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ΑΝΩΤΑΤΗΣ ΕΚΠΑΙΔΕΥΣΗΣ

HELLENIC REPUBLIC

H.Q.A.A.

HELLENIC QUALITY ASSURANCE AGENCY
FOR HIGHER EDUCATION

EXTERNAL EVALUATION REPORT

DEPARTMENT OF ELECTRICAL ENGINEERING
TEI of CRETE

Version 2.0

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External Evaluation Committee

The Committee responsible for the External Evaluation of the Department of Electrical Engineering of the Technical Institute of Crete consisted of the following three (3) expert evaluators drawn from the Registry constituted by the HQAA in accordance with Law 3374/2005 :

1. Professor Kimon Valavanis (President)
    (Title)   (Name and Surname)

    University of Denver, USA
    (Institution of origin)

2. Professor Evangelos Milios
    (Title)   (Name and Surname)

    Dalhousie University, Canada
    (Institution of origin)

3. Professor Maria Petrou
    (Title)   (Name and Surname)

    Centre for Research and Technology Hellas, Greece
    (Institution of origin)

4. _____
    (Title)   (Name and Surname)

    _____
    (Institution of origin)

5. _____
    (Title)   (Name and Surname)

    _____
    (Institution of origin)

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

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

Introduction

I. The External Evaluation Procedure

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

The committee, consisting from Professors Valavanis, Milios and Petrou, arrived to Iraklion on Monday, 17 October 2011 and was met at the airport by Professor Drakakis, the Head of the Department. The same evening, the committee went to the premises of the Institute, where they met the President of the Institute, Professor Kapetanakis, the Vice-President, Professor Savvakis, and some members of the Department. Some initial discussions took place for more than 2 hours and the programme of the visit on the following day was agreed.

The committee visited the Department on October 18 and 19, 2011. On October 18, the committee attendeda presentation of the Department by Professor Koudoumas and discussed with most members of the Department that were present the structure of the teaching activities of the Department. They also met with 6 graduates of the Department, who are currently in employment in the local private or public sector, and four students who were in the final stages of their studies and in particular in the process of doing their final year project. The committee also met with three out of the four members of the Departmental Secretariat (the fourth member was absent due to maternity leave). Finally, the committee asked and visited a lab session in progress, where they met more than 15 students of the 5th semester of studies (in the instructor's absence). Before departing for the day, the committee visited also some other teaching labs. On October 19 there was a general strike and most lessons were cancelled by the students, limiting the committee's access to any further lab and lecture sessions. Nevertheless, the committee met with another group of students who had come to attend classes, from a variety of stages in their studies. All different groups of students met were randomly selected and independent from each other. The committee did not meet with the official student representative, as he refused to co-operate because, according to what the committee was told, "his party did not allow him to participate in the evaluation procedure". All students the Committee met, consisting of randomly selected groups, declared that they were very happy with the process of evaluation and were very keen to talk to the committee. They all unanimously said that the parties ("parataxeis") did not represent them. The committee also had a discussion with Professors Drakakis, Koudoumas, Papoutsakis and Savvakis (the members of the Department Council), on the structure of the Department, consisting until recently from two Sectors ("tomeis"), with Professors Koudoumas and Papoutsakis being the Heads of the Sectors A and B, respectively. The anticipated changes due to the new Law for Higher Education were discussed, in particular the new structure, which will abolish the "tomeis" and the "tmima" and introduce the "School" and the "Programmes" within the School. All agreed that the new structure will

decrease bureaucracy and free up resources and academic time, and offer more flexibility in delivering the curriculum. Finally, the visit was concluded with a visit at the research labs of Professors Koudoumas and Kimakis, where PhD students from the University of Crete are performing their PhDs, and where several final year projects and practical assignments of undergraduate students take place.

The committee had received well in advance of the site visit the internal evaluation report of the Department, as well as the Studies' Guide that the Department issues. The committee also had the chance to examine in detail the returned evaluation questionnaires filled in by the students for each of the taught Electrical Engineering courses, samples of marked exam scripts, and samples of final year projects and lab reports. The committee did not have access to the evaluation forms for the subjects taught by the General Studies Department of the Institute. Finally, the committee was given access to the electronic black-board system used by the Department, called "e-class", where lecture notes and other teaching material are made available to the students.

II. The Internal Evaluation Procedure

Please comment on:

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

The committee considers that the information it gathered and the material that was made available for their perusal allowed them to form a comprehensive view of the strengths and weaknesses of the Department.

The committee considers that the information given by and the views expressed in the internal evaluation report are correct and valid. The committee, however, considers that the Department lacks a coherent identity, due to the diversity of the quality level of its faculty and students, and the lack of a well defined and focused mission.

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?

The goals and objectives of the curriculum focus on offering to students high level technology-based and applied knowledge in electrical engineering, so that its graduates are qualified as Electrical Technology Engineers. This is accomplished in terms of complementary educational, research activities, laboratory and project work and practical training. The curriculum consists of 31 compulsory courses and about 9 subject-area elective courses, a diploma project and practical training. The list of courses in the curriculum covers a wide range of topics from fundamental courses (i.e., mathematics, physics) to basic courses in electrical engineering (i.e., electric machines, electronics, systems of electric energy), to more modern courses (i.e., renewable energy, photonics), to advanced courses (i.e., robotics, mechatronics, materials). The curriculum is well diversified and well balanced, comparable to those offered by foreign Electrical Engineering Departments. The curriculum is designed to graduate competitive engineers who are marketable.

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

The Department fills the need to educate high-school graduates in the area of electrical engineering technology / applied electrical engineering. The objectives of the curriculum were decided considering the need to graduate qualified engineers for industry. The objectives are set against widely acknowledged standards such that the graduates are qualified to offer services in systems of electric energy, electric measurements, design, automation, electric and electronic circuits, communication systems, materials technology, renewable energy sources, lasers, microelectronics and mechatronics.

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

The curriculum, as recently modified and enhanced, is consistent with the set objectives and the requirements of the society at large. In particular it fills the need for assembly-line engineers, plant-engineers and electric-energy engineers. However, to some extent, it appears that part of the curriculum is very theoretical without the proper connection between theory and applications.

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

The most recent curriculum is the result of previous internal evaluations and discussions among the faculty members of the Department. The current curriculum is an honest attempt to create a four year undergraduate program that offers depth and breadth of knowledge in a wide range of topics. It is not clear whether students were consulted during this process.

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

The curriculum has been recently revised and the contents of the courses have been updated. At this stage there is no need for further revision.

IMPLEMENTATION
- How effectively is the Department's goal implemented by the curriculum?

The curriculum as designed (numbers of courses, thematic sequences of courses, course diversity, subject area elective courses) is more than sufficient to fulfill, even exceed Department goals and objectives. Indeed, the curriculum is very competitive compared to other Electrical Engineering Departments (domestic and international). However, it appears that there is some level of "disconnect" between theory and applications (in more detail, how theory is applied to certain real-life case studies, how theory is used to solve real problems), and this, in the long-term may limit the motivation of the students and the ability of graduates to be 'technology-based / applied engineers.

- How does the curriculum compare with appropriate, universally accepted standards for the specific area of study?

There is nothing wrong with the curriculum. It is very well designed, well balanced and diversified. Each course appears to be thoroughly prepared (at least based on the course description). The effort required for each course has been assessed according to the ECTS standards and the weight of each course towards the final qualification has been decided accordingly. The overall number of ECTS units per year is 60, which is the European standard. Students must complete 210 ETCS units in seven semesters, followed by 30 ETCS units in the eighth semester (thesis/project and practical training) for a total of 240 ETCS units. To some extent the diversity of courses is even greater compared with other similar Departments.

- Is the structure of the curriculum rational and clearly articulated?

The structure of the curriculum is rational and clearly articulated in the Department's Course Guide. The course sequence is rational and logical.

- Is the curriculum coherent and functional?

The curriculum is coherent. It may be completed in eight semesters by well qualified, well prepared and well motivated students who are full-time (non-working) students. It appears that the curriculum is difficult to be followed by the 'average student' as it imposes a heavier than 'average' load to most of the students. Perhaps, this is (just) one of the reasons why the average duration of studies is over 6 years (as opposed to the planned 4 years).

- Is the material for each course appropriate and the time offered sufficient?

The material of each course seems to be appropriate. However, it appears that the time available to assimilate that material by the students is rather short for some courses. It also appears that the majority of the students have major problems with fundamental first/second year courses (mathematics, physics) and this is another reason for the longer duration of their studies. Another reason affecting the implementation of the curriculum is that the majority of students fail to pass the fundamental courses before they take upper level courses.

- Does the Department have the necessary resources and appropriately qualified and trained faculty to implement the curriculum?

The current faculty is appropriately qualified to implement the curriculum. However, the faculty is overstretched as their number is very insufficient to cover all courses that are offered. As a result, a solution is hiring temporary faculty each semester. Further, there are clearly limited laboratory/equipment resources in some areas, while in others resources are outdated. These limitations will certainly hinder improvement and also implementation efficiency.

RESULTS

- How well is the implementation achieving the Department's predefined goals and objectives?

As previously stated, the curriculum is of high quality and very diversified. Proper implementation of the curriculum will most certainly produce Electrical Engineering Technology graduates of the highest quality, very competitive in the marketplace. However, it appears that the overall implementation of the curriculum suffers from some drawbacks: lack of motivation of the students; lack of sufficient resources in basic laboratory-related courses; lack of connection between courses (how do outcomes of one course connect to a follow up course); lack of connection between theoretical foundations and related applications. Further, the level of difficulty of several courses in the curriculum results in a longer average period of study.

- If not, why is it so? How is this problem dealt with?

The faculty is aware of curriculum implementation limitations. When it comes to basic resources, every effort is made to increase funding through the appropriate channels. When it comes to course delivery problems, the faculty is also aware of related issues, which are dealt with. It is obvious that long-term these issues need to be resolved.

- Does the Department understand why and how it achieved or failed to achieve these results?

The Department understands all existing problems and an effort is underway to improve the situation.

IMPROVEMENT

- Does the Department know how the Curriculum should be improved?

There is no need to change, modify or improve the curriculum at this stage. The curriculum is very strong.

- Which improvements does the Department plan to introduce?

There is no need to introduce changes in the current curriculum.

B. Teaching

APPROACH:

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

Please comment on :
- Teaching methods used
- Teaching faculty/ student ratio
- Instructor/student collaboration
- Adequacy of means and resources
- Use of information technologies
- Examination system

The Department uses mostly traditional teaching methods. For some courses, due to the volume of the material that is to be covered, the instructor gives to the students some initial key information to stimulate student interest ("erethismata"), based on which the students are expected to search for and find out by themselves the material they have to learn.

The student/faculty ratio varies according to the type of students one takes into consideration to calculate it. If one considers the active students, i.e. the students in 6 years after their first registration, who are 1284, with a current faculty of 15, the student/faculty ratio is 85! This is unacceptably high. Even if one considers only the students in the first four years of their studies, the student/faculty ratio remains unacceptably high by any international standard. The lack of permanent teaching faculty is compensated for by hiring temporary faculty, paid hourly. These are often graduates of the Department that have now moved on in the working sector, but not only.
If one takes into consideration the number of these extra personnel, which is varied from year to year, the student/faculty ratio becomes roughly half the above quoted value, which is still too high.

The very high student/faculty ratio has severe implications on the instructor-student collaboration. It appears that there are students of two streams: those that are interested in the course and collaborate closely with their instructors, and those that are not motivated enough to overcome the difficulties they encounter and are left to drift away. It also appears that there are two streams of instructors: those that care and spend a lot of time with the students and those that hardly care. The majority of the junior faculty are very dedicated and close to the students' needs. All students agreed about the high quality of teaching and attention they receive from the temporary faculty. They felt they were receiving from them excellent help.

The resources were definitely inadequate. This is beyond the usual complaining one hears in many Universities. In the Department the inadequacy of resources was evident. Not only in terms of teaching and technical support staff, but also in terms of aging equipment, computers, and room facilities. For example, the computer of the Secretariat is 6 years old. We saw notices of labs being cancelled because of equipment not working. There is no common room for the students to sit and read. The library opens only during the working days, from 9am to 7pm, although there are lectures until 9pm. Even during exam time, the library follows this timetable, remaining closed on weekends! Due to lack of technical personnel, the teaching labs usually open during the lab sessions and remain inaccessible at

other times. Students sometimes resort to tricks to gain access outside session hours: students doing their final year project, who have unlimited access, give access to the lab to other students, who wish to experiment with the equipment at their own time and at their own pace. Even so, the labs are locked up after normal working hours. Because of lack of resources, many subjects are taught only theoretically, although they could include a lab or exercise component.

The Department makes use of the Department's web site and the system "e-class" for posting lecture notes or other teaching material. It appears, however, that a fraction of the instructors do not make use of these facilities There was clear absence from the e-class system of material concerning a relatively large number of courses. In addition, the Committee was told that there are some instructors who refuse to make their notes available to the students electronically, so that they do not "get out". The students found this extremely inconvenient. Finally, exam questions from previous years are not made available to the students by some instructors. The students were happy with the program EVDOXOS for the distribution of books.

There is no coherent Departmental policy regarding the examination system. Some courses are examined only through the final exam, while for others there is a so called progress exam in the middle of the semester. We saw exam scripts and questions, which varied considerably from instructor to instructor: for some courses the exam questions were very easy, while for others they were much more difficult; for some courses there were 5 questions, while for others only 4, or fewer. For all exams the time allocated is 2 hours. However, students complained that certain instructors intentionally reduce the time to 1:45 or 1:30 to make the exam more difficult.

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

The quality of teaching procedures appears to be high or at least satisfactory for most subjects by most instructors. There appears, however, a gap in the teaching of theoretical subjects, mainly Mathematics and Physics. These subjects are taught in the early years of study and the students fail to appreciate their relationship with and usefulness in applications. There is also lack of any problem/tutorial classes, where example problems could be solved and discussed with tutors.

The students found it very difficult to cope with subjects where the instructor gives them "erethismata" and guidelines, and leaves it up to the students to find the reading materials.

As commented above, the resources are rather sparse. The material that is made available to the students is of high quality. The problem is with the material that is not made available, due to the bimodal quality of teaching offered. The course material is up to date. It is the lab equipment that is not up to date.

The Department has some excellent researchers, with very exciting research projects. Students have the chance to perform their practical training and their final year project in some excellent research labs, with equipment purchased from competitively awarded research grants. Many students have contributed to the development of research equipment through their final year projects.

The Department has very good links with many Universities abroad, with ERASMUS agreements with Institutions in Finland, Spain, Austria, Holland, Czech Republic, Hungary, France, Italy, Latvia and Estonia. Also, several members of faculty have collaborations with local and foreign Institutions, with which there are frequent exchange visits. The Department follows some rules (the so called "ten commandments") for selecting students for an ERASMUS exchange. There seems to be some controversy about a couple of these rules: it is left to the instructor of a course to decide whether a course followed abroad will cover his own course or not, with the authority to effectively veto a visit, by refusing to agree to the exchange; this may be in disagreement with the general spirit of such exchange agreements, where a course may be substituted by a foreign course from an approved university, without necessarily the syllabuses being 100% aligned.

The Department operates a scheme of evaluation of every taught course. We saw the evaluation forms completed by the students for the electrical engineering courses. The forms are comprehensive, with several questions and also with space for free-form comments to be made. Very few students make use of the option to write comments. It was reported to us by students that certain faculty members were verbally discrediting the process, giving students the impression that these questionnaires make no difference to the quality of teaching.

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?

Given that the average time taken for a degree is over 6 years, with many students graduating nearer to 10 years after first registration, the efficacy of teaching is not very high. There are courses where less than 5% of those taking the exam pass it. This percentage improves when the empty returns ("lefki kola") are not counted. A reason for that is that many students go to the army during their study years, so they show up in an exam simply to have a leave from the army. Other students find a job during their study years and do not devote the necessary preparation time for an exam. Many students simply cannot cope with what is expected from them, because of inadequate background. Many students show up in the exam poorly prepared, counting on being lucky to get exam questions they happen to know.

There is a backlog of roughly 150 students per year, as this is the difference between the accepted minus the graduated students per year. This is unacceptably high, as is the number of years taken to complete the degree.

The Department understands the reasons of the problem mentioned above.

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

The reasons which cause the problems of stagnating students and low exam success are largely beyond the control of the Department. For example, like all other Departments in Greece, the Department cannot control its own student numbers, as the number of students it is obliged to accept is determined by the Ministry of Education, and is much higher than the number the Department is capable of training given its faculty and lab facilities. This results some times in students with an average mark of 7 out of 20 entering the Department. These students lack the necessary background to follow the more theoretical subjects taught by the Department. The Department is going to implement the new law for Higher Education, which will allow it to remove from its lists students that stagnate for years because they are not prepared to dedicate to their studies the appropriate effort and time. This is expected to relieve the problem to a large extent.

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 has no graduate students at this time. It has submitted an application for an interDepartmental graduate program with the Mechanical Engineering Department on "Advanced Systems for Production, Automation and Robotics". We did not see an explicit research policy or internal standards for assessing research.

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 has 10 faculty members at the level of Assistant/Associate/Full professor, all of whom (except two) have demonstrated research activity. Most of them have a respectable publication record and research funding. Some have been very successful in generating high-impact research through substantial research funding, which allowed them to procure well equipped labs in their respective niche areas, in collaboration with domestic and international partners. The research labs were well equipped and space was made available for them. The teaching load (in terms of weekly contact hours) carried by the faculty is substantially higher than what is generally perceived as appropriate for faculty active in research. Faculty have relied on diploma theses and collaborations with neighbouring Institutions (ITE, Univ. of Crete) through co-supervision of graduate students and providing access to the Department's specialized research facilities to obtain the required personnel to carry out their research. Some faculty members have international collaborations and joint scientific publications to show from them.

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.

In spite of the high teaching load, the lack of a graduate program, and the lack of an explicit policy supporting research, faculty members have done surprisingly well in keeping up with research and they are to be commended for it. The research centers on niche areas focused on the expertise of the faculty members, some of which is quite interdisciplinary in nature (on the border between physics, chemistry and electrical engineering), and covers a very wide

range of research topics.

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

The Institute is trying to get the right to award graduate degrees. At this time, it contributes to educating PhD students from the University of Crete, without getting the credit for this effort (except the joint publications).

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 faculty, 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?

Within the constraints of available resources, the Department does its best to offer other services. The administrative procedures are continually simplified with the use of a home-grown electronic system called PANDORA. It was reported, however, that the system is frustratingly slow and unreliable. A recent undertaking of the issuing of student cards centrally by the Ministry of Education created a lot of extra work for the administrative staff, as they have to manually check each application and match scanned photos in the Ministry's data base uploaded by the students with hard copy photos on file.

The Institute operates an annual Career Fair. However, the students we talked to were not aware of it. Nevertheless, many students were aware of the Career and Placement office and made use of it.

We were not made aware of any policy to increase student presence on campus. However, there is an impressive looking athletic centre on campus, which might be a pole of attraction for the students.

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 Secretariat of the Department consists of 3 people currently (plus one on maternity leave) with two people due to retire soon. The staffing will be hopelessly inadequate after the departure of these two people. The Secretariat is accessible to the students from 11am to 1pm every morning. However, the students told us that even outside these hours they have had access to the Secretariat. In fact the students were very pleased with the services they were receiving and the courtesy of the staff in the Secretariat.

There does not seem to be a coherent policy for persons with special needs. For example, the new buildings have ramps for access for people with mobility problems, but the old buildings do not. The students have means-tested access to the dormitory and the mensa. The Institute makes a serious effort to keep the premises clean: the walls are painted and repainted regularly to cover slogans written on them on a regular basis. The cleanliness of the toilets has been undertaken by a private contractor. However, it was reported to us by the students that the toilets in the old buildings are often in an unacceptable state, while in the

new buildings are generally clean, but with toilet paper and soap often not available apart from the early morning hours. The library is open from 9am to 7pm working days only.

We were not made aware of any student counselling service. However, Professor Koudoumas, as well as Professor Drakakis, act as unofficial consultants to the students of the Department as the need arises. There is a state of the art athletics building on campus.

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

The administrative services are adequate and functional. The Department is braced for hard times ahead, when two of the administrative people will retire, and there is no provision for replacement. It is hoped that more and more use of e-services will help reduce the load of the administrative staff.

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

We were not made aware of any policies to this direction.

Collaboration with social, cultural and production organizations

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

The Department has strong links with ITE, the University of Crete and with the Public Power Corporation (DEI). The Department also has ongoing collaboration with the Prefecture of Crete, the Heraklion Chamber of Commerce and private enterprises in the area of energy and environment through research contracts.

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.

At this time (October 2011) the Institute is in transition from the old to the new law for Higher Education that was recently passed by Parliament. The new law is in the process of being implemented. As a result, the Department cannot have a long-term strategic plan, pending the implementation of the new law, and in particular the operating regulations (Organismos) that all Higher Education Institutions are expected to develop. This process will eventually lead to the creation and implementation by the Department of a long-term Strategic Plan.

The Department has to overcome a large number of inhibiting factors that are common in many other Departments in all domestic universities.

At the State level, inhibiting factors that create major obstacles are the administrative bureaucracy, insufficient funding, unclear chartered-status of the alumni, and the number of accepted students that is based only on political factors rather than student qualifications and even actual market needs. Further inhibiting factors relate to delays in receiving research funding (awarded proposals) that prohibit even short-term planning! The State's inability to act fast and in a rational way is the number one reason for many of the problems in domestic universities.

The funding problems at the State level propagate to similar problems at the Institutional level. Due to (basically) insufficient funding, the justified needs of the Departments are not fully met. Thus, compromises are unavoidable, which impose limitations on curriculum delivery! Further, at the Institutional level, it appears that there is limited effort to understand the particular needs of the Department, the laboratory requirements, the equipment that are required to deliver the curriculum, and the renewal of these equipment (most of which have a half-life of less than 3 years). As such, funding should be increased for resource and equipment-based programs.

Regardless, the new law for Higher Education is expected to solve many of the above inhibiting factors.

At the Department level, although monitoring mechanisms exist to identify issues students have with certain faculty members, who show disrespect to the students and arbitrariness in their examination and grading standards, (for example the mechanisms of course evaluations by students, and the option a student has to launch a formal complaint), two inhibiting factors were identified in rectifying the situation: students appear not to make use of the available mechanisms and the administration of the Institute appears hesitant to prosecute cases that come to its attention. As a result, significant discontent and a sense of helplessness were expressed by the student body.

A positive point at the Departmental level as well, is that every effort is made to cover needs based on available resources. However, a very strong aspect of this Department relates to research activities and funding received for such research activities. This funding is partially used, when appropriate, to establish / upgrade lab facilities, which, in turn, are used for

advanced upper-level course needs, on top of providing students with the opportunity to conduct research.

The Committee noted the existence of an Electronic Engineering Department within a branch of the same Institute in the city of Chania. The Electronic Engineering Department is of similar faculty size to the Electrical Engineering Department in Heraklio, and there is a very substantial overlap in the curriculum of the two Departments. Internationally, it is quite unusual to find two separate departments within the same Institution with such overlap.

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 lack of focus of the Department in its mission, the diversity of students it caters for, the lack of appreciation by the society for the status of the engineers it produces made the students the Committee spoke with rather demoralised and confused. In addition, the lack of faculty members and overloading of instructors makes the instructors rather demoralised. There is very little to be done about lack of faculty by the Department, but there are many things the Department can do to help the students. Some of them require extra faculty, but many of them do not.

Recommendations for the curriculum

The curriculum is already strong. There is no need to enhance/modify the curriculum at this stage.

Recommendations for teaching

To the Department

We believe that the problems with the efficacy of teaching are two-fold.

(i) Those that are beyond the control of the Department, which stem from the Ministry of Education deciding the number of students that the Department should educate, without offering to the Department the right resources to do so. This leads to the acceptance by the Department of students with very inadequate background to cope with the courses it offers.

(ii) The other reason is the lack of focus in the Department's mission. The Department does not appear to have decided what type of graduate it wants to produce. Raising the level of the Institute to become a fully fleshed University does not necessarily mean making the courses of university level from the theoretical point of view. It is possible for an Institute to be of University level and produce high quality practitioners.

For the above reasons, we recommend the following.

(i) The theoretical courses that are taught in the early semesters should be very clearly and strongly motivated for their relevance and use in the subsequent subjects that will be taught. Several students re-iterated that they found the first two years of the course demotivating and boring, while they started appreciating the opportunities their degree would offer them after the 4th semester, when subjects of speciality were taught. It would be desirable, therefore, this motivation to be given early on in the studies. This can be achieved if the courses of Maths and Physics themselves are shown early on to have relevance to applications and the exercises given are all from the electricity/electronics application areas.

(ii) There should be tutorial/exercise classes in parallel to the teaching of Physics and Maths, where exercises are solved in small groups and with close interaction with the tutor ("frontistiria"), possibly after they have been given to the students in the form of homework, which they could have attempted to solve on their own.

(iii) There appear to be students of multiple streams, with those coming from Technical High Schools well versed with the use of equipment but lacking the necessary background in Mathematics and Physics, and those coming from the General Studies High School lacking any background in the use of equipment but having the necessary background in theoretical subjects. It is recommended that some Remedial lessons are offered during the first semester and before the start of the main courses, or at least in parallel with the main courses, so all students are brought to the minimum necessary level for being able to follow all courses. Students from General Studies High Schools reported to us that they were expected to know basic things in the use of equipment, which they found too intimidating. A Remedial/Introductory course for that would solve this problem.

(iv) Courses that are difficult due to their advanced level and also the amount of material they cover could be examined in stages, where once a unit has been taught the student can take an exam to pass it, without the need to be re-examined on that material again if a minimum mark has been achieved.

(v) It is recommended that past exam papers and fully worked out model answers are made available in the e-class, as it is a common practice in foreign Institutions.

(vi) It is recommended that the transparencies and lecture notes of all courses are made available to the students through e-class.

(vii) It is recommended that the Department decides upon a single format of examination paper that will be followed by all subjects. For example, the format might be that the students are asked 5 questions, each one counting for 2 out of 10 units if answered correctly, and that two of those questions will be bookwork, i.e. they will examine how well the students studied the subject from the supplied course material, while the remaining three could be exercise-type questions, examining the ability of the students to solve problems.

(viii) It is recommended that for each exam the examiner supplies to the Secretariat or to some Departmental examination committee hand-written answers, to ensure that he/she has timed the time required for somebody to answer these questions, and made sure that the questions can be answered within 2 hours by well-prepared students. This is in accordance with practices in some foreign Universities.

(ix) Student course evaluations have been diligently collected over recent years. It was not clear what mechanisms exist within the Department to identify problems through them and feed them back to faculty members so that courses are improved over time. We were told that the evaluations were provided to the

instructors as individual feedback. Averages over the entire Department should be calculated and distributed as numbers as opposed to histograms, to easily identify courses which appear to be problematic to the students.

(x) It is recommended that a faculty-student liaison committee is established, where student representatives will be able to bring up specific problems related to teaching. The chairman of this committee should have the authority to approach individual faculty members to recommend changes and eventually take actions if the problem persists. The committee should keep minutes which will be reported to the general assembly of the Department, and make sure that loops are closed and actions are taken to solve the reported problems.

(xi) It is recommended that the library remains open at least from 9am to 9pm for seven days per week.

(xii) It is recommended that there are compulsory courses on health and safety in labs, with a first aid kit being available in each lab and a first aid trained person available in each teaching lab.

(xiii) It is recommended that the faculty/student relations are enhanced with some social activities the Department might organise for the students and with the students, e.g. "end of year barbeque party", "Vasilopita", "Christmas party", or whatever social activity is deemed appropriate.

To the Government

It is recommended that each Department has full control over the number and ability of students it educates. The Government may pay the Department a certain amount per student it educates, but it should not intervene to define either the qualifications or the number of the students accepted.

Recommendations for Research

The Department should continue its efforts to strengthen its relations with neighbouring Institutions to create critical mass in areas of high potential to establish themselves as regional, national or even international leaders (e.g. photovoltaic, wind energy, materials, high voltage insulators). Other areas, in which there is already significant local strength in other Institutions (e.g. robotics), should be carefully reviewed to identify niche areas consistent with the mandate of the Institute on which to focus, and join forces with the local Institutions (ITE and the Univ. of Crete).

Recommendations for Other Services

To the Department

- It is very likely that the reduction of the administrative personnel in the near future will cause serious problems to the functioning of the Department. It is also likely that some civil servants superfluous in some other organisation will be transferred to these positions. It is recommended that the Department pro-actively identifies properly qualified civil servants in other organisations about to be closed and seek to attract them to cover its needs.

- It is recommended that new students are assigned a faculty member as their personal tutor/mentor when they first arrive, to whom they can turn in confidence

for personal matters.

- A lot of students enter the Department as their second, or even last choice, with many admitting to us that they were very upset by the prospect, while later on they became very happy with the course and most of the graduates we met told us that they would have selected the Department as first choice if they knew the contents of the subject better. It is recommended, therefore, for the Department to organise an annual open day, where it invites local people and school children and shows its work, its teaching and research labs and explains its curriculum. This will help its image in society but also guide prospective students in their career choice.

To the Institute

All groups of students we had discussions with, all randomly selected, unanimously said that they did not feel represented by the "parataxeis" and that their voices were not heard in the general student meetings and as a result major decisions were taken without them, since meetings were dominated by supporters of certain groups on campus. There are now sophisticated electronic voting systems, which may be used to allow people to vote totally anonymously and securely, even for the election of national Governments. The Institute might consider using such a system for the students to vote for matters that concern them, so the decisions are taken by as large a fraction of the student population as possible.

Recommendations for Strategy

To the Department

The graduation rates given to us as a fraction of the intake in the first year appear to be very low, and point to serious issues that may be attributed to the lack of motivation in many students to complete their studies, or standards that are unrealistically high, given the level of students admitted to the Institute. It is likely that a non-negligible fraction of the student population is not qualified or motivated enough to complete the program. This fraction should be identified early on (in year 1) and given a clear message that they should not waste their time in the Institute. A clear prerequisite structure in the curriculum that prevents students from taking upper level courses before passing lower level ones would help. We were told that the prerequisite structure is constrained by law, which is an inhibiting factor.

A tension was observed between the faculty members' desire to raise the level of studies to what would be appropriate for a university-level Institution and the perceived mission of the Institute by the students to produce graduates with practical skills and employment-ready for industry. Defining the mission of the Institute more clearly would help shape the nature and the difficulty of the curriculum to resolve this tension and give a clear message to both faculty and students on what to expect from one another.

To the Institute

The presence of student groups affiliated with political parties appears to be perceived by the majority of the students we spoke with as a major problem that shifts the focus away from the real problems that the Institute is facing, and prevents the improvement of the quality of study. This silent majority feels disempowered when it comes to taking action towards resisting the influence of politics. A mentor system where new students are matched with senior students for informal advice would help strengthen the sense of belonging to students that is not connected to the political parties.

The Committee recommends that consideration be given to the possibility of a merger of the Electrical Engineering and the Electronic Engineering Departments. From a purely academic perspective, such a merger would create a single unit offering an only slightly expanded curriculum, with double the number of faculty members, resulting in substantial economies of scale in terms of teaching, and in a critical mass in terms of research capacity. The resulting unit would be in a much better position to cope with the resource issues that the Electrical Engineering Department is currently facing.

To the Government

The intake of students in first year is not under the control of the Institute, but it is set by the Ministry with political criteria. As a result, the number varies widely from year to year according to whether the base average grade of 10/20 is enforced as a requirement for admission or not. This inhibits proper planning of teaching faculty and lab facilities, and leads to a number of students that is significantly larger than the capacity of the Institute to educate properly.

It is recommended again that the Government should allow the Institute to establish its own standards and number of students.

The Members of the Committee

Name and Surname   Signature

1. Kimon Valavanis, University of Denver, USA

2. Evangelos Milios, Dalhousie University, Canada

3. Maria Petrou, Centre of Research and Technology Hellas, Greece