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

EXTERNAL EVALUATION REPORT

DEPARTMENTOF ELECTRICAL & COMPUTER ENGINEERING

DEMOCRITUS UNIVERSITY of THRACE

Report completed December 13th, 2013

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External Evaluation Committee

The Committee responsible for the External Evaluation of the Department of Electrical and Computer Engineering of the Democritus University of Thrace consisted of the following four (4) expert evaluators drawn from the Registry constituted by the HQAA in accordance with Law 3374/2005 and listed in alphabetical order:

1. Dr. Nicholas E. Buris (Committee Chair)
   (Title) (Name and Surname)

   president and chief executive officer, NEBENS LLC, Deer Park, IL, USA
   (Institution of origin)

2. Dr. Vassilios Agelidis
   (Title) (Name and Surname)

   Professor, School of Electrical Eng. & Telecommunications; Director, Australian Energy Research Institute, University of New South Wales, Sydney, New South Wales, Australia
   (Institution of origin)

3. Dr. Nikitas Dimopoulos
   (Title) (Name and Surname)

   Professor, Dept. of Electrical and Computer Engineering, University of Victoria, British Columbia, Canada
   (Institution of origin)

4. Dr. Marinos Vouvakis
   (Title) (Name and Surname)

   Associate Professor, Dept. of Electrical and Computer Engineering, Univ. of Massachusetts, Amherst, MA, USA
   (Institution of origin)

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

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

Introduction

I. The External Evaluation Procedure

- Dates and brief account of the 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?

Commonly acronyms used in this report:

DUTH	Democritus University of Thrace (often referred to as simply the University)
ECE	Electrical and Computer Engineering
Department	the ECE department at DUTH
EEC	External Evaluation Committee
IEC	Internal Evaluation Committee (OMEA in Greek)
MODIP	Quality Assurance Unit (=ΜΟΝΑΔΑΔΙΑΣΦΑΛΙΣΗΣΠΟΙΟΤΗΤΑΣ)
ELKE	Research Accounts Organization (ΕΛΚΕin Greek)

The EEC met with professor Anastasia Safigianni, chair of the Department and professor Christos Schinas, coordinator of the Department's IEC at the Elisso Hotel in Xanthi at 8:00pm Monday, November 4th, 2013. An introductory discussion lasting approximately 1,5 hours followed covering various topics including, activities of the Department, goals of the EEC, EEC documentation requests, scheduling and other logistic aspects of the visit.

The visit to the Department started on Tuesday morning at 9:30AM. Professor Safigianni presented in a condensed version the activities of the entire Department to the EEC. This was followed by presentations by each of the sectors. These presentations were held on Tuesday and Wednesday, November 5th and 6th, respectively. The sector presentations were

interrupted on Tuesday for about 1 hour by a group of students opposing the very concept of external evaluation. The EEC tried to accommodate these students on the spot, offering tohold its Wednesday scheduled meeting with the students. Unfortunately, no coherent recommendation was expressed by the students. To break the disruption, the EEC paid a visit and inspected operations at the secretariat office and, finally, returned to the conference room one hour later continuing its work. On Wednesday morning, the EEC toured the teaching and research laboratories housed at the old buildings, downtown Xanthi. Part of the EEC also visited the Telecommunications Lab and microwave test equipment housed at the new building (Kimmeria campus). Early on Wednesday afternoon, the EEC met with recent and old graduates of the department. Later that afternoon, the EEC met with about a dozen of current undergraduate and graduate students of the Department. These student and graduate meetings were held in the absence of any DUTH staff.

The Department's mission statement is articulated in the presidential decreesΠΔ671/1975 and ΠΔ266/1993which were drafted to establish and then rename the Department, respectively[1].

1. To develop engineers who deal with the study and development of systems for the generation, transmission, distribution, storage, processing and usage of power and information.
2. To offer high quality undergraduate education aiming at the graduation of Electrical and Computer Engineers with a complete theoretical and experimental background, interest for research and capability to follow the scientific progress.
3. To provide graduates the necessary skills that would secure their complete preparedness for their scientific, research and professional career.
4. To create an appropriate environment for high quality education of postgraduate students. Through the postgraduate study programs the Department aims to provide completely trained young scientists who will have the potential to become leaders in the continually progressing discipline of Electrical and Computer Engineering.

The Department is divided in five (5) sectors (τομείς). The sectors and their academic staff (lecturers and professors) are enumerated below:

- Power Systems (10)
- Electronics and Information System Technology (18)
- Telecommunications and Space Science (12)
- Physics and Applied Mathematics (7)
- Software and Application Development (6)

Each sector is comprised of several laboratories. The Physics and Applied Mathematics section focuses on providing the fundamental scientific background to the students of the Department. It also engages in some research activities which is helpful as, eventually, the engineering students could benefit from that work. The largest sector is that of Electronics and Information System Technology, which is three times the size of the smallest sector, that of Software and Application Development.

[1]As found in the Department's Internal Report and translated by the EEC

The total number of academic staff is 53, which is a good size for a modern department of ECE and could cover a wide spectrum of research areas. The academic staff is also helped by a technical staff of 21 who attend to and teach laboratories.

The Department awards the degree of Electrical and Electronics Engineer and students can follow three areas of specialization to achieve it:

- Electronics and Computer Engineering
- Electrical Power Engineering
- Telecommunications Engineering

The Department also offers postgraduate degrees at both, Master's and PhD level. The Master's program offers degrees in three specializations: a) Microelectronics Systems and Informatics Technology, b) Communications Systems and Satellite Telecommunications Technology and c) Power Systems and Renewable Energy Sources Technology. The document describing the postgraduate program included an extensive list of offered courses and an equally extensive list of documents associated with the application for the postgraduate school and the candidate specific program of study (i.e. template for the individual candidate's coursework, etc.). The plethora of postgraduate level courses offered is impressive. As an example, the specialization of Microelectronics and Informatics lists 32 courses in its Master's program. It was not clear what percentage of these courses are actually taught each year and how many students are enrolled in each course. The Ph.D. program offers courses that are grouped under four (4) areas of research focus. The EEC did not have enough time to thoroughly examine and evaluate all aspects of the postgraduate program. In particular, the teaching and, to a lesser extent, the curriculum aspects have not been evaluated. The research aspect is evaluated and is discussed in section C below. The inter-departmental postgraduate program in collaboration with the Civil engineering department and the department of Business Administration of the University of Macedonia, was mentioned to the committee, but it has not been evaluated either.

The Department occupies and uses space in three buildings. Buildings A and B at the new campus of Kimmeria with a combined area of 12.000 m^2 and a building at the old campus, inside the town of Xanthi, where most of the labs are with an area of 4.500m^2. The old building and its grounds are vandalized with graffiti, and could benefit from some clean-up and fresh paint. The new buildings are cleaner and better maintained. However, both new buildings, despite being in use for the last 4+ years, have not been "officially" commissioned. This has the ramification that certain departmental customizations and improvements to the buildings cannot yet be undertaken.

The logistics of the Department are handled by a well-trained and capable administrative staff of 6. The administrative staff are to be commended for providing the EEC all the requested documentation expeditiously and in a well-organized manner. Prior, during and after the on site visit, the EEC was provided and examined many documents, including the following:

- Internal Evaluation Reports (3 reports spanning over the period from 2008 to 2013)
- Teaching staff CVs(a couple were missing)
- Programs of study (with regulations and processes)
- Records of the Department's Program of Study Committee
- Lists of research programs and funding awards

- Student course evaluations
- Samples of student records
- Outlines of student registration and other administration processes
- Samples of diploma, MSc and PhD theses

On Tuesday, November 5th, the EEC was treated to an informal dinner by the Department at a local restaurant and was joined by the Department chair, professors Schinas, Chryssomalis, Koukourlis (dean of the school of engineering), professor George Costa, director of MODIP and vice rector for student and external affairs and professor Pantelis Botsaris, vice rector for infrastructure investments and planning.

The EEC met alone late in the afternoon of Wednesday to preliminarily summarize its data gathering activities and, subsequently, met with the Department chair and a few of the sector directors to discuss and outline some initial findings.

The EEC departed for the Kavala airport at approximately 6:00pm on Wednesday, November 6th, in a university provided and operated vehicle.

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 Program

The undergraduate degree curriculum serves the Department's program in graduating successfully students in the fields of electrical, electronic and computer engineering (hardware and software).The broadly defined/implied goals and objectives of the current curriculum are to give students the fundamental theoretical knowledge, specialized skills and a limited taste of professional experiences required to work as an electrical, electronic and computer engineer. This is currently achieved by a large number of courses organized into 9 semesters. The 10th semester is solely dedicated to the final thesis project.

According to the study guide (Programma Spoudon) there are currently three specializations as follows:

- Electrical Power Engineering
- Electronics and Computer Engineering
- Telecommunications Engineering

Despite the statement in the study guide that only 5 semesters are the common ones for all specializations, the actual fact is that the first 6 semesters are common to all specializations. It should be noted that the Department offers a single title degree. No specialization is mentioned in any degree. The curriculum tries to cater to all specializations mentioned above. To that extend, the curriculum needs to cater to many sub-disciplines of electrical, electronic, telecommunications and computer engineering and ensure all graduates have the understanding of all such sub-disciplines prior to specialization.

The curriculum has a number of core courses for the common part (6 semesters), followed by a number of core courses for each specialization. The student has the flexibility of taking a number of elective courses.

The courses also cover knowledge in economics, social and philosophical dimensions and sciences. This follows international standards and culture that requires engineering students to be exposed to such disciplines.

The breadth of the courses is considered very good. And, on the positive side, the students are exposed to a wide variety of courses. But, as alluded to earlier, the EEC believes the

students should have more flexibility in choosing their courses.

The objectives of the curriculum seem to have evolved over the years. The department has introduced a new program that is about to complete its first full cycle.

The curriculum generally delivers on the requirements of the society to graduate high quality engineering students.

Overall the following observations can be made about the current curriculum.

The first observation is that the current curriculum does not have clear objectives for the overall program and the structure of the courses is not optimal. Simply said, there are far too many courses that deliver the program objectives. Moreover, too many conflicting demands are placed on the curriculum. In some cases, courses offered appeared to be more tuned to the academic staff, their segmentation in laboratories and their required teaching load minima rather than the need of the curriculum to follow the state of the art in Electrical and Computer Engineering. In doing so, the curriculum "overloads" students, effectively depriving them from valuable time that could and should be used to study for homework, projects, and midterm exams.

A second observation is that significant overlap exists amongst courses, unnecessarily rendering their number high.

The EEC has identified several course sequences the material of which could be condensed and delivered effectively using a smaller number of courses. This is congruent with international practices and, by doing so, will ultimately reduce the course load.

As a first example of such sequencesconsiderH04Y/E,H05Y/E, and H10Y, H11Y and H21Y/H26Y-N. These two course sequences could be condensed into three single courses. Similarly, H22E, H18Y and H20Y could be condensed into two courses. The Computer Architecture sequence of courses could be realigned and moved earlier in the curriculum. For example H15E and H39 could be merged into one advanced computer Architecture course that includes quantitative analysis as per Hennesy and Patterson.H19Y seems to devote considerable parts in discussing rather old architectures such as Intel's 8085, 8086, Motorola's 68000 etc. While these examples include basic ideas of computer architecture, the same could be achieved by using modern examples. Such early processors are non-existent today, or are extremely rare. H43 includes detailed architectural discussion. This presumably has been covered in earlier computer architecture courses. Significant topics such as software hardware co-design and tools are missing. H34E focuses mostly on theoretical aspects. Important programming environments such as MPI, OpenMP, CUDA and hands-on experience are missing.

As a second example, the undergraduate program has the following five mandatory courses: Electromagnetic Fields I (T10Y, semester 3), Electromagnetic Fields II (T11Y, semester 4), Applied Electrodynamics (T09Y, semester 5), Principles of Telecommunication Systems (T37Y, semester 6) and Principles of Systems of Telecommunication Links (T36Y, semester 6). While all these mandatory courses could make sense to offer for the Telecommunications specialized students, the committee feels that they are an overkill and that the appropriate mandatory material could easily be condensed into two courses.

Another example of an opportunity for material consolidation is Physics I, Physics II, applied thermodynamics and engineering mechanics. While physics and related theoretical and/or applied topics are fundamental knowledge to Electrical and Computer Engineering, such background should be covered by a maximum of 3 courses and delivered in the curriculum as early as possible, i.e. in the first 3 semesters.

The EEC strongly urges the Department to redesign its curriculum following international standards and ensuring that it be focussed on the program rather than the teaching requirements of its academic staff.

It appears that the Department did not consult formally with stakeholders (i.e. alumni, industry, or postgraduate institutions abroad)in structuring the curriculum nor it has plans to initiate such important formal feedback mechanism. The Department should consider establishing an external advisory body to guide and assist the department with advice, feedback and help with respect to its curriculum, research and relevant activities.

There is a curriculum committee and clear procedures to revise the curriculum. However, such internal procedures to curriculum design seem to be very bureaucratic, when benchmarked against international practices. The EEC examined the official records of the curriculum committee. However, the EEC did not fully examine the content of various less formal emails and proposals for curriculum modifications. There appears to be some difficulty in the Department assessing and deciding on the appropriateness of new course subject matter. One reason appears to be the large number of currently offered courses and required minima teaching loads on the academics staff. The EEC urges the department to identify and offer according to student demand, "special topics" courses with new material that would track recent technological developments. As the Electrical Engineering technology has progressed in the last several years, the divisions from subject to subject have become more blurred. This makes revising the curriculum challenging. But, at the same time, it is an opportunity for the Department to innovate and offer differentiating educational and research learning experiences to the students.

IMPLEMENTATION

Even though the Department has, independently of the EEC, identified the large number of courses as an issue, its efforts to address it have not been materialized yet. The Department continues to breakdown core courses into many parts. There is significant overlap amongst various courses. The EEC strongly urges the Department to act swiftly on a plan to consolidate material and reduce the number of mandatory courses to the early years, allowing for more flexible program of study. Additionally, such a consolidation may serve the Department well in coping with an enunciated smaller number of technical staff.

In relative terms, the curriculum is, functional and the material covered is relevant. By the same token, the curriculum is relatively rigid and inflexible. This is due to, in part, the Department's segmentation in five sectors.

Moreover, the concept of a "prerequisite" is not used or practiced. A well-structured program cannot allow a student to enrol in an advanced class without ensuring that he/she has mastered the material of key required knowledge taught in prerequisite courses. Carefully thought prerequisites have to be established throughout the curriculum. The

Department is urged to find ways to establish and adhere to a prerequisites policy.

In general, the Department has the necessary resources and appropriately qualified and trained staff to implement the curriculum. However, there is some academic staff who are not adequately active in research. This is a potential issue as research inactive academic staff cannot easily link research to teaching and inform the curriculum with the latest field advances. This is especially consequential in postgraduate programs.

RESULTS

The department understands the need to improve, revise and review the current curriculum. The judicious use of English textbooks is considered an excellent initiative and is to be commended.

IMPROVEMENT

The department has a curriculum committee in place and often entertains proposals on how the curriculum should be improved. The Department understands that the number of courses required to graduate needs to be reduced. The department informed the EEC that it plans to do so soon, but no specific timeline was given.

The department should consider the following points:

- Reduction of the number of courses required for graduation
- Redesign of the curriculum to reduce course overlapping
- Introduction and adherence to prerequisites
- Encouraging the students to write their final year thesis in English

Suggested New Course Material:

- Consider introducing more general education courses (biological sciences, social and behavioral sciences, arts and literature, etc), and perhaps require a minimum number of general education credits for graduation.
- Introduction to innovation, entrepreneurship, legal environment, intellectual property rights, commercialization, business plan writing.
- The concepts of sustainability and impact of engineering solutions on the environment should somehow be taught in the context of engineering system design.
- Improved training of students in “soft” skills, such as how to make presentations, communication skills, team work, time management, negotiation skills, adhering to deadlines.

Guide on Curriculum: As of now, the Department requires about 63 courses and the final year thesis for graduation. As a general guide, the EEC believes that a target of a maximum of approximately 45 courses, which implies a 5 course load each semester, is more reasonable. The material consolidation suggested earlier, as well as more project oriented and applied in nature physics and mathematics courses, with more engineering related examples, would enhance student understanding, modernize the curriculum and increase its

relevance.

One semester should continue to be dedicated to the final thesis project. Although, ambitious students who want to perform research should be encouraged to select a thesis topic earlier and be accommodated accordingly, so as to devote more than a semester to their thesis.

The Curriculum does not include any specific focus to Engineering Design. Engineering design [2] is "a creative, iterative, and open-ended process, subject to constraints which may be governed by standards or legislation to varying degrees depending upon the discipline. These constraints may also relate to economic, health, safety, environmental, social or other interdisciplinary factors". Programmes in Engineering pay close attention to Engineering Design. This normally manifests itself as sequences of design focused courses that span the programme and normally culminate in what is called the "capstone project". This is ideally a penultimate year design project that involves a group of students, ideally with different skills and expertise, from different disciplines matching the requirements of the project. In addition, several courses may include elements of design. These need to be documented and eventually assessed to ensure that graduates receive appropriate engineering design education and experience.

The EEC noted with pleasure that the department has introduced an optional practical work experience ("Internship"). This is an important initiative as it helps students experience an engineering work environment and, in many instances, allows them to jump-start their career. "Internships" are very popular practical educational activities in most overseas universities. The Department could consider making the 2-3 months industrial placement (internship) compulsory, if feasible. The Department should also encourage students to seek internships outside the university and its research laboratories.

The curriculum should have clearly stated objectives for the overall program as well as each specialization. Each course should have clear learning objectives. The current practice of only outlining a course description could be improved. The EEC recommends that the Department consider restructuring the curriculum and rationalize the number of offered courses.

The EEC met with alumni who exhibited the desire to be of service to the Department and expressed willingness to provide feedback on curriculum and other relevant matters. The Department should consider utilizing this willingness and expertise of its alumni, industry and other stakeholders in the process of curriculum review. Such action could improve the curriculum and ensure its relevance and currency.

Online Courseware: The EEC applauds the initiative and use of e-platform to deliver course related material and information. The EEC sampled teaching materials available online in the e-class. However, not all courses were available online and some were incomplete. The EEC urges that all course material be developed and updated online. The Department is encouraged to develop a quality control system to monitor the development of the courses and ensure that they be updated on a regular basis.

[2]This definition is copied from the Canadian Engineering Accreditation Board's Accreditation Criteria and Procedures http://www.engineerscanada.ca/files/w_Accreditation_Criteria_Procedures_2011.pdf

Degree overall Grade Point Average (GPA): The calculation of the overall degree mark is based on the 5/6 of the sum of grades in each course divided by the number of courses plus 1/6 of the final thesis project mark. This implies that all courses are equal in weight. Such practice should be discontinued and a proper credit system defining the actual weight for each course should be introduced. To this end, the introduction of the European Credit Transfer and Accumulation System (ECTS) is a positive development. The weight of the final thesis project is 1/6th of the whole GPA and is, in fact, more than the equivalent of one semester weight. This emphasizes research and the EEC asks the Department to consider adjusting this weight, so that it be consistent with the overall goals of the Department and its strategy.

B. Teaching

APPROACH:

The EEC examined course material and course evaluation summary data provided by the Department. The Department uses the latest teaching tools and software to deliver the courses. However, with the exception of the laboratories, only the final examination counts for the grade of the courses. This, in turn, leads to low class attendance that often renders many in-class teaching methods ineffective. Most classes are conducted using traditional blackboard or "powerpoint" lecturing or in the form of guided labs. Many newer teaching methods such as team-based learning, discussions, mastery learning, peer learning, open-ended lab projects or fast-feedback methods have been overlooked. The use of mid-term examinations, project work and assignments throughout the semester would prompt higher student participation, and could improve student learning. The Department should clarify and include in the metrics of future reports the number of courses that have a variety of assessment methods as opposed to the typical final exam only. More detailed information and a summary about all courses over the entire curriculum should be made available so one can see gaps and opportunities for improvement.

The student/teaching staff ratio is very good. It should be noted that overseas institutions of similar size have higher student/teaching staff ratios.

From the meeting with students, albeit a small number of students, the EEC inferred that the teacher/student collaboration is very constructive and productive. The EEC was impressed by the collaborative working environment in the Department and the interpersonal relationships between academic staff and students. The very good interpersonal relations between staff and students is an important competitive advantage for the Department that should be exploited through promotional material to attract more and better quality, dedicated students.

The means used for teaching include the normal approaches such as theory through lectures, tutorials and laboratory work.

Laboratory facilities for teaching are considered adequate and, in some cases, comparable to similar facilities internationally. However, the EEC noticed that several labs operated outdated equipment. The EEC is acutely aware of the severe economic difficulties of the Greek Economy and the concomitant lack of available funding to replace and upgrade such equipment. However, it is of utmost importance that future engineers be trained on equipment that is state-of-the art, and would probably encounter in the workplace either in Greece or abroad.

The department uses an e-class online system to deliver teaching material and relevant information. However not all courses are available online. Many courses utilize software to enhance teaching and learning. The EEC was given an extensive list of software programs used to support teaching and learning. The EEC commends the department for incorporating advanced software tools to enhance teaching and student experience.

The examination system includes 3 weeks in February, 3 weeks in June and 4 weeks in September. Students of the Department expressed no concerns about the time allocated for exams. This length of time is considered adequate.

Exam results and final grades seem to become available at different times, not adhering to strict deadlines as student quality services demands. The release of student exam results should adhere to deadlines.

No midterm exams are used for assessment, and the EEC believes that introducing midterm exams in every class would have many beneficial effects with very small effort.

In addition, students commented that many of the exam problems and questions tend to repeat year after year; something that is inevitable when the same instructor teaches a course for a long time. Individual teaching staff at the Department perpetually offer the same courses, thus exam questions and problems tend to repeat. This is taken advantage by some students that just study the exam, often overlooking the broader course material. Some diversity in the courses taught by an individual teaching staff member would enrich the course offerings. It has the potential of exposing the staff to a hands-on experience of a broader part of the curriculum and will aid in course consolidation and better course inter-connectivity.

The Department schedules the examination of courses with large student enrolment early in the examination period and the EEC finds this a good practice. The EEC also finds the advanced release of the exam schedule to all students and staff a good practice.

IMPLEMENTATION

There is a culture among students, especially in the early years of the program, not to attend lectures and tutorials since none of them are compulsory. While such attitudes do not necessarily reflect badly on the quality of teaching, it is important that the Department increase its efforts in attracting students to classes and engage them with the teaching and learning practices. Such change of student behaviour will undoubtedly improve the quality of teaching and learning experiences and simultaneously improve student performance.

The quality of course material is varying. There are courses that have been developed and their quality is outstanding. The EEC was not in a position to check the materials given to students for all courses as many of them were not yet online.

Some courses would benefit by taking into account the student feedback given through the formal student evaluation procedures. Students provide important feedback to improve courses and if such opinions were to be implemented the staff/student overall relationship would be strengthened.

The EEC was not in a position to determine facts supporting a strong culture of linking research with teaching.

There seems to be a vague link between fundamental knowledge of the discipline, i.e. mathematics and physics and their relevance to electrical engineering. A more engineering applied process for teaching mathematics and physics could enhance the student learning. To that effect, a more problem based approach to teaching those fundamentals should be adopted utilizing real world engineering problems to assist the understanding of the concepts, the theory and the application of mathematics to engineering.

The mobility of academic staff to other overseas universities and research organizations is a good practice but this seems to be a weak point of the department. The department should encourage academic staff through its policies and financial support to undertake sabbatical breaks in overseas institutions.

The mobility of students is not as widely spread as it could be. There is a relatively small number of students who benefit from the ERASMUS and LEONARDO European-wide student mobility programs. The EEC urges the Department and the University to better advertise these opportunities to the students and increase their participation in these programs. Additionally, the EEC urges the active researchers in the Department to seek opportunities to send their students on short visits to their collaborators abroad.

The introduction of formal teaching evaluation for each course is a good practice. The analysis of the data is a key process. Utilising such data to improve the student teaching experience is vital. However, the EEC noticed that there seems to be no significant action on improvement opportunities based on such student evaluation. This appears to be a consequence of the Department's more general legal limitations in enforcing performance based corrective procedures on its academic staff.

The EEC was glad to hear the implementation of the student advisor/mentorship schema.

The EEC was pleased to hear of the establishment of awards of final project theses following a competitive evaluation process. Such awards motivate the students and inspire dedication to the engineering sciences.

RESULTS

The efficacy of teaching is overall very good. The practice followed by the Department to generate reports on teaching at the end of each semester is highly commended.

The EEC has seen evidence of overall student grading that has normal distribution across all grades and range of grades. There seems to be no serious issue regarding any abnormal distribution that needs attention.

There is a small number of individual courses with low passing rates. This should be monitored, but it is not considered a substantial issue at the moment.

The Department, in general, understands the reasons of success/failure of students for each course.

IMPROVEMENT

The Department is fully aware of the need to revise the curriculum and improve its structure. The Department also proposes to reduce the number of courses required to graduate.

Teaching:
The introduction of teaching assistants in key courses, i.e. mainly those with large number of students, is an excellent practice.

Industrial placement:
The introduction of student internship is a key development to improve the quality of the graduates. The EEC urges that the internship, being an important experience, become more widely spread and practiced.; ideally they should be required for all students, if feasible.

Final Year Thesis Project:
Currently, the overwhelming majority of diploma theses are graded as 10 out of 10. While a perfect student score is the ultimate goal of any educational institution, the results here are not statistically robust. The EEC urges the department to break down the thesis grade into constituent components to better help the students. The grade could have individual marks on innovation, technical completeness, depth, style, presentation skills, etc. The final grade could be a weighted average of these components. The EEC believes that such a breakdown will motivate the students to pay attention to these metrics and improve their performance and skills. This suggestion is also motivated by statements made in a meeting between the EEC and the Department's graduates.

C. Research

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

APPROACH

The EEC examined the curricula vitae (CVs) of the academic staff, the list of recent publications of members of the Department, the list of grants received, and assessed samples of PhD and Master theses. The EEC finds the research activity of the Department to be strong.

The research areas of the Department span a large spectrum that extends from fundamental fields such as electromagnetics, plasma and chaos to system level ones such as digital systems, electrical systems, software and software applications. Within these areas, certain fields have achieved excellence, and are internationally competitive.

As mentioned earlier, the Department is organized in five sectors (τομείς). These sectors support the undergraduate and graduate programs of the Department and provide a framework for its research activities. The sectors focus in Power Systems, Electronics and Information Technology Systems, Telecommunications and Space, Physics and Applied Mathematics, and Software and Applications Development.

Some of the sectors are quite broad but cover only partially the internationally observed norms in major topic areas. For example, the Telecommunications and Space sector does not include research activity in classical communication subjects such as coding, wireless communications systems, ultra-wideband communications, cognitive radio, secure communications OFDM and MIMO systems etc. Similarly, the Electronics and Information Technology sector does not include research activity in the general area of computer architecture, especially in relation to power and performance or many-core systems. Moreover, to the best of the EEC's knowledge, the Software and Applications Development sector does not include activity in requirements specification, software development, knowledge engineering etc.

The EEC inquired whether the Department had produced a Departmental plan that included research to guide it in its future development. Unfortunately, such a formal plan did not exist. The EEC was told that the Department had decided to focus its near future growth in Power. This contrasted the previous modus operandi where new academic positions would be equally distributed between the sectors. The EEC applauds the Department in its efforts to focus its development in areas it deems important rather than spreading its limited resources thinly. However, the EEC would encourage the Department to produce a coherent plan of growth that identifies high priority research areas. In addition, the Department should ensure that it remains flexible enough so as to be able to respond with changes to its research foci, congruent with global trends, and be able to react to opportunities that might arise in the future.

The Department is to be congratulated in that it requires each academic staff member to produce an annual summary (απολογισμός έργου) of his/her academic activities. This is an excellent mechanism to collect the necessary data that would inform any future departmental planning. However, the EEC did not see any evidence that this data was used consistently by

the Department to promote research, teaching and service through merit-based rewards, plan its research activities, counsel the academic staff, or produce promotional material.

Although several members of the Department perform internationally visible, high-quality, high-impact research, the Department should identify exact and merit-based metrics and standards for research output. These should be related to publications to high-impact forums such as journals and peer-reviewed conferences, citation index numbers, local and international research community service, graduate student supervision and research grants. The current metrics used by the Department, and as reported in its Internal Evaluation Report, do include research grants and supervised theses. However, gross anomalies in the distribution of those metrics per professor are not acted upon and, therefore, opportunities for improvement are missed.

IMPLEMENTATION

While it seems that the Department has established several awards to promote excellence in undergraduate studies, the EEC did not find any evidence that the Department is actively promoting research excellence through awards, or public announcements of postgraduate research successes.

The EEC toured the laboratories of the Department. Most are located in the old buildings that used to house the Department in Xanthi, while the offices and classrooms are located in the new facilities at Kimmeria, some 2.5 kilometers away. Although there is frequent bus service connecting the two campuses, it is not an ideal solution in that it does not facilitate immediate and close interaction of the academic staff with the graduate students working in the laboratories. Most of the laboratory space and infrastructure is dedicated to undergraduate teaching. Research space, in most cases, coexists with the undergraduate lab space and, although it may include some advanced equipment, the EEC was not satisfied that there was adequate research infrastructure to support internationally competitive research.

As always, there are exceptions. The infrastructure of the microwaves lab is very good. The EEC was shown a mobile lab used for Electromagnetic(EM) field measurements which is a very good research platform. The EEC was also shown newly acquired equipment to measure radiation; this test set-up targets both the undergraduate laboratory and research activities. Additionally, the EEC was shown two old X-ray crystallography apparatus, one of which was non-functional and the other in need of repairs. The EEC has noted the inadequacy of some of the research infrastructure and urges the Department to consider ways of improving it. Perhaps, other academic institutions in close proximity have been endowed with advanced research equipment which could be made available to the researchers of the Department. Perhaps a collaborative agreement could be reached to the benefit of all the parties involved, and the research promotion of the area of Eastern Macedonia and Thrace.

Most of the academic staff actively publish their research results in appropriate venues. Their research has been recognized internationally as evidenced by numerous citations. The EEC has also noted and commends the high productivity of the academic staff at lower ranks (Lecturers / Assistant Professors).

The Department has been successful in attracting funding through a large number of research grants, contracts and infrastructure funds. The EEC was provided with a list of more than 320 such grants since 2007 and the EEC would like to congratulate the Department for its success in attracting external funding. However, the EEC also noted that a very large portion of these grants are sourced from Greek sources such as E.T.A.A. and some of these are non-competitive. The EEC would like to encourage the Department to seek a larger involvement in European and other international projects and expand its collaboration with national and international research groups.

RESULTS

The EEC was shown some applied research especially related to the measurement of EM fields of power lines and the development of weather resistant, deformable mirrors for solar energy collection. Additionally, the EEC was informed by a graduate student of his development of a successful software package that has been widely downloaded. However, the EEC did not see any evidence of patents or other IP protection in this case.

The EEC is cognizant of the difficulties and resources needed in pursuing a patent. The EEC was also made aware of the University's policy on patents and intellectual rights. The EEC has verified that the University has a well-developed IP policy (chapter 14 of the University's financial administration guide http://rescom.duth.gr/thesmiko-plaisio/odegos-khrematodoteses-kai-diakheirises/odegos-khrematodoteses-kai-diakheirises). However, the EEC is of the opinion that neither the Department nor the University seem poised to protect and exploit their intellectual assets. The EEC urges both, the University and the Department, to pay more attention to and devote resources in protecting the IP generated by their staff.

Several academic, research staff and graduate students in the Department conduct internationally recognized research and have received best paper awards, are members of editorial boards or international consultative bodies.

IMPROVEMENT

In addition to the suggestions above, some opportunities for improvement are as follows:

1. The department should encourage and aid the funding (should funds be available) of memberships of all of its academic staff members to international professional societies such as the Institute of Electrical and Electronics Engineers (IEEE) and Association for Computing Machinery (ACM), etc. Furthermore, the Department chair should nominate academic staff members for senior memberships and encourage and promote fellowship nominations in these societies, as appropriate. These honours carry significant international weight.
2. The Department should encourage collaborations with industry by leveraging the connections of individual professors to the benefit of the students with invited talks and

events. The EEC was given a list of seminars and colloquia primarily sponsored by SPICE (Space Internetworking Center). Although these seminars were informative, the presenters were highly respected academics; the EEC noted the absence of presenters from industry. The EEC would like to encourage the Department to leverage the industrial contacts it has created through the internships program for undergraduate students.

3. Research by junior academics should be encouraged and facilitated, especially during the initial appointment period, through start-up funds or other funding opportunities through the Department or the University. Additionally, a lighter teaching load and exemption from heavy committee work is highly recommended for the first couple of years of a junior academic's appointment. An appraisal mechanism should be implemented with clear expectations and progress assessment as well as mentorship on a yearly basis to support the junior academics to establish their careers.

4. The EEC was informed that Lecturers, and Assistant professors during the first two years of their appointment, are not allowed to supervise doctoral students. This is certainly an impediment to their research. The EEC recognizes the potential risks involved with the supervision of doctoral students by early career academics (inexperienced supervision, a professor leaving his/her employment early, etc.). The EEC strongly urges the Department to consider the concept and scheme of co-supervision. Allowing co-supervision of graduate students, minimizes these risks, while ensuring that early career academics can advance their research.

5. The EEC has also noted that the Department has instituted a maximum number of graduate students (both at the Master and PhD levels). While such limits in principle protect the Department from significant pressures on its limited resources, strict adherence to these limits and inability to alter these limits according to the availability of resources (funding and infrastructure), introduces severe constraints to the research capacity of its academic staff, especially the early career academic staff. The EEC recommends that the Department introduce a flexible mechanism of determining the number of graduate students it admits and ensure that the research needs of its academic staff are satisfied.

6. The EEC noticed that both the Master and PhD programs, each requires the student to pass eight different graduate courses. While the number of courses at the Master program are compatible with international practices, the number of courses required in the PhD program is certainly much larger as compared to international norms. Additionally, the EEC noticed that if a student is admitted directly to the PhD program, he/she is exempt from the eight-course requirement of the Master program. This introduces inequality between students admitted directly to the PhD program as compared to the ones who have obtained a Master.

Finally, the committee noticed that there is a strict rule requiring graduate students with a 4-year University degree to pass a larger number of graduate courses as compared to students possessing a 5-year diploma. The EEC understands that a 5-year engineering diploma offers a broader education as compared to a 4-year university degree and it may be justifiable that, in some cases, the graduate student may need to compensate by taking additional courses. However, the EEC is of the opinion, that the strict adherence to this rule may prevent some qualified prospective graduate students from joining the graduate programs to the detriment of the research activities of the Department.

The EEC recommends that the Department consider revising its regulations concerning the minimum number of courses required for the two postgraduate degree programs, and empower the supervisory committees of its graduate students to perhaps prescribe additional (to the minimum number of) courses, should it feel that the student needs additional background to succeed in his/her proposed research.

D. All Other Services

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

The members of Departmental community (teaching staff, students) and facilities are serviced by the following entities:

- the undergraduate and graduate program office (γραμματια)
- the secretarial staff and technical staff (ειδικο τεχνικο εργαστηριακο, και ειδικο εργαστηριακο διδακτικο προσωπικο) of each sector
- the career office
- the library
- the computing center.

The undergraduate program is supported by two secretarial staff responsible for issuing official and unofficial document requests (also translated in English) from students, parents and alumni. They also handle first year student and course registrations, and keep all student records. The staff is sufficient, well equipped and trained to handle all students' requests in a timely manner thanks to using an electronic registration and filing system. It is noted that certain times of the year, e.g. during registration periods, the workload of the undergraduate office was reported quite high, but this is a common phenomenon among all higher education institutions, thus, it is not considered a weakness. Overall the undergraduate services provided by the department are very good and the secretariat is effective and efficient in performing its duties to the students.

One person, having similar duties to those of the undergraduate secretariat assistants, supports the graduate program office. Even though the graduate body is smaller, it appears that the absence of an automated electronic system makes the office less efficient and this is an important need and an opportunity of improvement for the office. The graduate program office would certainly benefit from a dose of automation and electronic record keeping.

Both undergraduate and graduate program staff are supervised by the departmental head secretary that also assists the Department chair and facilitates monthly or bi-monthly departmental meetings (γενικη συνελευση τμηματος). She is also responsible for interpreting the law and providing legal advice to the department administration. Many members of the teaching staff, the Department chair and her stuff rated the performance of the head secretary as excellent. It is worth noting that the EEC, too, received excellent support and full collaboration from the head secretary and her staff during and after the site visit.

An outstanding career services office supports the School of Engineering and the Department. The career services office focuses on networking, training/education of undergraduate/graduate students and alumni, and fosters some entrepreneurial initiatives. In addition, it facilitates a two month long industrial placement-internship (πρακτικη εξασκηση) for students in the Department. The EEC considers the career services office a strong asset to the Department and recommends capitalizing on this strength.

Currently the Department is organized into five sectors. Separate secretarial and administrative assistants that mostly facilitate with book distribution, Laboratory administration, interdepartmental communication and memos, purchasing orders, etc, support each sector. In some sectors and Labs it was observed that these staff were used to maintain Labs and assist educational activities such as Lab exercises. Overall, the EEC believes that these services could be centralized and modernized to promote a more efficient operation. This would effectively allow the reallocation of departmental resources to other priorities that may be in need (e.g. grant support staff, teaching assistantships, start-up funds for new academic staff etc). The Department does not have a plan to simplify administrative procedures and unify them across all sectors. More importantly, the EEC detected elements of distraction and barriers among the sectors. The EEC urges the Department to find ways to streamline its operations across all sectors.

The EEC was given the opportunity to visit most educational and research labs in the Department, mostly in the "old" campus facilities housed at the center of the town of Xanthi. Educational lab space is adequate for the size of the student body (assuming that reasonable student groups and lab rotation schemes are employed). Most of the labs visited were in good condition. Several education labs had modern equipment while others were also equipped with equipment, devices and development boards designed and developed in-house through diploma or MSc theses, and that alone is commended. Some lab equipment was clearly outdated or even unused but, overall, the array of the educational labs is somewhat comparable to equivalent departments around the world. Contrary, infrastructure that supports experimental research was considerably below international standards, with one or two research lab exceptions. Most of the labs were adequately staffed, with base-budgeted technical staff, something that is rare even at top ranked universities abroad. A possible cost efficiency would be to use doctoral and graduate students supported by teaching assistantships, while reducing the number of base-budgeted technical staff. The remaining base-budgeted technical stuff could serve multiple labs across the Department helping in providing continuity in lab operation over time. Undergraduate students identified one key omission in the educational lab facilities. Namely, the lack of dedicated “Open Lab Space” for their projects outside the regular classwork. This lab space would serve as an open learning environment that advances students' technical interests through hands-on experimentation, exploration interaction and entrepreneurship. Perhaps, professors could accommodate such students by announcing their willingness to provide lab space at idle times, as appropriate. In fact, during a Lab visit, the EEC witnessed a pair of students testing their tuner circuit design for a guitar. An activity completely outside their required class work. If resources were allocated for a dedicated "Open Lab Space", the concept could ultimately foster the much needed design-based thinking, multi- and inter-disciplinary skills in students, and promote innovation and entrepreneurship.

EEC members twice tried to visit the Library at the old campus (downtown Xanthi) during working hours and found its doors locked. This is of serious concern since libraries in most research universities are open to the public twenty-four hours a day, throughout the week (including weekends). Another very serious problem, identified by many members of the Department community, was the limited or non-existent electronic access of the Library to important journal gateways such as IEEE Xplore. The EEC believes this matter has the highest priority in the recommendations to the University or the Ministry of Education.

The School of Engineering offers students free bus rides between the "old" campus

(educational labs) and "new" campus (Department base and classrooms), which is very positive. But requests for more frequent services where voiced by some students. Both, the School of Engineering and the Department, offer students study places, Personal Computers and computing facilities, in the "old" campus. But these old campus facilities are in need of renovation and maintenance. The "new" campus (Kimmeria) certainly offers better and newer facilities, including excellent and adequate in number classrooms, spacious academic staff offices and good lab spaces.

Free wireless internet access is available to all members of the Department community and the Department website is very good and provides many online services and up-to-date information. However, an effort to harmonize the English and Greek terminology is needed to avoid confusion, especially for students and professors who interact with international collaborators and institutions.

To improve their operations, the Department and the School of Engineering have identified several infrastructure projects of critical priority. The Department has repeatedly expressed concerns about the poor or incomplete state of infrastructure, in particular contractors have not formally delivered buildings, and many aspects such as landscaping, are incomplete.

IMPLEMENTATION

Please see above

RESULTS

Please see above

IMPROVEMENTS

Please see above

Collaboration with social, cultural and production organizations

Space dedicated to counselling, athletic and cultural activity were not identified in the Department's internal report. However, the Dean, Career Service Office director and members of the teaching staff mentioned that the School of Engineering, the ECE Department and the Career Services Office support, organize and provide on-demand-space for cultural and outreach events such as seminars and colloquia. The EEC was also informed of several examples of outreach to the local community and dissemination of research and knowledge (e.g. the regional deployment of a state-of-the-art mobile unit for measuring exposure to low- and high-frequency electromagnetic fields). Also, some teaching staff have initiated and participated in significant cultural and outreach activities to the local communities. Activities that are certainly commended.

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.

First of all, this EEC believes that the ultimate success of a mature academic system relies on the state imposing some general policies and laws governing its public universities, establishing concomitant accountability and, then, letting the universities operate freely and manage their affairs with much greater degree of freedom that they have currently in Greece. The EEC encountered several times the situation where, when a reasonable solution to some problems was mentioned, an almost immediate response from the academic staff was that said solution could not be implemented because of either state or University regulations. Often, the EEC could not determine whether the said obstacles were imposed by the actual state laws, the interpretation of said laws, or by University and/or Department internal regulations, or if they were simply artefacts of the inertia of the status quo.

DUTH was established in 1975 with the presidential decree ΠΔ671/1975 and spread over several distant campuses in Thrace. Therefore, the University is relatively young and it plays an important role in the overall industrial and cultural development of a somewhat geographically remote area of Greece. The EEC thinks that these characteristics have contributed to the phenomenon that an excessively large number of the Department's academic staff comes from its own graduates. As the University and the Department matures and further establishes itself, it is expected that its ranks should trend toward a relatively very small number of its own graduates. This is a characteristic of most, if not all, well-functioning universities known to this EEC.

The Department in its Internal Evaluation Reports (e.g. page 16 of the September 2013 2011-12 & 2012-13 IEC) notes that its segmentation in five sectors helps the better coordination of its academic activities. However, the EEC found that, as practiced currently, the Department's sectors may actually be hampering its own academic activities. For example, combined perhaps with some state laws, courses are tied to each academic staff. Each sector has its own dedicated administrative support without necessarily common practices across the department. Professors spend time debating semantics such as labelling the expertise of one sector versus another.

DUTH has an Intellectual Property Rights (IPR) policy specified in detail on Article 14 in the Guide for Funding and Administration of Research (http://rescom.duth.gr/thesmiko-plaisio/odegos-khrematodoteses-kai-diakheirises/odegos-khrematodoteses-kai-diakheirises). However, none of the Department's academic staff appeared satisfactorily familiar with it. Most well operated universities have started long ago efforts to secure some of the IPR of the advanced work performed by their staff. Neither DUTH nor the Department's academic staff were observed to be keen on this concept. The EEC believes this is a missed opportunity to secure much needed funding for the Department's research programs.

The EEC examined in detail the program of study, the teaching, the research and the Internal Evaluation Reports of the Department. The committee found that the segmentation of the

Department in sectors, as practiced by the Department, and combined with program of study rigidity, obscured the goals of the Department and deprived it from its ultimate potential and success. For example, the Department is called an Electrical and Computer Engineering (ECE) department. Yet, none of its sectors is Computer Engineering. None of its Laboratories is Computer Engineering either. Furthermore, the largest sector, Electronics and Information System Technology, has 18 members while the smallest, Software and Applications Development, has 6. All the while, current importance of the smallest sector, at least as measured by the admittedly inadequate metric of a single factor, per capita research funding, is much higher than other sectors. There has been a prevailing recognition internationally that the engineering sciences move toward more and more multidisciplinary, interdisciplinary and multi-layered projects. Therefore, strict compartmentalization in sectors and programs of study rigidly adhering to these sectors impede progress and modernization. Academic staff and, consequently students, miss opportunities because of it.

The Department offers degrees in three areas of specialization (tracks):

- Electronics and Computer Engineering
- Electrical Power Engineering
- Telecommunications Engineering

In most similar universities known to the EEC, Electrical and Computer Engineering departments offer primarily two tracks:

- Electrical Engineering
- Computer Engineering

in some instances, Software Engineering is an additional track.

At the same time, for each track, other universities have a smaller number of compulsory courses and a larger number of electives than the DUTH Department of ECE. This renders the program more flexible and allows students to take courses based on their interests and the prevailing market needs for their future employment.

Department internal policies and dogmas appear to make open discussion of new research direction and modernization of the Department difficult to consider, let alone achieve. For example, the EEC heard academic staff pondering whether heavily mathematical work pursued in various software applications projects should be classified as traditional Electrical Engineering. The strength of successful modern creative organizations is the cohesiveness of their staff into an amorphous whole. In such organizations, complimentary expertise is utilized in a concerted effort to address large and challenging problems.

Some academic staff discussed the desire to have the 5 year program at the Department recognized as a MSc degree. While it is quite possible for a good student to graduate with a good thesis project and fulfil in essence all the requirements of a MSc degree from accredited universities, the EEC has doubts that this can be done for the entire Department without some critical changes to the program and its delivery.

Additionally, the latency associated in following state regulations made fulfilling of open staff positions and procurement of laboratory equipment frustrating and unacceptable when compared to the worldwide speed of technological progress. The hiring process at the

Department, or the University involves the ministry of Education and, therefore, is very lengthy. Important fields of research stay unattended for long time. For example, the Department has applied for a couple of openings in the areas of power and smart grids for 2-3 years now, but the positions have not yet been filled. The Department has lost valuable time as important work has already been done elsewhere.

Because of tenure, the hiring process at universities worldwide is inherently slow. In DUTH, as well as other universities in Greece, it is even slower. Therefore, the EEC recommends that the Department focus on hiring versatile staff and institute internal incentives and rewards that promote expansion and refocusing of existing faculty into new areas of research. Additionally, the Department could cultivate an environment of thinking as a unit and seek intra-departmental collaboration efforts to address new and exciting areas of research. This would not only mitigate bureaucratic impediments with the system of education in Greece, it also has the potential to strengthen the Department as an organization and propel it into fertile areas of research that its individual professors currently miss out. For example, the EEC mentions that a combination of expertise from its telecommunications and software academics could team up to address various challenging encryption and secure communications problems. As another example, many smart grid and/or smart sensor network research problems could be tackled by a judicious collaboration among the electronics, telecommunications, power and software applications academic staff. The Department is strong and has capable academic staff. The EEC believes that the Department could do better if its academic staff had tried to identify and pursue research goals for the common good. In that sense, the division in five sectors combined with the way it is practiced, seems to have hindered the Department from reaching its full potential. The EEC believes that a Departmental effort to achieve a formal plan of research and teaching goals could help in alleviating the aforementioned difficulties and make it more effective.

Of course, the Department and the University are not to be blamed for state inefficiencies and frequently changing laws of education. However, the EEC urges DUTH and the Department to find ways to remove internal obstacles to achieving their full potential. Some suggestions to this effect were outlined in the previous paragraphs.

In studying carefully the three Internal Evaluation Reports, the EEC discovered that they seem to pay insufficient attention to continuity. Items that were considered weaknesses in one year's report were not followed up in next year's report. For example, in the 2008-2009 IER, observations and recommendations for improvement included:

- large number of required courses for graduation
- change the program of study to meet the students' required knowledge and not necessarily the interests of the teacher
- examine the teaching, research and service load of the academic staff and provide incentives and counter-incentives

In the 2010-2011 IER, observations and recommendations for improvement included:

- some directions of specialization have become less attractive; establish committee to determine core knowledge required and adjust the program of study accordingly
- examine the teaching, research and service load of the academic staff; increase teaching load to counterbalance light research load.
- evaluate and/or combine Labs not only according to subject matter but also

according to contributions and competitiveness

In the 2011-2013 IER, the Department's Internal Evaluation Committee found the Department to be doing overall well and extremely quickly ended its report with the following recommendations for improvement (Departmental goals):

- interface the Department with Industry
- interface the Department with society
- battle bureaucracy
- manage the number of accepted students for smoother departmental operation

As a specific example of great importance, the large number of required courses for graduation was recognized as a weakness by the Department in 2008-09. Yet no further mention of it could be found in the subsequent IERs and no action had been taken by the Department. While the EEC commends the Department for creating three Internal Evaluation Reports in the last 4-5 years, it urges that such reports be more meaningfully followed.

So, the Internal Evaluation process has not yet become a guiding process for the planning of the Department. While the data in these reports is good and accurate, not enough attention has been paid to the meaning of the data. The Department has not yet clearly outlined tangible goals and which metrics, generated from data found in its IERs and other factors, it would use to achieve said goals. Consequently, a formal plan to improve based on monitored metrics does not exist. The EEC urges that the Department's internal and external evaluation reports be used as catalysts for the establishment of a formal improvement plan. Such a plan, when executed well, would help the Department reach its full and deserving potential.

F. Final Conclusions and recommendations of the EEC

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

Overall the EEC found that the Department accepts a reasonable number of students with good background, percentage wise, from the pool of candidates entering universities in Greece. Also, the level of graduates is solid. Certain research activities are well received and recognized internationally. The number of academic staff at 53 is a respectable number for the Department to address a wide spectrum of research areas and make impact. The Department is assisted by very well run career and secretariat offices. The Department is considering offering its newest academics the full amount of its available support which is expected to help said academics in starting their careers. The Department also has a loyal group of alumni who have expressed the desire to assist with their time and talents in offering feedback.

But the EEC also found that the Department has much higher potential in student and research output. The EEC found that there is no concrete strategic plan in the Department on how to reach its full potential. The various Department activities and proposals of improvement are timid, perhaps so as not to disturb its internal status quo and, at best, of incremental impact.

The EEC has made suggestions to the Department in each section of this report, as the subjects arose. For clarity, the most important recommendations are summarized below:

Recommendations to the State:

- provide consistent and long lasting, stable legal framework while allowing the universities to run their own business with less state bureaucracy
- consider carefully the numbers of students entering state universities and adjust according to societal needs and real employment opportunities available

Recommendations to the University:

- demand consistent goals and improvement plans from the Department and yearly assess actions and progress toward said goals
- assist, as appropriate, with goals and high level performance metrics
- reward Departments which secure external funding with a reasonable portion of the overhead so as to be used for the improvement of the departmental labs, new academic staff and other needs as the Departments see fit
- increase the efforts of ΕΛΚΕ(Research Accounts Organization) in providing assistance on research proposal submission, on recognizing and securing Intellectual Property Rights and consider establishing a Technology Transfer Program.
- finalize the delivery of the new buildings
- extend the electronic system of student records to cover the postgraduate program
- modernize the libraries and give free access to most popular electronic journal gateways for each discipline

Recommendations to the Department:

- Organization of the Department and Planning
    - establish a set of goals supporting the Department's mission statement and a meaningful plan to achieve them
    - establish a research plan and concomitant teaching, staffing and personnel improvement goals
    - consider assigning appropriate weights to research, teaching and service activities so that contributions by staff can be better measured and a more equitable load distribution can be achieved
    - reconsider the segmentation in sectors
    - centralize administrative, secretarial and technical stuff
    - establish an external advisory board and seek feedback on teaching, research and other matters, as appropriate

- Curriculum
  - Develop a curriculum that is program targeted and not academic staff centric. Academic staff should be assigned to teach (within their general area of expertise) different courses both at advanced and introductory levels.
  - condense the material and reduce the number of required courses for graduation to about 45
  - reconsider the curriculum, merge overlapping courses and offer new on subject matters of current interest
  - reduce the number of compulsory and increase the number of elective courses to allow individual students more options to follow their interests
  - enhance the fundamental courses of math and physics with more engineering related problems for a better student learning experience
  - enhance general education courses and add general education graduation requirements
  - introduce two semester long engineering design course series, where students design and build a high-level engineering product starting from realistic specifications.

- Teaching
  - establish a grading system that does not depend on the performance at a single final exam, but also rewards intermediate performance on homework and mid-term examinations
  - expand the undergraduate student best thesis awards program to include awards for postgraduate research accomplishments
  - utilize student evaluations, monitor and correct anomalies in the teaching and/or grading of the academic staff
  - establish incentives and counterincentives for teaching performance excellence in the academic staff
  - incentivise and promote modern teaching methods such as team-based learning, open-ended labs, mastery learning, etc.
  - create an “open lab space” for student extracurricular activities and design projects.

- Research
  - seek opportunities to form teams of academic staff in order to address missed research opportunities
  - carefully consider stable research output metrics and monitor them at appropriate intervals
  - establish incentives and counterincentives for research performance excellence in the academic staff
  - follow your own Internal Evaluation Report recommendations and seek better interface with the national and international industry
  - seek opportunities to create and license Intellectual Property (Technology Transfer)
  - Enable junior academic staff members’ research by providing start-up research funds (where funds are available), lighten their instructional responsibilities for a short initial time period, and allow co-supervision of graduate students.

The Members of the Committee

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