymers, polymeric or metal composites, ceramics and light alloys. Modern mechanical engineering products and systems are rarely purely mechanical, they often embody sophisticated electronic control systems and for this reason, the incorporation of courses and materials in courses on digital and analogue electronic systems and their control would enhance the students learning and employment prospects. To make teaching time available for these topics, the time spent for some current topics could be reduced e.g. reduction of the focus mainly on steel and reduction of fundamental science theory and laboratories.

The staff takes pride and praiseworthy responsibility for their subject areas but therein lies also a weakness of the Greek higher education context: The autonomy of the staff and laboratories does not encourage cross fertilisation of ideas and also impacts on the integration of the curriculum subjects.

The 1st degree graduates of the Department are well prepared for employment, through practically useful education backed by theoretical understanding of mechanical engineering principles. However, they could be even better prepared to meet present and future developments of Greek industry, in an internationally competitive context, by some enhancements. Some of the subject (mathimata) material needs revision to include modern materials and advancements in technologies. There also needs to be greater integration of the individual subjects through design exercise and projects (throughout the four years not

just in the final major degree project), where separate subject knowledge is brought together and integrated into engineering products and systems.

Recommendation for MSc programmes

The Department has a very successful track record of running MSc courses in conjunction with two UK universities, Kingston and Heriot Watt Universities.

Committee concludes that in view of these long and successful experiences of running these MSc courses the Department is ready to offer new MSc programmes autonomously while retaining, possibly on a more equal basis, the two joint degree programmes with Kingston and Heriot Watt Universities. Furthermore, the Committee recommends new autonomous MSc programmes adopt and enhance structures and good practices of the two MSc courses with Heriot Watt and Kingston Universities.

Doctoral studies

The Department has a number of research activities that lead to publications in high quality international journals. The Department also has MSc graduates who continue to Doctoral studies in other universities. The Department will be in a strong position to be considered for running its own autonomous Doctoral programmes in future when the Greek legislation allows this.

Teaching

Greater consideration by the Department is needed of the development of a clearly articulated, coherent pedagogic policy and development of additional teaching methodologies. Compared with some other EU and North American education systems, the total (cumulative) number of written, oral and coursework examinations and tests that students undergo, so that they can graduate successfully, appears to be far greater. There appears to be no clearly articulated pedagogical basis for such a large total number of assessments (especially written formal examinations)

The student attendance at lectures appears to be low, therefore there is need for introducing learning incentives to attract and engage students to lectures. The Committee believes that it would not be an effective solution to make lectures compulsory.

The students informed the Committee that they would like to have more staff from industry being involved in giving talks and other contributions to their studies for example during project work. The students would also like to visit more industrial sites and see industrial processes taking place.

The laboratory teaching resources are outdated and insufficient in terms of quantity due to serious underinvestment over many years, and this is impacting negatively on the teaching, through long waiting lists for the laboratories and non-availability of equipment which are important to the students' learning. Some laboratories, such as the numerically-controlled machinery one, are barely able to provide teaching support due to the lack of funds to repair and renew teaching equipment.

A policy or systematic process, whereby the results of the questionnaires are collated across subjects and used by the Departmental management committee to improve its processes of allocation of resources or review of its curriculum and teaching methods; it is also not clear if the students are informed regularly of improvements implemented as a result of the questionnaires. Nevertheless, there is a need for the Department to develop a policy and an action plan to help improve the throughput of successful diploma graduates. The introduction of the n+2 years system may improve the graduate throughput, however it is also the responsibility of the Department to continue to seek additional improvements in curriculum and teaching to improve the throughput further, while at the same time it continues to produce the sought after graduates that it produces now.

Research

The infrastructure for research is limited although there are opportunities which are often exploited by staff to utilise them for research. They have been successful in attracting external national and EU research grants, which have added in some cases to the facilities. The department has a number of commercial and in-house modelling and simulation tools.

All other services

The administrative and library facilities are functional and efficient but at the limit of being

sustainable in the long term, due to severe shortage of staff and funding. The Department is aware of the staff shortage and financial problems, but their efforts to continue providing a good service to the students is especially praiseworthy. The Department is fully aware of what improvements are needed but this is highly constrained by the lack of staff and funding.

Strategic planning, perspectives for improvement and dealing with potential inhibiting factors

At State: Funding for staff, facilities, infrastructure and consumables is far from adequate; critical facilities are no longer functional for delivering the Department's educational mission and programmes. TEI and the Department have a vital role to play in the Greek economy and society, working with municipalities, local industry and other bodies, and funding of enable and enhance such a role should be provided.

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They have ambitious goals to be the best TEI in Greece, to be research active, and to graduate excellent students. To a large extent these goals are achievable but they are contingent on substantially increased in-flow of funding (both government and generated by TEI and Department), more enabling legislative framework for TEI, and more formalised processes within the Department for formulating strategies, policies, and encouragement of academic collaboration between laboratories.

The Department has excellent staff and in good position to develop and implement plans and actions for improvement and they are aware of the improvements necessary. It is important that the Department develops a comprehensive strategic plan for the next ten difficult years.

The Members of the Committee

Name and Surname	Signature
1. _____	
2. _____	
3. _____	
4. _____	
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