ΕΛΛΗΝΙΚΗ ΔΗΜΟΚΡΑΤΙΑ

Α.ΔΙ.Π.

ΑΡΧΗ ΔΙΑΣΦΑΛΙΣΗΣ ΚΑΙ ΠΙΣΤΟΠΟΙΗΗΣ ΤΗΣ ΠΟΙΟΤΗΤΑΣ
ΣΤΗΝ ΑΝΩΤΑΤΗ ΕΚΠΑΙΔΕΥΣΗ

HELLENIC REPUBLIC

H.Q.A.

HELLENIC QUALITY ASSURANCE AND ACCREDITATION AGENCY

EXTERNAL EVALUATION REPORT

DEPARTMENT: **Electrical & Computer Engineering
(ΗΛ. ΜΗΧ. & ΤΕΧΝ. ΥΠ)**

UNIVERSITY /TEI: **University of Patras**

OPERATIONAL PROGRAMME
EDUCATION AND LIFELONG LEARNING
investing in knowledge society
MINISTRY OF EDUCATION & RELIGIOUS AFFAIRS, CULTURE & SPORTS
MANAGING AUTHORITY
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External Evaluation Committee

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

1. **Prof. Sotirios Skevoulis** (Coordinator)
   Pace University, USA

2. **Prof. Yannis Goulermas**
   University of Liverpool, U.K.

3. **Prof. George J. Vachtsevanos**
   Georgia Institute of Technology, USA

4. **Prof. Kimon P. Valavanis**
   University of Denver, 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) arrived in Athens the weekend of October 26-27, 2013, in order to evaluate the Department of ECE of the University of Patras (UP) from 28/10/2013 to 31/10/2013.

After the Committee's arrival in Athens, the Committee first assembled on Monday (28/10/2013) at 5:00 PM at the Achaia Beach Hotel in Rio/Patras. The Committee was met by faculty members of the Department (Drs. Tzes and Giannakopoulos, who played key roles in completing the Internal Evaluation Report) and the Deputy Rector, Dr. Avouris. A semi-official meeting took place over coffee, where the Committee was provided with updated information about the current status of the ECE Department. The meeting concluded at about 8.00 PM.

On Tuesday, 29/10/2013, the Committee arrived on campus. Meetings started at 9:00 AM in the Senate Room. The Committee was met by the Rector (Dr. Panagiotakis), Deputy Rectors (Drs. Avouris, Kyprianos and Daouli), the Dean (Dr. Anyfantis), several members of the Quality Assurance Unit (ΜΟ.ΔΙ.Π) and some faculty members. Following welcome and introductions, very comprehensive presentations were given about the overall University operations, including organization, administration, academics, research, financial status, mission and vision. A very positive first comment is that the Committee was given additional, updated and current, information about the University and the School of Engineering (Πολυτεχνική Σχολή), as well as the various Departments. The Committee observed that the level of state funding has been substantially reduced over the past seven years, while soft-money sources (external funding) are partially used as 'supplement' to cover operating and recurring costs.

Following a coffee break, presentations continued in the Department Senate Room. The Committee was impressed with the fact that almost all faculty members, including emeriti, were present at the meeting. Detailed presentations by faculty representatives focused on Department activities, including course offerings at the undergraduate and graduate levels, research and research projects, student mobility, safety and health, publications, collaborations and services to, impact on, the Greek society and market. In further detail, faculty members gave extensive presentations about the sectors/sections (τομείς) that went into considerable details on undergraduate and postgraduate curriculum issues, educational programs and research. The meeting concluded after 6:00 PM. An official dinner was organized at 9:00 PM by the Rector's office, in which faculty members were also present.

On Wednesday, 30/10/2013, starting at 9:00 AM, presentations continued coupled with laboratory and other facility visits, as well as meetings with undergraduate and graduate students. Representatives from the different laboratories (Θεσμοθετημένα Ερευνητικά Εργαστήρια) presented lab organization, administration and research activities, including student involvement. Presentations focused again on course offerings, research projects, funding, publications, citations, equipment and infrastructure, national and international collaborations with other institutions and industry. Several students (undergraduate and postgraduate) were present in the meetings. The Committee had the opportunity to observe an on-going non-mandatory quiz-exam exam (course, Systems of Automatic Control, ΣAE, in which more than 300 students were present). The Committee members had a lengthy discussion with a representative group of more than 100 undergraduate students in the absence of faculty members. The meeting was very interesting and at the request of the Committee it was extended. The Committee also had the opportunity to interact with and discuss several 'internally systemic' issues with faculty members and technical support staff, which negatively impact research and development progress – details are provided in subsequent sections. Meetings concluded after 6:00 PM.

On Thursday, 31/10/2013, the Committee continued touring classrooms and other facilities and also met with alumni and administrative staff. The visit concluded with a short meeting with the Rector and Deputy Rectors, Department Head and other administrators. Initial feedback concerning the Committee's findings was given to the University authorities. The Committee returned to Athens on Thursday late afternoon, in order to complete the report.

The Committee was very pleased with: i.) The hospitality, professionalism, collegiality and friendliness of the host Department and the University authorities; ii.) The open-minded and extroversive attitude of the faculty and the University authorities towards the external evaluation; iii.) The detailed information and data provided to the Committee; iv.) The level of self-awareness and self-criticism of the Department; v.) The eagerness of the Department to receive the external evaluation report, seeking recommendations for further improvements. On the other hand, the Committee was concerned because faculty members feel that they do not have the needed services, support and essential backing from the University (ΕΛΚΕ), which facilitates and encourages research and development.

In summary, the Committee had a very productive series of meetings and discussion; it was provided with extensive and very detailed documentation, copies of all presentations, and data of the Department's operations - despite logistical issues. The Committee was also given reports about the University's status, including organization and finances.

Overall, the Committee was very pleased and satisfied with the information given to its members. The Committee members thank wholeheartedly the University authorities, all faculty members, students and staff for their hospitality and collaboration during this visit.

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 Department of Electrical Engineering was first established in 1967 (Β.Δ. 546/1967). Since 1995, its name has changed to Department of Electrical and Computer Engineering (Τμήμα Ηλεκτρολόγων Μηχανικών και Τεχνολογίας Υπολογιστών). The mission of the Department of Electrical and Computer Engineering is the education and graduation of engineers who deal with the design of systems for the production, transportation, distribution, storage, processing, control and utilization of energy and information. The mission is still intact, and the Department feels that there is no current need for a mission modification.

The Department occupies three separate buildings, used for all educational and research needs. It appears that additional space will be needed in the very near future to cover the Department's programmatic needs, and this was also reaffirmed by several faculty members.

The educational and research activities of the Department of Electrical and Computer Engineering have been separated into four (4) sections (τομείς) as follows:
- Telecommunications and Information Technology (Τομέας Τηλεπικοινωνιών και Τεχνολογίας Πληροφορίας). The sector offers 33 senior level undergraduate courses.
- Systems of Electric Energy) Συστήματα Ηλεκτρικής Ενέργειας). The sector offers 24 senior level undergraduate courses.
- Electronics and Computers (Ηλεκτρονικής και Υπολογιστών). The sector offers 27 senior level undergraduate courses.
- Systems and Automatic Control (Συστημάτων και Αυτομάτου Ελέγχου). The sector offers 23 senior level undergraduate courses.

Each sector objectives are well-defined, as well as directions for further development. The four sectors offer 110 upper division undergraduate courses.

The Department officially follows (since 2010) the European Credit Transfer and Accumulation System, ECTS - a major strength and an accomplishment – which facilitates student mobility and cross-university program/course transparency. The Committee commends this decision.

The curriculum is delivered over a five year intensive program with a suitable background of basic/fundamental knowledge from all the subjects of work of the Electrical and Computer Engineer. The curriculum is very course-heavy and also includes laboratory exercises, project work, a diploma thesis (Διπλωματική Εργασία) and internships (practical training). Internships are a major novelty instituted by the Department, although there is no 'formal' framework that enforces it. The internship duration is 4 months and carries a salary of 1,200 euros (300 per month), as well as insurance. A drawback is that the salary is covered by Department funds, not industry/the employer. This should be rectified with attempts to officially engage industry in this process, which will also cover salary/expenses associated with practical training.

The curriculum covers 10 semesters (5 years), as follows:
- In the first six semesters (three years) students attend mandatory courses, common to all students. The core curriculum forms the essential background and basic knowledge of all cognitive subjects of the electrical and computer engineer. Students must complete 180 ECTS units, corresponding to 36 core courses, 2 educational/social/economic courses and 2 language courses – this is a total of 40 courses.
- In the next four semesters, students must complete 120 ECTS units, 80 of which focus on sector-specific courses and 40 ECTS units correspond to the diploma thesis. The internship corresponds to 4 ECTS units and it is equivalent to one elective course. Technical electives (sector-specific courses) may be chosen from at least two different sectors out of the four. The number of courses in the last two years varies, based on the ECTS units of each course, but the number is close to 20, total.
- The diploma thesis is conducted over 4 semesters, which allows for substantial research.

Courses do not carry equal weight factors. Weight factors vary between 1,0 and 2,0 depending on 'educational units'. The diploma thesis grade does not carry the 'de-facto' 20% weight towards the diploma grade – which is a very pleasant surprise. The Committee commends the Department's decision to develop a comprehensive 'grading scale' that reflects actual student performance.

The Department offers many undergraduate courses (55 different courses in the core program and 110 different courses from the four sectors). In order to graduate, students need to complete close to 60 courses, 40 of which are mandatory courses (36+2+2), and the rest are subject area technical courses from specialization areas. Students must choose 20 subject area technical courses, which may also include lab-based courses. It is the Committee's opinion that the curriculum is very course-intensive involving an excessively large number of courses. As an example, it is stated that four year curricula in international Universities include 30-32 courses.

Thus, the curriculum is summarized as follows:
- Core program (1st to 6th semesters) that is common to all students
- Section specialization (6th to 10th semester)
- Diploma thesis (spanned over 4 semesters)
- Practical Training, internship (with a bonus of 4 ECTS units)

The list of courses in the curriculum covers a very wide range of topics from fundamental courses (i.e., mathematics, physics, basic computer science, computer engineering) to courses in most of the subject areas that fall within the expertise of the electrical and computer engineer. The curriculum is diversified, extensive, broad, but rather inflexible.

Students have to follow subject area specific courses during the last two years of the curriculum.

The current course curriculum offers a comprehensive and balanced five-year undergraduate program. However, it is the Committee's opinion that the curriculum requires revision and restructure. The number of courses required to complete the undergraduate curriculum should be substantially reduced. Overlap between courses should be minimized, which may contribute to reducing the number of courses. It is the Committee's opinion that the five year curriculum should have about 50 courses (i.e., should be reduced by about 10 courses). The reduction of the number of courses may be balanced by more depth in the covered material.

The Committee understands that faculty members are aware of the need for curriculum revision, and they are committed to address and resolve this challenge. The specific procedure for the revision of the curriculum and the 'timing' of this revision was not explicitly stated, nor was it discussed. However, the Committee encourages the Department to do so.

The educational lab infrastructure (equipment, resources) is good, although there is room for improvement in some areas. It was reported to the Committee that equipment in some labs is almost obsolete. There are several lab intensive courses in the curriculum that the students need to follow. This helps students acquire the practical level of knowledge/skills during their studies. The Committee feels that although the Department is on the right path, a coordinated effort must focus on closing the gap between theory and applications, with better coupling of theoretical and lab related courses. Further, design and synthesis, as opposed to only analysis, must be emphasized.

On information received by undergraduate students, it appears that better coordination, updated information, and more relevant and comprehensive lab exercises will benefit student learning.

The Committee commends the Department's decision to officially institute the 'Academic Advisor' for each student as early as the freshman year.

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 follows, and it is constrained by the common core and specific subject area course structure. Since the structure is 'rigid' and 'inflexible', it may not serve the Department's long-term goals. The Committee feels that the curriculum should be more flexible with substantially fewer courses.

The structure of the curriculum is rational and articulated in the Department's Course Guide. It is overall coherent and it appears to be functional, despite its rigidity and inflexibility.

As previously mentioned, the number of undergraduate curriculum courses is high. Only well motivated students complete the degree in ten semesters. However, due to recent changes in the legal framework for higher education, an increased number of students aim at completing the curriculum within seven (7) years.

The faculty is, overall, well qualified to deliver and implement the curriculum, despite a considerable reduction in their salary and infrastructure resources over the past six years. On information received by undergraduate students, the Committee reports that there are a few issues with specific instructors related to course notes/material and the pass/fail

percentages.

The Department delivers the curriculum, despite the limited funding (from the State) for resources and infrastructure support. Indeed, funding is insufficient judging from the high number of students the Department serves. The operating budget has been considerably reduced over the past six years, imposing additional challenges that need to be overcome. The Committee commends the Department for the major efforts to create and maintain the lab facilities. In more detail, the Committee commends the faculty members' efforts to improve lab infrastructure through soft-money resources, that is, through external competitive funding. However, this should not be the 'norm', as external competitive funding is project related.

Space appears to be inadequate due to the wide range of courses, lab needs, research activities, and the (absolute number of) students in the Department.

Faculty activities are solid with publishable results in internationally known transaction/journals and referred conferences.

The Department appears to move towards being 'heavy' in Full Professors. Out of the 52 currently active faculty members, 26 are at the level of Professor, 7 are Associate Professors, 17 are Assistant Professors and 2 are Lecturers. The Committee was informed that vacant positions have not been filled. This issue is mostly attributed to the lack of replacement and new faculty lines given to the Universities by the Ministry of Education.

The Committee feels that the current number of faculty members is sufficient to deliver the curriculum. The Committee recommends that the Department balances better among the different faculty ranks in the future. Strategic areas should be chosen to reflect the Department's future vision, and along these lines, the Department should request additional faculty lines (regardless of whether the Ministry of Education will approve such request).

Along the same lines, and since the Department has instituted the ECTS, it is important to develop a comprehensive 'teaching load policy', so that teaching responsibilities are well balanced among faculty.

The curriculum was last updated in 2009-10 (major revision) followed by minor annual revisions. Curriculum revisions followed the Department general assembly procedure. The Department is committed to continuous re-evaluation of the curriculum.

The Committee commends the Department's initiative to institute procedures for course/instructor evaluations, which follows international practice. However, on information presented by students, and based on the Committee's observations, it is not clear how this feedback is used towards improving the curriculum and teaching. Further, there is no clear information related to the % of students who evaluate instructors/courses. The Committee recommends that the Department develops a framework that allows for the online evaluation of courses.

The total number of (all) undergraduate students is close to 2.000, which is very high and results in high faculty-to-student and administrative-to-student-ratios. However, the number of 'active' students is smaller. Regardless, the Department, under the new legal framework for higher education, must enforce 'procedures' to reduce the number of stagnated students.

Postgraduate and doctoral program

The Department does not currently offer Postgraduate Concentration Diploma (Μεταπτυχιακό Δίπλωμα Ειδίκευσης) degrees. However, the Department is an integral part of three Interdisciplinary Postgraduate Concentration Diploma (Διατμηματικό Μεταπτυχιακό Δίπλωμα Ειδίκευσης) degrees. The Committee was informed that: i.) One of the reasons the Department does not currently offer Postgraduate Concentration Diploma (Μεταπτυχιακό Δίπλωμα Ειδίκευσης) degrees is attributed to the five years of undergraduate education leading to a diploma equivalent to a 'Master of Engineering'; ii.) The Department has submitted a completed application to the Ministry of Education for Postgraduate

Concentration Diploma degrees, but approval requires as prerequisite the external evaluation report.

Regardless, the Department has a very well-defined (technical, procedural and administrative) structure that will result in the Postgraduate Concentration Diploma degree. The list of courses is very wide and more than sufficient to cover current and future program needs.

The Department offers Doctoral Degrees that require, in addition to the research, a total of 6 compulsory courses for students graduating from a five year program or 10 compulsory courses for those coming from four year programs. The number of postgraduate level courses is sufficient and covers a wide range of topics.

The Department currently has a sizable number of doctoral candidates, about 70% of whom are supported by funded research projects. Doctoral students also provide laboratory support services and also coordinate lab exercises (due to the lack of technical support staff).

Doctoral student progress is evaluated annually, which follows international practice.

The Committee observes that there is no 'approved funding mechanism' to support postgraduate students. The Department does not have sufficient special funding for Teaching Assistants.

The School has a solid record of competitively funded projects, which allows for postgraduate student support and involvement in projects.

In summary, concerning the postgraduate and doctoral programs, the Department has a living document and plans to implement it once the Ministry of Education approves the submitted application.

The Committee recommends that the number of postgraduate students is substantially reduced to include only the active ones who make continuous progress in their studies. It appears that the total number of postgraduate students is prohibitively large, and in principle, the Department does not have the resources needed to cover research needs.

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 Committee observed that the Department has a well-defined mission and vision and knowledge of future directions. The Department has already instituted the ECTS, which facilitates cross-university degree/diploma recognition and acceptance. The Department is moving towards the international practice of course grading that corresponds to the A, B, C, D, E, scale.

The Department has instituted course/instructor evaluation procedures. However, it is not clear how these results are utilized and whether there is room for any disciplinary action if and when needed.

The Department has established collaborations and bilateral agreements with international universities and promotes student exchange. The Department moves towards establishing a 'common framework' for such agreements.

The Committee understands that Universities are in transition due to the new legal framework for higher education and this may create issues in the long-term planning. The Committee strongly encourages the Department to stay on course with their long-term

planning, despite systemic difficulties. This is essential in spite and because of the current uncertainties.

The overall implementation of the curriculum is satisfactory, despite some course overlap or partial repetition. Infrastructure (educational) resources are limited in some areas, but overall sufficient, but space appears to be inadequate. The Committee states that the Department needs to develop a 'replacement plan' to improve over time the lab educational resources, which must reflect current advances and state-of-the-art technology. Consequently 'funding sources' must be identified to cover the associated cost.

Faculty must be acknowledged for their ability to attract competitive external funding.

From presented information, it appears that there is an imbalance between administrative, support and technical staff. The Committee feels that the number of technical staff must be increased in order to support the Department's needs in lab support, relieving postgraduate students of this burden. There does not seem to be any justification for reducing the total number of the administrative, support and technical staff members. However, rebalancing is essential.

It is clear to the Committee that the current financial situation in Greece and the complexity of the bureaucratic procedures of the Ministry of Education imposes additional obstacles to improving the Department's infrastructure. Connection of the University with local industry is not overall satisfactory and this is attributed to many 'factors'. Faculty members do want better collaboration with industry, but this may not be currently possible due to several reasons.

IMPROVEMENT

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

The Department has a current and working document outlining the procedures on how to improve curriculum design, development, delivery and implementation. The Committee commends the Department's efforts to improve all aspects of curriculum development, including streaming of the curriculum.

The Department must upgrade lab equipment and facilities. As stated, a replacement plan must be developed.

The Department, through the Internal Evaluation Report, has identified a list of specific things that need improvement. The Committee commends this exercise and encourages the Department to start addressing and consequently solving such things.

The Committee highly commends the practical training aspect of the curriculum, despite timing and logistical difficulties. A framework must be developed to enforce practical training as it provides an integral dimension of the modern electrical and computer engineer. The Committee strongly recommends that the Department develops procedures for closer collaboration with industry, not to be reflected in the curriculum in any way, shape or form, but in order to help students develop the essential 'skills', which will make them competitive in the marketplace.

The Committee also comments on the following issues, which the Department should address in the near future:
- The number of students involved in ERASMUS activities is relatively small. It will be beneficial to the Department to increase this number.
- The number of international students is extremely small, almost non-existent. The Department should move towards attracting international students, in parallel to considering course delivery in English. This will enhance substantially the University's reputation at the international level. On evidence presented by the group of students with whom the Committee met, students will not oppose teaching

courses in English.

- On evidence presented by the group of students the Committee met with, the Committee recommends that there is some level of consistency and/or uniformity on how students are evaluated. For example, the one final exam paradigm is not well received.
- On evidence received by the students, there must be a timely distribution of the books during the first week of classes. This is neither a Departmental problem, nor a University specific problem. It appears that this is a 'systemic' problem faced by all Universities. As such, Universities must voice their opinion to the proper authority to rectify the problem immediately.

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, a mandatory diploma thesis and internships.

Teaching methods vary as well as class size. Core classes, common to all students are considerably larger.

The Department currently has 52 full-time faculty members, an 'unclear' number of administrative, technical and support staff (that is about to be reduced considerably) and close to 2.000 total number of undergraduate students (UG). This is a very large number of UG students that results in very high faculty-to-student ratio and staff-to-student ratio. Note that these figures ignore postgraduate students.

Large classes may be divided into sections. It is not clear to the Committee of how uniformity and consistency is enforced across the entire cohort of the students. It is also not clear what is the policy behind multiple section courses.

It appears that, in most cases, there is sufficient interaction between faculty members and students. Interaction is better in upper division courses, and one reason is attributed to the considerably reduced number of students registering in subject area specific courses.

Educational resources (labs, lecture halls) are sufficient to deliver the curriculum, although it is also clear that additional space will soon be needed. On information presented to the Committee by the students the Committee met with, some equipment are outdated.

It also appears that the number of members in each group conducting laboratory exercises must be reduced, not to impact the quality of learning of each student. A potential solution is to extent the access time to the labs, which will result in reduced numbers per group.

The Committee visited several classrooms with different capacities. It is the observation of the Committee that all classrooms must be equipped with updated technology resources that will help facilitate delivery of courses.

Library facilities at the School level seem to be sufficient. Faculty members and students

complained that subscription to certain online libraries (i.e., IEEE Xplore) is not current due to budget cuts. The Committee feels that this is unacceptable and records its concern. Further, the Committee reports that students have considerable difficulties in accessing multiple reading resources per course.

Several courses include quizzes/exams before the final examination. It appears that there is no uniformity in the examination system, though. The Committee recommends that the Department, being progressive and open-minded, develops an across the board basic policy setting course passing standards, not just a final exam. This follows international practice.

On evidence received by the students, which is enforced by discussions with faculty members, it appears that higher marks in courses are difficult to obtain. The Committee was asked whether it is known that, for example, a mark of 7 in any course in the Department corresponds to a mark of 8 or 9 in other sister Departments. Students were also concerned because this 'grade suppression' may have an impact in being accepted for postgraduate studies in international universities.

Although the Department is aware of this issue, the Committee strongly recommends a thorough examination of this issue and the development of uniformity guidelines in the grading policy of the Department. This does not interfere with the freedom each faculty member has, nor does it impose pressure on individuals. Rather, it allows for across the Department consistency, which follows internationally known common practice.

The Committee does not have sufficient evidence to comment on the high failure rates in some courses.

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

From documents received and interviews with a sufficient sample of students, the Committee understands that:
- The quality of teaching and teaching methods varies. The feedback ranges from poor to excellent comments.
- The timing students receive their books is not strict. There are recorded cases where students did not have access to the online material after 4-5 weeks of classes. This is unacceptable and must be rectified at all costs. The Committee understands that this is not an internal, Departmental, problem.
- Teaching material is overall good, with minor exceptions. In some cases, instructors also distribute their own sets of notes.
- Resources appear to be limited and outdated in some areas. The Committee refers to programmatic needs to deliver the undergraduate curriculum.
- Students complained about the compression of the teaching periods due to strikes and occupations.

The Committee was pleased with the coupling of undergraduate education and research. The lab structure (Θεσμοθετημένα Ερευνητικά Εργαστήρια) and the mandatory diploma thesis requirement, encourages student participation in research.

Student mobility must be improved. It is the Committee's opinion that students do not take full advantage of programs like ERASMUS, to name one.

The Committee observed that the vast majority of upper division courses were research

oriented, preparing students for postgraduate work rather than addressing needs of students whose goal is to seek work in industry right after graduation.

RESULTS

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

The Committee recognizes that the current uncertainty in higher education and the fear of strikes and occupations may have an impact on the duration of the academic semester. The Committee commends the decision of the Department to cover, according to the letter of the law, the whole spectrum of 13 teaching weeks. As long as the academic semester structure is intact, courses should be delivered as expected.

The Committee observed discrepancies in the success/failure rates between courses. The failure rate in core courses (first 6 semesters) is higher compared to the failure rate in upper division courses. This appears to be consistent with observations in sister Departments in Greek Universities. Several reasons may be attributed to this phenomenon, however, the Committee would like the Department to address and, somehow, resolve this issue.

Students are classified as 'active' and 'stagnated'. Active students usually complete the curriculum within 7 years, which is within the time period the new law for higher education allows.

The Committee, based on discussions with the faculty members, believes that the Department is aware of such issues and difficulties and that it already discusses ways to overcome such issues.

IMPROVEMENT

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

The Committee registers the following observations:
- The Department is very dynamic, and since 2010 it has implemented a series of worthy initiatives in an attempt to follow international practice. However, given the current crisis in Greece, this dynamic potential may result in some, relatively speaking, instability. This is put in the context of the uncertainty in higher education. The Department is correct in its assessment of what needs to be done; however, its vision may be adversely impacted by bureaucratic bottlenecks imposed by the Ministry of Education.
- The ECTS, although a breakthrough, appears to create considerable inflexibility with respect to the rigidity of 30 units per semester and 300 units over five years. Students expressed the desire to register in additional courses, or courses they prefer but cannot take due to the 30 units per semester. The Committee strongly feels that this bottleneck must be overcome.

The Committee recommends that the Department organizes on an annual basis seminars and one day meetings (ημερίδες) where students are given the opportunity to: see research projects and other activities; listen to faculty talking about the multi-dimensionality of the electrical and computer engineer; understand how and why basic courses are needed to stimulate engagement of the students in subsequent years; understand what will be expected in subsequent years

The Committee feels that the examination questions should have graded difficulty so that the average student passes with an average mark and the excellent student is awarded with an

excellent mark.

The State should limit the TOTAL number of students, not just those through matriculation exams. The Department must work towards this direction.

C. Research

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

APPROACH

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

Overall, the Department is active in research at multiple levels, in terms of: Competitively funded international projects involving collaborations with European partners; competitively funded national projects – although the funding level is reduced over the last years because of the financial situation in Greece, and, funding from the domestic public and private sector.

Based on studies conducted by the Department, 58% of the faculty members have served as project PIs in one or more projects. The annual funding level per individual faculty member is very wide, ranging from no funding to 'respectable'. Note that the Committee had detailed discussions on this issue with faculty members and comments are provided at the end of this Section.

Further, the Department has statistical data related to overall average funding per faculty, cumulative departmental funding per year, and level of funding as a % of the University funding. The Department employs 6% of the total University faculty members, but contributes 10% of the total funding. However, the level of 2.2 million euros per year for 52 faculty members must be substantially improved. A coordinated effort must focus on strategically chosen research areas with critical mass of faculty members, which will help attracting more external funding.

The Committee observed a strong funding record from nationally funded projects. However, the Committee is concerned with the sustainability of this type of funding, as the funding from national sources is dramatically reduced. Thus, diversification is highly recommended. In addition, increased efforts must center on developing new alliances with international partners, agreements with international universities and participation in consortia. This will improve competitiveness that will result in internationally competitive funding.

The Department has conducted internal studies to find the correlation between funding and publications, as well as how funding may impact the quality of education/teaching. This constitutes a novelty, and the Committee commends this initiative and encourages the Department to continue on this path as it will help establish work balance loads for faculty members.

Along those lines, the Committee observed an 'imbalance' among faculty members organizing international conferences, serving in editorial boards, or having chief editor/senior editor positions in internationally acclaimed magazines and journals.

The University as a whole has funded 42 internally evaluated proposals of research networks (with seed funding), 17 of which were from the College of Engineering (Πολυτεχνική Σχολή) and 7 from ECE. This seed funding has contributed to efforts to attract external funding.

To conduct research, the faculty members involve many times doctoral students, and postdoctoral researchers, and, sometimes, undergraduate students (mainly through diploma theses).

The Department does not have internal standards for assessing research other than those built into the procedures of tenure and promotion of individual faculty members.

Overall, faculty members have solid publication and citation records. Collaboration with other international Universities is sufficient, but it can be improved. The Committee witnessed a collegial working environment, and, despite logistical difficulties, it encourages even stronger efforts to collaborate with industry and other key stake holders.

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

The Department of Electrical and Computer Engineering has a strong research infrastructure thanks to mainly external funding and the individual efforts of the faculty, which facilitates research activities. This follows international practice.

Lab research facilities are overall impressive, mainly thanks to faculty member efforts to purchase, upgrade and maintain such facilities.

The number of scientific publications ranges from satisfactory to outstanding. The Committee encourages and supports faculty members to be further involved in IEEE and other professional society activities.

The number of research projects and the total external research funding must be improved. Collaborations and inclusion in international consortia must be strengthened.

The Committee observed that the Department does not promote sufficiently its activities and achievements through publication of an annual/biannual report. The Committee strongly recommends that such a report be produced. It will enhance tremendously the international reputation of the Department.

However, the Committee was impressed with the breadth and depth of the basic, applied research and development activities of the various research groups that has resulted in the development of several final products!

The Committee, after detailed discussions with faculty members and technical staff registers below a series of observations that may impede research progress and advancement.
- It appears that there are some internal (at the University/ΕΛΚΕ level) and systemic problems that impose bureaucratic and on occasion legal obstacles that adversely impact competing for funding.
- Faculty members reported lack of essential support, lack of efficiency, and very narrow-mindedness from the University entity that is 'supposed' to facilitate research.
- It appears that the environment discourages creation of spin-off companies from members working within the University who have produced results/products worthy of commercialization.
- It appears that the framework and policy for Intellectual Property Rights protection, distribution, etc. of the University is not known and not applied by all faculty members.
- It appears that the environment does not encourage the creation of a Research Institute (for example, like the ICCS - Ερευνητικό Πανεπιστημιακό Ινστιτούτο Συστημάτων Επικοινωνιών και Υπολογιστών) that will help establish an efficient framework, which will support, facilitate and improve research and will increase funding.
- It appears that connection and collaboration with industry is very difficult. Along the same lines, it looks like the word 'επιχειρηματικότητα' is forbidden.
- The Committee was informed that a number of faculty members, quite successful in the past in bringing external funding, have now given up due to the above reasons.

It is clearly stated that the Committee is appalled by the numerous artificial and/or real obstacles that impede research progress and advancement. The Committee is also astonished with the fact that faculty members did not attribute any of the above issues to 'the current situation in Greece', the 'current uncertainty', the 'intervention of the Ministry of Education in University affairs', etc. The Committee is convinced that the faculty did not look for excuses, but they were expressing real concerns about a real problem impacting their professional advancement. This situation is unacceptable and unheard off and affects the international reputation and standing of the Department and the University as a whole.

The Committee clearly states that this set of problems must be immediately addressed and resolved at all costs. The Committee expects that faculty members will have the support mechanism to carry, expand and enhance their research and development activities.

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.

There is no official document that clearly states the Department's research objectives, although the Department has conducted studies that demonstrate critical areas of research.

Research projects offer a 'mechanism' to fund postgraduate students (who also act as teaching assistants in undergraduate courses).

Faculty members have publication records ranging from satisfactory, to very respectable to outstanding.

There is a very wide spectrum of funded research projects undertaken in the Department, with an increased number of newly funded projects from industry and the private sector. This is very encouraging despite logistical issues and 'other issues' that limit such initiatives.

The doctoral program is well established with the average duration of study within international norms. About 70% of the doctoral students are supported by funded research. It appears that there is no uniform funding policy for doctoral students.

Overall, the faculty produces outstanding and impressive research results, collaborates internationally, and its publications are well cited. Funding is OK at this stage (for research active faculty members) to support research activities.

Research funding
The total amount of research funding, given the reputation of the faculty members, should and must be improved. The Committee feels that the faculty members must continue and intensify efforts in this path. The Committee also feels that previously research/funding active faculty members must be re-engaged in such activities, pending some level of 'resolutions' related to internally systemic problems as previously mentioned.

The Committee feels that the faculty members are capable of attracting even better students. This will result in more publications and increased funding. There is room to improve the percentage of research active faculty members (currently at about 58%).

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

There is no specific plan to change research directions in the Department.

The Committee strongly recommends continuation of external funding diversification to prolong funding sustainability.

It appears that there is much room for improving policies and procedures at the University level (ΕΛΚΕ). The researchers believe that the administrative framework imposed on research funds management is too complex, often impeding research.

The Committee recommends the organisation of research days and seminars by the research leaders of the Department to expose students to current research efforts of the Department.

The Committee strongly recommends that the University develops a plan to 'market' the department's accomplishments. It is not known that research has resulted in final products.

The University must promote research accomplishments. The University must encourage faculty members to create spin-off companies as a result of their findings. Accordingly, the University should and must benefit from proceeds/profits to be generated from such spin-off companies. This follows international practice.

D. All Other Services

For each particular matter, please distinguish between under- and post-graduate levels, 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 academic activities of the Department are supported by faculty members, administrators, support staff, laboratory and technical staff, as well as a number of postgraduate students who cover lab needs. Administrative staff members deal with various student affairs such as registration, finance and operational logistics, undergraduate and postgraduate studies, etc.

The Committee members felt that there is a level of uncertainty with respect to the sufficiency of the number of staff members, and they discussed this issue. From these discussions it is clear to the Committee that the Department must provide a justified document for the Departmental needs that are essential to deliver the curriculum. As such, it is recommended that, with reason, a more balanced way is found to cover all Department needs.

There are recommendations to fully digitize administrative and all other procedures under a common framework. Although procedures are processed electronically, this is accomplished in a decentralized way (42 νησίδες οργάνωσης). The Department and the University have a well-defined initiative that will result in a 'digital revolution' streamlining all procedures and providing all services electronically.

The Department also has a clear Security and Health policy with steps that need to be followed to guarantee a healthy and secure working environment. The Committee strongly commends this initiative!

Although there is no centralized policy to increase student presence on campus, due to the current uncertainty, students themselves seem to be eager to complete their studies.

On evidence presented to the Committee by the group of students the Committee met with,

the dormitory situation must be considerably improved in terms of quality and room availability.

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 Committee states that during its visit there was an on-going strike of the administrative and support staff. According to the information presented to the Committee, it is clear that, pending staff reduction, the number of total staff will not be sufficient for all Department services.

The Department is aware of the present challenges and has undertaken initiatives to streamline administrative processes. The 'digital initiative' to process everything electronically is underway; however, there is no clear time framework for its completion and full implementation.

There are very limited coordinated extra curricula activities and it also appears that the athletic facilities are good.

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

On the limited evidence available to the Committee, the administrative and other services appear to be functional. Due to historical reasons there is an imbalance between what are described as "administrative" and "technical" staff. This must be sorted out to reflect the true function of each member of staff.

The Department is concerned with the potential reduction of the support and technical staff as it will not be able to complete all needed administrative services.

It appears that once the 'digital initiative' project completes, services will be optimized.

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

In the current climate it is difficult to engage in a rational discussion with staff under the threat of redundancies. Central funding and research funding provide support but the current system appears to be inflexible in accommodating the developing needs in various areas of research, teaching and administrative support. This needs addressing at the Department/University and Government level. The easiest thing is to ask for more money, staff, etc., but there is also lack of a proper transparent structure reflecting real needs and practices.

There is a plan to optimize services. Streamlined efficient administrative procedures are essential. The 'digital initiative' project will be essential to optimizing services.

Collaboration with social, cultural and production organizations

No comprehensive information has been provided to the Committee.

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

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

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 operating framework the Ministry of Education 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 Ministry truly inhibit progress.

The Committee recognizes and strongly commends the Department entities, which are very open-minded and forward thinking seeking guidance and recommendations for improvement amidst a new law for higher education and because of personnel and support staff renewal and succession.

The Committee commends the strong support the University authorities (Rector's office) provide to the Department, naming it the 'flagship' unit in the College. Along those lines, the Committee encourages stronger collaboration between the Department and the Rector's office.

The Committee is alarmed by some internal systemic issues that prevent faculty members to take initiatives engaging in University-Industry collaboration, launching of spin-off companies as a result of their research findings, and other real or artificially imposed problems.

In what follows, the Committee's observations are presented in terms of strengths, weaknesses, threats and opportunities.

Strengths

1. The Department attracts very qualified students since it stands high on student preference.
2. The Department attracts the top students among those within the College of Engineering (Πολυτεχνική Σχολή).
3. The Department enjoys a strong reputation coupled with a successful record that has earned its prestige and respect at the national and international levels.
4. The Department has a large number of highly talented faculty members with achievements and international reputation.
5. The quality of the diploma theses is high.
6. The diploma thesis grade weight has been streamlined to provide 'true information' on the grade scale.
7. The curriculum includes practical training.
8. The Department has instituted the ECTS that facilitates student mobility and cross-university efficiency.
9. Course grading, in principle, depends on a well-defined weight scheme.
10. Transcripts reflect the actual number of times the same course is (re-) taken before a passing mark is earned.
11. There is a specific timetable to record course marks, and grades are recorded electronically.
12. The Department is networked in the international community with bilateral and multilateral agreements for collaborations, and plans to enhance and expand such collaborations.

13. The undergraduate curriculum has extensive coverage of a wide spectrum of subjects in the fields of electrical and computer engineering.
14. The Department has officially instituted the Academic Advisor for all students from day one on campus.
15. The Department offers a high quality doctoral program, and it is involved in interdepartmental postgraduate programs.
16. Research based recognition is solid.
17. Faculty members have produced final products based on their research activities.
18. External funding from national sources has been very strong.
19. The Department has plans to deliver all services electronically, thinking about a centralized digital framework to deliver all services.
20. The Department has an unusual high level of self-awareness and self-criticism responsibility, recognizing obstacles and bottlenecks to success.

Weaknesses
1. The number of students is high (close to 2.000), resulting in high student-to-faculty ratio, and support staff-to-student ratio. Further, there seems to be a culture of complacency that extends studies beyond five years, wasting resources.
2. The number of postgraduate students is also high.
3. The (Committee feels that) 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 carry over courses over time.
4. There is no properly enforced prerequisite structure, only the co-requisite structure.
5. It may be mentioned that the lack of sanctions encourages the prolongation of studies and waste of resources. Such practice increases the cost of educating the students unnecessarily.
6. The Department needs a well-defined and well-balanced workload policy (teaching policy) with well-defined metrics for implementation.
7. The effects of the state bureaucracy system have stifling effects on the development of the Department. It does result in indecisiveness and ineffectiveness.
8. There have been no new hires in the faculty. The lack of renewal may have negative impact on the Department's programs in the future.

Threats
1. The state's interference in higher education threatens and stifles productive initiatives in the Department and provides unnecessary obstacles to the Department's advancement.
2. The lack of sufficient funding from the state to cover operational needs and educational undergraduate curriculum programmatic needs may have an adverse impact on the quality of education.
3. The lack of a timetable to upgrade and modernize the Departmental infrastructure is a major drawback.
4. Internally systemic bottlenecks constitute a threat to research advancement and my result in externally competitive funding.

Opportunities
1. The successful graduates of the Department can be a major resource of support at all levels. For example, it can be exploited through tracking and engagement and increased linkage.
2. The Committee strongly recommends that the Department continues its extroversive way of functioning, seeking ways to advance amidst uncertainty.
3. The Committee recommends that the Department exercises to the full extend the opportunities the new legal framework for higher education offers in order to develop internal plans of organization, which can be exploited to accomplish worthy goals and objectives that the previous operational framework did not allow.

F. Final Conclusions and recommendations of the EEC

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

It is the Committee's observation that the Department is eager to move forward on all fronts! Faculty members are aware of the need to have flexibility in the operational and planning framework, which relates directly to staff recruitment, student numbers, facilities and services. The Committee presented in the previous Sections of this report its main findings on the curriculum, teaching and research activities as well as on the various Department services. The main observations and conclusions of the Committee were then grouped in Section E in terms of strengths, weaknesses, opportunities and threats.

In this final section the Committee summarizes its main conclusions/findings in the form of the following recommendations to the Department:

1. Continue functioning as an extroversive unit performing regular SWOT analyses.
2. Re-evaluate regularly long-term planning and future directions, by updating goals, milestones, quantitative measures, and evaluation procedures that will guide the Department's activities.
3. Streamline the undergraduate curriculum to the degree possible.
4. The Department should consider increasing the number of international students taking courses at the University of Patras. In this context, the Department should consider teaching some courses in English.
5. The Department should introduce an annual Research Day as part of student orientation where laboratories are open. Small presentations should be given.

The Committee sincerely thanks the Department and the University authorities for its support, professionalism, friendliness and collaboration during the week of the visit in spite the difficult circumstances.

Members of the Committee

UNIVERSITY OF PATRAS
DEPARTMENT OF ELECTRICAL & COMPUTER
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