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ΑΡΧΗ ΔΙΑΣΦΑΛΙΣΗΣ ΚΑΙ ΠΙΣΤΟΠΟΙΗΣΗΣ ΤΗΣ ΠΟΙΟΤΗΤΑΣ ΣΤΗΝ ΑΝΩΤΑΤΗ ΕΚΠΑΙΔΕΥΣΗ	HELLENIC QUALITY ASSURANCE AND ACCREDITATION AGENCY

EXTERNAL EVALUATION REPORT

DEPARTMENT OF
Electrical and Computer Engineering
ARISTOTLE UNIVERSITY OF THESSALONIKI

March 2012

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External Evaluation Committee

The Committee responsible for the External Evaluation of the **Department of Electrical and Computer Engineering** of the **Aristotle University of Thessaloniki** consisted of the following five (5) expert evaluators drawn from the Registry constituted by the HQAA in accordance with Law 3374/2005:

1.   *Prof. Antony Ephremides* (Coordinator)

      University of Maryland, USA

2.   *Prof. Athanasios Manikas*

      Imperial College London, UK

3.   *Prof. Kimon Valavanis*

      University of Denver, USA

4.   *Prof. Evangelos Milios*

      Dalhousie University, Canada

5.   *Prof. George Vachtsevanos*

      Georgia Institute of Technology, USA

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

The Evaluation Committee (the Committee) visited the Department of Electrical and Computer Engineering (ECE) of the Aristotelian University of Thessaloniki from 19/3/2012 to 21/3/2012. Upon arrival in Thessaloniki on Monday afternoon, the Committee was met by the Chair and Vice-Chair of the ECE Department and was transported to the Macedonia Palace Hotel for check-in. Following check-in, the Committee was transported to the University Administration building, where the Vice-Rector for Academic Affairs presented an overview of the University, and then, jointly with the Department Chair, focused on the unit under evaluation. Later the same night, the ECE Department hosted a dinner for the Committee; a sizable number of the ECE faculty members were present at the dinner.

On Tuesday, 20/3/2012, department faculty gave extensive presentations that went into considerable details on curriculum issues, educational programs at the undergraduate and graduate levels, as well as a description of the Department research activities. Unfortunately, because student activists threatened the conduct of the review, the Department was forced to make alternate arrangements for all presentations to take place off campus, at the NOESIS Museum. The Committee commends the Department for their timely reaction and planning that avoided any confrontation and disruption during the visit. On Tuesday afternoon, the Committee, accompanied by faculty, toured the Department laboratory facilities. Posters that summarized the diploma project work (or "diplomatikes ergasies") of graduating seniors were also viewed by the Committee. Later that night there was a joint dinner for the Committee and the faculty.

On Wednesday, 21/3/2012, additional presentations were given that were related to the outreach activities of the Department (again, not on campus due to the student threats, but in the excellent facilities of the University Research Administration Building that is located adjacent to the campus). After that, the Committee met separately with representatives of the different constituencies of the Department (junior faculty, administrative staff, undergraduate students, graduate students, and other specialized supporting personnel). The undergraduate students represented a cross-section of the majority of the student population; they were very informative, courteous and intelligent. The Committee also asked to meet with representatives of the student activists and political party youth organizations, but was turned down by these groups. After lunch, the Committee met in executive session, collected its major findings, and then met with the Department Management Council for an initial briefing. Following that, the Committee was transported to the Airport for their return trip to Athens.

The Committee was provided with extensive documentation, copies of presentations, and complete data on almost all aspects of the Department's operations. In addition, and ahead of the visit, the Committee was provided with a copy of the Department's Internal Evaluation Report that was thorough, detailed, comprehensive, and informative.

A. Curriculum

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

APPROACH

- What are the goals and objectives of the Curriculum? What is the plan for achieving them?

- How were the objectives decided? Which factors were taken into account? Were they set against appropriate standards? Did the unit consult other stakeholders?

- Is the curriculum consistent with the objectives of the Curriculum and the requirements of the society?

- How was the curriculum decided? Were all constituents of the Department, including students and other stakeholders, consulted?

- Has the unit set a procedure for the revision of the curriculum?

The goals and objectives of the undergraduate curriculum of the ECE Department focus on educating students to become capable of designing, building and developing systems for the generation, transmission, distribution, storage, processing, control and utilization of energy and information, so that, as graduates, they may qualify as Electrical and Computer Engineers. This is accomplished through a five year, course-heavy, and diverse educational program that includes laboratory training, project work, a diploma thesis, and, on occasion, internships (practical training).

The undergraduate curriculum includes:

(i) the Core program (five semesters) that is common to all students;

(ii) Sector specialization (starting from the sixth semester);

(iii) Diploma Thesis ("Diplomatiki" project work);

(iv) Practical Training internship (optional).

Courses are classified into mandatory ones, subject-area elective ones (that are defined by each Sector), and general electives. The list of courses in the curriculum covers a wide range of topics from fundamental courses (i.e., mathematics, physics, basic computer engineering) to courses in Electric Energy (i.e., electric power systems, electric machines, power electronics, nuclear technology, high-voltage, materials, etc.), Telecommunication Systems (networks, fiber optics, radar, microwaves, signal processing, biomedical, etc.) and Electronics and Computer Engineering (electronics, automatic control, robotics, computer

architecture, etc.), as well as more advanced elective courses. The curriculum is diversified, extensive, broad, but inflexible in the sense that upper division students have to follow the Sector curriculum. It is the committee's opinion that the curriculum, compared to those offered by international ECE Departments, is too course-intensive (61 courses in five years, as opposed to 30-32 over four years elsewhere in Europe and North America).

The curriculum objectives were decided through the usual process that other comparable programs in Greek Universities follow, i.e. through the general assembly decision process. Details of the process were not discussed.

The curriculum, which was modified and enhanced in the early 2000's, appears to be consistent with the objectives and requirements set at that time. However, it is the Committee's opinion that the curriculum should be restructured, updated and modernized. Specifically, there is a need to remove outdated courses and introduce new ones that reflect recent developments in electrical and computer engineering (e.g., renewable energy, wireless sensor networks, mobile communications, modern signal processing, etc.). Furthermore, an imbalance between theory and practice has been identified both by the students and the Committee, which should be addressed

The current curriculum, was created as a result of previous internal evaluations and discussions among all faculty members of the Department. It was designed to create a comprehensive and balanced five-year undergraduate program that offers depth and breadth of knowledge in the fundamentals of electrical and computer engineering and is organized along three sectors. It is not clear whether students were consulted during this process.

A specific procedure for the revision of the curriculum has not been described to the Committee, but the Department declared its intent to proceed with such a revision and the Committee encourages them to do so. A curriculum committee exists in the Department that looks into enhancing and modifying the current curriculum.

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 faculty to implement the curriculum?

The current curriculum is constrained by the Sector-based structure of the Department and does not serve the Department's goals sufficiently well. In addition, it appears that there are some issues with basic/general courses (math, physics) offered during the first three semesters of the curriculum resulting in a large number of students failing these courses. Further, it appears that there is some level of "disconnect" between theory and applications that may limit the ability of graduates to be competitive electrical and computer engineers.

In order for the curriculum to compare favorably to universally accepted standards, it requires revisions as described in the "Approach" section.

The structure of the curriculum is rational and clearly articulated in the Department's Course Guide. However, it is not as coherent and functional as it should be. The absence of tracks and prerequisites inhibits the curriculum's functionality. The views expressed by some of the students to the Committee confirm this observation.

It may be difficult to complete the degree in ten semesters due to the large number of courses. Only very well qualified, prepared, and motivated students who stay full-time may be able to complete the curriculum. It appears that the curriculum is quite difficult to be followed by the 'average student' as it imposes a much heavier than 'average' load to most of the students. Perhaps, this is (just) one of the reasons why the average duration of studies is close to 7 years (as opposed to the planned 5 years).

The limited duration of the external review process did not allow a thorough evaluation of the content of every course. However, it appears that in some cases, the time available for students to assimilate the required course material is not sufficient. This is especially true with some basic first/second year courses (mathematics, physics), and this accounts in part for the longer duration of a student's studies. Another reason that adversely affects the successful implementation of the curriculum is the lack of prerequisite structure or flexibility in the selection of courses.

The faculty is well qualified to implement the curriculum and the Department manages to do so with its current resources. However, it is clear that the faculty is overstretched due to the size of the curriculum. Furthermore, there is an imbalance between the resources which are equally allocated among sectors, due to the demand of the sectors in terms of student numbers varying over time.

The so-called 'General Department' in the College of Engineering that offers basic/fundamental science support courses seems to be poorly matched to the needs of the Department.

Graduate and doctoral program

The Department offers five Graduate Programs autonomously, or in collaboration with other University Departments, domestic and/or International Universities. The graduate programs objectives are well defined and the curricula are well structured and well balanced.

The Department offers a Doctoral Degree. The program is flexible, requiring only four courses and the PhD dissertation research. The number of courses, according to US standards, appears to be small. However, the number of courses is comparable to those of other European Union Universities.

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 main issues are the high failure rates in several courses, the heavy course-load, the inflexible structure of the curriculum, and the lack of regular revision of course content.
However, it appears that the overall implementation of the curriculum suffers from drawbacks: lack of sufficient resources in laboratory-related courses; lack of sufficient number of faculty and technical support staff; connection between courses (how do outcomes of one course connect to a follow up course); lack of connection between theoretical foundations and related applications.
The Department understands all existing problems and an effort is underway to improve the

situation. However, the current financial situation in Greece imposes additional obstacles to improving the Department infrastructure.

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

Regarding the implementation of the Department's goals and objectives with respect to the undergraduate curriculum, the Committee notes that the Department understands the issues described above and has declared its intent to deal with them through curriculum restructuring and reduction of the number of courses.

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 pedagogical policy of the Department is based on the combination of applied theoretical and technical education. It deploys a variety of teaching and learning methods including lectures, laboratory sessions, coursework and a mandatory six-month Diploma Thesis (Diplomatiki project work). It also includes "frontistiria" (in UK this is known as "study groups" and in USA as "recitation sessions"). Furthermore, the Department has recently begun allocating Academic Advisors to first year students. In the future, the plan is to offer this service to all undergraduates.

The Department has 44 faculty members and about 2500 enrolled undergraduate students (UG); the exact number of UG students depends on how they are counted. This is a huge number of UG students that results in 1/56.82 faculty-to-student ratio, which is unacceptably high. Note that this figure ignores postgraduate (MS and PhD) students. It is important to point out that more than half of the UG students are well beyond the normal duration of the degree - which is 5 years.

In order to form an opinion about the teaching partnership between teachers and UG students, the Committee visited various parts of the Department. Although the official Student Association, which is typically controlled by the political party youth organizations, was against the evaluation procedure and tried to block the activities of the Committee, the Committee with the help of the Department managed to interview a group of UG students. In the last day of the visit (21/3/2012) the Committee invited, through the Department Head, representatives of the Student Association for a meeting but the invitation was refused.

The Committee spoke to junior faculty and teaching assistants to listen to their views about the teaching activities of the Department, and concluded that there is good teacher/student collaboration. However, despite the considerable commitment to teaching by the

Department, the students expressed serious concerns about the relationship between lectures and assessment procedures (examinations) in several courses. This is an issue that the Department has to address.

The means and resources deployed within the teaching process can be improved. The capacity of the teaching rooms and laboratories is much smaller than the number of students in the Department and this creates serious problems for the smooth operation of teaching and learning activities. It is unclear how these problems could be removed or mitigated without new, more spacious buildings. The library facilities are, in general, satisfactory but some key electronic access/subscriptions to scientific papers have been disrupted due to financial difficulties. Despite these difficulties, the faculty and students have managed to sustain an effective learning experience for themselves.

The use of information technologies for delivering lectures, etc, (e.g. Data Projectors, PCs, laptops) is inhibited by equipment being continually destroyed by various groups of students or outsiders This is unacceptable waste of necessary and expensive resources that negatively impacts the quality of the teaching and the program of studies. The Department's security issues must be addressed by the University and the State as soon as possible.

The teaching material of several courses (e.g. lecture Notes, lecture slides, problem sheets, assignments, etc.) is available online for dissemination to the students. It would be desirable to expand and make this a uniform practice for all the courses.

The Department makes use of electronic detection of plagiarism applied to Dissertations.

The examination system is based either on a single final exam, or a combination of a final exam and coursework.
The average failure-rate of the students per course is too high, compared to the international norm, especially considering the excellent quality of the students entering the Department in the first year. Although this issue is understood by the Department, it is imperative that it be resolved; for example, guidelines for setting and grading the exams should be considered.
A student has the right to repeat the examination of a course, without any upper limit to the number of repetitions per course.. This overloads the faculty members and is detrimental to their other activities and the overall educational process.

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

Despite the considerable commitment of the majority of the faculty members to teaching activities, the class sizes are intolerably high, thereby negatively affecting the quality of teaching.

Due to the limited time spent on site, the Committee had the opportunity to check only a small a selection of laboratory teaching materials, but, in general, these were insufficient. For example, the laboratories were designed to accommodate only two students per experimental bench but due to the large number of registered students this has reached 5 students per bench, making the resources

inadequate to accommodate the teaching and learning outcomes of the Department/students.

Although the Committee did not have the opportunity to perform a thorough review of the quality of the course material, it was felt that a number of courses need to be modernized and need to avoid unnecessary overspecialization.

It is commendable that, at the undergraduate level, the students are given the opportunity in their diploma thesis to participate in the Department's research activities.

Furthermore, the Department has a very good mobility track record of both academic staff and students via its collaborative programs with a number of European Universities.

The "Lecturer Evaluation Questionnaire" (UK) or "Course Evaluation" (USA/Canada) is not being carried out consistently over the whole evaluation period and for all courses. Thus, the quality of course material, as perceived by the students, is not clear to the Committee. For example the course "Calculus II" (Logismos II) (which includes topics in multidimensional calculus, vector analysis and differential geometry) has a failure rate 55-70% and no course evaluation for it seems to have been conducted yet.

It is important for the evaluated faculty member to receive not only the results of his/her course evaluation but also the statistical average scores across the whole Department.

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?

There is substantial evidence of low attendance in the Lectures and this considerably reduces the efficacy of the teaching. The Department should address this issue and devise strategies for promoting attendance.

The statistics presented to the Committee indicate that:

(i)   there are courses with very high failure rates, which is hard to justify, given the excellent performance in the entrance examinations of the students in the Department and,

(ii)   there is a high variance in the time to graduation as well as in the final degree grades.

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

The Department has indicated plans and methods for improvement, and the Committee commends and encourages these efforts.

Important initiatives taken by the Department include (i) the establishment of an internal program restructure committee to reduce, revise, and update the curriculum and

(ii) the establishment of an individual advisor for incoming students.

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?

The Department is active in research at multiple levels: Competitively funded international projects involving collaborations with European partners, competitively funded national projects, and services to the domestic public and private sector. To conduct research, the faculty members involve doctoral students, and postdoctoral researchers, and, sometimes, undergraduate students (mainly through diploma theses or "diplomatiki" project work).

The Department does not have internal standards for assessing research other than those built into the process of tenure and promotion of individual faculty members, and internal research awards. There is an emphasis on publications in ISI-listed journals, with a focus on IEEE journals.

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

Junior faculty are not provided with appropriate incentives to promote their research career, for example, lower teaching load or adequate funding for PhD students (the amounts given in priority to junior faculty are quite small). We note the lack of a strategic plan for developing specific research areas, or a thematic team structure in terms of research. The research pursued therefore appears to be uncoordinated and simply based on the interests and initiatives of individual faculty members.

There is good equipment in some cases, thanks to external funding and the individual efforts of the faculty. However, technical support for this equipment is inadequate. Most labs visited were found to be marginal to grossly inadequate in terms of space. Lack of space, combined with the large number of undergraduate students, leads to limited exposure of undergraduate students to the research activities of the department.

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 vast majority of faculty members have publication records ranging from respectable to outstanding. Several faculty members are IEEE Senior members, and some have received research awards. One Professor Emeritus is an IEEE Fellow. Several faculty members have patents.

There is a wide variety of research projects undertaken in the Department. About 32% of faculty are involved in EU-funded projects, about 55% in national projects and about 70% engage in services to the public and private sector. The latter are services that require specialized expertise not available through engineering consulting firms, and often have a significant research component, and a substantial impact on the community they serve.

Many of the research projects undertaken in the department involve external research partners, mostly from other EU countries.

The doctoral program is well established, with over 100 doctoral students. The average duration of study is 5 years, which is within international norms. Although there is no formal process for evaluating doctoral students, there is:
(i) an annual progress report presented to a supervisory committee;
(ii) the requirement of original research publications (2 papers in ISI journals plus conference papers), and
(iii) research maturity and ability to conduct independent research.
Doctoral students are required to take 4 graduate courses, selected with help from their supervisor to support their thesis research. Doctoral students who do not have a diploma in Electrical and Computer Engineering may be required to take additional courses, graduate or undergraduate, to build sufficient background to conduct their thesis research. The formal process of advertising positions and selecting candidates could be supplemented by more vigorous proactive advertisement and recruiting effort. There is no uniform funding policy for doctoral students. Some doctoral students are funded by projects or service contracts when available, but typically not in their first year of study. Such projects are typically related to the student's PhD thesis. The program of PhD scholarships offered by the National Scholarship Foundation (IKY), awarded on the basis of examinations and providing 450 euros/month, is no longer available. Some doctoral students mentioned that they have almost daily contact with their supervisors. The scientific output of doctoral students is excellent on average, and compares favourably with the average in good North American or European PhD programs.

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

Diversification of research. Overall, the faculty produces excellent research, collaborates internationally, and its publications are well cited. The committee recommends that the Department, in the context of a Strategic Plan, diversify its research activities into areas internationally growing in importance, by building on its current strengths. Areas such as smart and green buildings, wireless sensor networks, smart grids, 3G/4G+ mobile communications, were mentioned as having potential for growth.
Interdisciplinary Master's degree programs, in which the Department is involved, have the potential to create another source of diversification of research activities, if they become integrated into the academic structure of the Department and the workload of the faculty members.

Hiring new faculty members in modern strategic areas not currently covered would be an effective way of achieving such diversification, when upcoming retirements get replaced. The current economic uncertainty should not discourage forward thinking and strategic planning for the future of research in the Department.

Structure of doctoral program. A significant part of the research in the Department is carried out by doctoral students under the supervision of and in collaboration with the faculty. However, the doctoral program has minimal structure. Consideration should be given to a qualifying examination, which could take the form of a publishable research result within the first 12-18 months of the doctoral program. Failure to pass the qualifying exam is a mechanism to dismiss students who do not make satisfactory progress. Furthermore, there is no funding policy for doctoral students, so that they can devote themselves to, and be more effective in, their research. The availability, and amount, of funding for doctoral students depends on the supervisor. Technical support for research labs was mentioned as inadequate. PhD theses written in English and published in a technical report series would facilitate the promotion of research outside Greece. A course on research methods, and tutorials on how to give presentations, write successful research papers, and apply for research funding, are also helpful components of a doctoral program, which the Department would benefit from introducing

Research funding. The amount of research funding, although near the top compared with other departments in the University, could be augmented. The committee feels that the faculty has the potential to obtain additional research funding, which in return should be used to provide support for doctoral students, technical support staff, and postdoctoral researchers. Infrastructure needs to be put in place to provide internal review and mentoring for research proposal writing, and post-award administration of projects, in order to diffuse and share the available experience within the Department, especially for junior faculty members.

Postdoctoral researchers. Service contracts require specialized expertise that may lead to the use of postdoctoral researchers instead of doctoral students. The existence of postdoctoral researchers within the Department was brought up, but we did not have the opportunity to meet any who were exclusively, or primarily, devoted to research.

Workload rebalancing. A rationalization of the undergraduate curriculum (as a reduction in the number of courses offered) will lead to a better balance of the faculty workload, by shifting faculty time from teaching to research.

Promotion of research. The research activities of the Department, especially those that involve industry, need to be better advertised both within and outside the University. Particular emphasis should be placed on advertising to the undergraduate students. This would stimulate student interest in research early on, and raise the profile of applied research in the Department. The Committee was told that one serious impediment to such promotion is the minority of student factions driven by non-academic interests, such as political parties, which tend to dominate the student majority, and are likely to violently object to the involvement of industry in university research. This is truly lamentable and goes against what is common practice in Engineering Schools around the world.

Access to digital libraries. Subscription to digital libraries (e.g. IEEE, ACM, Springer, Elsevier) is paid for centrally. In the past its payment has been delayed, leading to lack of access to the research literature by the Department's researchers for extended periods of time (e.g. six months). Effort should be made to prevent this from becoming a regular occurrence.

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 has taken significant and pioneering initiatives to maintain and improve services to the academic community, the community at large and the profession.

The Department and its leadership are striving to simplify and optimize administrative procedures in order to facilitate and promote student and faculty/staff participation in the Department and general Campus academic and cultural activities. Specifically, it provides adequate access to the Internet, Library facilities, electronic resources, student counseling to undergraduates, and other cultural activities.

Initiatives taken by the undergraduate and graduate students themselves are noteworthy. The undergraduate students are to be commended for the unique and valuable assistance they provide to their colleagues with special needs. They have organized and support these students for better access to laboratories, classrooms and other facilities. The lack of appropriate access to physically-impaired individuals is obvious and must be corrected.

The students have organized athletic teams and in cooperation with faculty members participate in major cultural events, such as musical events, performances, and recordings.

The creation and broad usage of an electronic forum (thmmy.gr) is providing easy and convenient access to students to express freely opinions, comments, and announcements of interest to the student body, faculty and other members of the academic community.

The administrative infrastructure is satisfactory and the services it provides to students and faculty are adequate, expediting timely access to the Department's administrative processing of paperwork. The communication between the Department and the University administration units could be improved.

At the graduate level, and, most importantly, at the PhD level, the candidates are in contact with their advisors almost on a daily basis. This facilitates and expedites focused academic activities and promotes an atmosphere of collaboration as evidenced by the excellent dissertation work, awards, attendance to scientific conferences, publications, etc.

The Department strives to improve student presence on campus through a series of academic and cultural activities but also by promoting and encouraging cordial and collegiate relationships between student groups and between students and faculty members.

The general weaknesses, identified elsewhere in this evaluation, prevent the expansion of these academic and cultural activities. Nevertheless, the Department has undertaken major and significant steps to overcome current difficulties.

Emphasis must be placed on increased collaboration with the productive sectors and organizations in the Community, which, especially for Engineering, must include Industry. Students, both graduate and undergraduate, must be brought closer to such organizations, as well as government agencies, and the civil sector that need and request technical assistance.

It is noteworthy that the faculty involves a good number of students in such project work, as noted elsewhere, and its members must be encouraged and assisted to increase these numbers.

Among other significant activities, the Department's participation in interdisciplinary and inter-departmental research and development is to be noted and encouraged. The narrow bounds of the Department's serious and intensive academic activities (courses, laboratories, tutoring, etc.) must be expanded and supported to provide students with an understanding of the impact of their own discipline to other academic and research activities.

The on-campus and off-campus presence of students is a key to the Department's success. Programs, such as Erasmus, provide student access to other European Universities and enhance significantly their academic, social and cultural experiences. These activities must be maintained, provided that required funding is available.

The "Other Services" provided to students and faculty by the Department have achieved significant milestones. However major obstacles remain to be overcome. In order to improve and enhance these services the Department must be supported by the University's Administration. The majority of the student body must adopt and accept 'changes' that improve services and the society must recognize the contribution of the Department to the country's productivity objectives.

Staff Development, appraisals and feedback mechanisms could be considered for the improvement of staff morale and productivity.

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.).

The outlined services are implemented either through traditional channels and mechanisms or by sheer commitment and devotion of individuals that goes beyond the call of duty.

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

The overall results are both adequate and functional. The department seems to be quite supportive of them.

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

The Department seems interested in assessing and expanding these services. However, it is faced with serious shortage of resources.

Collaboration with social, cultural and production organizations

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

As indicated above, there is considerable and sizeable effort by the Department to be involved, and collaborate, with social, cultural, and production organizations in the Community, the Country as a whole, and internationally. It is confronting, however, the vehement opposition of politically motivated minorities (both among the students and among the faculty) that make involvement with Industry problematic.

The Department should also be more proactive in promoting and advertising its activities without unnecessary modesty.

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.

The Committee feels that the legal operating environment the State imposes on the University as a whole presents serious challenges and impediments to the Department's operations and development. The uncertainty, extensive bureaucracy and interventional nature of the control mechanisms imposed by the State truly inhibit progress. Despite that, there are domains within which the Department can exploit opportunities and, at least partially, approach its objectives. In what follows, the Committee's observations are presented in terms of strengths, weaknesses, threats and opportunities. Before that, however, we note that the Committee was impressed with the philosophy of creating a sense of community within the Department for both students and staff.

Strengths

1. The Department attracts the top tier of qualified students since it stands high on student preference. It has a large pool of exceptionally talented and well-motivated students.
2. Being part of one of the oldest Universities in the country, the Department enjoys a very strong reputation and a successful record that has earned it prestige and respect in the community.
3. The Department includes several highly talented faculty members with remarkable achievements and good reputation.

4. The quality of the Diploma Theses (Diplomatiki project work) is impressive; several of these lead to original research presentations in professional forums.
5. The different constituencies of the Department display a sense of solidarity and 'esprit de corps' that is not too common in academic environments.
6. The outreach activities of the Department towards the community and industry are extensive, successful and impressive.
7. The Department is well networked in the International Community with many bilateral and multilateral agreements for collaboration and exchanges.
8. The overall academic program has extensive coverage of a wide spectrum of subjects in the fields of electrical and computer engineering.
9. Within the Department, and towards the University, the Department Administration, as well as the individual members of the Department, display a positive attitude of consensus building rather than confrontation.
10. The students of the Department show a commendable sensitivity towards people with special needs, which is fairly uncommon in the rest of the country.
11. The quality of the various interdepartmental, graduate programs in which the Department participates seems to be high.

Weaknesses

1. The number of students is huge! It results in unusually high student-to-faculty ratios and dilutes the quality of the offered program of study.
2. The number of required undergraduate courses (including the mandatory and elective ones) is excessive. It places a heavy load on the students and at the same time reflects the accumulation of courses over time without a commensurate introduction of the latest and timely topics in evolving technologies.
3. The failure rate in undergraduate courses is unacceptably high.
4. The physical plant of the University is not well maintained. It is crowded, architecturally dull and not very functional.
5. The laboratory facilities are marginal, and, again, lack modernization and emphasis on emerging technologies.
6. The effects of the state bureaucracy and the university governance system have stifling effects on the development of the Department. It results in indecisiveness and ineffectiveness.
7. The faculty resources are grossly inadequate to provide effective guidance, counseling, and advising to the undergraduate students.
8. There have been no new hires in the faculty for over five years. The lack of renewal has negative impact on the Department's programs.
9. The so-called 'General Department' in the College of Engineering that offers basic/fundamental science support courses seems to be poorly matched to the needs of the Department.
10. Many of the PhD students lack any form of financial support This leads to discouragement, poor morale and detrimental consequences for the Department's research programs.
11. Most of the faculty members are graduates of the Aristotelian University of Thessaloniki. Hiring more faculty members from other Universities/Institutions is a useful and necessary ingredient for a healthy composition of the Department.
12. There is a rather elevated and surprising security vacuum on campus. Break-ins and other vandalisms are common.
13. The strategic plan of the Department, as in most cases in Greece, lacks quantitative measures, concrete goals and milestones, e.g. quality assurance mechanisms and regular evaluations of individuals and procedures.

Threats

1. The lack of resources, mostly due to the current financial crisis in the country, endangers the Department seriously and at all levels.
2. The solid reputation and history of the Department tends to dampen the desire and effort for renewal and expansion of activities in academic and research matters. As a

result, there is a risk of complacency and stalemate that must be avoided.
3. The continuous disruptive activism of the extremist political groups that literally threaten and stifle productive initiatives may very well lead to a noticeable decline of the Department's reputation

Opportunities

1. The ubiquitous availability of electronic media provides the opportunity for vast and effective promotion of the Department's accomplishments and achievements. It is beneficial to the Department to make its remarkable initiatives and successes more widely known.
2. The proliferating numbers of talented and successful graduates of the Department can be a resource of support at all levels. For example, it can be exploited through tracking and engagement and increased linkage.
3. The new degrees of freedom that the recently passed law for higher education provides, namely the opportunity to develop internal plans of organization, can be exploited to accomplish worthy goals and objectives that the previous legal framework did not allow.

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 Committee summarizes its findings through the following recommendations to the Department.
1. A modern, tractable and renewable strategic plan should be developed with specific goals, milestones, quantitative measures, and evaluation procedures that must be a living document to guide the Department's activities.
2. The Academic Undergraduate Program should be thoroughly revised towards a more flexible structure with tracks of prerequisites towards diverse specializations, and a reduced load with an eye towards modernization of the curriculum.
3. The work load of the faculty needs attention to better balance teaching duties and research conduct.
4. The governance rules of the Department should be modified, to the extent possible, so as to assign some real executive powers and increased responsibilities to the Department Head to increase the effectiveness in the implementation of change and new initiatives.
5. Increased cross-disciplinary collaboration within the department should be encouraged.
6. Within the framework of the university, the establishment of a Security Force to reduce and to prevent crimes should be seriously considered.
7. The physical plant and Department facilities should be modernized to any degree possible.