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ΑΝΩΤΑΤΗΣ ΕΚΠΑΙΔΕΥΣΗΣ

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

EXTERNAL EVALUATION REPORT

ΤΜΗΜΑ ΗΛΕΚΤΡΟΛΟΓΙΑΣ

ΤΕΙ ΔΥΤΙΚΗΣ ΜΑΚΕΔΟΝΙΑΣ

December 2011

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External Evaluation Committee

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

1. Professor Vassilios Agelidis (Coordinator)
   The University of New South Wales, Sydney, Australia

2. Professor Christoforos Chadjicostis
   University of Cyprus, Nicosia, Cyprus

3. Professor Nikitas Dimopoulos
   University of Victoria, Greater Victoria, British Columbia, Canada

4. Dr. Kiki Ikossi
   Institute of Electrical and Electronics Engineers, Washington, U.S.A.

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

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

Introduction

I. The External Evaluation Procedure

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

II. The Internal Evaluation Procedure

Please comment on:

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

The External Evaluation Committee (EEC) visited the Department from Monday 5 December 2011 (6pm arrival time) till Wednesday 7 December 2011 (3pm departure time).

The EEC met with permanent academic staff, casual and contract teaching and academic staff, technical and general support staff, students, graduates and some representatives from industry employing graduates from the Department.

The Department was well organized and made available, in an open and transparent manner, the following:

- Individual course folders for the entire undergraduate curriculum. Each folder included detailed course description, course syllabus, course learning objectives and outcomes, documentation for laboratory experiments, sample of exam papers, student performance statistics, and marked student examination booklets.
- Course textbooks and other relevant teaching support reference books and teaching notes.
- A sample of about 10 undergraduate project reports/theses spanning over the last four years.

It should be mentioned that the Department operates a well-organized e-portal for all the courses and uses such portal to make relevant announcements to students, staff and the public. Such portal (e-class) provides access for each student and makes available all the teaching and learning materials, including teaching slides, lecture notes, tutorial documentation, past exam papers and solutions, laboratory student list and participation and much more.

Given that the Internal Evaluation Report (IER) was put together in 2008-09 and only documented the Department's activities until the 2008-09 academic year, the EEC made requests for more current and updated documentation. The Department with pleasure, full

cooperation and a positive attitude made available, on EEC's request, all of the following documents:

- Updated course outlines for the entire curriculum. These documents were recently generated (August 2011) to meet the European Credit Transfer and Accumulation System (ECTS) and other relevant requirements.
- Updated samples of software-based project work to support the Department's new initiatives for introducing state-of-the-art learning tools associated with electrical energy transmission and distribution systems (Powerfactory exercises).
- Documentation to support student learning during a visit to local industrial plants and facilities.
- The policy and regulations of the undergraduate student project report.
- Sample of announcements of student project's oral examination times, date and place.
- The policy and regulations for the mandatory 6-month practical industry student experience and the formal student diary/passport that serve as a record of the student learning activities in the industrial and professional environment.
- The formal announcements for undergraduate projects being offered for each semester/year.
- The form that assigns an undergraduate student project.
- The form that records an undergraduate thesis submission and examination results.
- Samples of student assignments that utilize software tools in the Programmable Logic Controllers course.
- Electrical drawings of industrial facilities being used during the coursework to support learning of industrial and building plants course.
- List of the 2011-2012 undergraduate project titles and short project description.
- List of the 2007-2011 research and scholarly publications of the full-time and contract academic and teaching staff. The list was organized on per year basis and included books/book chapters, journal and conference publications.
- List of the last four years of the student practical and professional placement record that included the name of the organization and the period of student training.
- The formal contract between the Department, the student and the organization for the student practical experience.
- The form being used to collect data regarding the student's proposal for the organization(s) to undertake his/her practical and professional experience.
- Examples of past hardware-based projects and apparatus built by students as part of these projects.
- The Department's strategic plan (ΕΚΘΕΣΗ ΑΚΑΔΗΜΑΪΚΟΥ ΠΡΟΓΡΑΜΜΑΤΙΣΜΟΥ) 2008-2012.
- The academic CV's of all full-time and contract academic and teaching staff.
- The curriculum and plan of the two postgraduate programs the Department participates and supports through lectures and laboratories. The provided curriculum for these two programs contained information identical to what is published online and was not as detailed as the information provided for the undergraduate program. For most courses, a list of bullet points for the topics covered in the course was given and the name of the academic/teaching staff involved with the course. There was no information about the laboratory work the students were required to do to complete the two-year program.

- The list of students who have participated in the above mentioned postgraduate program since its inception. Such information is also available and published online.

The EEC met the following groups of people:

- Permanent academic staff both formally and socially.
- Contract and casual academic and teaching staff.
- Technical staff.
- The librarian and the Department's secretariat.
- About 20 currently enrolled students, drawn from all years of the program.
- The President of the Institution.
- Alumni from as early as the early 1990s till recently (2009).

The EEC visited teaching and research laboratory facilities as well as the Institution's dining facilities. The EEC, due to time limitations, did not visit classrooms but was given assurances that the classroom facilities were of good quality and seem to be adequate for the number of students actively attending classes. Moreover, the EEC did not visit the Institution's physical training and athletic facilities.

The quality of the documentation provided was very good. The quality of the recommended textbooks was considered very good. The quality of the documentation to support laboratory experiments was also satisfactory. The evidence reviewed and provided, when available, was satisfactory.

The Department provided what was requested in an honest and transparent way. The Department academic staff felt that the quality assurance process was a positive experience and expressed willingness and desire to learn from the first time that such process was undertaken. The Department's main aim was to learn from this quality assurance process and improve the processes and procedures as well as the overall curriculum, teaching, research and student services provided.

The overall Department response was generally adequate in order to meet the objectives of the internal evaluation process. However, a number of questions in the IER were dealt with relatively simplistic statements and lacked any evidence to back them and clear explanations to support the arguments. It should be noted that during the EEC's visit that this was not a strategy to avoid dealing with such questions and everyone was very forthcoming and helpful. The EEC concluded that due to the lack of experience with formal internal and external evaluation procedures some of the answers in the IER appeared incomplete.

Nevertheless, the EEC was positively impressed with the level of commitment and work ethic at the Department, and pointed out the need to more clearly highlight such quality work in the IER. It was evidenced during the visit that the Department's activities and overall excellence was higher than that documented and stated in the IER.

During the formal presentations, additional important information was provided that was not documented in the IER such as:

- A comprehensive survey of graduates that included a relatively large sample (224, given that the average number of graduates is about 60 per annum) drawn from multiple graduation years (2000-2006). The survey provided a relatively positive insight about the Department's graduates and their employability.

On EEC's requests, the Department supplied via email post-visit, the following documents:

- List of courses, list of topics and academic in charge for the Mechatronics postgraduate program.
- Samples of laboratory work in the Mechatronics postgraduate program.

- List of students that have undertaken the Mechatronics postgraduate program since 2006.
- List of student average grading for the Applied Informatics postgraduate program.

A. Curriculum

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

APPROACH

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

UNDERGRADUATE CURRICULUM

The curriculum of the Department focuses specifically on electrotechnology. The main focus is what is called "high current", that is generation, transmission, distribution, use and control of electrical power including electrical industrial installations and buildings.

The curriculum comprises a set of core courses and a set of elective courses. At the final term, the curriculum includes an internship (which is normally undertaken in industry) as well as a graduating thesis supervised by a faculty member. In addition to the strictly technical courses, the curriculum includes a course in English terminology as well as courses in Technical Law, Technology and Innovation, and Professional Practises.

The curriculum also supports two areas of concentration; that of high current (τομέας υψηλών ρευμάτων) and that of low current (τομέας χαμηλών ρευμάτων). Students must take the majority of their elective courses in one of the two areas but they also must take courses in the other area.

The curriculum is consistent with the objectives of the Department that is to educate technologists in electrotechnology. The curriculum certainly covers this particular area and it is compatible with similar curricula at other institutions overseas.

The curriculum has evolved over the years (the Department was established in 1976 as part of a Center of Advanced Technological Education –KATEE and evolved to a Technological Educational Institution –TEI in 1983). Many inputs were used as the curriculum evolved including the opinion of their students, similar curricula abroad (e.g. those of the Fachhochschulen in Germany) as well as the needs of the Greek society and industry.

The proximity of the main Greek electricity generation stations (ΔΕΗ) provides an excellent environment and incentive to evolve a relevant curriculum.

The curriculum has evolved over the years. The Department has established a curriculum committee that serves a two-year term and is in charge of curriculum revisions. Any changes in the curriculum need to be approved by the General Assembly of the Department (Γενική Συνέλευση).

GRADUATE CURRICULUM

The Department states that it supports two postgraduate degree programs in cooperation with Universitat Politechnica de Catalunya (Mechatronics) and with the University of Macedonia, and the Department of Enterprise Management of TEI Kozanis (Applied Informatics).

Although no details were included in the internal evaluation report, the Department supplied us post-visit with some pertinent information concerning the two postgraduate degree programs.

Each program lasts two years and comprises 20 semester courses including a project.

Members of the Department are involved in teaching some of the courses. For the Mechatronics program the EEC was able to identify 9 out of the 20 courses that were taught by members of the Department, while the figure for the Applied Informatics Program was 3 out of 21 courses.

The documentation provided for the Mechatronics program indicated that there was a steady number of about 25 students per year starting with the class of 2005-2006. There were similar figures provided for the Applied Informatics Program.

A quick analysis of the curricula of these two programs revealed many introductory courses and several advanced courses. It is the opinion of the EEC that most of the courses are congruent with undergraduate level rather than graduate level courses.The Department stated that although it participates in these programs, these programs are offered by the Universitat Politechnica de Catalunya (Mechatronics) and the University of Macedonia (Applied Informatics) respectively.

From the documentation provided, it is not clear how these programs are managed and how the curricula have been designed and quality controlled.

The remainder of the discussion focuses entirely on the undergraduate programs offered by the Department.

IMPLEMENTATION

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

The curriculum is effectively implemented with clear delineation of core, and elective courses. The program clearly indicates which semester a course is offered and is expected to be attended by the students. The Department maintains a prerequisite structure for its courses. However, this structure has presently been suspended to minimize the impact of the requirements of the new education law on the maximum length of studies, and also to facilitate the transition from a dual-stream system (with intakes in the months of September and February) to a single-stream system (with intakes only in the month of September). The EEC discussed this issue and was assured that the prerequisites structure will be reactivated as soon as this transitory period elapses.

The curriculum covers amply all the subjects one expects to see in a modern

electrotechnology curriculum. However, there are some areas that could be improved.

The curriculum does not include a course in statistics. This is normally a requirement in electrotechnology programs. The EEC feels that the introductory course in Tools in Informatics (Εργαλεία πληροφορικής) is not an academic course and does not have a place in an academic curriculum.

Also, the two courses in programming offered in the second and third semesters use MATLAB as the programming language. Although MATLAB is very useful in modelling and solving mathematical problems, it is not a language that is widespread in industry (especially in non-research and development sectors) and as such it is not very useful to the graduates of the Department.

The microprocessor course is based on a specific processor and system (PIC) and it focuses on the use of this particular processor rather than exploring the general field of microprocessors and systems (of which PIC is but very simple example).

The EEC at its meetings with the undergraduate students heard that the coverage of the first mathematics and physics courses was at a level that is lower than the one expected from an institution of higher education. The students mentioned that this was probably due to the fact that the composition of the class was uneven including students of different backgrounds and skills. Perhaps, remedial courses in these subjects may be needed to bring the class to the same academic level.

The EEC thought that the there is a need for tighter relationships between individual courses as prerequisites to ensure the flow of the entire curriculum. For instance the power electronics course is not a prerequisite for the electrical transportation systems.

The EEC thought that the curriculum should include more real-life industrial examples delivered through case studies, visits, videos etc. These examples must be well integrated with the curriculum.

The EEC felt that there is no overall coordination between the various courses because many individual courses are designed separately and asynchronously by the academics in charge. For instance, in the electrical transportation systems, there is a great deal of topics listed dealing with review of machines. Since there are two separate courses on machines (Machines I and II) there is a need to review the overall curriculum against the recent course outlines generated in August 2011 and eliminate overlaps and repetitions. This exercise will free space for more relevant topics that are currently missing from the curriculum.

The EEC failed to identify topics in the curriculum covering power system harmonics, effects on machines and generators, communication protocols for automation such as Fieldbus and Profibus.

There is also need for reviewing courses such as the Introduction to fuel cells. Although such course is a good one for a postgraduate curriculum, devoting one full semester course on technologies hardly available anywhere in industry, other than nice applications, does not serve well with industry needs. It is suggested that such course be refocused on emerging technologies and include other technologies and not just fuel cells. A new course, titled “Emerging Technologies”, may be more appropriate.

The EEC also heard from graduates of the program that it is desirable that the curriculum exposes the students to practical aspects of electrical and mechanical technology, including mechanical and electrical shop practice.

Although safety is covered in several courses and labs, there is no single identifiable course that exposes the students to safety and electrical protection issues with strict goals and objectives. Similarly, there is no single identifiable course that covers the electrical code.

Finally, the EEC thought that topics covering maintenance and operation of power system

equipment and apparatus are not covered well by the current curriculum.

RESULTS

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

The present curriculum achieves most of the stated goals and objectives of the Department. The inclusion of laboratory courses is a distinct advantage as these expose the practical aspects of the curriculum and ensure that the students understand the application of the theory in real environments.
However, as stated previously, there is room for improvement by possibly realigning and refocusing some of the material and introducing some of the missing material.
The EEC heard that class attendance (as opposed to lab attendance) is not compulsory and that many students do not attend classes regularly. This puts these students at a disadvantage especially with respect to their preparation and understanding of lab work.

IMPROVEMENT

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

The Department in its long history has achieved a good reputation as to the quality of its graduates. The EEC was impressed by the testimonials of its former and current students as to the desirability of its curriculum.

Given the Department's experience with the evolution and operation of its curriculum thus far, it is now an opportune moment to re-assess the organization of the curriculum.

The Department was very responsive to our suggestions regarding changes in the curriculum.

B. Teaching

APPROACH:

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

Please comment on :

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

The Department delivers its curriculum through formal lectures and laboratory exercises. It is estimated that students spend about 40% of their time in a lab environment and 60% of their time in a classroom environment attending either lectures or tutorials.
The lab section sizes are reasonable and the labs are well staffed with academic and technical personnel.
Formal lectures are delivered to the whole class, although as we commented earlier, attendance in formal classes is not mandatory and hence class sizes tend to be very small.
There is adequate academic staff to deliver the curriculum. However, the academic staff is divided into permanent which mostly delivers the formal lectures, and non-permanent staff hired under contract (currently six-month contracts), which mostly delivers the laboratory part if the curriculum. Due to the very large number of students and student failure rates in courses (and labs), there is a need of a large number of laboratory sections and hence a large number of academic staff to teach these sections. The practice of hiring large numbers of non-permanent staff has an effect in the delivery of the curriculum because the possible continuous changes of instructors may not contribute to a uniform delivery over time.
The EEC was impressed with the labs their equipment and the proficiency of the academic staff involved in laboratory instruction. The EEC also observed the use of several application packages in courses and labs. These included Multisim, Power Factory, Matlab, Labview, EPLAN, 4M, ATP, and PSIM.
The EEC was impressed with the e-class system that is used to deliver course material, contact tests and serves as a forum through which students and instructors could communicate.
However, e-class may be facing stability problems. Students reported that for several electronically conducted tests, the system ended the test period prematurely.
Also, some students reported that not all students have access to personal computers through which they could access the system remotely.
Both courses and labs are examined at the end of the semester. Lab examinations consist of an actual laboratory exercise and an oral examination by the instructor.

IMPLEMENTATION

Please comment on:

- Quality of teaching procedures
- Quality and adequacy of teaching materials and resources.
- Quality of course material. Is it brought up to date?
- Linking of research with teaching

- Mobility of academic staff and students
- Evaluation by the students of (a) the teaching and (b) the course content and study material/resources

The EEC examined course material that was made available. It found that the notes and books provided were current. Most of the books were translations of standard textbooks used internationally for similar courses.
The EEC also examined graduation theses. It found that most of these theses presented work of a good quality.
However, the presentation differed widely. Some of the theses were well written and documented while others lacked such essential elements as the title, proper bibliography, adequate captioning, even the name of the academic supervisor etc.
The EEC also observed that most of the theses literally copied graphic material (figures, photographs) from other electronic or print publications without adequate attribution and proper referencing. Finally, several theses had multiple authors. The EEC wondered how the individual contributions to such multi-authored works were determined.
The EEC is of the opinion, that the Department should establish and publish clear guidelines of how a thesis should be written and presented, including a template for the document.
The courses have been evaluated by students in the past three years using the form proposed by HQAA. However, the procedures of performing the evaluation and handling the results have been implemented neither consistently nor optimally. It was not clear when these evaluations were performed. Students stated that they were distributed during final examinations or laboratory examinations. This is obviously not a proper time as the pressure of a looming examination could distort the clarity of the student's opinion as per the course and the course instructor.
The evaluation of the course (the formal lecture) and the associated lab happen at the same time on the same form. It is difficult to discern differences between the two course components and the instructors.
It is not clear that the results of the evaluations are given to the instructors. Ideally, such results should be communicated to the course/lab instructor to help them improve the delivery and content of a course. Also course evaluations could be used to reward excellence in teaching performance.

RESULTS

Please comment on:

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

The Department is to be congratulated for the very personalized and interactive teaching in the labs.
It was not possible to determine whether there were differences in the grades and the success/failure rates between different courses. It seems that there is no system to consistently collect, analyse, and utilize such information. Should the Chair of the department approve the grades of each class, this could enable him/her to have an overview and take proper action.
The EEC observed that a large number of students take a long time to graduate, or have not graduated. For example, the statistics presented by the Department showed that from the

class of 2002-2003, 55% has not graduated yet, while 20% took more than 7 years to graduate and only 25% graduated in less than 7 years. Similar numbers apply for the other classes as well. The average degree grade has kept approximately constant over the past seven years varying between 6.35 and 6.68. This is consistent with ensuring that the grading standards have been maintained and no grade inflation was introduced. However, it was also observed that no student graduated with a grade that was above 8.5 (considered excellent). The EEC was not able to determine whether this was due to strict grading standards or whether it reflects on the quality of the students the Department attracts.

IMPROVEMENT

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

The current and former students interviewed by the EEC were generally satisfied with the education they have or are receiving and by the reputation the Department has.
The Department has been receptive to the EEC's suggestions of improvement. The Department should implement the suggestions of this report within the shortest possible time.

C. Research

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

APPROACH

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

Research is appreciated both at the Department and the Institution level. The EEC noted that although the legal framework encourages research, the restriction of a TEI to award a PhD, due to the legal framework, is seen by the TEI Faculty members as an inhibiting factor. The EEC heard that this restriction is in a direct conflict with research activity and research publications being an important criterion for faculty members' advancement to a higher academic level. On a positive note, the EEC also heard how the Department addresses currently such an inhibiting factor, which is through collaborations with University Departments to be able to generate research output with post-graduate students and attract research talent indirectly. The EEC was also shown some research and development projects currently active within the Department, and engaging members of the Department.

The EEC noted that the Department does not provide clear incentives, such as teaching relief and cannot cover expenses such as registration for conferences, which is due to the guidelines imposed by the relevant legal framework. The EEC also noted that despite many constraints, which are beyond its direct control, the Department does provide, where and when possible, research funding to active research teams and covers some limited travel expenses. The EEC neither requested nor received any exact information about how much research funding is channelled by the Department to its researchers and/or research laboratories or the exact financial support being offered by the Department for conference attendance.
The EEC noted that a number of faculty members have made efforts to get more involved in research in their respective areas of expertise, by establishing even closer collaborations with the neighbouring University of Western Macedonia and other Greek Universities. What the Department has going for it in this direction --and this is what some faculty members have been able to exploit and successfully attract research funding-- are its excellent laboratories and laboratory know-how, and the demonstrated willingness of the Institution to support research in terms of space, equipment, and technician time.

IMPLEMENTATION

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

The Department's output in terms of referred research publications in journals and conferences is rather weak. In the period 2004-2009 (last five years prior to the writing of the IER) the department's faculty (including both permanent and visiting faculty) authored or co-authored 7 monographs/books, 4 book chapters, 94 journal papers, and 143 conference/workshop papers. The IER did not provide specific publications and it is unclear what the quality of these publications is. These numbers include the publications of short-

term visitors in the Department (the data provided include 32 persons that turned in data as requested prior to the writing of the report). A quick look at the Department's webpage (which only provides information about permanent faculty members) shows some publications in quality journals.

During the period 2002-2009, the Department participated in a few research programs. Eight of these research programs were led by the Institution with participation by members of the Department; however, it is unclear what the level of funding was and whether these projects were led by members of the Department or simply involved participation of faculty member from the Department. During this period, the Department also participated in six other research programs (funded by agencies or institutions in Greece) and ten European research programs. The IER does not indicate the amount of funding received by the department.

At the time of the visit, the Department was able to provide additional data regarding publications and research programs. In particular, from 2007-2011, members of the faculty have published 67 journal articles and 100 conference/workshop articles. During these years, they have accumulated 239 citations. It was not clear how such citations were verified and what source was used to extract the data.

Again, other than the lists of publications, no specific printed or electronic record with these publications as full papers was presented so it is difficult to assess the quality of these publications. It is suggested that in the future, all research publications organised in folders for the EEC to peruse.

During the visit, the Department provided data that indicated the cumulative research funding for the Department (starting in 2002) to be in the order of 200K Euro, which is rather small. A few research proposals are currently under evaluation and the Department is hopeful for positive outcomes.

Members of the faculty have established research collaborations with faculty from the nearby University of Western Macedonia and other Universities (e.g., with Newcastle University, Iowa State University, and several Universities in Romania); this is commendable and such collaborations should be more actively pursued. In the committee's opinion, the department should also try to further establish research collaborations with other Universities (e.g., the Aristotle University of Thessaloniki) and also pursue --despite the difficulties-- closer ties with the local branch of the Public Power Corporation (ΔΕΗ).

It appears that research activities are, for the most part, restricted to academic staff with minimal student involvement. It also appears that despite the fact that visiting faculty is encouraged to participate in research projects, there are several inhibiting factors that make their participation difficult (e.g., many of the visiting faculty leave before they have a chance to initiate research collaboration and/or pursue funding opportunities).

RESULTS

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

The Department/Institution have had a positive attitude towards research and, wherever

possible, have tried to facilitate research. As mentioned earlier, research outcome (as measured by publications and research funding) is rather limited, and as a result the number of citations is also small (482 citations overall). Three faculty members have participated in nine Program Committees for Conferences/Workshops (either National or International), whereas two faculty members have served as editors in journals, and five of them have served as reviewers. It is unclear whether these numbers also include short-time visitors in the Department (they include 32 persons that turned in data requested prior to the writing of the report), but in any case improvements are needed.

The Department and the Institution have not identified direct ways to evaluate/reward research participation by the faculty. It is stated that faculty members with at least three research publications in the last four years are relieved from the proctoring of exams, but more incentives and rewards need to be provided to active researchers. Also the Department and the Institution could more systematically pursue research collaborations (right now, the research collaborations that exist are up to each individual faculty member).

Finally, a key ingredient of all research activities is the participation of students and such important contribution should be encouraged.

IMPROVEMENT

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

The EEC recognizes the overall positive attitude towards research by both the Department and the Institution; however, the EEC believes that current research efforts need to be strengthened. The IER does not really indicate clear goals that the Department has and the means/methodology to achieve them. During the visit, the faculty indicated some of their intermediate and longer-term objectives, such as identification of research areas of interest, participation in national and international conferences, establishment of research collaborations with other Greek and international Universities and Corporations, and others. Nevertheless, the Department and Institution appear to be completely lacking a strategy of how to best promote these initiatives.

It is the EEC's recommendation that additional resources should be provided to the Department from the Institution in order to further promote research, at least to a degree that will allow its faculty to be active and up-to-date in their fields. The long run objective should be to create a largely self-sustainable research program.

Despite legal and institutional hurdles, the Department together with the Institution should actively and more directly take steps that will improve research outcome indicators. For example, faculty can be formed into research groups and the Department could consider targeted hiring (of both visiting and permanent faculty), aiming not only at fulfilling teaching requirements but also at creating some nominal research groups to the extent possible. This could in turn provide more opportunities for research collaboration, which is very important particularly for younger faculty. The faculty can also consider how to best take advantage of the strengths of the Department (excellent laboratory infrastructure, measurement capability, experienced technicians and laboratory personnel, etc.), and pursue collaborations with other partners that may lack (but need!) this capability. Some faculty members have already taken such an approach and that has proven effective.

The EEC also recommends that faculty should invest in submitting and publishing in archival journals. Mobility programs (funded by the European Union) can also help in giving an initial boost to such research activity (e.g., by improving faculty visibility).

D. All Other Services

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

APPROACH

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

The Department is actively pursuing the fulfilment of its role as a high quality service provider to the members of the academic community, industry and the community at large. The Department has a satisfactory electronic system for keeping student records that is maintained and updated by dedicated personnel. The electronic system is very functional and can serve the needs of the student population. The Department has also adopted the state procedures for promotion and hiring of academic personnel. The Department has a policy that is geared towards increasing the student presence on campus. The majority of the courses are mandatory and have labs that the students are required to attend, with a one to one interaction between the students and faculty members. In addition, the free student cafeteria program and student organization activities attract students to the campus.

IMPLEMENTATION

- Organization and infrastructure of the Department's administration (e.g. secretariat of the Department).
- Form and function of academic services and infrastructure for students (e.g. library, PCs and free internet access, student counseling, athletic- cultural activity etc.).

There is very good organization and a solid infrastructure for the Department's administration. The academic services are very good. There is a small but very comfortable and relatively well-equipped library with multiple copies of text books and support texts for all the classes. There is on line access to relevant research journals and databases. Although the availability of Greek textbooks was sufficient, the very limited number of English language electrical engineering texts books was noticeable. There are PCs and free Wi-Fi internet access all over campus. There are a number of places on campus with free PCs (such as the library and the labs). There seems to be adequate athletic facilities (a gym and tennis courts, as evidenced by information available online) available to students and faculty.

RESULTS

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

The administrative and other services are functional. The demand for services is seasonal and follows the academic schedule as in most other domestic and overseas institutions. At times of high demand for services there is a need for additional personnel to properly service the student population. The Department views the results of the administration as very functional.

IMPROVEMENTS

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

The Department has identified the need for additional administrative personnel to be able to serve the students better. The initiatives undertaken in this direction were to incorporate this need in their report and in their requests for future funding of an additional administrative position. Further actions by the institution towards mediating the uncertainty of external funding of a new position include the implementation of a computerized record system accessible to the students through the internet. In addition, the administration of all departments is centralized with a number of different administrative support personnel of the different departments located in the same place. This is an excellent initiative as it provides redundancy and allows the administrative personnel to support each other and the students they serve.

Collaboration with social, cultural and production organizations

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

The Department collaborates with a number of professional organizations and institutions. These organizations and institutions are either state or private and serve as employers for the students during their mandatory six-month practical work experience. The requirement of students to have a practical work experience prior to graduation is an original requirement for a Greek educational system. It offers a significant advantage to the graduating student and it is a great benefit to both the collaborating organization and the department. Practical experience is a key component to high quality engineering education. The TEI of Western Macedonia is doing a very good job in incorporating the practical technical experience into every graduating student's qualifications.

It would have been very beneficial if governmental organizations were more accommodating to accepting student trainees so that the program could potentially be expanded to incorporate not just the graduating students.

There was no information on the report on collaboration with social or cultural organizations. Observations from the onsite visit on student campus activities revealed a rather rich and interwoven association of student organizations with at large society organizations.

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

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

Please, comment on the Department's:

- Potential inhibiting factors at State, Institutional and Departmental level, and proposals on ways to overcome them.
- Short-, medium- and long-term goals.

- Plan and actions for improvement by the Department/Academic Unit
- Long-term actions proposed by the Department.

There are a number of inhibiting factors that are in some respect beyond the immediate control of the Department. The EEC felt that the Department should continue to capitalise on every opportunity available and maintain the positive environment where younger staff can channel their energy and contribute towards research for them and the Department into the future. The EEC thinks that the new governing law may resolve a number of issues created by the environment the Department operated in the past.

Strategic Plan (ΕΚΘΕΣΗ ΑΚΑΔΗΜΑΪΚΟΥ ΠΡΟΓΡΑΜΜΑΤΙΣΜΟΥ**)**

The strategic plan 2008-2012 has the following sections: infrastructure, postgraduate programs, growth, outward looking and openness, human resources, student services and lifelong learning.

Vision and mission

There should be a clearly defined vision for the department. Examples may include:

- To become Greece's top ranked technological institution for the training of industry sought Electrical Engineering Technologists.
- To offer highly relevant Electrical Engineering Technology education at the undergraduate level, e.g., reaching the level of a German equivalent qualification (Fachschule)

Research

The plan lacks clear direction for research and makes no relevant needs analysis. There is no description of key research areas the Department seeks to expand and acquire skills. There is no organisation of the department under research themes and directors for each theme to drive such development. There are no clear, specific, measurable goals and clear line of responsibility assigned for such goals to be achieved.

Teaching

Curriculum development is not mentioned as a measurable goal and there are no clearly defined paths to upgrading and updating such curriculum to integrate the latest developments needed by the industry. There is no clear and specific plan and a systematic approach to incorporate the latest technological developments to inform the curriculum.

Human Resources

There is a great deal of discussion about support staff and required needs. It is acknowledged that the workload of support staff is seasonally high, especially during semester start dates. However, there is no in depth discussion and goals about academic needs for the Department as far as areas of expertise are concerned. There is no plan for the professional development of technical and support staff or discussion of such needs and how they can be addressed. There is a need for technical and professional training of technical and contract teaching staff on the latest technologies impacting the curriculum.

There is a need for a clear development plan to describe the needs for each laboratory and how the Department plans to maintain the currency of its infrastructure.

Industry engagement

There is no discussion about industry engagement and a more systematic two-way cooperation and collaboration. There should be a semester based plan for industry interaction through seminars so that students and industry experts can meet and expand

student's horizons prior to their practical and professional experience in the industry. The strength of the Department being in close proximity with the Public Power Corporation (ΔΕΗ) should be translated from a perception and personal interactions to a plan of collaboration, activities and projects that are mutually beneficial for both parties.

Student Services

The introduction of student coordinator must be implemented as discussed in the strategic plan.

The library should include more English textbooks and further assistance should be provided for students to improve their English language skills. This will increase student mobility within Europe and abroad.

Overall comments

The list of publications and conference attendance of academic staff has no reason to be in the strategic plan. Instead forward looking statements, specific and measurable aims and objectives and needs analysis of how to get there are needed such as:

- Number of targeted high impact archival journal and conference publications per full-time academic staff.
- Analysis of research areas and expertise required to grow, by when, how etc
- Ideas about conference organisation or workshop organisation to attract industry, interest in the activities of the Department (For instance it is not clear if there has been any workshop organised by the Department to address research or industry needs in the last 5 to 10 years).
- Succession planning, as many academic staff members are close to retirement.

F. Final Conclusions and recommendations of the EEC

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

Conclusions and recommendations of the EEC on:

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

The EEC's overall impression is that the Department is a strong and a well-established one. The teaching and learning environments are positive and the students, those who are interested to learn and participate in the teaching and learning processes, have access to good laboratory facilities, dedicated staff and excellent expertise.

The curriculum is well designed and comparable to other technological institutions but comes short of meeting the depth and academic rigour of a university level electrical engineering curriculum. The EEC felt that the undergraduate program is similar to overseas programs that lead to a Bachelor of Engineering Technology (Electrotechnology) or Bachelor of Applied Engineering (Electrotechnology).

The strengths of the Department are numerous. One of them is the online management system (e-class) and good laboratory facilities for teaching. The IER prepared by the Department was detailed and very well prepared. Throughout the document it was evident

that the Department was eager to present their work and achievements. The interpersonal interaction between the members of the Department is very positive and healthy. The faculty members interacted constructively between themselves and the students. The educational personnel and students embraced the evaluation process and were very forthcoming and helpful.

The labs were extremely well equipped and the lab sessions well attended. The students have unique direct hands-on learning experience that prepares them well for becoming productive members of the workforce.

The educational personnel were all extremely well qualified with accredited advance degrees and/or Ph.D.'s Furthermore the enthusiasm in teaching and transferring knowledge to the young students was un-parallel to any other Educational institution.

The Department is ready and capable to receive constructive criticism and respond positively to the recommendations for change and further improvement.

In particular, the EEC makes to the Department the following recommendations:

- Better alignment between the expertise of the teaching personnel and the courses assigned for them to teach.
- Need for continuity of teaching quality. Not knowing who is teaching the course till the last minute is not conducive to a uniform quality of the classes offered.
- The number of temporary contracted to permanent educational personnel is high to a level that hinders the smooth operation of the Department and affects continuity of high quality education.
- Some students can benefit from remedial Mathematics to reach a level that allows them to follow the normal curriculum.
- It is highly desirable that probability and statistics be introduced in the curriculum, as they are indispensable in dealing with reliability, and measurement.
- The undergraduate projects have a large variability with regards to scope and depth. A common format for the report needs to be adopted that includes bibliography and references to all adopted external information.
- A rule that requires an individual report from each student needs to be enforced. Even for larger team projects, each student can report and contribute to specific segments of the project.
- The grading system needs to be documented, and become clear to the student, transparent and traceable.
- A closed loop system to formally handle, review and evaluate exam papers must be developed.
- The number of years the majority of students take to complete their studies is unjustifiably large and needs to be confined to 4 years.
- The lax in class attendance is perhaps a contributing factor to the long time to graduation. The Department should introduce measures to entice the students to attend classes regularly.
- The Department's quality assurance system needs improvement.
- The student evaluations of the classes need to be performed regularly and according to the evaluation standards and specifications.
- The Department encountered difficulties in teaching evaluations because the students do not regularly attend the theory lectures. As a consequence the class evaluations were performed at the labs. Evaluations of classes from students that do

not attend are meaningless and evaluation of labs in place of classes is misleading. The class and lab evaluations need to be tabulated and the results provided to the teaching personnel.

- The Department needs to develop a feedback loop between teaching- evaluations – action-teaching improvement.
- The Department needs to establish clear procedures for curriculum enhancements and updates.
- The Department needs to establish clear and documented procedures for student grade assignments and resolution of any disputes.
- The Department needs to resolve the causes of a large number of registered students versus the small number of graduating students.
- The graduate (Masters Degree programs) studies need attention. Identification of resources is required and the programs need to be focused on specific goals.
- The Department needs to develop an action plan to document the improvements required and mentioned in this external evaluation report with a clear schedule, timelines and people in charge to deliver the desirable results.
- The Department needs to encourage practical (experimental/hands-on) undergraduate projects. A key objective should be to change the ratio between practical and theoretical undergraduate project theses being offered and taken. A 3 (practical) to 1 (theoretical) ratio must be achieved as a minimum target.
- The Department needs to establish clear standards for the evaluation of faculty research performance and provide more aggressive incentives for faculty that is research active. Establishing formal collaborations with industry and other institutions at the Department and/or Institution level will also be helpful.
- The Department needs to establish a research vision by identifying its three to five primary research areas; this can also help in targeted hiring (of both permanent and visiting faculty) and also in terms of allocating sparse resources.
- Many suggestions and recommendations are discussed throughout this report in all sections. The Department needs to address all such points, as they appear in Sections A though F.

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