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H.Q.A.

HELLENIC QUALITY ASSURANCE AND
ACCREDITATION AGENCY

EXTERNAL EVALUATION REPORT

DEPARTMENT OF ELECTRICAL ENGINEERING
TECHNOLOGICAL EDUCATIONAL INSTITUTE OF PIRAEUS

June 30th, 2013



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External Evaluation Committee

The Committee responsible for the External Evaluation of the Department of Electrical Engineering of the Technical Education Institution of Piraeus consisted of the following five (5) expert evaluators drawn from the Registry constituted by the HQAA in accordance with Law 3374/2005:

1. Prof. **George Stylios**, Heriot-Watt University, Scotland, Edinburgh, United Kingdom (Coordinator)
2. Dr **Panagiotis Kosmas**, King's College London, London, United Kingdom
3. Prof. **Panagiota Morfouli**, Institut Polytechnique de Grenoble, Grenoble, France
4. Dr **Christos Politis**, Kingston University London, London, United Kingdom
5. Prof. **Nicolas Tsapatsoulis**, Cyprus University of Technology, Lemesos, Cyprus

Introduction

I. The External Evaluation Procedure

The External Evaluation Committee (EEC) met from the 25th to the 30th of June 2013 to conduct the external assessment of the Department of Electrical Engineering (Τμήμα Ηλεκτρολογίας) of the Technological Educational Institute (TEI) of Piraeus, 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 25th of June 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. On the 27th of June 2013 and prior to the departure from the Institution, a preliminary presentation of the findings was given to a group of delegates of the Department including the Head of the Department and the OMEA committee.

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

- President (Prof. Lazaros Vryzidis);
- Head of the Local Quality Assurance Committee and Vice-President (Prof. Dimitrios Tseles);
- Vice-President (Prof. Petros Vernados);
- Director of School of Technological Engineering (Prof. Maria Rangousi)
- Head of the Department (Prof. Pantelis Malatestas)

It also involved meetings 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;
- the three division leaders of the Department;
- lab assistants;
- technical support staff;
- students (from different year of study);
- alumni;
- representatives of industrial companies who cooperate with the Department; and
- administration staff

Prior to arrival at the institution, the HQAA provided an electronic version of the 2009-2010 internal evaluation report to the EEC, which was prepared under HQAA rules and the Identity Report of the Department. An electronic version of the Department's annual report of 2011-2012 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 2009-10;
- an updated version of the annual evaluation report covering the period 2011-12;

- the programme of undergraduate studies and a report on the international context of undergraduate studies;
- the guide for project dissertations (“πτυχιακές”), project proposal lists, proposal forms, project extension forms, project assessment committee appointment forms, project evaluation reports, project submission notification forms and project abstracts;
- 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);
- the course syllabus and specifications;
- samples of publications by members of the Department;

The EEC visited the following facilities of the Institution:

- lecture theatres / rooms;
- the conference center
- undergraduate and research student laboratories;
- academic staff and administration offices;
- IT facilities and the computer centre;
- the library;
- the liaison office; and
- sports facilities

The EEC was given access to the virtual learning environment used by the Department (IBM Learning Space) and the one which is to be adopted (Moodle).

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 sources and documentation used

The Internal Evaluation procedure was carried out by the Department (OMEA) in accordance with the HQAA directive.

According to the report, the sources used were from the:

- (1) Departmental archive data
- (2) The Institution's archive data
- (3) Archives of other departments to which the Department offers support teaching.

Module evaluation obtained from students took place over a specific time period, prior to

final exams, and the (manually) collected data was entered to a purposely designed database. Considering student concerns on low participation the EEC feels that the module evaluation by students could be improved if offered online, provided that anonymity is preserved. In the current procedure external intervention may not be avoided rendering problems with data integrity which affect student participation, as students expressed their concerns on this as well as on the questionnaire. The EEC encourages the Department to think how to increase student participation and to consider student involvement both in the questionnaire design and in the analysis of the data. Furthermore, it recommends to the Department to communicate more effectively the module evaluation procedure and its purpose.

With regard to the research activity of faculty staff, some well-known tools and databases should be considered for increasing the efficiency of measurement of the research output, such as:

- Scopus (<http://www.scopus.com>),
- Publish or Perish (<http://www.harzing.com/pop.htm>),
- My Citations of Scholar Google (<http://scholar.google.gr>).

Quality and completeness of evidence reviewed and provided

The EEC members were given access to two different versions of the internal assessment report: One prior to their visit (through electronic access provided by HQAA) and one on site provided by the Head of Department in hardcopy. The former was not adequately prepared with some parts having been copied and pasted from reports of other departments, some tables and table data were missing, while typos and syntactic errors appeared frequently. The hardcopy version of the report was significantly improved and better presented.

Overall the internal assessment report is somewhat superficial and lacks critical view. The significant problems faced by the Department were not clearly stated, and no specific plan for addressing these problems was given.

According to the internal assessment report, not all members of the Departmental General Assembly are convinced for the necessity of evaluation for self-improvement. The reasons and the concerns of those disagreeing with the evaluation procedure should be explained and dealt with.

Some specific comments on the internal assessment report follow:

- The data presented in Table 11.1, p.32-33, about the personnel of the department since 2005-2006, contradicts those presented in p.6.
- Section 2.3.3 is somehow superficially treated. We would have expected more elaboration and direct consideration of the aims, as set by statute law, and the degree offered, according to the perspective of the Department.
- In section 3.1.4 it is mentioned that the curriculum was revised taking into account curricula of similar departments in Greece and abroad. It is useful to state those departments.
- Section 4.2 refers to the quality and effectiveness of the instruction process. The discussion presented therein is minimal and the conclusions drawn are not justified by any statistical measurements. Furthermore, neither quality nor effectiveness measures are defined.
- In section 4.9.1 it is important to state co-operations with other institutions and the

framework of this cooperation e.g. partners in research projects, ERASMUS networks. How can you grade the extent of this cooperation (high, medium, low)? Does the Department promote this kind of cooperation and how?

- In section 4.10 the mobility of students is not discussed at all, and table 11.8, assumed to report on student and faculty staff mobility, is missing.
- A large part of the report (p.65-p.132) consists of statistics obtained from the student questionnaire data generated from the evaluation of various modules. It is hard to draw a conclusion by reading this data in the way presented. Tables, summarizing the findings across all modules, are much more useful while a critical discussion on the findings is also necessary.
- The same as above holds for the module assessment reports completed by instructors (see p.134 – p.230). These reports appear to contain exactly the same answer to the same questions, while many of the questions are consistently left unanswered.

Extent to which objectives of the internal evaluation process been met by the Department?

The aims of the internal evaluation process have been partially met. Important steps towards quality dealing with quality in teaching and curriculum have been made through the internal evaluation process. Concerning research the Department needs to define a clear strategy and show how they will improve the research output (in terms of research projects, collaborations with industry, publications, and patents). A more critical consideration of some of the assessment report points is needed for helping the Department to improve in curriculum, teaching and research.

One of the most important aspects, however, is that all Departmental staff members accept that the evaluation process is an opportunity to gain external feedback for improving on all its procedures, policies and processes.

A. Curriculum

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

APPROACH

The curriculum is broadly in line with the stated aims and objectives of the Department as given in the statute (Φ.Ε.Κ.). These include efforts for the horizontal and vertical integration of modules within the programme of studies as well as for aligning the provision with requirements related to the employability and professional development of students.

The overall aim of the curriculum has been clearly defined by the Department and is stated in the programme of study. It is focused on producing electrical engineers who specialise in all topics relevant to electrical systems and their applications, including power electronics, automation, electrical installations in buildings and industrial environments. These objectives are determined based on the history and tradition of the department and its faculty, the curriculum of other relevant departments at national and international level, and through continuous discussion in formal and informal divisional/ departmental meetings. The educational background and continued strong links of the academic staff with the National Technical University of Athens seem to play a positive role in the formation of the curriculum. Most modules have a strong emphasis on experimental lab work, coupled with theoretical components.

Although the curriculum serves well traditional aspects of Electrical Engineering, it would also benefit from a gradual modernisation and shift to topics related to strong societal needs of more efficient and eco-friendly alternative sources of energy. Nevertheless, the level of studies is comparable with international standards and appears to meet the needs of industry and society at large. The Department supports the continuous improvement of the programme of studies and the preparation of students for the “real” world.

Procedures for the revision of the curriculum are set out in the statute, governing the operation of the Department based on subject area informal group meetings that feed into division and departmental committees. According to the statute, major restructuring of the curriculum is allowed every three years. In order to do so the Department follows robust departmental procedures (which include student representatives) and the relevant legislation of the state. According to faculty members, their links with industry and with their alumni, although not formalised, help them taking into account industrial priorities in revising the curriculum. Although there is evidence of some monitoring of the curriculum and major revisions, it seems that a somewhat inflexible framework, dictated by the Ministry of Education, does not allow for the agility needed in the fine tuning of the curriculum.

IMPLEMENTATION

The undergraduate programme consists of general content and specialised modules. A total of 39 modules and a project dissertation (counting as one module) must be completed for the award of the degree. These modules are taught over seven semesters (five to six modules per semester), and are distributed across the three departmental divisions:

- Signals and Systems
- Electric Power

- Electric Installations and Constructions

The project dissertation and a six month industrial placement (“πρακτική άσκηση”) are scheduled in the eighth semester. During placement, the students are required to work in the premises of an industrial partner, and in some cases, in departmental labs. Both project dissertation and industrial placement provide a further opportunity for an integration of theoretical knowledge, experimental tools, techniques and methodologies of the chosen subject. This is also the main conduit for student preparation and familiarisation with research. The Department and the EEC are in agreement that these processes are an important component of the degree as they facilitate a smooth transition to industrial environments and research culture.

Consistent with international best practice, the structure of the curriculum makes use of “prerequisite modules”, “module choices” and a few optional modules to guide students through the programme of study and also provide some flexibility. There is some evidence of vertical integration between prerequisite modules. There is also evidence of horizontal integration between modules and opportunities of setting subjects in the context of each other, exploiting synergies between course modules, and hence improve learning by integration. The structure of the curriculum appears to be well articulated in the degree guide (“οδηγός σπουδών”), but the description of modules is missing. Detailed module information including syllabus, aims and objectives, learning outcomes and bibliography, are provided in the departmental webpage for some modules only, and, even in these cases, it appears to be inconsistent.

The EEC reviewed the teaching material for theory and laboratory work and found it adequate. After interviewing faculty members and students, it has been clear that the staff have been making commendable efforts in implementing the curriculum, despite the large number of students, particularly in carrying out laboratory work. **Infrastructure appears to be adequate but modernisation and setting up a lab on alternative and renewable forms of energy is advisable and should be pursued by the Department.** There is no doubt that the faculty members have the necessary experience, training and expertise to deliver the current curriculum, but there is a high degree of reliance on non-permanent academic staff for the coordination of some of the modules which is a cause of major concern. The greatest concern, however, is the fact that the laboratory work, one of the strongest aspects of the degree cannot be carried out efficiently due to the unacceptably low staff to student ratio discussed in other sections of this report.

A minor inhibiting factor in the implementation of the curriculum is the enforcement of prerequisites for some modules, which can lead to significant delays in the completion of studies. This has been highlighted by some of the students and was raised in the EEC’s meeting with faculty members, who have acknowledged this issue and have assured the EEC that they are working on limiting the prerequisite requirements to the absolute minimum.

In summary, the programme of studies strives to provide breadth rather than depth across the field of electrical engineering and to integrate theory and practice. Although the current implementation of the curriculum is deemed by the committee adequate, further improvements are possible. The limited available human resources, in terms of permanent academic staff (thirteen), imposes constraints and stretches the Department’s ability to sustain the implementation of the curriculum. The culture in the Department is dynamic and collegiate, fostering collaboration among members. The EEC are particularly impressed with the approachability, friendliness, collaborative and supportive spirit of all faculty members, which was also confirmed in discussion with students.

RESULTS

The implementation of the curriculum seems to be achieving the Department's goals as defined by the programme of study. Discussions with the Department's alumni have confirmed that the Department has a long tradition in producing electrical engineers fit for the industry. The programme is supported well by laboratories, computer software, IT infrastructure, and library facilities. The present rate of students' attendance is high in laboratories (since this is mandatory) but quite low in classes that are theory based (elective).

An important obstacle in achieving the Department's goals is the lack of necessary resources, especially for the laboratory component of the curriculum. In particular, the equipment in many cases needs to be updated to modern standards, and the excessive number of students compared to staff results in some laboratory experiments becoming just demonstrations without any active participation in lab work by the students. The students have confirmed in discussions with the EEC that staff members are doing everything they can to deal with this problem (adding many extra unpaid hours of laboratory exercises in many cases), but the number of students is prohibitively high for the problem to be eliminated. Nevertheless, more extended usage of simulation software, whenever this applies, prior to the actual lab sessions would be beneficial for students' involvement in lab work.

The overall workload of the curriculum is rather high. There are various factors contributing to this issue: First, the number of modules that the students need to take appears to be rather high, affecting course progression. Second, the educational background in mathematics of the incoming students is diverse and it ranges from students having a solid foundation, to students having none or weak foundation in mathematics. As a result, a considerable percentage of students find it challenging to follow and pass the maths modules. Nevertheless, the overall number of contact hours in mathematics (six hours per week for three semesters), is high and may need to be reduced, or lectures hours could be replaced by virtual labs (exposure of students to simulation software like Matlab, Mathematica and other similar packages)

The key issues and challenges identified in the design and operation of the curriculum can be summarised as follows:

- Lack of control over student entry is a challenge, especially as students have different backgrounds on entry, especially in terms of mathematical ability.
- Long mean completion time for students, low pass rates in modules and low attendance to lectures are issues of concern, that need addressing.

IMPROVEMENT

The Department attempts to improve the quality of curriculum through internal reviews of its academic staff and (informal) feedback from industry. The EEC recommends that this process is strengthened further by seeking systematic advice from other stakeholders, namely industry and alumni, in addition to inputs from academic staff, students and Central Administration. An essential ambition of the programme should be to prepare students for their professional life thereby enhancing considerably their employability and skills.

A new key initiative by the Department is the development of a postgraduate programme of study at MSc level, mentioned in the next section. This provision would certainly enhance the curriculum and would provide opportunities for a more research-focused environment beneficial to both staff and students.

The EEC and the department have agreed on some actions to improve the implementation of the curriculum, such as extending the use of e-learning services and adjusting the mathematics modules by introducing more practical approaches applied to electrical engineering. This will be facilitated by the recent decision to incorporate the mathematics instructor into the departmental staff, rather than relying on service teaching. It is recommended that the material taught in the curriculum's three existing math modules is revised to reflect more closely the needs of the department and accommodate the diverse background of students.

B. Teaching

APPROACH

The Department of Electrical Engineering covers subjects on the application of science and technology in the domain of electrical engineering with particular emphasis on energy topics, such as electric systems and installations (average, high and low voltage), industrial automation and specific issues of power management. It provides a wide range of teaching, learning and assessment strategies appropriate at undergraduate level. Consequently, the graduates possess theoretical and practical knowledge that enable them to be employed either independently or in teams to study, research, and apply the technology in fields of electrical engineering, such as for example; electrical machines, electrical measurements, power electronics, high voltages, electrical installations, photometry and renewable energy. Due to the nature of the course, there is evidence of a strong emphasis on practical exercises and laboratory activities which are complemented by lectures.

The EEC finds that the Department's facilities, laboratories, and equipment are satisfactory for the purpose of its curriculum. However, it would be useful if lectures and tutorial notes, activities and guides were also available in e-Classes, a new area that is currently being developed by the department. Students seem to enhance their experience by practical work in a lab environment which provides real opportunities and practical benefits. However, the EEC notes that some of these labs are restricted in practice to demonstrations of the experimental apparatus without the possibility for any practical 'hands-on' work, due to the excessive number of students. Therefore, an approach offering group work in problem solving with task allocation and team working may be an effective way of complementing existing traditional teaching.

The EEC also notes the low student attendance rate in lectures and, in some cases, in laboratories. The legal framework, which does not oblige students to attend lectures maybe a significant contributor to this problem, and this may also contribute to the fairly low completion rate. For example in March 2013, there were 1564 enrolled students of whom 713 in regular attendance and 851 dormant "not attending" students ("αμνάζοντες φοιτητές").

Another point observed by the EEC, is that the number of permanent academic staff members is very low (at present the department has 13 full time faculty members, and around 34 temporary instructors and 4 technicians). It is clear that the number of permanent faculty members is insufficient, and as a result, the program relies heavily on the temporary instructors. Even if the quality of the temporary staff is high as appears to be the case, their temporary engagement and the fact that they are only present for their lectures in the Department (their participation is limited to 2-4 hours per week), restricts their accessibility to the students and creates discontinuities in terms of teaching philosophy, teaching consistency, familiarity between students and staff, and having administrative duties.

Regarding the policy for postgraduate studies, the Department is planning to establish a postgraduate programme (at masters level) in the field of "*Management and Energy Optimization of Systems*". This idea seems interesting and will allow for a real connection between research and teaching activity, which is necessary. The overall impression is that the scope, structure and content of this MSc programme are consistent with the strategic objectives of the Department, but taking again into account the low number of permanent staff, the EEC questions the effective operation of such programme.

Moreover, the EEC notes that there is an evident and unquestionable passion and commitment from both staff and students to improve the standards of the Department. During our visit, both groups demonstrated a notable and exemplary high level of co-operation.

The performance of the students is assessed by a variety of methods including examinations, presentations, practical coursework and reports. The final written exam is the main method of assessment in all modules, both for theoretical and laboratory work. In some laboratory classes there is an intermediate evaluation, while in some subjects homework is given, the result of which counts towards the final mark. The final mark is determined as a weighted sum of the marks achieved by the students in the different assessment parts of a given module and across modules for the overall award grade. The transparency and meritocracy of the evaluation process is ensured by public announcement of the results and by access of student's written exam scripts, as well as feedback discussion by the teaching staff. It has been revealed however that a failure of laboratory work renders a repeat of theory examination also which is not consistent with learning objectives.

A special case of evaluation is the dissertation (“πτυχιακή”), which is examined by a three-member committee appointed by a departmental committee, requested by the students and approved by the supervisor. One of the three members of the selection committee is the academic supervisor.

IMPLEMENTATION

The level and quality of teaching and teaching preparation of the course seems to be good. The course material consists of a set of textbooks and lecture notes, which are distributed for free to the students. A library is also available to students and staff for accessing textbooks, books, reports, theses and research papers. However, it has been pointed out during discussion with the students that some of the available teaching materials and resources are of low quality, especially for labs and need to be upgraded. The teaching assessment approach of examining seems to be the standard one used by the sector across the country. The existing infrastructure in terms of buildings, rooms and computing equipment is good, but problems arise primarily due to the large number of students, because the Department has to deal with twice the planned number of students.

There seems to be a very low ratio between graduate completions and enrolled students that must be seriously considered by the Department. The average time of study before graduation seems to be 14 to 16 semesters, i.e., more than double of the normal duration of studies. Despite all the above, students seem to be satisfied with the teaching quality, which totals 40 lectures and 10 practical laboratories. The following table highlights this problem by summarising the annual intake/enrolments and the graduate completion per year from 2005:

Year	Intake	Enrolments	Graduates
2005-2006	312	2076	109
2006-2007	186	2035	115
2007-2008	204	2070	92
2008-2009	192	3716	105
2009-2010	189	3778	138
2010-2011	208	1808	151

The EEC understands that the current institutional structure imposes a rather stringent set of curriculum specifications on the Department, but we think that further improvements are possible to enable students to better their educational experience, to complete on time and to balance work and education.

Concerning the very useful industrial placement some inconsistencies have been identified with the use of the liaison office, perhaps a closer and more formal relationship with companies and students and monitoring by visits, where possible, can eliminate problems and improve service. Ex-graduates may be involved more effectively for finding industrial placements.

Since 2009 students are regularly asked to evaluate the academic staff and the course modules through a formal procedure. Nevertheless, it has been noted that the outcome/findings are not used to further enhance the Departments' performance since there is no formal procedure to discuss and reflect on these results, and in doing so develop ways to integrate the needs of the students in curriculum improvement and development. Adopting an assessment strategy that perceives assessment as part of the learning experience, and enhancing the feedback provided to students from their assignments, could improve the situation.

Finally, the EEC would like to point out that there is no international dimension in the course, and it will be very useful to develop student and staff mobility through EU schemes for enhancement of the course provision.

RESULTS

The department is mature, established in 1985 and a total number of 1553 students have graduated over the last eight years, against the total number of students registered of approximately 18796 over the same period, which is extraordinary for today's educational standards. Throughout this evaluation, the EEC observed a high level of commitment from staff and students to co-operate towards improvement of this situation.

The efficacy of teaching is generally good, but students note a slight variation of receiving feedback from a few non-permanent staff against good support and feedback received from most permanent staff. The EEC is particularly concerned with the high number of contact time by non-permanent staff., notably, a very high percentage of laboratory sessions are delivered by hourly paid non-permanent staff.

It is noted that the average degree award grade is consistently low over the years (i.e. 2008/09: 6,25/10; 2009/10: 6,26/10; 2010/11: 6,27/10; 2011/12: 6,24/10; 2012/13: 6,28/10). Also, the percentage of students obtaining first class awards, i.e., awards with an

overall mark between 7 and 8.5/10 is extremely low (only 4 to 5%), whilst, the percentage of students obtaining an average around 5.5/10 is relatively high (25 – 30%). It has been revealed that some students cannot follow the course due to personal reasons (military service, work and study), while others have difficulty in following certain subjects of the curriculum such as maths. Part of this problem is the quality of student intake, the odd and even semester module provision and student intake with insufficient maths background (students can enter from Lyceum and from technical schools). This significantly contributes to delaying their graduation. A significant component of learning through problem solving coupled with interaction in lectures and laboratories, needs to be addressed as part of solving student progression.

There are significant indicators of good quality educational provision, such as the good employment rate of the Department's graduates (~60%) for the years before 2010, which is commendable. It is also worth noting that a good percentage of graduates find jobs relevant to their degree within less than a year of graduating.

IMPROVEMENT

The Department has identified the need for appointing new permanent academic staff, which is strongly recommended by the EEC for reducing teaching loads and improve teaching quality and research.

The Department seems to be following almost the same curriculum over several years, and the EEC suggests renewing aspects of course content so that students are taught the latest technological advances such as renewable energy.

The very low attendance in certain modules by students is a concern that may also contribute to low completion rates. Thus, in the modules that the assessment is based only on exams and as such minimum attendance is not required, the EEC would encourage the department to reflect and consider ways that this can be changed i.e., mid-term exams, assignments, or formative assessment. The department should consider and formalize ways to assist the weaker students and to align student intake backgrounds to a common level. The high ratio of non-permanent to full-time staff; 26 to 13 respectfully is inappropriate for fulfilling the objectives of the department.

Mobility of students and staff abroad has to be actively encouraged and intensified via EU programmes such as ERASMUS.

C. Research

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

APPROACH

Research is seen as a weak link of the Department's strategy and activities. This is understandable due to the heavy teaching workload of the academic staff and the lack of postgraduate and research programmes. However, the Department has some research outputs and there is interest by staff in engaging in research activity, recognising that they are well qualified and capable to carry out research.

There is no clear structure of research groups in the Department but only technical laboratories with limited resources and, in some cases, dated equipment. Some laboratories (e.g. the Photometry lab, the High Voltage lab and the Electrical Installations lab) have undertaken a commendable job in seeking support for updating their equipment internally (such as using students' project deliverables) and externally (consultancies, EU and Greek research projects). Furthermore, the Department has an ad-hoc strategy of developing cross-group collaborations and partnerships with other institutions and with industry at national and scarcely at international level, thus a more formalised approach is necessary.

The Department sees the formal provision of postgraduate studies as a strategic means for enhancing its research activities and, to this end, it has requested the approval of a relevant M.Sc. programme. This proposal has yet to be approved.

Currently, the Department has no formal framework for encouraging and assessing its research performance, but there is recognition of the research efforts undertaken by individual members of staff, against difficult institutional conditions.

IMPLEMENTATION

The research in the Department takes place at individual laboratories and in line with academic staff expertise. There are some national research activities ΑΡΧΙΜΗΔΗΣ (ARCHIMEDES) III and ΘΑΛΗΣ (THALES) that the school is involved with. The state funding of the laboratories is very limited, some of them e.g. the High Voltage lab and Photometry lab are 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.

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 exist, but these need to be formally organised and managed. 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 are weak, below the expected norm, partly due to

the existing infrastructure and resources available and also due to institutional restraints. The existing administrative and teaching load of the permanent academic staff of the Department limit their research scope and outcomes.

Scientific publications

The following table gives a summary of the Department's selected publications compiled from the internal evaluation report of 2010 and the supplementary report of 2011-13. The full list of selected publications can be found in the internal assessment report.

Year	Course and lecture notes (internal)	Book Chapters	Journals (Refereed)	Conferences/ Workshops
2003 - present	14	3	16	58
Year average	1.4	0.3	1.6	5.8

It should be noted that the list of publications does not include internationally reputable journals (e.g., IEEE Transactions) and most of conferences cited took place in Greece.

List of research projects

Academic staff members have implemented and delivered technical consultancy projects, e.g. 1) SEELight, (South-East European Lambda Network Facility for Research and Education), ΕΣΟΑΒ, ΥΠΙΕΕ, 2009-2013, 2) "Technical Assistance to Ukrainian Quality Infrastructure in Ukraine - EuropeAid/126112/C/SER/UA/8".

They also participate in the following Greek-funded research projects and technical consultancies: 1) «ARCHIMEDES III: Funding of research groups in T.E.I.» (under the Operational Programme "Education and Lifelong Learning 2007-2013"), Project title: «Investigation of Power Quality and Energy Savings Potential in Existing DC Motor Drive Systems in Greece ». 2) «ARCHIMEDES III: Funding of research groups in T.E.I.» (under the Operational Programme "Education and Lifelong Learning 2007-2013"), Title of Research Project: «Development of a Mathematical Model based on Fuzzy Logic and Analytical Measurements for Power Quality Assessment of Electric Distribution Systems », TEI of Piraeus. 3)«COOPERATION 2011 - Partnerships of Production and Research Institutions in Focused Research and Technology Sectors», Project title: «Integrated System for Gas emissions Monitoring & Best Management of Ships Energy Operational Characteristics [e-greenship]», TEI of Athens. 4)«THALES Programme» (under the Operational Programme "Education and Lifelong Learning 2007-2013), Project title: «Development of an innovative, intelligent system with a optical digital sensor (CCD) for best management of indoor lighting system and energy savings exploiting natural light», NTUA.

Academic staff have also engaged in submission a few EU projects but without being successful thus far.

Research collaborations

The Department has developed some research collaborations with external institutions at national and international level. As documented in the supplement of the internal evaluation report of 2010-13, national external research collaborations include the Electrical Engines and Power Electronics laboratory, the Electrical and Computer Engineers Department of NTUA, the Phototechnology laboratory of NTUA, the Renewable and Bio Energy Systems laboratory, the Environmental Engineering Departments of the Technical University of Crete

and Research team of Environment Buildings, and the Physics Departments at EKPIA. External collaborators include the Earth Engineering Center, Columbia University New York (Research on extracting materials and energy from waste) and the Electrical Engines laboratory, Technical University of Cluz Napoca, Romania.

Applications of research and uses

There is some evidence of applicability of the research results of members of the Department, notably the work of the photometry laboratory, where they have designed and developed an in-house photometry apparatus. 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 2006 and 2013, provided in the table below by the Department, but not verified by the EEC :

2006	3
2007	12
2008	17
2009	13
2010	22
2011	19
2012	39
2013	14

IMPROVEMENT

The Department has intensified its effort to obtain further research funding and data presented during the visit suggests that a reasonable percentage of members of the academic staff (at least half of them) submit at least one research proposal per academic year. Overall, it has also 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 performance in research would benefit 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. Furthermore, the establishment of a framework for assessing research performance at departmental, group (laboratory) and individual level would enable staff to focus better their efforts and achieving full potential individually and departmentally.

It is also worth noting, that there seem to be opportunities for increasing the research income of the Department based on research and technical consultancy work which are not fully explored at present or are offered on a free of charge basis (e.g., services offered by the technical laboratories), 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 levels, if necessary.

APPROACH

The Department makes use of the facilities and services of the hosting TEI. The available services support the research and teaching activities as well as other services and recreational activities for students and staff.

Services such as the library, the liaison office, IT services, catering, hospitality, physical and cultural activity provision, etc are at a good standard or are improving. The provision of childcare to staff by the institution is commendable.

IMPLEMENTATION

The Departmental services operate sufficiently; its communication with students, the requirements and management of their studies and the cooperation between staff operate well. Its administrative procedures are encouraged to continue to be communicated via its web site to the community, including teaching staff and students. The Department is organised and managed well and the structure and allocation of duties and responsibilities are clear and well defined. The managing and administration team coordinates well and decision taking seems to be respected and executed by all departmental members.

The administration service is almost exclusively focused on the needs of the large student body and it is not unexpected that a lot of other secretarial duties, such as typing committee minutes, have to be performed by the academic staff.

RESULTS

The library is adequately equipped and emphasis has been placed in providing a spacious work environment. There is electronic search of books and documents by using keywords on titles. The need of the library to keep up with journals, books and periodicals is recognised, however the economic restrictions of recent times has affected the Department, the organization and even the sector, despite some unilateral deals for maintaining access of some journals which are recognised. This lack of funds is unsustainable and dangerous for maintaining the learning outcomes of the course. The library seems to be run well with ample of reading space and good provision of access to students and staff on-line and outside the institution. The presentation of projects, theses and scientific reports and referencing according to standards in writing and referencing may need to be reinforced to the students and the provision of other languages self- learning in a dedicated room is a commendable library provision.

The role of the liaison office is very important for ensuring transition of students from academia to employment. It operates centrally at the institutional level for the benefit of all departments. It is primarily focused at jobs and placements for every Department. The provision of data with regard to demand and supply and its optimisation have been discussed and the need of effective swift deployment of information to stakeholders is recognised. Some discrepancies related to the efficacy of connecting students and graduates with companies

has been considered during our discussions and solutions have been put forward to extending the data based tools with a more targeted and immediate approach to information access. Nevertheless the liaison office has a reasonably good infrastructure connecting the students and graduates with the job market in Greece and the EU.

IMPROVEMENTS

The Department seems to have coherency and collegiality and this is evident in the seemingly positive feedback by its students and their respect to the educational aims of their course. Currently the teaching of modules is not compulsory and it may be one of the reasons of low attendance, the scope perhaps of connecting lab-work with formal instruction may improve this situation and ultimately attendance rules and policy may need to be closely examined and even linked more directly with academic performance.

The Department functions well despite a high number of registered students and it is expected that the limit of extending the completion of the degree introduced recently will improve the situation, an aspect that is welcomed. Decision making takes place at departmental meetings and it is encouraged that representatives from administration, technical staff and particularly student representatives constitute the membership of such committee meetings. Given the large body of students an effective deployment of decisions should be communicated via the internet. It is standard practice that important requests/rules/changes are sent to the student body and staff by administration using simple IT tools via web-services.

With regard to the central services related with staff and student mobility, the recognition of opportunities to enhance student and staff experience and culture using bi-lateral EU programs such as ERASMUS should be encouraged. A more proactive facilitation approach by the mobility office and the department should be emphasised. The Department does not operate any postgraduate activity at present (a new master's course is being planned) and hence this section is restricted to undergraduate activities only.

Collaboration with social, cultural and production organisations

The Department participates in institutional activities, and the relationship and collaboration between departmental staff socially and culturally is excellent. It should be particularly mentioned that during our visit, we had the opportunity to meet individuals and companies, most of which were ex-graduates of the Department, indicating good networking with ex-students and companies. The Department is encouraged to extend the willingness, enthusiasm and market knowledge of companies in a formation of an industrial advisory board which will be useful in the development and deployment of future plans of the department. The willingness of the companies to assist the Department in student placements, final year projects, employment, donation of modern equipment and in training should be capitalized. This will enable the Department to extend its scope in the student experience and its research and to slowly build confidence in generating external support.

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

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

The Department is invited to think its future and either incorporate a closer relationship with sister TEI Departments such as electronic engineering, automation and computer engineering or to focus its scope further by specialisation incorporating modern energy resources and environmental issues to its teaching, learning and research. This will enable the Department to define its focus and to differentiate itself from other electrical provisions at home and abroad by specialising. Whether the Department adopts one or the other approach, it will enable it to facilitate the necessary partnerships by interfacing at its boundaries and hence expanding and complementing undergraduate and research activities.

The EEC considers the following areas needing improvement in the short-term, some of which immediate, because they affect the function of the Department and its teaching, learning and research objectives:

1. Increasing of staff to student ratio.
2. Increasing the number of staff in teaching, technician and support areas in accordance with the need of the provision and to the planned number of student intake.
3. Implementation of degree completion limiting the length of registrations in accordance to latest state rules.
4. Sustain the industry based orientation of the Department, enhance its lab-based provision, but rationalise formal instruction to enable self-learning through well directed and monitored problem solving. The difference between teaching and learning has to be understood and implemented by the Department.

Other activities that maybe considered by the Department are the following:

1. The outward looking of the Department is fundamental for its future development, its differentiation, benchmarking and collaboration with other Departments at home and abroad necessary.
2. Fostering closer communication with industry and facilitating their support through industrial placements, job destinations, bi-lateral business lectures, training and visits are important and necessary.
3. The formation of an Industrial Advisory Board maybe a way of strengthening the networking with companies and help the Department with its strategic positioning and future goals. To that effect companies such as Vpower, Elemko SA, Kafkas and others are already willing to get involved and to help the Department in such endeavour.
4. Facilitation of the modernisation of laboratories by donations from the industry to enhance learning and research objectives should be seriously considered.
5. The Department should recognise that EU directives welcome initiatives of generating funding by EU higher education institutions, towards becoming self-sufficient. To that effect the EEC recommends to the Department to examine innovative and sustainable ways of generating funding for part of its activities, especially those that cannot be supported centrally. A number of examples are given below:

- Undertaking research and becoming partners in EU and local projects should be enforced by the management, better organised and monitored.
- Provision of lab-space to company training and testing or new product development where possible, may be a way of generating extra funding. Recognising the lack of lab certification, which may then be easier to undertake having generated its own funds.
- The establishment of short-training courses to dedicated master's but offered also outside Greece and by charging a fee and licensing the provision to approved partners in developing countries
- Building of consultancy is another area that the Department could use its staff to undertake commercial services, perhaps involving graduates and its technical infrastructure.
- Organising seminars and conferences on a fee paid basis.
- Capitalise on staff/student mobility EU schemes.

F. Final Conclusions and recommendations of the EEC

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

The Department of Electrical Engineering of the TEI Piraeus has a long history of operation. It has fulfilled the need of the state to provide hands-on electrical engineers capable of designing and implementing electrical installations for the domestic and industrial market. This has differentiated the Department from other state provisions and particularly from the ATU which seems to be more theoretical and this differentiation has continued at the present date. The challenges of new energy resources and the new technologies underpinning these changes are well recognised by the Department, but need to be adopted, integrated and delivered, through teaching and learning to its students and expanded through research.

The Department needs to either embrace close collaboration with sister Departments such as electronic engineering, automation and others or/and to focus its scope in further specialising but still adopting the new energy/ electrical technologies.

The operation and management of the Department is good despite its low staff to student ratio but this is not sustainable and it is encouraged to seek means of increasing this ratio, allowing staff time for research. The EEC acknowledges that this depends largely on state provisions and allowances, which need to be revised and updated.

External support is an area of importance that almost all EU academic and research institutions have already adopted and EU directives already allow and expect self-funding activities. A number of initiatives towards external support have been highlighted in section E which will allow the Department and the Institution to be sustainable, competitive and to develop further.

Curriculum and teaching are working under difficult conditions, but a number of improvements are necessary such as the bringing of student intake to an appropriate level, the rationalisation of theory and labs, the reduction/reformation of mathematics and attention for reduction of teaching and the increase of learning by team work and problem solving.

The cooperation and collaboration of staff is very good, their qualifications and age profile improving which are necessary for the future development of the Department. Their cooperation with the EEC was excellent and the Head of the Department went beyond the course of duty making sure that we were well looked after and provided with any possible help which made our evaluation easier and more constructive.

Our recommendations are summarised below:

1. Increasing staff to student ratio.
2. Increasing the number of staff in teaching, technician and support areas in accordance with the need of the provision and to the planned number of student intake.
3. Implementation of degree completion limiting the length of registrations in accordance to latest state rules.
4. Sustain the industry based orientation of the Department, enhance its lab-based provision, but rationalise formal instruction to enable self-learning through well directed and monitored problem solving. The difference between teaching and learning has to be understood and implemented by the Department.

Other activities that may be considered by the Department are the following:

1. The outward looking of the Department is fundamental for its future development, its differentiation, benchmarking and collaboration with other Departments at home and

abroad necessary.

2. Fostering closer communication with industry and facilitating their support through industry placements, job destinations, bi-lateral business lectures, training and visits are important and necessary.

3. The formation of an Industrial Advisory Board maybe a way of strengthening the networking with companies and help the Department with its strategic positioning and future goals. To that effect companies such as Vpower, Elemko SA, Kafkas and others are already willing to get involved and to help the department in such endeavour.

3. Facilitation of the modernisation of laboratories by donations from the industry to enhance learning and research objectives should be seriously considered.

4. The Department should recognise that EU directives welcome initiatives of generating funding by EU higher education institutions, towards becoming self-sufficient. To that effect we ask the Department to examine innovative ways of generating funding for part of its activities, especially those that cannot be supported centrally.

Finally the EEC would like to thank the HQAA which has been very effective in organising our visit and providing all necessary papers, and for being very helpful and accessible for advice and guidance throughout our evaluation process.

The Members of the Committee

	Name and Surname	Signature
1.	George Stylios	
2.	Panagiota Morfouli	
3.	Panagiotis Kosmas	
4.	Christos Politis	
5.	Nicolas Tsapatzoulis	
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