



ΕΛΛΗΝΙΚΗ ΔΗΜΟΚΡΑΤΙΑ  
**Α.ΔΙ.Π.**  
ΑΡΧΗ ΔΙΑΣΦΑΛΙΣΗΣ ΠΟΙΟΤΗΤΑΣ  
ΑΝΩΤΑΤΗΣ ΕΚΠΑΙΔΕΥΣΗΣ

HELLENIC REPUBLIC  
**H.Q.A.**  
HELLENIC QUALITY ASSURANCE AGENCY  
FOR HIGHER EDUCATION

## **EXTERNAL EVALUATION REPORT**

**DEPARTMENT OF MECHANICAL ENGINEERING**

**TECHNOLOGICAL EDUCATIONAL INSTITUTE OF THESSALY  
(Previously Known as TEI Larissa)**

According to Version 2.0 of the Template

December 2013

## 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.

#### ***B1 and B2. Teaching at undergraduate and at postgraduate and doctoral levels***

##### 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 External Evaluation Committee 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 (TEI) of Thessaly (previously known as TEI Larissa)**, consisted of the following four (4) expert evaluators drawn from the Registry constituted by the HQA in accordance with Law 3374/2005:

**1) Prof. Paul Maropoulos**

***Professor, Chair of Innovative Manufacturing, Director of the Laboratory for Integrated Metrology Applications, Department of Mechanical Engineering, University of Bath, UK / Coordinator***

**2) Dr George Aggidis**

***Senior Lecturer, Director of Lancaster University Renewable Energy Group & Fluid Machinery Group, Lancaster University, UK***

**3) Dr Konstantinos Salonitis**

***Lecturer in Manufacturing Systems, Department of Manufacturing and Materials, School of Applied Sciences, Cranfield University, UK***

**4) Prof. Stamatis Rossides**

***Associate Professor, Head of Department of Mechanical Engineering, Frederick University, Cyprus***

## ***Introduction***

### **I. The External Evaluation Procedure**

- **Dates and brief account of the site visit.**
- **Whom did the Committee meet?**
- **List of Reports, documents, other data examined by the Committee.**
- **Groups of teaching and administrative staff and students interviewed**
- **Facilities visited by the External Evaluation Committee.**

The HQA has made available to the External Evaluation Committee (the *Committee*) information about the Department of Mechanical Engineering (*DME*, the *Department*) of TEI Thessaly for the early preparation of the Evaluation. The provided Internal Evaluation Report of the Department covered the period 2007-2011. The Internal Evaluation Report presented useful and well-structured information that provided the factual evidence for the Committee.

The Committee visited DME of the TEI Thessaly from Monday 09/12/2013 to Wednesday 11/12/2013. Upon arrival at Larissa, on Monday 9<sup>nd</sup> December, the Committee was met by DME faculty members. In particular, the Committee met with the Department Chair, Associate Prof. Yiannis Kechagias, who was the host during the visit. The TEI President, Prof. Panagiotis Goulas, welcomed the Committee to TEI Thessaly and gave a general introduction of the present conditions within the TEI, its priorities and challenges. The Committee then met privately for the first time to review the schedule of the proposed evaluation and agreed a number of changes with Prof. Kechagias.

The first day of the external evaluation started on Tuesday 10<sup>th</sup> December 2013, with a Departmental presentation given by Prof. Kechagias. This covered a range of useful information of the Department. The Department has two Divisions, the Energy Division and the Manufacturing Division. DME is a relatively small department comprising 11 members of faculty (3 Professors, 4 Associate Professors, 2 Assistant Professors and 2 Lecturers), 5 technical support members of staff and 1 administrator. The experimental work of the Department is carried out in 14 laboratories that support both teaching and research.

The Department currently has 1,650 registered undergraduate students, with an annual intake of 151 students at present, down from around 250 students per annum in the previous year. Approximately 50% of the students come from Thessaly and around 25% from Athens. Around 20% of the entry students place the Department in the first 3 positions in terms of their choices, and this is considered a positive aspect due to the large number of choices available to candidates. The current student-to-staff ratio, calculated for the entry cohort only, for year 2012-2013 is 9.2, down from 10.5 from the previous year. Of course, this ratio is much higher when the students in all years are taken into account, as well as students who are still registered, several years after completing their nominal period of study.

The Department graduates from 90 to 130 students per annum. The graduation rates per annum are low, with very few students graduating as expected and a large proportion of graduating students taking twice as long as their normal period of study to graduate. From 2002 to 2005 the non-graduation rates as a proportion of the respective intake were from 67.7% to 76.4% and this is a very high number, indicating a fundamental issue of lack of commitment on behalf of a large proportion of students to pursue their studies within reasonable timeframes, as expected by the Department. It is expected that the newly introduced law of “n+2” that limits the maximum duration of studies to 2 years more than

the normal years of studies (n) will, in due course, improve the graduation rates. Prof. Stefanos Zaoutsos, who is the current Director of the School of Engineering (Dean), reported that in the period 2007-2010 graduate employment rates have been approximating 87%. Questionnaires of graduates completed in the last 2 years showed that around 40% of students are already in employment by the time they are graduating; of those 50% went to the private sector, 13% joined the public sector and 31% worked as free-lance professional engineers.

In terms of research, the current range of research programmes in the Department comes to € 2,000,000 comprising the national “Thales” and “Archimedes” programmes and participation in 1 FP7 EU programme. The overall success ratio of research proposals is running at around 10%. In terms of outputs, during the past five (5) years the faculty members of the Department have published on average per annum, 7 papers in learned Journals and 6 papers in refereed Conferences. These outputs were produced by 6 research active faculty members, giving an outline ratio of 1.16 journal papers and 1 refereed conference paper per faculty member per annum. The analysis of DME research is given in Section C, below.

In terms of resources, during the period from 2007 to 2010 the Department has received € 1,000,000 for equipment, € 15,000 to 20,000 for operating costs and consumables and € 257,400 for contracts of fixed term teaching staff (660 contract hours per week at 15 euros per contract hour, for 26 weeks). In the period since 2010, the equipment budget has been eliminated, the operating budget has been reduced to € 2,000 per annum and there is € 12,480 for 2 hourly paid teaching support staff at Lecturer level (32 contract hours per week at 15 euros per contract hour, for 26 weeks). In addition, the Ministry of Education has provided funding for 37 Teaching Fellows for the TEI as a whole and the expectation is that 3 of them would be deployed within the Department.

Prof. Michalis Vlachogiannis, who is also the TEI’s Vice-President, then introduced the Programme of Study of the Department. The Department offers a wide range of courses (43) and the award of the Degree requires the successful completion of 39 courses – taught over 7 semesters - of which 35 are compulsory and 4 optional selected out of 8 optional courses that are available. During the first 5 semesters all courses are compulsory; in the first 4 semesters students take 6 courses per semester and in the 5<sup>th</sup> semester there are 5 courses. Limited streaming of courses leading to specialisation follows in the 6<sup>th</sup> and 7<sup>th</sup> semesters with students taking 5 courses (3 core and 2 optional courses) per semester. The optional courses are clustered into two (2) themes corresponding to Manufacturing and Energy Studies. Each course includes around 5 hours of learning activities per week – 3-4 hours for lectures/tutorials and 1-2 hours for laboratories– over the 13 weeks of each semester. The Committee was informed that lecture attendance rates are low but increasing, with current attendance rates estimated at around 40%. Lectures and support material for these courses are offered on-line in the “e-Class” system, with approximately 90% of courses being available electronically. Further analysis of the Curriculum can be found in Section A, below.

The Committee was informed that course revision is carried out to reflect staff interests and expertise, industrial requirements due to personal contacts and knowledge, student feedback and structured benchmarking. Graduate surveys indicate an overall student satisfaction with the Programme of Study of more than 62% and with the knowledge gained of around 79%.

The Committee then met in private with 5 faculty members and discussed the operation of the Department and their individual research priorities. The discussions that took place were

very open and constructive and provided valuable additional perspectives.

Then the Committee had the opportunity to meet with a large group of undergraduate students from the Department. In this meeting the students discussed issues related to their curriculum and the learning process in an open manner, providing valuable feedback to the Committee and contributing greatly to its work. The specific points will be covered in the following sections of this report, mainly A and B.

The schedule of meetings on 11<sup>th</sup> December 2013 started by continuing the one-to-one meetings with the faculty members. The Committee noted that the value of links with industry and the importance of innovation and entrepreneurship are well understood by staff. In particular, the Committee would like to note the creation of a spinout company, "Exothermia.com" (dealing with scientific simulation software for heat transfer modelling), by a DME faculty member as a consequence of his previous research in the Department of Mechanical Engineering of the Aristotle University of Thessaloniki; this should be an exemplar for the commercialisation of research outcomes from DME research. The feedback given from members of staff was honest and open and helped the Committee to gain additional insights and perspectives in relation to the operation of the Department.

The Committee's programme on 11<sup>th</sup> December included a meeting with the Department's five (5) members of technical support staff. The process of supporting the teaching and learning process via the laboratory based activities was discussed and the technical support members of staff outlined that they had to support multiple laboratories, with the exception of the CAD and drawing laboratory. They noted the reduction of hands-on practical work in the labs by the students that have arisen as a consequence of the reduction of the hours available for laboratory classes. The additional 2 hourly paid teaching support members of staff and the 3 teaching fellows are expected to provide a useful additional resource that should allow the Department to reconsider the reduction in the laboratory hours. The technical staff would welcome such an increase. Further issues arising from this meeting will be analysed in the following sections.

Then the Committee met with the Departmental administrator, Mrs Constantina Boulamatsi and the student support officer, Mr Vasilios Tarnanas, who operates from a central unit that is remote from the Department. The admin staff outlined their roles and presented their workloads and commitments. It appears that the student-facing role of Mr Tarnanas supports around 3,500 students (from Mechanical and Electrical Engineering) and this is exceedingly high. Mrs Boulamatsi is responsible for the complete administrative support in terms of filing and processing of all Departmental documents, dealing with queries and communications, and supporting the work of all committees including minute taking and circulation. The key issues arising from this meeting will be analysed in Sections D and F.

The Committee then toured the laboratories of the Department and gained an impression of the infrastructure available within the Department and TEI. During the tour of the laboratories, staff who were in the labs gave short descriptions of their work. The overall impression of the Committee is that most laboratories of the Department are well equipped. The Committee then toured buildings of the TEI including the Student Canteen and the modern and well equipped Library building.

Before departing for the hotel, the Committee requested and received additional information from the Department Chair concerning the strategic goals and objectives of the Department.

Overall, this external evaluation visit to DME of TEI Thessaly took place in a professional,

cordial and collegial atmosphere. The Committee members are unanimous in expressing in writing their gratitude and appreciation to all staff, and students, of the Department for their excellent hospitality, collaboration and help with all aspects of the evaluation. The Committee would also like to thank HQA for the very effective logistical support.

## **II. The Internal Evaluation Procedure**

- **Appropriateness of sources and documentation used**
- **Quality and completeness of evidence reviewed and provided**
- **To what extent have the objectives of the internal evaluation process been met by the Department?**

The Committee was provided with adequate and up-to-date documentation on all relevant aspects of the Department's operations including the Programme of Study and the Summary Annual Report of 2011-2012. The Committee was also presented with a copy of the Department's Internal Evaluation Report covering the period 2007-2011 that was thorough, comprehensive, and informative and was prepared by an internal committee. The members of the internal committee were available during the visit and provided clarifications as was required.

### ***A. Curriculum***

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

#### **APPROACH**

- **What are the goals and objectives of the Curriculum? What is the plan for achieving them?**
- **How were the objectives decided? Which factors were taken into account? Were they set against appropriate standards? Did the unit consult other stakeholders?**
- **Is the curriculum consistent with the objectives of the Curriculum and the requirements of the society?**
- **How was the curriculum decided? Were all constituents of the Department, including students and other stakeholders, consulted?**
- **Has the unit set a procedure for the revision of the curriculum?**

The scope of the DME's curriculum is to provide students with "practical technological knowledge on Manufacturing and Energy issues, bridged with hands-on training on advanced simulation software packages by studying real test cases from the industry" (see: Programme of Study, 2013, pg. 3). The visit of the Committee showed that the courses and laboratory equipment available are adequate for meeting the objectives set. However, the visit also showed that the Department is understaffed and at the same time a high number of intake students per annum is enrolled, reducing significantly the hands-on time available per student. Additionally, the third main goal of the curriculum (studying test cases from industry) was not evident from the Internal Evaluation Report provided by the Department and the visit.

The curriculum has been structured with the aim of providing 30 ECTS (European Credit Transfer and accumulation System) per annum to the students, which is a typical goal for TEIs. The curriculum has two main pillars: the foundation courses and two sets of specialization courses. This structure is typical for TEIs in Greece.

The latest curriculum update was introduced in 2011. The previous curriculum update took place in 2005 (see Internal Assessment Report 2007-2011, page 75). The interviews revealed that the objectives, structure and lectures' timing was decided from the faculty staff with limited discussion and consultation with other internal and external stakeholders. Faculty members when interviewed stated that they consulted informally members of their own network of industrial partners. The Department does not have a defined strategy on how frequently the curriculum should be updated and who should be the key stakeholders during this process.

**Recommendation A1:**

*The Committee recommends that the Department should define and apply a detailed procedure for the periodic reviewing and updating of the curriculum.*

It is suggested that the curriculum should be formally updated every 4 years by a faculty committee, after considering benchmarks from other institutes and consulting all internal and external stakeholders (i.e., faculty members, fixed-term teaching staff, technical staff, administrative staff, students, industry, professional bodies and regional bodies). The defined procedure should indicate the timeframe and the required activities for revising the curriculum. Additionally, flexibility should be provided to allow minor changes (less than 10% changes in the content of a course) without faculty board approval. Finally, the Committee recommends that the vision and goals of the curriculum should be explicitly stated and documented in the next revision of the curriculum.

The interviews revealed that the needs of the local industry, the council and the region can and should be further reflected in the curriculum. Local industry is composed mainly of manufacturing SMEs, a few larger companies as well as businesses from the food and drink and the agricultural sectors.

**Recommendation A2:**

*The Committee recommends the establishment of an Industrial Advisory Board that will comprise representatives of regional and national industries from different industrial sectors, as well as representatives of regional bodies and professional associations.*

The food and drink industry and the agricultural industry in general that is a key local industrial sector should be represented in the board. The board's role should be to; provide advice regarding the strategy of the Department and its links with industry and the region, provide advice regarding curriculum updates, support DME to establish a network of industrial research partners, support DME in securing industrial placements for the students, and deliver industrial invited lectures on key applied technologies.

Currently, there is no postgraduate programme of studies offered at DME.

**IMPLEMENTATION**

- **How effectively is the Department's goal implemented by the curriculum?**
- **How does the curriculum compare with appropriate, universally accepted standards for the specific area of study?**
- **Is the structure of the curriculum rational and clearly articulated?**
- **Is the curriculum coherent and functional?**
- **Is the material for each course appropriate and the time offered sufficient?**
- **Does the Department have the necessary resources and appropriately qualified and trained**

**staff to implement the curriculum?**

The curriculum has been structured taking into consideration the expertise of the existing faculty members as well as the resources available for conducting the tutorials and labs. However, the annual student intake exceeds the capacity of both labs and lecture rooms. During the last two years the number of temporary (hourly paid) teaching staff that can be employed per annum have been drastically reduced. As a result of this reduction, the Department limited the hands-on elements of laboratories for the students. The student interviews revealed that they wish to have more practical experience during the laboratory classes.

Comparing the DME curriculum with that of equivalent Greek educational institutes, it is clear that a similar pattern is followed. Faculty members that were involved in the last update of the curriculum stated that they benchmarked with other curriculums from other institutes both national and international. The aim and objectives of the curriculum are not clearly defined, and it is suggested that in the next revision, these should be explicitly stated.

The curriculum includes 43 courses, requiring the successful completion of 39 courses – taught over 7 semesters - of which 35 are compulsory and 4 electives selected out of 8 optional courses. The lectures are delivered over seven semesters and during the eighth semester the students are undertaking their dissertation and are placed for practical training in local and national industries. The choice of optional courses is very limited, covering two basic themes of specialization, Energy and Manufacturing. The curriculum lacks any courses in management and engineering costing that are important to industry.

**Recommendation A3:**

*The Committee recommends the introduction of new courses covering engineering project management and economics/costing for engineers. These might be set up as a new theme of specialization or support the existing energy and manufacturing themes.*

The coherency and functionality of the curriculum are considered as satisfactory. The curriculum reflects the faculty members' attempt to cope with the large student intake, given the limitations posed by the available staff, resources and equipment. All courses included in the Programme of Study have a brief syllabus, the annual schedule and the assessment method (mainly through mid-term and final exams). Also, there is no ownership or accountability for the curriculum and its delivery during each year and this needs to be addressed.

**Recommendation A4:**

*The Committee recommends that the description of every course of the curriculum becomes more detailed to allow for better planning of lectures and for making sure that overlaps between courses are eliminated.*

**Recommendation A5:**

*The Committee recommends the appointment of a senior faculty member as “Programme Director”, with the responsibility for managing the structuring of the curriculum and for monitoring its delivery.*

The final semester dissertation and industrial placement are considered as important aspects of the Department's curriculum. Currently, only faculty members can supervise students for their dissertation, resulting in an average of 12 student dissertations per faculty member. The visit of the Committee at the labs showed that the available infrastructure (teaching

equipment and demonstration machines) is in a very good shape, with most of them having been updated within the last 5 years. Furthermore, the interviews with the existing faculty and technical staff showed that they are appropriately qualified, and the students confirmed the Committee's opinion that DME staff is committed to delivering the programme in the best way possible.

## RESULTS

- **How well is the implementation achieving the Department's predefined goals and objectives?**
- **If not, why is it so? How is this problem dealt with?**
- **Does the Department understand why and how it achieved or failed to achieve these results?**

The goals and objectives set in the curriculum are achievable. However, staff shortages have recently limited the opportunities for students to get hands on experience in the laboratories and resulted in high staff workloads. The Committee's interviews revealed that faculty staff have a clear understanding of these issues and are taking appropriate action to address them. The anticipated appointment of additional teaching staff (approximately 2 fixed term teaching staff and 3 teaching fellows are expected for the second semester) should improve the staffing profile, addressing some of these problems and help to enhance student experience.

## IMPROVEMENT

- **Does the Department know how the Curriculum should be improved?**
- **Which improvements does the Department plan to introduce?**

The DME's curriculum has been recently updated and DME faculty members of staff understand the need for frequent revisions in order to keep the curriculum up-to-date. The Department plans new courses in new technologies, materials and renewable energy sources.

During the meeting with the Committee, senior members of the Department stated that on the assumption that the current resource constraints are mitigated, the Department's proposed improvements of the Programme of Study are as follows; (i) to offer more laboratories as there is good equipment available, (ii) to enhance the theoretical content of courses, (iii) to introduce management courses, (iv) to develop courses to cover new technologies and (v) to develop courses that generate links with the agricultural sector.

The Committee met with two DME graduates who work full time in industry and they expressed their high level of satisfaction regarding how their studies prepared them for their career. At present the Department's links with graduates are ad-hoc and there is considerable potential benefit from enhancing its links with graduates.

### ***Recommendation A6:***

*The Committee recommends the appointment of an alumni officer in the DME or the School that will enhance the networking with past graduates.*

Members of the Industrial Advisory Board (see recommendation A2) could be alumni. Furthermore, this will allow the enhancement of the links with industries where alumni are employed and will provide additional opportunities for finding of industrial placements for

the students.

## **B. Teaching**

### APPROACH

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

- **Teaching methods used**
- **Teaching staff/ student ratio**
- **Teacher/student collaboration**
- **Adequacy of means and resources**
- **Use of information technologies**
- **Examination system**

The pedagogical policy and teaching approach of the Department are appropriate. The Department's policy on teaching is based on a continuous interaction with students and uses feedback obtained from student's questionnaires.

The teaching methods used are lectures, tutorials and laboratory activities for selected courses. Each course runs for 13 weeks. Faculty members make use of a number of technology platforms to enhance the educational process such as PowerPoint presentations. The Department's faculty members use the e-Class on-line system where lecture material and notes are made available on the Internet. Students noted that around 90% of lectures are on e-Class, but some course descriptions are not available on the system. Also, some faculty members of staff do not exploit in full the e-Class system capabilities (such as setting online tests, revision quizzes etc.) that could further enhance the teaching and learning experience of students. The Department is advised to look into these matters.

The undergraduate students brought to the Committee's attention problems associated with course scheduling and classroom availability.

An important issue is the low student attendance of lectures. Estimates provided by the faculty point to an average attendance figures of around 40% in comparison to much higher figures of around 70% suggested by the students. To improve lecture attendance, the scheduling of classes needs to be optimized from the perspective of student presence on campus and the lectures may be made more attractive to students by making them more relevant to their professional needs. The introduction of continuously assessed courses would also improve lecture attendance.

The Mechanical Engineering Programme of Study follows a four-year curriculum and this has been outlined in the Introduction and has been analysed in Section A. With 11 faculty staff members and 1650 registered students the student to faculty ratio is 150; this ratio is excessive for an effective educational system. When considering the "active" students (who are participating in the learning process), whose number is estimated by the Department at around 700, the student to staff ratio is about 64 which is still too high. If the additional 2 hourly paid staff and 3 teaching fellows are recruited as planned, this ratio will be further reduced to around 44, which would be more manageable. The Committee is concerned about the impact on the quality of education delivered to the students under such high students to staff ratios, especially as the number of students is decided by the Ministry of Education. Nonetheless, the Committee is pleased to note that the number of students have been reduced from 250 in 2012 to 151 in 2013, which is a 40% reduction. The lower intake

level and the n+2 law regarding the graduation period will gradually reduce the student staff ratio.

The Committee had the opportunity to visit all 14 laboratories; some visits were during laboratory exercises. All 14 laboratories are fully equipped, but the hours of the laboratory classes have been reduced and the hands-on elements have been reduced due to staffing shortage. The imminent arrival of additional staff will improve the situation, as outlined in Section A.

The collaboration between students and faculty members of staff is good, a fact confirmed by the students during the interview with them. The development of the concept of 'Tutor' could, however, further enhance this collaboration and provide individual help to the students.

The Committee identified the need to develop a procedure for improving the communication between faculty members and students. Apart from questionnaires, there are no other ways for students to express their views to the faculty. The Committee believes that the questionnaires are very useful as long as the views expressed by the students are analysed and steps are taken to eliminate any concerns and problems raised by the students. The students are satisfied with these arrangements; however they noted that they do not get fast feedback on the way that their views are implemented in order to improve the quality of teaching.

In terms of resources, the Committee visited two lecture rooms with no audio visual facilities and in need of refurbishment. In general, by considering the size of student intake the Department needs larger lecture rooms. Computing and network facilities are well organized and used. The Committee visited one of the two available computer laboratories. The visited computer laboratory was well equipped. The Committee appreciates that the reduction in student intake numbers will have a positive impact on resource and infrastructure demands.

The electronic communication system e-Class is used widely by the students. The expansion of the communication system to include an electronic questionnaire in the middle of semester will be able to identify and correct any problems by the end of the semester.

The current examination system is based on a written exam at the end of each semester and on the completion of laboratory exercises. The procedure for examining the final Semester project is good and generally maintains an acceptable standard. The industrial placement is assessed but no mark is given and as a result does not contribute to the average mark of the final degree.

#### IMPLEMENTATION

- **Quality of teaching procedures**
- **Quality and adequacy of teaching materials and resources.**
- **Quality of course material. Is it brought up to date?**
- **Linking of research with teaching**
- **Mobility of academic staff and students**
- **Evaluation by the students of (a) the teaching and (b) the course content and study material/resources**

The quality of teaching procedures is good as evidenced by the results obtained from student questionnaires, as shown in Tables 4.11, 4.12 and 4.13 of the Internal Assessment Report – 2007-2011. The Committee noted from the interviews with the students that they were satisfied regarding the level of teaching staff's knowledge and enthusiasm.

The quality of course materials is satisfactory as evidenced by student feedback and

observed by the Committee after examining a number of course materials such as, exam scripts, laboratory reports and dissertations. Most course materials were up to date. In addition, the existence of a large and modern library assists student learning.

During the visits to laboratories the Committee has been shown laboratory equipment that has been used by students to support their final Semester dissertation.

Currently, there is low participation of academic staff and students in mobility programmes. According to the Internal Evaluation Report during the academic years 2011-2012, and 2012-2013 the numbers of students from the Department who studied abroad through the Erasmus programme were seven (7) and nine (9), respectively. Two students from Spain have visited the Department through the Erasmus programme.

The Department uses end of semester written exams and laboratory exercises to evaluate student learning and these methods appear to be satisfactory.

## RESULTS

- **Efficacy of teaching.**
- **Discrepancies in the success/failure percentage between courses and how they are justified.**
- **Differences between students in (a) the time to graduation, and (b) final degree grades.**
- **Whether the Department understands the reasons of such positive or negative results?**

The Committee would like to note the genuine effort made by faculty staff for the constant improvement of the educational processes and appreciates the degree of difficulty in implementing such improvements under the current economic climate.

From the questionnaire, the students evaluate the teaching quality as good. There is no evidence of any discrepancies in the success/failure percentages between courses, however, during the faculty interviews the Committee observed different approaches to marking as a result of lack of clearly defined quality standards and student progression guidelines.

Apart from the graduation information given during the presentations to the Committee as included in the Introduction Section of this Report, there are no overall statistics to indicate the average graduation time. With the introduction of the n+2 legislation, the maximum time for the award will be limited to 6 years.

From the graduation statistics over the years 2008 to 2011 (see Internal Assessment Report – 2007-2011), there is no student who graduated with an average grade in the range of 8.5-10, while the percentage of students graduating with an average grade in the range of 7-8.4 was 3.1%, between 6.0- 6.9 was 54.8% and between 5-5.9 was 42.1%. The average overall grade over the years 2008 to 2011 varies in the range between 6.06 and 6.14.

## IMPROVEMENT

- **Does the Department propose methods and ways for improvement?**
- **What initiatives does it take in this direction?**

The Department has already started implementing the recommendations included in the Internal Evaluation Report in order to improve the quality of teaching using the available resources. In addition, the Department is very keen to use the results of the questionnaires in order to further improve its teaching methods. The Committee acknowledges their efforts and in addition suggests the following recommendations.

### **Recommendation B1:**

*All faculty members shall update all lectures and support material in the e-Class system. This exercise shall be repeated at the beginning of each semester in order to ensure that the material corresponds to the coming semester. Additionally, faculty members should attempt to fully exploit e-Class capabilities.*

**Recommendation B2:**

*The Department must make every effort to improve student lecture attendance and participation. One way is to introduce midterm tests, which will not only enforce participation but will also improve the quality of the examination process.*

**Recommendation B3:**

*In order to provide pastoral support and advice to students and enhance the collaboration between students and faculty the Committee suggests the introduction of the concept of Tutor.*

This will give the opportunity to students to not only obtain individual help and advice but also to make improvement suggestions.

**Recommendation B4:**

*The Committee believes that the faculty must continuously update their method of delivering their lectures in order to maintain and improve the quality of education.*

**Recommendation B5:**

*The Committee believes that there is a need to develop a procedure for enhancing the communication between faculty members and students.*

The Department shall call a meeting with the students at the beginning of each Semester in order to summarize cohort progression issues, course improvements and changes arising from student feedback and laboratory updates as well as introduce the modules for the coming Semester. At the meeting the students and the faculty will have the opportunity to exchange ideas on how to improve the educational process.

## **C. Research**

### APPROACH

- **What is the Department's policy and main objective in research?**
- **Has the Department set internal standards for assessing research?**

TEI's Research and Education Committee (REC) is responsible for the TEI's research strategy and annually conducts the research budget planning, the assessment of research results, the identification of deviations from the plan and their reasons, and the submission of proposals for improvement of the institute's research productivity. The REC constantly supports the researchers, by informing them about National, European and International research calls, collects proposals from the institution's researchers, facilitates the formation of research groups, facilitates the preparation and submission of the proposals and finally links them with the industry and enterprises to develop cooperation.

The Department over the last five (5) years decided to fill its staff vacancies with carefully selected candidates who are also research active. Today, the research activities of the Department are carried out mainly by seven (7) out of a total of eleven (11) faculty staff

members. These activities cover the main research areas of Energy and Manufacture and the specific research areas are as follows; 1) Heating, Cooling and Air Conditioning (Vlahogiannis), 2) Strength of Materials and Manufacturing (Zaoutsos), 3) Machining Technology and Control, CNC and Welding (Kehagias), 4) Tribology and Lubrication (Iakovakis), 5) Materials Technology, Metrology, Electronic Microscopy and Microanalysis (Mouzakis), 6) Heat Transfer (Charalambous) and 7) Engineering Mathematics, Analysis, Statistics and Finite Element Analysis (Providas). At the request of the Department, the Committee would like to note that during the past seven (7) years, Prof. Tsiricoglou has had extensive administrative duties, holding senior positions within the TEI, including being President for one year and chairing the TEIs' Committee for Training and Research for five years. These activities have reduced Prof. Tsiricoglou's research outputs during the past five years.

At the request of the Committee, the Department outlined its general research targets that include the frequent submission of research proposals to national and international calls, the long-term research cooperation with other institutes, the development of patents by the Department and the increased participation in international conferences.

Currently, the fourteen (14) laboratories of the Department are used for teaching needs and are also in operation for covering some of the research requirements. There is limited evidence of coordination with each other.

**Recommendation C1:**

*The Committee recommends that the Department, with the engagement of all faculty members of staff, should formally define its research strategy that will define the general direction and scope of its research activities.*

Based on the information that was provided to the Committee, the Department does not appear to have a formal policy or standards in terms of the evaluation of internally conducted research.

**Recommendation C2:**

*The Committee recommends the creation of internal standards for assessing research quality and outcomes as well as for monitoring research income.*

**IMPLEMENTATION**

- **How does the Department promote and support research?**
- **Quality and adequacy of research infrastructure and support.**
- **Scientific publications.**
- **Research projects.**
- **Research collaborations.**

The Department promotes research primarily via the appointment of research active members of faculty. This policy is in place for many years now and consequently all newly appointed faculty members are research active, resulting in a Departmental profile with 7 out of the 11 faculty members being research active. The other main support for research is via the investment in laboratory equipment that can be used for research. The Committee identified several pieces of equipment that were state of the art and were purchased to primarily support the research activities of the Department. The Department wishes to explore options for the joint supervision, with Universities, of doctoral candidates who are registered at Universities. There has been limited activity in this direction, mainly involving

collaboration with the University of Thessaly.

The main drawback in terms of creating a research environment is the lack of doctoral candidates and to a second degree the lack of a postgraduate course that would have created opportunities for higher quality dissertations with a potential for generating publications. Also, there are few funded research projects and this generates only a small number of research officers who can contribute to the operation and utilisation of the research infrastructure.

As already mentioned in the Introduction section, the Department during the period from 2007 to 2010 received € 1,000,000 for equipment and this has allowed the purchasing of several pieces of research equipment. However, equipment funding has currently been suspended and it is important that alternative sources of funding are found, such as funding arising from regional bodies and linked to applied research for competitiveness improvement of regional companies. The Greek regions have been allocated EU funding for the period 2014-2020 and it is important that the TEI and Department participate in such programmes.

**Recommendation C3:**

*The recommendation of the Committee is that the Department should seek to find alternative funding mechanisms, such as the regional innovation and competitiveness programmes, to improve further its infrastructure in terms of research equipment.*

The Department staff members over the period 2008 to 2013 have published 7 journal papers per annum. When considering that there were 12 members of faculty (out of whom 6 were research active) the average research outcome is modest at 0.58 journal publications per annum, per member of staff. This figure becomes 1.16 journal papers per annum per member of staff when only the 6 research active members of faculty are taken into account. These figures are below national and international norms.

**Recommendation C4:**

*The Department needs to encourage the publication of good quality and quantity journal papers by the members of faculty.*

As mentioned in the Introduction, the current range of research programmes for the period 2011-2015 in the Department comes to € 2,000,000 comprising 80% EU and 20% national funding. The overall success ratio of research proposals is running at around 10%. The average income per member of staff for the 11 staff is 182k €. There is no evidence of planning the applications in terms of establishing more stable acquisition of R&D income and insure visibility in selected fields.

In terms of research collaborations, the Department appears to have a number of active collaborations with Universities inside and outside Greece. The Department has academic collaborations both nationally (i.e. University of Thessaly) and internationally through European Union Erasmus funding (i.e. Frederick University in Cyprus, Technical University of Ostrava in Czech Republic, Hochschule Niederrhein, Kerfeld in Germany, Transylvania Universities of Brasov and Craiova in Romania and Loughborough University in the UK). No direct links with industry were mentioned.

**Recommendation C5:**

*The Committee notes that the level of research income is modest and also that more collaborative programmes are needed, in partnership with other Universities and industry.*

## RESULTS

- **How successfully were the Department's research objectives implemented?**
- **Scientific publications.**
- **Research projects.**
- **Research collaborations.**
- **Efficacy of research work. Applied results. Patents etc.**
- **Is the Department's research acknowledged and visible outside the Department? Rewards and awards.**

During the period 2009 to 2013, the Department members of staff have published; 1 book, 36 papers in learned journals, 2 papers in other journals, 29 papers in international refereed conference proceedings, 31 papers in international conferences, 20 papers in national conferences and 6 chapters in technical books. During 2013 faculty staff members have published; 7 papers in learned journals, 14 papers in international conferences, 3 papers in national conferences and 2 chapters in technical books.

In terms of other outcomes and distinctions arising from publications, the Department staff members over the period 2008 to 2012 have received; 382 citations of publications, 1 mention in the special/scientific press, 2 participations in conference scientific panels, 7 participations in the editorial board of scientific journals, 3 invitations for keynote papers for international conferences, 1 patent and 1 other award.

Doctoral candidates and postgraduate students through collaboration with the University of Thessaly are involved in the research projects, something that the Committee considers as good practice and include: 1) Dallas, P. A study of travelling waves in inclined liquid film flow, 2007 (MSc), 2) Syranidou, N. Effect of pipe inclination on the transition to slug flow regime in two-phase gas-liquid flow, 2009 (MSc), 3) Papadimitriou, E. Experimental study of instability of inclined film flow, 2010 (MSc), 4) Georgakaki Anna. Effect of soluble surfactants on free surface flows, 2013 (PhD) and 5) Zhehui Cao. Primary instability and subsequent dynamics of liquid film flow along periodic corrugations, 2013 (PhD).

## IMPROVEMENT

- **Improvements in research proposed by the Department, if necessary.**
- **Initiatives in this direction undertaken by the Department.**

There is an expectation by the Department that by applying national rules, regulations and procedures concerning research will assist in a positive way the development and planning of its research laboratories, for the achievement of its research aims.

The Committee noted the effective absence of a coherent research strategy and of detailed targets and objectives. The Department is advised to define a strategy with the associated research standards and targets for papers and research income and all these issues are covered in the preceding recommendations.

The other major area is the apparent fragmentation of research focus between all laboratories. The Department is advised to prioritise its efforts and investment to a few selected laboratories and large research themes/projects that secure the collaboration of all members of staff.

### **Recommendation C6:**

*The Committee recommends that the Department promotes collaboration between its*

*faculty members using large research themes/projects.*

## ***D. All Other Services***

### APPROACH

- **How does the Department view the various services provided to the members of the academic community (teaching staff, students).**
- **Does the Department have a policy to simplify administrative procedures? Are most procedures processed electronically?**
- **Does the Department have a policy to increase student presence on Campus?**

The Department is taking initiatives to maintain and improve the services provided to the academic and student communities. Therefore, during the last five (5) years these initiatives include; Electronic data management, Electronic documentation, Electronic administration – for student matters, Electronic lectures registration, Electronic books registration, Electronic administration of certificates, Electronic insertion of grades, Electronic production of degree certificates, Electronic questionnaire management and evaluation system, Electronic administration – for part time teaching staff matters, Electronic applications submission, Electronic evaluation, Electronic table with a list of candidates, Administration for technical and financial aspects of ERDF (ΕΣΠΑ) projects and Administration for the National Research Committee research projects.

Several faculty members used to organize student visits to related industries and other universities and this was well received by the students but currently is significantly reduced due to economic factors.

### **Recommendation D1:**

*The Committee recommends that the Department ensures the continuation of organised student visits to industry.*

The committee interviewed a large group of undergraduate students who came to the meeting on a voluntary basis and who were articulate about their own academic and student-life related affairs. This is considered as a good sign that the student body is involved in the affairs of their Department, and as a consequence the student presence on campus is adequate. The Committee then toured the laboratories of the Department and established an impression of the infrastructure that is available within the Department'. The overall impression of the Committee is that the Department has a good set of laboratories that are well equipped. The Committee finally toured the buildings of the TEI including the modern Library building.

### IMPLEMENTATION

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

Under a TEI framework of savings on funding and staff the Department organised a unified electronic student register that operates centrally with reduced staff requirement in order for each Department to reduce the number of administrative staff to the level of a single staff. As mentioned in the Introduction Section there is only one (1) administrator in the Department

and one (1) administrator for student matters, who are remotely placed. The feedback given to the Committee by the two members of staff was that their workloads are very high and that their remote location does not help either, as there are multiple business processes that require the engagement of both. When considering the size of the student population in the Department and that the student support officer also supports Electrical Engineering (together around 3,500 students), the Committee considers that the present levels of admin and student support are inadequate. The TEI President had indicated that the Government had recognised the need for more administrators at TEI level and this will help to address this issue.

**Recommendation D2:**

*The Committee recommends that the TEI increases the level of administrators to the Department by at least one, who should be based in the Department and support both the administrative processes and the student support aspects.*

**RESULTS**

- **Are administrative and other services adequate and functional?**
- **How does the Department view the particular results?**

The implementation of electronic ways of working by the Department has been successful. The administrative services of the Department are not adequate and this has been addressed above, see Recommendation D2.

**IMPROVEMENTS**

- **Has the Department identified ways and methods to improve the services provided?**
- **Initiatives undertaken in this direction.**

According to the centrally applied rules by the state and regulations for the TEI and the new law 4009/2012 that sets the aims and actions that relate to the preparation of the new internal regulations and the constitution of the institution. Specific aims for these actions relate to the investigation for the use of IT, compliance with ISO 9001, and simplification of the bureaucracy for ordering consumables and other supplies. The Department is interested to improve and strengthen these services and the administrative group has a forward-looking attitude to achieve improvements. Electronic documentation should be enhanced and would further streamline the administrative load.

**Collaboration with social, cultural and production organizations**

**Please, comment on quality, originality and significance of the Department's initiatives.**

The Department members of staff are involved with the delivery provision for the National Educational Programme for Energy Inspectors (offered by a small number of HEI in Greece) and also participate in the Thematic Working Groups of the Thessaly Prefecture for its Development Planning for the period 2014-2020.

The Department members of staff have a continuous involvement with local authorities including the Larissa Institution, the Technical Chambers of Greece (Section of the Central and Western Thessaly), the Thessaly Institution of Industry and Business, the Business Chambers of Thessaly and Central Greece, and a number of technical events and technical updates.

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

- **Potential inhibiting factors at State, Institutional and Departmental level, and proposals on ways to overcome them.**
- **Short-, medium- and long-term goals.**
- **Plan and actions for improvement by the Department/Academic Unit**
- **Long-term actions proposed by the Department.**

In the three weeks prior to the visit and during the external evaluation visit, the Committee has had the opportunity to; study the Internal Evaluation Report and the Programme of Study of DME at TEI Thessaly, listen to presentations by the Department Chair, TEI Vice-President and Dean, hold interviews with all faculty members of staff, meet with all administrative and technical staff as well as with a large group of undergraduate students. In addition, the Committee met with two alumni of the Department and held extensive group and individual discussions. Hence, the Committee considers that it has gathered enough factual data and information on which to base its responses to the questions posed by the HQA, as shown below.

The DME is one of the first Departments created within the TEI Thessaly, and hence its origins go back to the start of 1970s. It is a well-established Department, with functional but ageing buildings, very good equipment levels and a renewed faculty staff profile following several new appointments and staff retirements. The DME has good reputation within the TEI community and in Greek industry, with many companies employing its graduates.

At institutional level, the TEI of Thessaly is having an engagement policy with the Thessaly region and its industry and there is recognition that it should play its role in various sectors of the Greek and regional economy, including agriculture.

The present condition of the Greek economy is placing major funding challenges to the Greek public sector, including the Universities and TEI. These difficulties have manifested themselves into funding cuts for the TEI and a reduction of the equipment and operating budget for the DME. In the period prior to the financial crisis, a feature of the operation of DME, that was similar to all TEI Departments in the country, was the deployment of hourly paid members for staff for lecture and lab support. In the period 2007-2010, the Department has awarded teaching support contracts covering 660 hours per week for both semesters to hourly paid staff, which equates to placing 41 contracts each for a typical 16 hour per week teaching support. Clearly, these levels of resourcing were excessive and financially unsustainable. The current funding allows placing teaching support contracts for 32 hours per week, or 2 contracts of 16 hours each. Consequently, the TEI and DME have had to undergo a major and rapid operational readjustment arising from these funding changes and resulting in an increase in faculty staff workloads. When this is seen in the context of lack of

approvals for the replacement of retiring faculty staff, then the situation becomes even worse. However, the student intake of DME was reduced from 250 in 2012 to 151 in 2013; this represents a 40% intake reduction and will reduce staff workloads.

**Recommendation E1:**

*The Department is advised to develop a fact based resource planning procedure that would link the requirements arising from the number of undergraduate students and the structure of the Programme of Study, to the resource capability available within the Department.*

This would allow the evidence based planning of how the teaching and learning activities would be supported within the Department, each year.

On the request of the Committee, the Department Chair provided the Committee with an updated document listing the goals of DME and respective actions towards achieving those goals. The short-term goals of DME include; maintain an updated course programme, increase student attendance of lectures, enhance student access to the IT facilities of the Department and improve communication with its students. The Department has started addressing some of these issues. The Committee's view is that there needs to be a structured process within the Department by which to update the Programme of Study, avoiding ad-hoc actions, as outlined in Recommendation A1, in Section A. Also, having spoken to the students, it is clear that there is scope for enhancing the communication between the Department and its students and this is covered in Recommendation B5, in Section B.

A key medium to long-term goal of the Department is to increase its members of staff. This is of course directly linked to the funding provided by the Government and it does not appear likely in the medium term. Instead, the Committee understands that there will be redeployment of faculty members of staff from other Departments and this appears a good way to increase the number of faculty staff. These additional faculty members, together with the Teaching Fellows and the hourly paid contract staff should result in a satisfactory number of teaching staff within the Department.

The Committee understands that recently the Department has reduced the number of hours per laboratory, due to the large number of students and the low number of staff available. As mentioned by the students and the technical members of staff this has had a negative effect this year, with some laboratories becoming lab based lectures or demonstration sessions. This is a concern that needs to be addressed by the Department as a matter of priority as it relates to the core mission of DME to prepare engineers with a practical skill sets as required by industry. Bearing in mind the reduction in student numbers, the Committee's view is that the Department's resource levels, as outlined above, can adequately support its laboratory programme.

**Recommendation E2:**

*The Department must ensure that all its laboratory sessions contain practical application, hands-on elements to provide the students with the skills required according to its own declared aim to provide applied training within a laboratory setting, as outlined in the Programme of Studies 2013.*

In terms of research, the Department plans to improve its research laboratories, and enhance research collaboration with overseas Universities and its participation in European research projects. The Committee fully supports these aspirations and the related recommendations can be found in Section C.

In the view of the Committee, the regional role of DME needs to become a core aspect of its

strategy in terms of training its students via placements, carrying out applied research projects and contributing to regional competitiveness and innovation via tailored projects funded by EU programmes.

**Recommendation E3:**

*The Department, and TEI, would need to develop a coherent Regional Impact Strategy regarding how they could support the development of innovative products and services and the increase of competitiveness of all sectors of the economy within the Thessaly region.*

***F. Final Conclusions and recommendations of the External Evaluation Committee***

**Conclusions and recommendations of the External Evaluation Committee on:**

- the development of the Department to this date and its present situation, including explicit comments on good practices and weaknesses identified through the External Evaluation process and recommendations for improvement
- the Department's readiness and capability to change/improve
- the Department's quality assurance.

The external evaluation of the DME at TEI Thessaly took place at a difficult time for Greece, with major resource constraints for the TEI arising from the financial crisis. The Committee understands that the equipment budget of the Department has been reduced to zero but the equipment available within the Department is overall at a satisfactory level. The resources for consumables and hourly paid teaching support staff have also been drastically reduced but these cuts will be partly mitigated by imminent staff redeployments from other Departments and the introduction of teaching fellows.

Overall, the Committee considers that the operation of the Department of Mechanical Engineering is satisfactory. The taught programme has a satisfactory content and is being delivered well. The overall level of research within the Department is adequate when this is viewed in the national context of TEI operations, but is below average when seen in a holistic Higher Education context with national and international dimensions. There is an increasing number of research active faculty members of staff operating in well equipped laboratories and this is encouraging and needs to be supported and built upon. DME staff is generally well motivated, the student number is good and the Department has gained a good reputation since its creation.

The Committee has made many recommendations in the previous sections of this report. All these would need to be considered by the Department. Herein, the Committee wishes to restate and stress a selected number of key recommendations as follows:

**Recommendation A1:**

*The Committee recommends that the Department should define and apply a detailed procedure for the periodic reviewing and updating of the curriculum.*

**Recommendation A2:**

*The Committee recommends the establishment of an Industrial Advisory Board that will comprise representatives of regional and national industries from different industrial sectors, as well as representatives of regional bodies and professional associations.*

**Recommendation A3:**

*The Committee recommends the introduction of new courses covering engineering project management and economics/costing for engineers. These might be set up as a new theme of specialization or support the existing energy and manufacturing themes.*

**Recommendation B4:**

*The Committee believes that the faculty must continuously update their method of delivering their lectures in order to maintain and improve the quality of education.*

**Recommendation B5:**

*The Committee believes that there is a need to develop a procedure for enhancing the communication between faculty members and students.*

**Recommendation C1:**

*The Committee recommends that the Department, with the engagement of all faculty members of staff, should formally define its research strategy that will define the general direction and scope of its research activities.*

**Recommendation C3:**

*The recommendation of the Committee is that the Department should seek to find alternative funding mechanisms, such as the regional innovation and competitiveness programmes, to improve further its infrastructure in terms of research equipment.*

**Recommendation C4:**

*The Department needs to encourage the publication of good quality and quantity journal papers by the members of faculty.*

**Recommendation D2:**

*The Committee recommends that the TEI increases the level of administrators to the Department by at least one, who should be based in the Department and support both the administrative processes and the student support aspects.*

**Recommendation E1:**

*The Department is advised to develop a fact based resource planning procedure that would link the requirements arising from the number of undergraduate students and the structure of the Programme of Study, to the resource capability available within the Department.*

**Recommendation E2:**

*The Department must ensure that all its laboratory sessions contain practical application, hands-on elements to provide the students with the skills required according to its own declared aim to provide applied training within a laboratory setting, as outlined in the Programme of Studies 2013.*

**Recommendation E3:**

*The Department, and TEI, would need to develop a coherent Regional Impact Strategy regarding how they could support the development of innovative products and services and the increase of competitiveness of all sectors of the economy within the Thessaly region.*