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HELLENIC REPUBLIC
H.Q.A.
HELLENIC QUALITY ASSURANCE AND
ACCREDITATION AGENCY

EXTERNAL EVALUATION REPORT

Department of Mechanical Engineering

Technological Educational Institute of Patras

26 October 2012

European Union
European Social Fund
OPERATIONAL PROGRAMME
EDUCATION AND LIFELONG LEARNING
investing in knowledge society
MINISTRY OF EDUCATION, LIFELONG LEARNING AND RELIGIOUS AFFAIRS
MANAGING AUTHORITY
NSRF 2007-2013
programme for development
EUROPEAN SOCIAL FUND
Co- financed by Greece and the European Union

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External Evaluation Committee

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

1. Professor Tassos G. karayiannis_____(President)
   (Title) (Name and Surname)

   Brunel University_____
   (Institution of origin)

2. Professor George Vatistas_____
   (Title) (Name and Surname)

   Concordia University_____
   (Institution of origin)

   _____

3. Professor Stamatis Rossidis_____
   (Title) (Name and Surname)

   Frederic University_____
   (Institution of origin)

4. Professor Paul Maropoulos _____
   (Title) (Name and Surname)

   Bath University_____
   (Institution of origin)

Introduction

The members of the External Evaluation Committee (EEC) met at the headquarters of the Hellenic Quality Assurance and Accreditation Agency (HQA) on Monday 8th of October. An introduction on the purpose of the evaluation and the visit was given by the acting chairman of HQAA professor C. Memos. This included a presentation of the main conclusions of the previous evaluations of university and TEI departments. A discussion followed on the specific visit to the department of Mechanical Engineering of the Technological Educational Institute of Patras. The EEC members then travelled to Patras.

Professor S. Kaplanis, the TEI president, welcomed the EEC members at the institute. The head of the Department Professor George Kabourides and the secretary of TEI (academic registrar) Dr Dimitra Nanousi joined the meeting and the discussion that followed in Professor Kaplanis' office. The TEI president gave his views on the vision and mission of the Institute and of course the Department in the context of the current circumstances. He also informed the EEC members of some of the plans of the Institute in engineering and technology including the development of postgraduate programmes and research. The structure of TEI is based on Departments grouped into Schools. Unfortunately the EEC members did not have the chance to meet the head of this School. Therefore they cannot comment on the views of this level of management of TEI on cooperation between departments/school.

After this initial introduction the meeting continued in the office of the head of the Department were the EEC members were introduced to the permanent academic and administrative staff. The following two days were divided between presentations and detailed discussions and visits to the laboratories and support services/facilities of the Department/TEI.

The list of the documents received in advance by the EEC included:

(i) Internal Evaluation Report (2009/10)
(ii) Study Guide (2009/10)
(iii) A partial Curriculum Vitae (CV) of permanent full time (FT) staff
(iv) Work and output of temporary part time (PT) staff
(v) Detailed course syllabi
(vi) Samples of support material including theoretical and laboratory parts
(vii) Sample and detailed results of student questionnaires
(viii) Report on programme Archimides I and II.

Note that during the visit the EEC received additional documents, i.e.

(i) Text books written by staff
(ii) Study Guide 2012/13
(iii) An additional CV of a FT faculty member
(iv) Samples of graded examination papers
(v) Samples of graded student theses
(vi) Course document, MSc Solar Energy and Management
(vii) Course document, BEng
(viii) Information on Summer School.

The first day started with presentations giving examples of staff profiles and their workloads. The day continued with a detailed discussion on the curriculum, teaching methodology and research undertaken by the department. A tour of the laboratory on renewable energy was arranged to complete the day.

During the second day the EEC had a meeting with sixteen (16) students of all years, twelve (12) PT members of staff and the two (2) departmental administrative staff. Following that the EEC visited the following:

(i) The Mechanical Engineering laboratories
(ii) Lecture theatres and lecture rooms including computer and technical drawing rooms
(iii) The Library
(iv) The Sports Centre

In addition, a meeting was arranged at the request of the EEC members, with company representatives accepting TEI/Mechanical engineering students on placement. The sources and documentation provided prior and during the visit were appropriate, comprehensive and in most cases complete.

The Department has met most of the objectives of the internal evaluation process. In general, all meetings were carried out in an engaging, constructive and friendly atmosphere indicative of the importance of such visits and evaluations. This report gives, in detail, the findings of the Committee under the general headings of Curriculum, Teaching, Research, Services, Strategic planning and ends with Conclusions. Each section includes specific recommendations.

The view of the EEC is that, although there is room for changes and improvements to be made, the Department of Mechanical Engineering can play a significant role in offering educational opportunities and "added value" to a cohort of students from the local area and beyond that can support local industries and develop new ones. We appreciate the difficulties that the country faces and the consequences on the educational system. Hence we are aware of the major economic restrictions within which the Institute and the Department have to operate. We are also aware that, in some cases, management and staff have to operate in a rather over-centralised and bureaucratic system such as the current one in Greece. In that context, we hope that the management of TEI and the staff in the Department will view our recommendations and conclusions as an attempt to offer supportive comments in their efforts for needed improvements.

A. Curriculum

APPROACH

This section relates to the evaluation of the Curriculum of the Degree in Mechanical Engineering offered by the TEI Patras. The Department has prepared and circulated a "Study Guide – Academic Year 2009-2010 and 2012-2013" (Οδηγός Σπουδών) and this document, together with the observations made during the visit of the Department, formed the basis for the evaluation of the Curriculum. It must be noted that the following discussion of the Curriculum is only dealing with the current Undergraduate Programme of Study. The Departmental plans for establishing a Postgraduate Programme of Study are addressed in a specific section below.

In the Prologue section of the Study Guide 2012, the top level aim of the Department is stated as being the training and creation of professionals who can deliver high quality services and solve modern problems of production and satisfy the needs of society. The Department also aims to provide knowledge to its graduates for the optimal utilisation of the technical knowledge and the application of new technologies in the area of Mechanical Engineering. Two streams or specialisation areas are offered, namely: Energy and Manufacturing.

The Department has identified as the top priority of the Programme of Study "to offer to its students fundamental and specialist knowledge which are essential in order for them to be employed in sectors of the economy which relate to the production process, the use of mechanical and electronic systems, the protection of the environment and the development of use of new materials" (Ref: Study Guide, 2012, page 15).

As a consequence of this priority, the stated obligations (objectives) of the Department include (Ref: Study Guide, 2012, page 15):

(i) To provide sufficient training to the students in technological matters, in order to demonstrate their capabilities in the development and advancement of new technologies.
(ii) To develop scientific links with industry, by participating in the production process as well as in the advancement of innovative projects, which aim to develop the technological know-how in the country.
(iii) To participate in programmes of applied technological research.
(iv) To develop programmes and seminars of specialism in modern technologies with the goal being the continuous training of graduates in these.

The first two of the above stated objectives are directly relevant in the process of the evaluation of the Curriculum and will be referred to in the following sections of this section. The next paragraphs deal with the organisation and nature of the courses provided by the Department and their evaluation in terms of satisfying the stated aim and objectives.

The delivery of the Curriculum is achieved via a Programme of Study that comprises eight (8) semesters, of which the first seven (7) cover the taught courses and the eighth semester is dedicated to the practical training of the students via Industrial

Placements.

The courses included in the Programme of Study belong to the following types (Ref: Study Guide, 2012, page 27).
(i) Courses of general scientific foundation. These are designed to provide the general scientific background such as mathematics and physics.
(ii) Courses of technical foundation relevant to the scientific discipline.
(iii) Courses of technical specialism relevant to the scientific discipline.
(iv) Courses of Management, Humanities and related disciplines.

The courses are further sub-divided into compulsory and optional courses, with the optional being delivered in semesters 6 and 7.

The Study Guide document contains brief descriptions of each undergraduate course (Ref: Study Guide, 2012, pages 34-76) that include; the classification of the course (as described above), the learning goals, its content, the method of course evaluation and the recommended bibliography. Overall, these course descriptions in the Study Guide were satisfactory but it would be desirable to have a more uniform presentation and to be consistent in terms of structure, volume of information, and description. It would also be advantageous for the descriptions to include the learning outcomes and methods employed; these were included for only one course. However, it must be noted that the Committee was presented with additional appendices that included supplementary course descriptions following fixed templates.

The EEC understands that the Curriculum is defined and organised by the nine (9) permanent members of staff of the Department, reflecting the views and priorities of the two specialisation areas within the Department. The Committee did not find a clear description of the Curriculum design process, and the same applies to the process for Curriculum update and renewal. Feedback obtained from the hourly paid, PT staff of the Department indicated their strong willingness to participate in the process of Curriculum design and development. However, at present, PT staff have no or very little engagement with the Curriculum definition process.

Recommendation A1
The EEC recommends that the Department needs to define explicit and detailed procedures for Curriculum definition, organisation and renewal. The Committee strongly recommends that the PT staff who have appropriate expertise, experience and association with the Department should be consulted in this process (see also Section B).

The evaluation of the overall structure of the Programme of Study by the Committee is that the undergraduate courses of the Department are organised and delivered in a satisfactory manner that is broadly compatible the aim and objectives of the Curriculum.

The evaluation of the technical and scientific content and academic balance of the Undergraduate Programme of Study by the EEC is that these are adequate and appropriate. However, there is a number of technical and scientific gaps in the existing course structure as follows:

(i) The "design of engineering systems" is not covered properly. This should include the analysis and synthesis of engineering systems, with mechanical, electrical and electronics content, and shall seek to apply the theoretical and practical knowledge gained by the courses for the design of an engineering system. The present Curriculum includes technical courses that can be developed and structured in a manner that can satisfy this requirement.

(ii) The "manufacturing processes" are not covered in a coherent manner in the current Programme of Study and this should ideally be done in the early stages (year 1 or 2), to allow the students to develop their understanding of manufacturing processes and their capabilities including; casting, forming, machining (machine tools and lasers), injection mounding, finishing operations and assembly.

(iii) The "engineering project management" is not covered by the current Programme of Study. Modern Mechanical Engineers need to have strong understanding of the theory and practice of project management and this element needs to be included in the Programme of Study.

Apart from the above three thematic gaps, there are additional technical areas that could also be included such as Logistics, Robotics and Precision/Metrology. The recommendations that follow address the views of the Committee in terms of the priorities that would need to be set to ensure the technical completeness and coherence of the Undergraduate Programme of Study.

Recommendation A2
The Department should consider the introduction of a "Design of Engineering Systems" course. It will be essential for this course to be structured as a hands on and team based course focusing a team of students in the design and development of an engineering system, such as a "wind turbine". The key objectives would be to train the students in the design of engineering systems by drawing on their technical knowledge and the state of the art, and also to prepare the students for team based work in industry.

Recommendation A3
The Department should consider the introduction of a "Manufacturing Processes" course that provides the theoretical and practical knowledge of a range of production processes. Subsequently, this course should also include aspects of precision and metrology and must be linked with a review and renewal of the "Mechanical Drawing", the "Programming of CNC" and the "Machine Tools" courses.

Recommendation A4
The Department should consider the introduction of an "Engineering Project Management" course. This is absolutely essential in order to ensure that the graduates have the necessary knowledge and skills to organise and manage projects in industry. Relevant courses in this area would need to be reviewed and modified as may be appropriate.

Postgraduate Programme of Study
The EEC recognises the Departmental aspiration to organise a Postgraduate Programme of Study in "Solar Energy Technology and Management". The Committee

was very pleased to note the very strong track record of the Renewable Sources of Energy Laboratory and the supporting activities and international associations.

Recommendation A5

The overall view of the EEC is that technically the Department is in the position to support a very good Postgraduate Programme of Study in Renewable Energy. In due course a second programme in Manufacturing could be considered. This development should be considered alongside the present financial constraints and a detailed analysis regarding the market demand should be performed. The low number of FT staff in the Department, together with the ensuing uncertainty regarding the status and method of engagement of the PT staff in the Department are also factors that need to be considered and resolved. The EEC considers that the low number of FT staff and the lack of a satisfactory engagement of the PT staff generate considerable risks regarding the delivery of the Undergraduate Programme and this may have a negative impact on the proposed Postgraduate Programme of Study. In principle, the Committee is very supportive of the plans of the Department to organise postgraduate programmes. However, the advice is to firstly address the financial, marketing and staffing issues to ensure the successful launch of this new initiative. A more generic title (e.g. Renewable Energy Systems) and therefore content could also be considered.

IMPLEMENTATION

As noted in the above section, the EEC considers that the undergraduate courses of the Department are organised and delivered in a satisfactory manner that is broadly compatible with the aim and objectives of the Curriculum.

In order for the Curriculum to be broadly comparable with universally acceptable international standards it will be important to implement a number of enhancements to address the identified technical gaps in the present course structure (see recommendations A2 to A4). The time allocated for each course is appropriate.

The Department manages to deliver the courses of the Programme of Study via the engagement of its FT and PT staff. The Committee understands that currently there are nine (9) permanent FT members and staff and around twenty (20) PT staff, two of who have been elected and are awaiting their appointments. The nine permanent members of staff are not sufficient for the delivery of this Programme of Study to around 1,024 students who are currently in the system. Hence, the Department needs the engagement of temporary staff. The Head of Department indicated that there has been a steady and substantial rationalisation of the number of temporary staff during the past 2-3 years and this is something that finds the EEC in agreement.

The EEC met with the majority of the PT staff of the Department. From this meeting and from reviewing their CVs the members of the EEC have concluded that the present cohort of PT staff includes many individuals with excellent academic qualifications, motivation and knowledge of the Department's operations. The Committee is concerned that these valuable members of staff are asked to operate under a highly uncertain and short-term process that is totally unsatisfactory and fails to properly recognise their substantial contribution to the Department.

Recommendation A6

The Committee recommends that the TEI and Department need to urgently work to find meaningful, practical and effective ways of engaging the PT staff in a more long-term and planned manner. This is vital in order to reduce the operational risk of the Department in relation to the delivery of the Mechanical Engineering Programme of Study. The constraints arising from the present financial situation in Greece and from National Legislation are appreciated and understood. To that effect the EEC expects that the Ministry of Education will provide a flexible and sustainable financial and legal framework to underpin the future operation of HEIs and TEIs.

IMPROVEMENT

The Department has several ideas for the further development of the Curriculum and the enhancement of several of its Laboratories including the Renewable Energy, Fluid Mechanics, Machine Tools CNC, Steam Engines and Steam turbines. The Committee fully recognizes the hard work that has gone into structuring and operating these laboratories. However, there are clear areas of improvement and these would need to be addressed.

Recommendation A7

The EEC recommends that the TEI and Department need to continue the process of enhancement and upgrade of the existing teaching Laboratories by allocating appropriate budgets for new equipment as well as for the upkeep and maintenance of the existing infrastructure.

The Committee had the opportunity to meet with three practicing engineers who are graduates of this Department and offer placement to students for their practical training. In the discussion it became apparent that the Curriculum improvement process does not include at present practicing engineers and industry and this is something that needs to be rectified.

Recommendation A8

The Committee recommends that the Department, with the full support of the TEI and the local community, should form an "Industrial Advisory Group", the main roles of which will be; (i) to provide advice regarding the updating and revision of the Curriculum to ensure that it remains relevant to the needs of industry, (ii) to provide feedback to ensure that the training of the students includes state-of-the art equipment, and (iii) to enhance the opportunities given to the students for practical training and careers in industry.

B. Teaching

APPROACH

The department offers a first degree in Mechanical engineering with two specializations, namely Manufacturing and Energy. The approach that is used is based on the need to deliver both theoretical and laboratory based courses. The EEC reviewed in addition to the Curriculum, the overall approach used by the staff of the Department in delivering their courses and their assessment, evaluation and monitoring of their teaching.

The first observation made by the EEC is the unacceptable low level of FT members of staff (see also Section A) for a typical Mechanical Engineering Department aspiring to deliver courses at an acceptable university level. Therefore, the contribution of the PT staff is extremely important as they possibly carry out an equal or higher share of the teaching load, while they support some key research activities. There is no doubt that the Department cannot operate without their contribution. The evaluation of the curriculum vitae of the PT staff and the discussions that followed both with them and the students confirmed very clearly that they are highly qualified and motivated. The students expressed their complete satisfaction with the delivery of lectures and laboratory classes and the enthusiasm of the PT staff. Therefore, we wish here to revisit and strengthen comments made earlier on PT staff (section A, Recommendation A6), i.e. eventual employment of some of them as FT staff. to strengthen the Department and allow further developments both at undergraduate and postgraduate level.

Recommendation B1
PT staff should be included in all departmental and other meetings that relate to both the development of curriculum and course delivery (see also Section A, Recommendation A5). This is particularly important not only because they teach a large part of the curriculum but also because they will help in bringing courses up-to-date based on their research and industrial experience.

Recommendation B2
The facilities provided to temporary PT staff should be improved, i.e. minimum provision should include shared office accommodation and a PC.

The teaching methodology followed by the department does not differ substantially from established engineering departments, i.e. lectures, supported by tutorials and laboratory classes. However, a striking difference from other well-established overseas institutions is the fact that the theoretical and laboratory parts of a subject are considered separate and can be taken at different semesters/years. Inevitably, the students fail to connect theory and experiment with the obvious loss of learning benefits.

Recommendation B3
The department should integrate the theoretical and laboratory parts of each technical subject. The laboratory should be examined by a series of laboratory assignments spread over a semester when the theoretical part is taught. Students should be required to pass both parts during the same semester with the final mark being the

weighted aggregate.

The EEC members were disappointed to find out that course prerequisites were abolished not on reasonable academic grounds but, as staff of the Department explained, because of student pressure.

Recommendation B4

The staff of the Department should re-examine the Curriculum and the courses offered and establish the appropriate prerequisites.

The Committee had a good chance to visit laboratories, classrooms and computer rooms. Space does not seem to be a limiting factor for this Department. Unfortunately some of the laboratories are in need of modernisation and even more worrying some give the impression of neglect and lack of ownership. In few cases, laboratories were not clean and tidy with areas used as temporary stores of unwanted materials and gave the impression that health and safety rules were not adhered to. However, it must be noted that the majority of the laboratories were adequate and did not suffer from these shortcomings.

Recommendation B5
It is recommended that staff in the Department seek to improve their laboratories urgently. The EEC recognises that in some cases funding will be required. However, in a lot of cases that we saw, significant improvements can be made including avoidance of health and safety hazards without the need of any significant financial resources.

The examination process was discussed with members of staff of the Department. Unfortunately the Committee found that there is absolutely no scrutiny of the examination papers, process or results with inevitable discrepancies and mistakes.

Recommendation B6
The examination papers should be assessed and signed-off by a second member of staff before they are issued to students. Note that in some countries (e.g. UK) the examination papers are assesses internally and externally by expert members of other universities (external examiners) before they are considered complete. We appreciate that this is a national rather than an institutional issue but at least the Department should initiate an internal review of the papers so as to avoid mistakes.

IMPLEMENTATION

The actual quality of the teaching was considered appropriate by the EEC following discussions with staff and students. The teaching material used was also appropriate and some of the staff have detailed sets of notes and their own text books relevant to the subject they are teaching. There is some linkage with research although this can be improved as more staff engage with research. However, the resources available were not adequate both in terms of classroom facilities and IT support (no white boards, no overhead slide projectors, no projectors linked to PC – See also Section C for further commends and recommendations)

The EEC was not introduced to the appropriate offices dealing with mobility of students and staff.

The questionnaires used to seek student opinion on teaching and course contents were very detailed and well analysed. However there appears to be limitation as to their effective use, see below.

RESULTS

The Department provided detailed data which formed the basis for discussion on student attendance, numbers taking examinations at the end of each semester, and examination pass rates. It must be emphasized here that these statistics are seriously low and would have been questioned in overseas universities as totally unacceptable and requiring immediate corrective measures. We must mention here that the EEC members experienced similar worrying low levels of examination success in other Greek institutions. Students were confronted with this during our meeting and suggested "student mentality" as one the reasons, although this is changing slowly. Having said that, what is worrying is the fact that this low success rates did not result in a debate and a proposal for corrective action by the members of staff since there are other factors in addition to the student mentality and the low academic achievement of some of the students at entry to TEI. The Committee feels that other changes could be considered to help understand the extend of the problem, the specific details (how wide spread in the department or limited to certain subjects or method of delivery) and thus initiate some corrective actions.

It was also evident during the two-day visit that communication between the students and the staff needs to be improved.

The relationship of the Department with industry seems (on a small sample) to be good. There were limited data on the employability of the graduates and the number that continue their studies at postgraduate level.

IMPROVEMENT

A discussion took place at the end of the two-day visit with the FT permanent m embers of staff where methods and ways for improvement were discussed.In addition to the recommendations indicated in other parts of the report we add here the following:

Recommendation B7
The Department should establish a student personal tutoring system. The EEC advises the Department to appoint an academic member of staff as Personal Tutor or Student Advisor for each small group of students. The Personal Tutor will be responsible for the general well- being and the academic progress of all the students belonging to his/ her group. This will no doubt improve staff- student relationships,

which will, in turn, improve the students' academic performance.

Recommendation B8
The Department should consider appointing a programme director (PD) who will assume overall responsibility of the Undergraduate Programme of Studies (both streams) and ensure smooth problem-free delivery of all courses. She/he will also be the focal point of the students. A similar appointment should be made for the MSc programme before this is introduced.

Recommendation B9
The PD should call and chair a teaching and learning meeting "Board of Studies" twice a year. The membership should include all the teaching team (FT and PT) and students' representatives (one from each year). The agenda should include among others curriculum development, the teaching process and suggestions for improvements. The outcomes of these meetings should be made available and be discussed as the General Assembly of the Department.

Recommendation B10
A detailed evaluation should be performed on student performance in each subject at the end of each year followed by a specific action plan. This could be included as part of the business of the Board of Studies.

Recommendation B11
Students should be offered re-assessment of a failed subject at the first available opportunity (unless mitigating circumstances are submitted in advance). The number of failed attempts should be limited to two. Failure to pass the second time should result in termination of studies.

The Department has done very well in issuing and receiving completed questionnaires. Unfortunately some staff (particularly PT) were not informed of the results especially in their own subjects.

Recommendation B12
This process should be continued and be combined with a questionnaire on the whole programme. All staff should be made aware of the results. The Department should consider an action plan based on the results and provide feedback to students.

Recommendation B13
An annual Departmental evaluation is needed. Hence it is recommended that the Department establishes an Annual Monitoring Process. Some of the issues above can be discussed including staffing, research and resources and action plans agreed.

Recommendation B14
The Department should keep a record of graduates' employment or progression to studies at higher level. This is a key performance indicator and can be used to encourage students and in Departmental publicity material.

C. Research

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

The Department of Mechanical Engineering of TEI in Patras has a fairly well structured teaching oriented engineering programme. However, as is also the case with other institutions of this kind, its research efforts were more or less impromptu, undertaken by the faculty members either on a voluntary basis or as means to advance through the academic steps. Based on the provided documents, as well as our discourse with the faculty and administration officials, it seems that the Department did not have a clear future research vision. Consequently, a long-term plan with policies that will define and support their plan, or set standards in assessing research, is noticeably absent. This deficiency is not uncommon to most of the Technological Educational Institutes in Greece. The previously mentioned central mission of teaching students the engineering trade through the applications of science did not formally incorporate the production of new knowledge as one of the requisite academic components that typifies university education. As a result, with some noticeable exemptions[1] past research output is found to be well below the internationally recognized expectations for analogous programmes, operating within good foreign universities (an average of 2 high-quality journal papers and several well regarded conference publications per year per faculty member) [2]. This points to the need for the development of research criteria in the evaluations of academic staff promotions and the recruitment of new candidates. There are several faculty members who have already retired and some are expected soon to retire. It is thus a favourable time where the Department could take advantage and recruit new members with strong research potential and expertise relevant to the main research thrust of the unit, which is yet to be defined.

As a result of our visit and the review of the new documentation provided, we now understand that the Department is indeed aspiring to substantially augment its research component. To this end, the EEC believes that through a well thought-out strategic plan, the Department could in the near future meet the internationally accepted university research standards. If a long-term research goal is properly identified, an effective plan of action is designed, and properly executed, then it could result in valuable research contributions.

The EEC is impressed with the department's success of research programmes such as Archimedes I, II, III and Thales. These along with others could very well act as a catalyst in triggering enhancement of research activities that will upsurge research productivity within the department. In addition, it is anticipated that the establishment of the MSc programme, the continuation and perhaps enlargement of the collaboration with sister institutions (existing and other) outside Greece, and a vigorous and persistent effort with the aim to establish research collaboration with institutions within Greece, will greatly augment research. A good start could be a formal agree-

[1] Four Part-Time faculty members have published between 3.8-2.0 journal articles per year per member and between 5.4-1.0 conference publications per year per member.

[2] The past Full-time faculty publication record is approximately 0.2 journal articles per year per faculty member and 0.8 conference publications per year per faculty member.

ment of research cooperation with the well regarded nearby University of Patras.
In order to achieve the abovementioned goals the committee recommends:

Recommendation C1
The Department should draft a detailed, long-term research vision and develop guidelines in assessing research.

Recommendation C2
The Department should include in the departmental plan clear steps/actions in achieving the overall objectives by outlining guidelines that include explicit criteria for academic staff progression and future faculty recruitment that ensures that the incoming member is research active in a topic relevant to one of the areas in which the Department seeks to excel. The Committee is pleased that this process has already started and this is very encouraging.

Recommendation C3
The Department should fill new appointments with faculty having proven expertise in the desired areas of research concentration.

Recommendation C4
The Committee advises researchers to increase their research output and publish their work in journals that are included in Thomson's citation index (or equivalent) and are of high quality.

Recommendation C5
The Department is encouraged to publish an Annual Report that will showcase their recent research activities. This could be made available electronically to new applicants (including the future MSc students), final year students, other academics, and industry.

D. All Other Services

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

APPROACH

The Head of Department appreciates the contribution of administrative staff for achieving a good operation of the Department. At present, there are two (2) administrative members of staff in the Department having reduced from four (4) at previous years, with a wide variety of duties in all administrative matters related to undergraduate and to upcoming MSc programme students.

Some of the duties of the two administrative members of staff are:

Departmental administration:

- Taking minutes of Departmental committee meetings
- Keeping the Protocol of the department (both hand-written and electronic)
- Filing documents and maintenance of departmental records
- Be informed on relevant past and new Legislation.

Academic administration:

- Keeping students records
- Providing information related to student matters
- Student Support (including registration, providing academic certificates, detailed list of marks, archiving of documents, uploading exam marks to electronic e-class system)
- Issuing student ID cards.

Administration staff and all departmental staff including part timers use the web based system e-class, dealing with requests and activities related to students and staff, e.g. student registration to courses, general information of students matters, and provision of syllabus for the courses and other information to students. In order to save time for the administration staff, electronic processing can be introduced in areas such as students' questionnaires and study certificates to name a few. Time saving for the administration staff will also be achieved, if some documents (e.g. Protocol), which the law requires hand written record to be kept, allow to be kept in electronic form.

The EEC understands that until recently, no Career service and student welfare office existed at TEI level. However, in order to alleviate the requirement of providing career services, TEI Patras established three action committees: Two, at TEI level, and one at Departmental level. The two Committees, at TEI level, are to work on (i) support graduates with employment and career development and (ii) to establish links with industry for the practical training of students via industrial placements. The Committee at departmental level is dealing with the promotion of innovation and enterprise.

The External Evaluation Committee strongly endorses the formation of these support mechanisms at TEI and departmental levels, which are internationally relevant, and

we would like to wish them every success for the benefit of the students.

Recommendation D1

Having established the links with industry it is of upmost importance for the department staff to obtain feedback from them for their requirements. This information will assist the Careers office and the Department to provide updated advice to students. The Department should encourage Mechanical Engineering students to use more often the Career service. This recommendation relates to Recommendation A7, regarding the formation of an Industrial Advisory Group.

Student support services are provided by TEI and include among other help with accommodation and the provision of free meals. However, there is no counseling service.

Recommendation D2

TEI should also provide student counseling support within their student support services. It is also vitally important that these counseling services are also offered to all staff of TEI. This may become more necessary in today's economic climate.

The Department understands the importance in the electronic processing and provision of academic and administrative tasks. However, there is scope to further enhance and simplify its administrative procedures. Some examples are the establishment of a registration system for the submission of a final year project by the students and the establishment of a departmental rule in the area of the re-assessment of students' examination papers.

The Committee visited the Sports Facility of the TEI and it was clear that there was a considerable scope to improve on the present provision.

Recommendation D3

It will be of great benefit to both the Department staff and students if the Department encourages its staff and students to undertake sports activities. On this matter, there is an urgent need for the TEI Patras to quickly and drastically improve their Sports facilities.

IMPLEMENTATION

There is a good level of support that is provided from the two Department administration staff regarding general administration activities, academic studies and student support and some other departmental activities. There is no allocation of administrative/secretarial support to department academic staff apart for the Head of Department.

The relationship between the departmental administrative staff and other staff/students is healthy and productive. Responsibilities are allocated and tasks executed efficiently. The administrative staff should be commended for the effort they put in order to provide appropriate service to students.

There is a sufficient IT service to students and staff. Computers, networks, Internet room and Wi-Fi connectivity exist. However, the existing hardware is very old and

there is a need for updating. For example, the Computer Aided Design office has a range of very old computers restricting the ability of staff to teach the software's capabilities and generating maintenance and support problems. Further, IT support does not extend to the lecture rooms which do not include any IT aids for lecturing (see also Section B). The EEC expects that all software use in computer labs are updated with the appropriate new version every year.

The central Library facilities are of good standard and the building is new. However, there is a lack of a professional librarian. Common areas for study are available as well. If there is no teleconference facility in the Library it will be very useful to establish one. Informal feedback to the Committee indicated that TEI students do not have access to the library loan facilities of the University of Patras.

Recommendation D4
Continue efforts for updating textbooks available in the Library and expand the availability of postgraduate textbooks in anticipation of the new MSc programme. Establish a teleconference facility in the Library. We also recommend that TEI students should be allowed to have full access to the to the library loan facilities of the University of Patras and vice-versa.

There is a dormitory for students and further enhancing the presence of students on campus. Additional TEI buildings are available and ready to use for accommodation.

Recommendation D5
TEI should plan to release the available accommodation buildings to students as soon as possible. In addition, the impressive large campus area with so many trees and grass areas could be used as an attraction for student recruitment and the creation of recreation areas for the local community. TEI should find ways to better maintain and improve the appearance of the campus; one way may be to involve students in a voluntary basis.

The condition of the lecture rooms is very poor and none have basic audio visual facilities such as projectors and white boards. It is of great importance lecturers to have up to date teaching tools in order to deliver their lectures more efficiently and in the same time make the lesson more attractive for the students, see also Section B.

Recommendation D6
TEI should urgently proceed to furnish the Department's lecture rooms with audio visual equipment and IT network links. A quick solution could be to make available a number of mobile sets of laptops and projectors and set up a hiring system to be used by the lecturers.

The Head of Department indicated that he has tried to create links with the local community and schools. Unfortunately, there has been little response in these efforts and this is regrettable.

Recommendation D7

The Committee recommends that the Head of Department receives support from TEI services and the Departmental administration in order to enhance the Department's links with industry, schools and the local community of Patras. Such events could take place in Campus and/or out-doors facilities.

These interactions, combined with a well-maintained TEI campus, will provide an enriched life experience for the students, faculty and staff together with the citizens of the city of Patras.

In order to help the new students to a smooth transfer from school to university life, the Department needs to establish a standard welcoming policy.

Recommendation D8

The Department together with some relevant TEI services, such as library, career office and administration should develop an induction and orientation programme to provide the students with all the necessary information for their new life within the TEI Patras.

RESULTS

Administrative services are reasonably effective mainly due to the use of web-based systems, but there is always room for improvement. For example, the reduction from 4 to 2 administrative staff serving all the undergraduate and future postgraduate students and staff means that if one of them is unwell, the other becomes highly overloaded and it is difficult to cope. In order to eliminate such functional problems in the future, it is recommended that the departmental administration staff create formal support relationships with the other administration services within the School.

Technical support services for the Laboratories are very limited. Reduction in technical staff numbers over the years has made it difficult to provide appropriate service to the teaching laboratories and maintain appropriate levels of student support and supervision that may be required for safety. This must be considered carefully within the department and at the institution level.

IMPROVEMENTS

The functionality and characteristics of the relatively new e-class system used by the Department is quite sophisticated and as such it should be used by academic and support staff in a more effective manner (e.g. a wider use of mailing lists to certain group users, electronic feedback from students for teaching quality).

Recommendation D9

It is recommended that the School/TEI management consider integration of the administrative staff into one School Administrative Office that would offer support and services to all students and staff in the School. This does not imply that specific staff are not allocated to mechanical engineering or other disciplines in the School but brings together all the administrative staff under one formal structure and allows mutual support and improvement of services.

Some additional secretarial support to academic staff will also be particularly benefi-

cial and will increase staff productivity and effectiveness in carrying out academic duties.

The awareness and exposure of students to the new Careers services and help should increase. In addition, the departmental committee for innovation and enterprise should become more active in building links with potential employers. The Committee strongly welcomes the initiative to promote student placements, careers and innovation and we like to see this effort maintained and enhanced.

Collaboration with social, cultural and production organizations

As mentioned above, there are no established programmes by the Department to build healthy relationships with social cultural (secondary education schools, local authorities). However, academic staff have some links and collaborations with industrial organizations. The EEC considers that there is room for improvement in these interactions as outlined in Recommendation D7.

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.

At undergraduate level, the Department of Mechanical Engineering developed and established an Undergraduate Programme of Study based on four (4) years, full time. This course is offering two streams of specialisation, namely: Energy and Manufacturing. The syllabus needs to be redesigned with focus on new technologies that clearly reflect the needs of the Greek industry sector of Renewable Energy and Manufacturing, with clear focus on both modern Systems and Technologies, see Recommendations A2, A3 and A4. At postgraduate level, plans are in place for the introduction of a Masters degree in Renewable Energy. The Committee's opinion is summarised in Section A, Recommendation A5.

Short, medium and long term goals.

The Department has developed short, medium and long term goals. The Head of Department, on the invitation of the EEC, has prepared and submitted to the EEC a document entitled "Objectives of the Department" summarising the medium term research and teaching objectives and the respective actions and success criteria.

In terms of teaching, the objective is the upgrading of the educational training provided by the Department. The specific actions listed to achieve this objective include; (i) upgrading and renewal of the programme of study to include new technologies, (ii) linking of the specialist courses with Industry, (iii) improving the quality of the Final Year Degree Projects, (iv) improvement of the practical training of students via Industrial placements, (v) carrying out annual internal evaluations, and (vi) improvement of the web-presence of the Department. The key outcomes of these actions are to increase the average degree mark from the current 6.4 to 7.0 and to reduce the average extra semesters (beyond the standard 8) required for graduation from the present 6.2 to 4.

The EEC warmly welcomes the proposed teaching objective and considers the respective actions as appropriate and well thought through. The actions relate well to a number of recommendations that have already been made by the Committee in the sections above.

Recommendation E1

The EEC considers that the proposed medium term actions proposed by the Department are appropriate and should be carried out. In this respect, the Committee strongly advises the Department to enhance the actions planned as a result of analysing the recommendations made by the Committee in relation to Curriculum and Teaching in sections A and B respectively.

Recommendation E2

The Committee advises that caution should be exercised in relation to the aspiration of raising the average mark of the cohort from 6.4 to 7.0. International benchmarks

indicate that the present average is satisfactory. A better measure may be to maintain the present degree average whilst enhancing the standard of the examination process and reducing the extra semesters required for graduation from 6.2 to 4.

In terms of research, the main objective is to develop a systematic process for carrying out applied research within the Department. The key actions listed include; (i) the commencement of postgraduate studies, (ii) the enhancement of the equipment base of the laboratories and (iii) the reduction of the teaching and administrative load of the academic members of staff. The key outcomes per annum and member of staff include; the writing and publication of at least one good quality paper and the submission of one application for research funding.

Recommendation E3

The EEC is broadly supportive of these actions and the respective outcomes and would like to encourage the Department and TEI to implement them.

Apart from the above issues covered by the medium term objectives outlined by the Department, the EEC notes that there must be relevant short term and also long term goals and the respective plans for their implementation.

Recommendation E4

There is a need for the establishment of mechanism and processes that will help the continuous improvement of the Department in all the four main functions of Teaching and Learning, Research and Development, Administration and Management, and Community and Industry engagement.

Plan and actions for improvement by the Department / Academic Unit

Recommendation E5

Short, medium and long term plans to achieve the above goals and aspirations need to be developed and implemented. The details of these plans would need to be worked out and appropriate policies must be developed at Department level. In times of high uncertainty, different scenarios and risk mitigation plans must be devised.

Efficiency and effectiveness maximisation by focusing on the core activities that deliver the aims and objectives of the Department are of paramount importance, as is the continuous effort for external funding aiding the long term sustainability agenda.

If the MSc degree is launched and proves to be successful (the EEC is confident that this can be the case), then the model can be used to offer other postgraduate degree level courses which can involve other Departments and Organisations.

F. Final Conclusions and recommendations of the EEC

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

The External Evaluation Committee reviewed the paperwork sent in advance and provided later by the Department of Mechanical Engineering of TEI Patras. Subsequently the EEC spent two days at the Department/TEI followed by discussions in Athens on the detailed findings and final outcomes of the review/visit. The main conclusions of the evaluation process are given above in the form of recommendations and there is no need to present them here again. In summary, the EEC members agree that the Department of Mechanical Engineering of TEI/Patras has a role to play in the training and education of Greek students based locally and beyond. It can provide local industries with graduates in the two main areas of specialization that the Department supports namely, Energy and Manufacturing.

The EEC members agree that there is a significant scope for improvements to be made in all areas of provision of the Department – Curriculum development, teaching and learning process, research and support services – and the main areas are given in the sections above. There is also the need to consider carefully an appropriate balance between student numbers and numbers of FT and PT faculty staff and technicians. Formal mechanisms for evaluating the success of any measures introduced to evaluate improvements in the learning and teaching process recommended above should be established. Recommendations were also made in improving administrative support. The Department/TEI should also consider the state of the current teaching (and research) infrastructure and initiate improvements.

The EEC members agree that the Department could technically organise an MSc in Renewable Energy. Hence the EEC recommends that they proceed with this programme. This will have benefits both in the teaching and research effort of the Department and the staff and offer an excellent opportunity to some good graduates of the Department and others to further their education. However, this development should only be considered by taking into account the present financial constraints, the market needs and the low number of full time academic staff in the Department. Note that the Bologna Agreement calls for a three plus two year model of education to graduate qualification (leading to chartered engineering status) and the proposed MSc (four plus one) can possibly provide this. Support and commitment for this initiative will be needed from existing PT and hopefully new FT staff plus industry. The Department should also consider support from the national government or EU for this or the requirement of a fee so they can provide and maintain high quality teaching environment.

The Committee advises the academic staff of the Department to increase their research output and disseminate the results of their work in journals of high impact.. The Department should draft a research vision and develop guidelines in assessing research. The planning steps that will allow the unit to achieve its overall objectives should include explicit criteria for staff progression. The hiring of new faculty members must be research active in one of the topics in which the Department is seeking to excel.

Finally, we hope that colleagues and management in the Department and TEI will read this report and our recommendations in the context of a sincere effort to offer support and advice based on our experiences and find them useful in their effort for continuous improvement of their provision.

The Members of the Committee

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