



EXTERNAL EVALUATION REPORT

DEPARTMENT OF ELECTRICAL ENGINEERING

TEI OF WESTERN GREECE



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

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External Evaluation Committee

The Committee responsible for the External Evaluation of the Department Electrical Engineering of the Technical Institution of Western Greece consisted of the following four (4) expert evaluators drawn from the Registry constituted by the HQAA in accordance with Law 3374/2005:

1. Professor George K STYLIOS _____(President)
(Title) (Name and Surname)
Heriot Watt University _____
(Institution of origin)
2. Dr Dimitrios MAKRIS _____
(Title) (Name and Surname)
Kingston University _____
(Institution of origin)
3. Dr George GOUSSETIS _____
(Title) (Name and Surname)
Heriot-Watt University _____
(Institution of origin)
4. Dr Nikolaos TSOTSOLAS _____
(Title) (Name and Surname)
AMBIENCE _____
(Institution of origin)
5. _____
(Title) (Name and Surname)

(Institution of origin)

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

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

Introduction

I. The External Evaluation Procedure

Dates and brief account of the visit

The External Evaluation Committee (EEC) met from the 21st to the 26th of October 2013 to conduct the external assessment of the Department of Electrical Engineering (Τμήμα Ηλεκτρολόγων Μηχανικών Τ.Ε.) of the Technological Educational Institute (TEI) of Western Greece, Greece, referred to as “Department” and “Institution” respectively in this Report.

The EEC was briefed by the Hellenic Quality Assurance Agency (HQAA) in the morning of the 21st of October 2013. Later, on the same day, the EEC visited the campus of the Institution under evaluation where they had a short meeting with the President and Vice President of the Institution, the Head of Department and other staff. The visit lasted for 3 days, until the 23rd October. During this period the EEC had the opportunity for detailed discussions with the staff, extensive visits to the laboratories and support facilities and access to a broad range of documentation related to the operation of the department.

On the 23rd of October 2013 and prior to the departure from the Institution, a preliminary presentation of the findings was given to the Head of the Department and a delegation of Departmental staff.

People associated with the department met and interviewed by the Committee

The visit to the Institution involved meetings with the following executive and academic faculty members of the Institution:

- President (Prof. Socrates Kaplanis);
- Head of the Department (Prof. Labros Bisdounis)

It also involved meetings and interviews with:

- the members of academic staff of the Department who were responsible for the internal assessment report (OMEA);
- members of permanent academic staff;
- non-permanent academic staff;
- technical support staff;
- students (from different year of study);
- alumni;
- administration staff

It should be noted that the committee was able to meet students on an ad-hoc basis; during the visit of each laboratory and after a brief introduction by the Head of the Department and the responsible academic member of staff. Staff members withdrew from the room and the

committee had the opportunity for informal interaction with the students. The input from the students provided valuable information to the Committee.

List of reports documents and other data examined

Prior to arrival at the institution, the HQAA provided to the EEC an electronic version of the prospectus of studies as well as the 2010-2011 internal evaluation report and the Identity Report of the Department to the EEC, which was prepared under HQAA rules. An electronic version of the Department's annual report of 2012-2013 was also provided to the EEC members two weeks prior to the visit.

On arrival, the EEC was also given copies of:

- an updated version of the internal evaluation report covering the period 2012-13;
- the prospectus of undergraduate studies;

The EEC was given access to the virtual learning environment used by the Department (eclass) and a range of documentation including:

- the guide for project dissertations (“πτυχιακές”), project evaluation reports;
- the guide for industrial placements, industrial placement approval forms, industrial placement log books, industrial placement completion forms, and contact details of organisations hosting industrial placement students;
- samples of exam papers and coursework briefs;
- samples of marking schemes;
- samples of exam and coursework scripts, and dissertations;
- samples of module grades including coursework, exams and dissertations;
- samples of textbooks and other learning resources (e.g., lecture notes);

Facilities visited by the Committee

The EEC visited the following facilities of the Institution:

- lecture theatres / rooms;
- undergraduate and research student laboratories;
- academic staff and administration offices;
- the library;
- the liaison office

The report that follows is based on the information received before and during the visit.

The EEC is aware that some remarks/suggestions contained in this report may not meet the existing institutional and legal framework in Greece, but are consistent with the policy of their own institutions within the EU.

II. The Internal Evaluation Procedure

Appropriateness of information

The written information provided to the committee in the form of the self-study as well as that made available to the Committee during the site visit were directly related to the objectives of the visit and sufficient to allow the Committee to reach its conclusions with a high level of confidence.

Quality and completeness of information

During the meeting on Monday morning the Committee identified some omissions and ambiguities in the Internal Evaluation Report. Clarifications were sought during the visit. By the end of the site visit on Wednesday, all the requested information was provided and the ambiguities resolved.

Achievement of internal evaluation objectives

To a large extent, the information contained in the internal evaluation report supports the conclusions reached in Chapter 9 of the report. The observations and comments of the External Evaluation Committee on the basis of the Internal Evaluation Report, the additional documents provided and the interviews conducted during the site visit are contained in the concluding section of this report.

Acknowledgement

The Committee appreciates the support and professionalism of the HQAA secretariat before, during and after the visit. The documentation, arrangements and willingness to help with any queries made the task of the EEC much easier.

A. Curriculum

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

APPROACH

The goals and objectives of the electrical engineering curriculum are described in detail in the departmental prospectus of studies. The main focus of the curriculum is to provide to the students:

- a) high quality education that addresses the needs of the industry across the electrical, electronic, information, automation and communication sectors.
- b) a broader advanced background and complementary skills that will enable the students to adapt and follow the rapid developments in the aforementioned sectors

In this respect the aims of the curriculum are aligned with common practice in other electrical and electronic engineering departments in Greece and abroad. Particular emphasis is placed in providing applied scientific and technological skillset that is directly applied to the needs of the market. In order to achieve these goals, the program of studies involves modules of i) general background (8 modules); ii) topic-specific background (14 modules); iii) specialization (23 modules); iv) management, finance and legal studies (4 modules). In order to graduate the student should successfully attend 39 modules out of a total of 49 modules on offer. All 26 modules among categories i, ii, iv above are compulsory. Among the 23 specialisation modules, 6 are compulsory to all students while the remaining 7 are selective from two different streams.

The objectives of the curriculum were decided by the department considering the national legal framework, the current needs of the Greek economy as well as the career prospects of the graduates. Following discussions with the officers and the faculty, we understand that the present curriculum is the result of a revision that was conducted in 2002. The revision was prepared by consensus across the departmental faculty following a consultation process that engaged the industry as well as external academic faculty. This is appropriate given the aforementioned aims and objectives and in accordance with best practice nationally and internationally. As an example that highlights the fruitful interaction with stakeholders to enhance societal benefits, it is noted that following advice from the industrial representatives components associated with Programmable Logic Controllers were added in the curriculum.

This committee saw no evidence of written procedures for revising the curriculum on the basis of identified needs, yet an informal flexible mechanism seems to be in place that within Institute and national boundaries allows the development of new courses and expanding the laboratories content. The committee was advised that a follow-up revision was planned for 2012 but has been delayed due to recent developments that have seen the departmental staff reduced by about 50% since 2007. It is understood that this revision is now postponed until the academic year 2014-15 and that a similar procedure will be followed in the planned revision. Although the informal procedure in place seems to be effective, it would be beneficial for the Department to codify it and document it. In accordance with best practice in Europe, the department also applies the European Credit Transfer and Accumulation System (ECTS), an EU-wide standard for comparing the study attainment and performance of students of higher education.

The current curriculum structured around modules in categories i-iv above is responsive to the goals set given that it comprises both background and specialization modules that follow standard practice for Bachelors of Engineering (BEng) studies or equivalent internationally. The curriculum places heavy emphasis on the practical applications of electrical engineering by exposing the students to extensive laboratory experience. The laboratories are designed

and developed in accordance to the curriculum and are well integrated with the theory courses. Examination of the course descriptions of the laboratory courses and examples of projects contained in the course files reveal the applied nature of these courses. On the basis of interviews with students, the laboratories were considered the most attractive part of the curriculum compared to the theoretical part. The high success rate of the students in the laboratory courses seems to confirm the positive opinion of such courses. This increased level of laboratory exposure exceeds the average practical training of students in similar courses elsewhere and the committee sees this as a distinct advantage of the departmental curriculum.

IMPLEMENTATION

The contents and structure of the curriculum are well-documented both in electronic format as well as hard copy. These records describe the courses, their contents and the sequence in which they must be taken to ensure that a student seeking to enrol in a course has satisfied stated prerequisites for the course. The committee has examined in detail syllabi and reference materials for the courses described in the prospectus of studies. During the on-site visit, the department made available individual folders for the modules on the curriculum that included detailed description of the contents, visual material used during the delivery of the lectures, the choice of books given to the students as well as past examination papers with solutions, and relevant statistics of grades for the past three years. Selected folder samples have been reviewed by the committee.

The topics and contents of the courses are comparable to those in Electrical and Electronic Engineering Bachelor of Engineering (EEE BEng) or equivalent programs elsewhere. The structure of the curriculum is rational and clearly articulated in the prospectus of studies together with the specific sectors where the relevant skillset is immediately applicable. The content of the courses is appropriate for the aims of the curriculum as well as the lecture and examination time. The level of the courses' content is generally high matching (and in some cases possible exceeding) the average level for similar courses elsewhere. The material made available to the students is extended and of very high quality. Electronic platforms support the distribution of such material.

A semester dedicated to the final year project is scheduled for the last year of the curriculum. The committee has had the chance to review several among recent final year projects, which indicated the relevance and high quality of the activities undertaken. The departmental faculty advised that increasingly they discourage students from bibliographical-type of projects and encouraging students to develop coherent understanding and practical skills through projects emulating real-life scenarios. This is appropriate in view of integrating the knowledge acquired at earlier stages of the studies and obtaining practical skills applicable to the industry's needs. From discussions with the students and recent graduates, the committee understands that on several occasions, the outcome and experience obtained during the final year project can be central in the post-graduation career development. The curriculum also includes an industrial placement ("stage"), which is in-line with the goal of professional and industrial relevance and is in accordance with best practice elsewhere.

The breadth and depth of some general and topic-specific background modules in the curriculum, including mathematics, is appropriate in view of the aim set to deliver engineers trained at appropriate level to follow future technological developments and potentially

deliver future research leaders. The success in achieving this goal is evidenced by the increasing number of graduates who move on to postgraduate taught or research studies as well as cutting-edge technology. During the visit to the department, the committee had the opportunity to meet several individuals that belong to this category. However such concentration of theoretical knowledge constitutes a heavy load, particularly for those students who graduate with weaker background and/or less exposure to theoretical topics. In view of the above, it is noted that during the past few years the department has received graduates with grades well below 50% (e.g. 20% and in some extreme cases near 0%) in theoretical topics at secondary education level. The feedback from the students confirmed the difficulties that a significant fraction of the cohort faces with theoretical topics. This is identified as a major educational challenge for the department.

In terms of resources for implementing the curriculum, it is noted that at present the student to staff ratio is very unfavourable, understood to exceed 150:1. Considering fixed-term contract staff as well as a number of “inactive” students, this ratio is likely to drop to 50:1. Faculty should be acknowledged for the high quality of education they achieve despite such challenging conditions; on several occasions faculty have to repeat the same laboratory exercise 14 times or more so that no more than 2-3 students share the same experimental setup.

RESULTS

The structure of the curriculum and the contents of the courses are aligned with the goals and objectives set. The syllabus structure and content is aligned with high quality EEE BEng topics elsewhere. Yet, a careful examination of the totality of the data relating to examination results provided by the Department highlights a significant challenge. Very few students graduate within the nominal matriculation period. The average grade of the graduating group is about 6.5. In several courses, the average grade for the examinations over the past three years was less than 4.0 with the majority of the grades falling in the range 0-4.0. A very small fraction of the students received grades 7.0 and higher. Only a single student has received a first class degree (Αριστείο) since the establishment of the department. These data lead to the conclusion that there is a serious mismatch between the curriculum and the matriculating student body and the goals of the Department are achieved only for a small minority of the registered student body. Whatever the reason might be for the poor performance of the majority of the students, their presence in the program diminishes its effectiveness and does a disservice to the small minority who make the effort to complete the program on time and with relatively good grades.

Another problem detrimental to the effective implementation of the curriculum is the lack of resources. The student/staff ratio is unfavourable. Likewise the available space for delivering lectures and laboratories is limited considering the size of the cohort. The Department is aware of these deficiencies, but it is constrained by the lack of sufficient personnel and funds. In spite of these difficulties, the commitment of the teaching staff, the links with industry and the extensive laboratory training provide a positive environment for ensuring an effective implementation of the curriculum. The final year placement, a compulsory obligation of the curriculum, ensures a straightforward adoption of graduates in any working environment.

IMPROVEMENT

The Committee appraised the Department of the concerns concerning the curriculum and its implementation. The deficiencies with respect to the resources available, the level and quantity of incoming cohorts and the low ratio of graduating students to the number of registered students are beyond the control of the Department. Funding for facilities is controlled by the central government. Also, until recently, by law a student could not be terminated from a program, regardless of the time of matriculation. The Committee was told that the law has been changed and this problem should eventually be solved.

Regarding the poor performance of the students, it is the responsibility of the department to take mitigating actions. Traditionally, the academic standing of students entering the Technical Educational Institutes is lower than those entering university engineering programs. To improve the graduation rate, the Department needs to make extra effort to help the entering student improve their knowledge of mathematics and physics. It is recommended that the Institute initiates a formal program of tutoring to help the incoming students compensate for their deficiencies. The Department needs to critically look at the theoretical course content and sequence and decide whether or not all the material covered in the two said courses is necessary for completing the curriculum. If so, the Department should consider options such providing tutoring services to help the students with deficiencies, and/or removing some of the topics from the mathematics courses and integrating them better with the applied courses.

One challenge identified through discussions with students/faculty and considering the legal framework and wider societal context within which the department operates, relates to the communication of the goals to its students and the wider public. In particular the committee has observed indications of a misalignment between the stated goals of curriculum to deliver highly skilled engineers at BEng level or equivalent and the expectations of a fraction of the student cohort that consistently appear to anticipate receiving training at technician level. Such a misalignment could be attributed to a combination of a range of factors including; the heritage of the Institution; the entrance qualification procedures; the professional rights of its graduates; the professional and social background of the students. In view of this observation, the committee notes that promoting the high level of education delivered through the curriculum to its students and wider society can be beneficial for the department.

B. Teaching

APPROACH

The teaching strategy adopted by the Department is based on delivering a combination of theoretical lectures and practical laboratories that are assessed independently, emphasizing “hands-on” education that will lead to employable graduates with practical skills.

Students participate in lab sessions in small classes (12-24 students per session) which allow strong interaction with the teaching staff. Theory lectures are normally given to audience of 30-100 students. Generally, teaching is aimed at an average student profile. Modules are well organised, with learning outcomes clearly specified and teaching syllabus and assessment satisfactorily align to the learning outcomes.

Since 13 members of academic staff correspond to 1600 students approximately, the teaching staff/student ratio is extremely low (1/150). Very large number of students is registered in early semesters, e.g. up to 1010 in modules in semesters 1 and 2 and up to 887 in modules semesters 3 and 4. In later semesters numbers are lower, especially for modules that are not compulsory for the whole cohort of the course. Obviously, such a low staff/student ratio adds huge pressure to the academic staff.

Teacher-student collaboration seems to be good, as a consequence of small group lab sessions. In theoretical classes, students are encouraged to ask questions. Outside teaching hours, students are able to approach staff during “surgery hours”. In the final year project dissertation, students have the opportunity for one-to-one interaction with their own supervisors and wider collaborations with industry.

The departmental buildings have limitations in space and also need modernising. Generally, labs are well equipped. Students are able to access internet in computer labs, when no scheduled class take place. In addition, wireless network enables students to connect to the internet through their laptops and mobile devices. Lecture rooms are designed for old-style teaching, as they are equipped with large blackboards that are hardly used in other EU institutions nowadays and they lack of IT provision (networked computer/data projector/projector screen). Alternatively, teaching staff use a combination of laptop, mobile data projector and project in the wall, which however provide a poor experience to students (e.g. staff wastes time to set the projector system, the projection area on the wall is small and at one side of the room, therefore students may have poor or limited visibility of the material. In a lecture room the door is missed, allowing noise from the corridor to disturb the lecture. Lack of elevator limits the accessibility of building by disabled students and this needs immediate addressing.

A range of information technologies are successfully and extensively used to support teaching. For instance, e-class, a virtual learning environment, facilitates electronic distribution of educational material, online coursework submission, messaging, announcements, online fora, etc. Presentation slides are provided to the students to structure and guide the lectures and provide an effective summary of the syllabus.

Specialised software, such as Matlab, AutoCAD, OrCAD Pspice, OptSim, LonWorks, AVRStudio, Altera, Simatic Step 7, Fine Adapt 4M, Electrical CADdy++, Retscreen, Wireshark, Labview and DIALux are used to support the needs of specific labs.

The examination and assessment system seems fair. Exams are well-invigilated, as they take

place in small classes with sufficiently large gaps between students. Dyslectic students may request oral examinations. Students can access to their marked exam scripts. If a student fails a module three times, he/she is eligible for a special examination process that is overseen by a three-member committee.

IMPLEMENTATION

The teaching/learning process is mainly teacher-driven. High quality teaching practices have been adopted, such as gradual escalating of the difficulty of lectures through the semester to maintain class attendance, well-structured lectures, encouraging interaction through questions that check students understanding, exemplifying theory and open questions to encourage student questions

Two books are suggested for each module, either covering 100% module syllabuses. In addition, detailed instructions for practical workshops are provided. Generally, the quality of course material is modern and at a good standard.

Some final year projects provide the opportunity to students to be exposed to research activities overtaken at the department, the university, or industry and hence enhancing their experience.

Although both academic staff and students are overloaded, there is evidence of mobility in Europe as part of the Erasmus programme. E.g. 2 to 3 students and 1 or 2 members of academic staff are exchanged per year.

Student satisfaction is very high, as reflected by the official questionnaire-feedback that was managed by the department, but also from informal discussions between students and the external evaluation committee. Specifically, students are highly satisfied by the academic staff, the organisation of the course, the quality of course feedback, although there is some criticism on the dated building and laboratories used for the course.

RESULTS

The main challenge in the course teaching is a large number of entrants and the wide range of their backgrounds. Specifically, the majority of students enters the department through the national university entrance exams (~75%) and they tend to lack technical background, whilst the other (25%) originates from secondary technical education and they tend to have weak theoretical background. In the last few years, the entry requirements for applicants were decreased significantly. As a result, both students and staff identified the challenge of the discrepancy between the level of the course and the students' background.

Since teaching is generally aimed at the "average student", weak students experience difficulties to progress in the course. Specifically, in theoretical modules of the first few semesters, such as Mathematics, Physics, and Electrical Circuits, student's success rate is very low, and as a consequence the number of students needing to pass these subjects is

gradually accumulated in numbers.

IMPROVEMENT

The department prepared the following set of proposals with the aim of improving teaching, that are stated in the internal evaluation report and/or discussed in informal discussions during the visit of the EEC:

- The strategic aim is to eventually attract students of higher quality and educate them in theories and technologies that will make them attractive for job destinations in industry, commerce and in R&D by continuing to higher degrees.
- Moving to a new modern building that will resolve space issues. Some lab equipment also needs modernisation.
- Completing the pending appointments of three already elected members of academic staff, as well as of two specialized technical staff members.
- Requesting additional permanent staff (academic, teaching fellows, technicians, administrative)
- Continuous improvement and adjustment of curriculum based on academic criteria and market and society needs.
- Secure professional rights for the department's graduates, to motivate high quality perspective applicants to choose the department for their studies.
- Formalising the good cooperation with industry through an Industrial Advisory Board.

C. Research

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

APPROACH

Despite the low staff to students ratio and taking into account that TEI institutions cannot award postgraduate and research degrees the Department's research and scholarship are commendable. Although not clearly stated in the strategic objectives of the Department, research is carried out in certain areas, namely: M2M, Energy and resources management, Smart/Power grid, Intelligent buildings, Industrial automation, Internet of things, Photovoltaics, Advanced materials, DSP, Electronic circuit and device modeling, Dielectrics, Lightning protection, Powerline communications. This research is recognised nationally and internationally with state as well as EU funded research. Graduates of the Department are being involved in several R&D departmental projects. Some graduates go on to obtain their MSc degree at the University of Patras. PhD student supervision takes place through collaborations with the University of Patras and Thessaly supervised by Departmental staff and using Departmental facilities and laboratories.

There is some structure of Departmental research groups, in the aforementioned areas, attached to the technical laboratories and although are established for teaching purposes, they also support research and development projects. Exception is the Nanotechnology and Advanced Materials laboratory, which is primarily carrying out research. The Department has undertaken a commendable job in seeking support for updating their equipment internally (TEI central administration) and externally mainly through Greek research projects, though there is some EU project participation also. The need of extra space needs to be addressed. The Department has a mentionable collaboration with research organizations, technology clusters, industrial associations, as well as state-of-the-art enterprises. The Department has to reinforce its strategy of developing cross-group collaborations and partnerships with other institutions and with industry at national and EU level, thus a more formalised approach to research may be necessary.

The Department sees the formal provision of postgraduate studies as a strategic means for enhancing its research activities and to this end it is thinking for setting up of a relevant M.Sc. programme. An older graduate program draft proposal (prepared by the Department in 2008), which did not advance beyond the proposal stage due to institutional legislation prohibitions, supports such an objective. This possibility is encouraged especially if it was able to increase its staff to student ratio with permanent well qualified lecturers.

Currently, the Department has no formal framework for encouraging and assessing the research performance of staff, but some of its research is at a high level and the research efforts undertaken by individual members of staff should be recognised, against underfunding as well as difficult institutional and state conditions.

IMPLEMENTATION

The research in the Department takes place at 11 individual laboratories and in line with academic staff expertise. There are a number of national research activities that the Department is involved with. The state funding of the laboratories for replacement of equipment and space are very limited and the Department is actively seeking industrial and state funding in order to certify their services, improve their equipment and become

competitive in their areas. The laboratories offer opportunities for engagement in research to the final year students as part of their industrial placement scheme and/or dissertations. To this effect there are some exceptional final year projects that have been conducted by students. In addition, some of these final year projects were integrated within demanding research project deliverables.

The Department has developed a few collaborations with external institutions (see *Results* section below for further details). These collaborations offer further opportunities for engagement in research by academic staff and students. Opportunities for research visits, collaborative research, and bidding for research funds take place, and they are encouraged to enhance these activities by formal organising and managing. Addressing the key limitation that arises due to the current legal framework of the operation of TEIs, notably their inability to award PhD degrees and offer research-based education at this level is paramount and requires urgent resolution.

RESULTS

The EEC believes that the research results of the Department are good and in some areas very high. The school is managed well, the rapport and enthusiasm of staff is high and their expertise and qualifications with any university in the EU and elsewhere. The experience of staff in the private sector and their relatively younger age distribution provides all the ingredients for a sustainable highly academic institute of repute. It is disappointing that despite the very low staff to student ratio, staff cannot focus on their teaching, research and administration and are required to look after totally unrelated issues such as is the case of certifying the quality of the food in the canteen for instance. The existing resources available need to be addressed with the recruitment of additional permanent staff and laboratory/teaching space, these institutional restraints lower the impact that the research of the department is capable of having. Therefore existing administrative and high teaching loads of the permanent academic staff of the Department restrain their research scope and outcomes.

Scientific publications

The following table, table 1, gives a summary of the Department's selected publications compiled from the internal evaluation report of October 2013, 2nd edition. The full list of publications can be found in the internal assessment report.

Year	Books	Book Chapters	Journals (Refereed)	Conferences (Refereed)	Conferences (refereed/not published)
2006 - present	3	7	52	32	17
Year average	0.4	1	7.4	4.6	2.4

Table 1. Scientific Publications 2006-present.

It should be noted that the list of publications includes internationally reputable refereed journals and other peer reviewed publications and of conferences.

List of research projects

Academic staff members have implemented and delivered a number of project and other research oriented activities mostly national in nature but with high quality outputs. In 2007-13 more than 7 projects have been undertaken which is commendable. The Department is encouraged to have a presence in EU research project proposals by networking. The internal assessment report October 2013 2nd edition states 22 research projects and associated activities on page 45, section 5.2

Research collaborations

The Department has developed research collaborations with external institutions at national and international level and with companies. As documented in the internal evaluation report of 2013, national external research collaborations include the Universities of Patras, Metsovio, Thessaly, Open, Democritus, etc. External collaborators include the universities of Cyprus, Ege-Turkey, Cincinnati-USA, Torino-Italy, Budapest-Hungary and Babes-Bolyai-Romania. Co operations with industry exist with Intracom, BRITE, InAccess Networks, BLUEdev, Irida Labs, Zeus Chemicals, Roumeliotis, Multilab, Triaina. The Department is a member of the Corallia Hellenic Technology Clusters Initiative, and an associate member of the Hellenic Semiconductor Industries Association and of the Chamber of technological industries of Western Greece (STEDE).

Applications of research and uses

There is evidence of applicability of the research results of members of the Department. In the Nanotechnology and Advanced Materials laboratory, research students and final year students work together in team, mainly on photovoltaics. The Microcomputer Systems Laboratory, along with Communications & Networking, Digital Systems and Electronics laboratories, employed department graduates as research developers who worked together in teams, with final year students, post doctoral researchers and engineers from the microelectronics industry, within research projects. This activity needs to be expanded with outward looking scope through industry engagement and business development at home and abroad.

Acknowledgement and visibility of research

The Department organizes seminars and industrial workshops for their students, staff, alumni and the general public, an activity which is welcomed.

The publications of the Departmental staff have seemingly a noted increase in the number of citations between 2007 and 2013, as it is evident from the internal evaluation report (October 2013, 2nd edition).

IMPROVEMENT

The Department has intensified its effort to obtain further research funding and data presented during the visit suggests that a good percentage of members of the academic staff (at least half of them) get involved in submission of a number of research proposals per academic year, against limiting funds and high competition. Overall, it has been clear that there is increasing effort, especially over the last three years, to improve the equipment of the technical laboratories of the Department, and to offer opportunities for involvement in research work to undergraduate students, those reaching the final semester of their study.

The Department's high performance in research would be sustainable and benefit further from the development of a clear and structured research strategy, the identification of areas of strategic importance for research development, and the subsequent targeted allocation of available resources to such areas. The additional resources of staff and space as already highlighted should be coupled with these actions. Furthermore, the establishment of a framework for assessing research performance at departmental, group (laboratory) and at individual level would enable staff to focus better their efforts and to achieve full potential individually and departmentally.

The Department is encouraged to use its network to collaborate in PhD programs awarded by universities at home or abroad. They can use their experience and facilities to co-supervise PhD students, something that is relatively easy nowadays with universities in the EU.

It is worth noting, that there may be opportunities for increasing the research income of the Department by technical consultancy work which need to be fully explored, therefore interaction with industry and practised based consultancy which should be systematically encouraged.

D. All Other Services

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

APPROACH

The Department provides a set of services to students and staff (permanent and temporary), either independently or in collaboration with central administration of the institute. These are regular services provided by any TEI in Greece and are designed to comply with the needs of staff and students. The information provided in advance of our visit in relation to support services is primarily summarized in the internal evaluation report of the Department. During the visit, the EEC had the opportunity to meet the 2 members of staff that provide administrative support to the Department. Visits were also made to various institutional support services available to student and faculty of the Department; these include the library, and the international liaison and Erasmus office. The EEC also examined the Departmental web page as well as the two electronic platforms (i.e. eclass, estudents), in support of the educational process.

Particular focus is given to the simplification of the procedures, the speeding-up of service delivery and the satisfaction associated with service provision. To this end, the Department has made a substantial effort to develop the infrastructure for the provision of electronic services across the entire range of its operation. Special attention is given on the way the administrative staff members collaborate with the Departmental community on a personal level so as to maintain a very good level of interpersonal relations that helps them to carry out the procedures effectively. Equally important is the commitment of the administration staff to provide effective access to information using the web for all the activities of the Department.

There is a need of organising and simplifying some administrative procedures (e.g. procurement of materials and equipment) for increasing Departmental efficiency, but we note that these procedures are defined centrally by the central TEI administration and State law. The Department has specific proposals for interventions at Department - TEI level to improve the delivery of these services within the framework set by the Ministry.

In addition to the services related to administrative issues, the students of the Department are provided with a complete set of services related to practical training, students mobility, students welfare, access to information (internet access, library) and recreational activities (sport, culture). The EEC identified defects related to disabled accessibility to Departmental and Institutional facilities, which need immediate attention.

In the following subsections the EEC evaluates the implementation and impact of the following service categories: administrative support to students and educational staff, access to information, library, and access to PCs and to Internet, internships, mobility, catering, recreational activities and accessibility.

IMPLEMENTATION

Administrative support to students: The Departmental administration is well organised and

equipped. It is staffed by two administrators and is hosted in a spacious and well-equipped environment. Several among the services provided to students that are related to the educational process are supported by two electronic platforms. The first concerns the registration to individual modules and laboratories, marking and marks reporting, issuing certificates of study, internships etc., and keeping a full educational folder for each student. The second is the platform e-class, a web-based asynchronous e-learning platform through which the members of staff provide detailed information about each course, additional training materials, coursework, bibliography, links, etc. Furthermore, students are supported concerning the acquisition of books by the electronic system “Evdoxos”, which supports all higher education institutions in Greece. This office is open to the public / students between 07:30-15:00 pm all weekdays.

Administrative support to educational staff: The Departmental administration also supports educational staff (permanent and temporary) concerning the delivery of the courses and the process of several administrative tasks. The two aforementioned electronic platforms support them in managing documents, managing marks, delivery of educational material and providing information to students. The secretariat also supports the faculty on procurement of equipment and purchase of consumables especially regarding the functioning of the laboratories. It also operates an electronic protocol with direct connection to the central administration of TEI which enables flexibility in several procedures. The Secretariat also supports the Head of the Department.

Provision of information: The departmental website has recently been upgraded and contains adequate information both in terms of informing its students as well as promoting the educational and R&D activity of the Department. Its layout is very professional and it provides a user-friendly navigation.

As far as the students counselling is concerned one of the members of the academic staff is nominated as student advisor. Students can contact their advisor for any issue that has to do with their studies or on any other matter during their study.

Library: There is one central library for all departments of TEI. It is spacious, well organised and has 4 members of staff who provide the necessary support and assistance. It has almost 40.000 titles; it is linked to other University libraries throughout Greece and can offer interlibrary services. The library provides also access to hundreds of on-line scientific journals through HEAL-Link (Hellenic Academic Libraries Link). There is ample study space in the library, although at the time of the visit only a few students were present. The library maintains hardcopies of all final year project dissertations.

Access to PCs and Internet: The Department is connected to the web through high speed GigaBit optical fibres. Internet access is available free of charge and the students may use the WiFi infrastructure using their own laptop computers as well as 50-60 PC clusters placed in three computer rooms. The PC rooms were almost fully occupied during our visit. Taking into account the number of students in the Institute, this provision needs to be increased.

Internship: The Departmental administration also assists students with their industrial placements undertaken during the last year of their study. It monitors the whole process and keeps detailed records of all placements. This service is also supported by one of the

aforementioned electronic platforms. Unfortunately, there is no formal procedure for keeping records concerning the employment and destination of graduates, which if better organised and used may help the departmental objectives.

Mobility: Students' mobility is supported by the liaison office, a central institution facility, which appears to be active with the Erasmus programme and the department maintains Erasmus agreements with several good Universities across Europe. The Committee was informed that on average approximately 4 students are exchanged annually.

Catering services: Inside the campus there is a restaurant, open at lunchtime and in the evenings, providing good quality meals to students and staff.

Recreational activities: TEI of Western Greece centrally provides several recreational activities to the students in the campus such as theatre groups, gym, basketball, etc. Also special arrangements have been made for high quality sports facilities (built for the Olympic Games of 2004) and students are provided with free access to these facilities which are within walking distance from the campus.

Accessibility: Although the Department and Institute have clear accessibility policy, especially for disable access, this provision in practice is absent and needs to be immediately addressed. The department's building (three floors), where the classrooms and laboratories are situated, has no elevator. During the Committee's visit at the central library it was observed that the elevator (the only accessible way to the library for someone with physical disability) was out of order and we have been informed by students and staff that this particular elevator has been out of order for 8 to 9 months this year. This is unacceptable and the management authority of the Institute is required to provide an efficient access to the library as a matter of top priority.

RESULTS

Administrative support to students: During the Committee's visit we asked several students to evaluate the quality of the services provided by the Department's administration and the level of satisfaction was particularly high. Clerical and administrative staff gave the impression of being friendly and helpful, committed to the well-functioning of the department.

Administrative support to educational staff: Members of academic staff also express high level of satisfaction from the services provided by the Departmental administration. Nevertheless, one problem that has been pointed out is the numerous administrative tasks that members of the academic staff have to undertake, which originate from assignment requests by central administration; these tasks are not related to their educational or research activities and they are assigned to them despite the heavy teaching load they already have. Aspects of running of the Department and certain procedures need to be agreed by the central TEI administration. Speed of delivery and transparency of actions and procedures delivered at TEI centrally need to be improved for the effective and efficient running of the provision.

Provision of information: Students are being informed for departmental activities through the

web site and the electronic platforms.

Library: The library provides very good quality services but the numbers of students who systemically use its services are believed to be low. This needs to be addresses by organising fresher's seminars on books, periodicals, access tools, internet and written reports, essays and dissertations, referencing and on copying and plagiarism.

Access to PCs and Internet: There is no problem in relation to internet access, the IT infrastructure (WiFi, computer rooms) is broadly considered sufficient subject to the limited PC seats at the library observed. At departmental level, the latter is complemented by access to Departmental PC labs.

Internship: Students are not facing difficulties in finding industrial placements and the Departmental administration supports effectively the whole process. On the other hand the absence of reporting using the information of the electronic platform is considered as a weakness, in addition to the absence of a formal tracking of the employment status of the Department's graduates.

Mobility: The support provided to students which are exchanged both to the EU and from the EU under the ERASMUS framework is very good.

Catering services: Catering services provided on campus in addition to the variety of recreational activities are adequate and contribute to the wellbeing and recreation of students.

Accessibility: Due to poor infrastructure and lack of maintenance there are some serious problems of accessibility as discussed which need immediate attention.

IMPROVEMENT

During our meetings with staff several propositions for improving the departmental operations were discussed.

The implementation of a Virtual Personal Network facility would enable students' remote access of on-campus software and services.

Paper-less implementation is already supported by the electronic protocol application; a scanner could be used to effectively eliminate physical exchange of paperwork inside TEI and increase the speed of service delivery. Furthermore this infrastructure could be combined with a workflow – document management system which could result in an increased degree of transparency and accountability. In this framework, it is also proposed to redesign processes for reduction of bureaucracy and simplification of procedures as an effort to decrease the workload of academic staff especially for managerial issues unrelated to education.

Given the lack of financial autonomy of the department, there is little margin for initiatives at departmental level. It is strongly proposed that the Institute proceeds without delay on implementing the government's directive concerning budget allocation per department.

The electronic platform that supports students shall be upgraded in order to serve better the needs of reporting the industrial placements. It would be particularly beneficial for the department to collate a database of businesses and of company profiles for more effective

management of industrial placements exploiting a documented tracking of graduate and company performance. This extension of the platform could increase the liaison between the department and the job market. It will also allow better organization of educational visits to companies found in the database. The cost of such minor upgrades is considered to be low given the fact that the platform has been developed internally by the Institute. It is the EEC's view that there is space for improvement of web site exposure and material for further promotion of the departmental research activities and project and achievements.

As far as student counselling is concerned, the studies advisor scheme whereby each student is assigned to a tutor, provides the much needed help especially to first year students. Finally, particular attention shall be given with no further delay for tackling the serious accessibility issues highlighted.

Collaboration with social, cultural and production organizations

The Department makes efforts to maintain stable and sustainable partnerships with social and industrial organizations, but also to participate actively in the development of local / regional development plans. In parallel, the departmental staff develops daily contacts with the local and regional communities while trying to participate in regional, national or international research networks. The department is an associate member of the Chamber of Technological Industries of Western Greece (STEDE) and staff members have good working relationships with several departments of the University of Patras.

The Department is also in close cooperation with major companies, especially in the proximity of Western Greece, on knowledge transfer between in-house R & D expertise and industry. This cooperation could be further strengthened through two main axes : (i) the development of a comprehensive policy of openness (Standing Committee liaison with market which involves company executives - graduates disseminating research results through local and national media, communication and visits to schools, promoting the department, the subject and the aims of the course), and (ii) the institutionalization of the laboratories of the Department in order to be able to directly provide research services to businesses.

Finally, the Department plans to organise events with the participation of graduates, which are already in jobs with the industry, aimed at discussing the current trends in the labour market and their role for revising and promoting the aims of the Department.

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.

The EEC did not see evidence of a written strategic plan that clearly describes the Department's mission, establishes goals and identifies mechanisms for achieving them. The

sections on Conclusions (Chapter 9) and Plans for Improvement (Chapter 10) of the Internal Evaluation Report implicitly define objectives for the Department and identify potential inhibiting factors. The major objectives may be summarized as follows:

- Improvement of the building infrastructure and lab equipment to support the teaching and research activities of the department.
- Recruitment of academic, administration and technical staff.
- Continuous improvement of curriculum, based on academic criteria and responding to modern requirements.
- Expansion of the research activities; establishment of postgraduate programs and collaborations in PhD degrees where possible.

Some key inhibiting factors are:

- Reduced professional rights to the department's graduates as described by the law. As a result, the department becomes less attractive to good applicants. The academic level of the department's student is further affected by a societal perception (lower class than polytechnic/university level) related to Technological Institutions (TEI). This perception needs to be eliminated by educating students and the wider community.
- The acceptance of new students with low grades, mixed backgrounds and against their choice creates a number of difficulties in teaching, degree completion, low morale and identity perception of graduates.
- Lack of funds for recruitment of staff supporting technical and research roles. This includes disproportionate low fraction of research budget allocation to the Technological Education Institutes when compared to the universities and the lack of funds to replace faculty members who retire.
- The legislative framework that does not allow the Department to offer post-graduate degrees and PhDs.
- Lack of accreditation of research laboratories;
- The framework and adverse economic conditions render heavy teaching and administrative loads for the faculty, thus inhibiting research growth.
- The legislative framework that allows students to remain enrolled indefinitely irrespective of their academic performance, thus creating a large body of inactive students, although now legislated needs to be implemented.
- Low staff/student ratio is unsustainable and needs addressing.
- Economic hardship of the students is a problem needing a sustained strategy.
- Lack of formal centralized procedures for assessing attainment of teaching and learning objective.

The inhibiting factors fall into two major categories, external and internal. Most of the external ones relate to State Law and are beyond the control of the Department but needs addressing by all TEI's collectively to Government. It is the view of the EEC that the aforementioned inhibiting factors are significant and need to be addressed at the State level. Until the legal environment changes, the Department will have difficulties in expanding especially in postgraduate studies and research. Having placed the Universities and the Technical Education Institutes at the same educational level, the State needs to clarify some contradicting features that have emerged since the transition of the Institutes to "higher" educational institution status.

The very low staff/student ratio, which is the main teaching challenge for the department is affected by two State policies. Firstly no new academic/teaching positions are approved by the Ministry of Education, due to the current economic climate and therefore the number of academic staff continuously decreases, as retired members are not replaced. Secondly, the number and quality of student entrants are explicitly or implicitly specified by the Ministry of education. The Ministry sets the exact number of entrants for each department. By increasing the number of entrants it reduces the quality of students, as applicants with high entrance scores choose to study other subjects and/or in universities or other institutions.

Economic hardship forces some students to work in parallel with their studies resulting in not having enough time to study falling behind in their course obligations.

Further inhibiting factors identified from within the department (internal) include the lack of a centralised procedure to assess the extent to which the learning and teaching objectives have been achieved. The low average marks achieved by the students due to high level of curriculum content in conjunction with the reduced effort by the students, the lack of continuous student engagement with their studies during the semester, need to be overcome, as recognised in the Internal Evaluation Report.

Some key mid/long-term aspirations of the Department and the institution relate to the State imposed inhibiting factors as already discussed. The EEC understands that some of these changes in the legislative framework are more difficult to implement than others. Others are either easier to administer such as the introduction of pre-requisite modules to proceed to further and more advanced ones, and the reduction of the maximum duration of study.

The Department is eager to offer a graduate program. As stated in section 3.2.1 of the Internal Evaluation Report, and informed by the members of the academic staff, the Department has decided in May 2008 to organise an MSc programme in “Energy intelligent building, power generation and energy management systems”. However, the completion of the external evaluation procedure is a prerequisite of the state law for issuing the necessary regulatory approvals and authorisation. With the completion of the current external evaluation process, it is expected that the Department will have the opportunity to run the mentioned MSc programme, if they still feel that it is appropriate.

It is unclear to what extent provision for research degrees and laboratories will be made in future legislation. Likewise, it is difficult to predict the timescales and outcome of negotiations surrounding the professional rights of engineers graduating from the Technological Education Institutes. Given the current financial circumstances, it is difficult to foresee the release of any substantial State funds. In view of that, the Department and Institute could plan in raising external funding by third party resources. Some aspects of the Anglo Saxon educational model were discussed as part of the visit. The establishment of taught and research postgraduate programs as well as enhanced interaction with the industry could attract further funds in this direction. Consulting to companies, research and development services and the use of laboratories by companies maybe areas that may attract outside income. External funded research, understandably, is another means of sustaining the educational quality of the institution and its finances and it should be necessary to build the application of research proposals amongst their obligations, which should be teaching, research and scholarship.

F. Final Conclusions and recommendations of the EEC

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

The overall picture of the Department as formed through this evaluation procedure is positive in that the department is well organised and delivers high quality applied engineering skills to its graduates. The Department maintains a well-developed curriculum which is published and easily accessible. The curriculum is in-line with best practice nationally and internationally for Electrical Electronic Engineering BEng degrees (or equivalent) with a strong hands-on training element, which is seen as advantageous. The learning and training of graduates is underpinned by well-equipped functioning laboratories delivering the educational mission of the department to provide practical experience to their graduates.

Quality of teaching is high and many good teaching/learning practices are already in place and student satisfaction is good. The overall student experience appears to be positive with relatively simple procedures for administering student matters (such as enrolment, registrations, dissemination of marks etc.). Based on the discussions with the students it appears that the Department is in good rapport with their cohort. To a large extent, this is also attributed to the attitude of the members of the staff, who show high level of commitment to the learning and teaching process and on average maintain high level of motivation for research. Evidence of collegiality among the faculty and commitment to the common task of promoting the Department's profile was also apparent during the visit.

The Research activity and output are commendable, particularly when considered within the context of the heavy teaching load, the national legal framework and limited resources. The majority of faculty members are research active and the department hosts pockets of national and international excellence. The EEC further saw evidence of fruitful links of the Department with national industry, which brings significant potential for societal impact. Alumni of the department have been successful in pursuing professional careers in the national and international industry, postgraduate studies and further R&D as well as technology company start-ups.

The EEC brings to attention that national legislation presently has contradictory elements in relation to the operation of TEIs. In the case of engineering departments, such as the Department being assessed, this is reflected in the limited professional rights of its graduates. The law further makes no provision for the award of PhD degrees from any TEI Department, posing unnecessary impediments to the research sustainability of these Institutions. In the case of the Department being assessed, this restriction is imposed despite the fact that the vast majority of faculty is trained at PhD level and maintain an active research profile. The fact that career progression of faculty is assessed against their research performance this is a further contradiction of the current legislative framework. The EEC believes that the State should reconsider the framework within which TEIs operate to resolve such contradictions. The lack of resources (in terms e.g. of budget and staff replacement) is a further significant difficulty that the Department is facing. It is understood that to a large extent these are dictated by the financial circumstances nationally and internationally. Increased autonomy of academic institutes could provide pathways for maximising the efficiency of the available resources and the benefits they offer to the Greek society.

At institutional level, the EEC understands that the Department has very limited autonomy; for example, there is no departmental budget despite the relevant provision by the law. Staff advised that a case should be made to the Institute centrally even for everyday consumables. This brings unnecessary inefficiencies as a result of the increased bureaucracy. During the visit of the campus, the committee was shown a three-storey building and was advised that it was delivered in 2009 and has been empty ever since. Considering the limited space available to the Department and the large number of students enrolled, the committee recommends addressing this inefficiency. It is further noted that provisions for disabled access in e.g. the library and classroom/laboratories beyond the ground floor are unacceptable and need to be immediately addressed. ➤

Recommendations

- The Department would benefit from a more outward looking attitude that will promote its educational and research services nationally and internationally. A strategic plan of the Department should identify the mission and identify the uniqueness of the educational and research aspects they wish to develop, namely what they want to achieve, who is the target audience and what would the relationship be between this Department and departments in a similar subject area from other higher education institutions nationally and internationally. For example, in relation to the education offered, the Department would benefit from promoting the BEng degree on offer to prospective students, enrolled cohorts and the wider society. Emphasising the strong hands-on aspects of the education delivered can also be seen as a comparative advantage. In relation to research, the Department would benefit from a more structured research strategy that will consolidate the strengths to provide more funding opportunities and deliver increased impact.
- A key challenge is identified in the quantity and quality of the Department's student population and mainly the variety of educational backgrounds of first year students. The Department could benefit from the design of a strategic approach for teaching/learning to address this challenge. The EEC encourages the Department to consider the role of e.g. the student tutor; peer mentoring; supporting teaching sessions; lectures from alumni and industry; revisiting the curriculum along the lines of best practice nationally and internationally; in addressing the low average marks, the low morale of students, their perception and prolonged studies period.
- The Department would benefit from a more structured approach in their interaction with the industry; this could be implemented for example through the establishment of an industrial advisory board and/or the implementation of a database of industrial contacts. Such a mechanism would provide feedback for improving the educational program, enhance the employability of graduates, and increase the Departmental visibility. The Department could also benefit from a formal mechanism for maintaining contact with its alumni. Evidence of progress in this direction is available and further efforts in this direction are encouraged. Use of tools such as the World-Wide Web and social media would enhance the image of the Department in the society at large.
- The Department is capable to offer postgraduate degrees at Masters and MPhil/PhD level, with appropriate collaborations with other universities at home and abroad; and with industry. It is encouraged to agree a strategy with a measurable action plan which will bring students and funds and hence enable its long term sustainability.

The Members of the Committee

Name and Surname

Signature

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