



ΕΛΛΗΝΙΚΗ ΔΗΜΟΚΡΑΤΙΑ	HELLENIC REPUBLIC
Α.ΔΙ.Π.	H.Q.A.
ΑΡΧΗ ΔΙΑΣΦΑΛΙΣΗΣ & ΠΙΣΤΟΠΟΙΗΣΗΣ ΤΗΣ ΠΟΙΟΤΗΤΑΣ	HELLENIC QUALITY ASSURANCE AND ACCREDITATION AGENCY
ΣΤΗΝ ΑΝΩΤΑΤΗ ΕΚΠΑΙΔΕΥΣΗ	

EXTERNAL EVALUATION REPORT

DEPARTMENT : **ΤΜΗΜΑ ΗΛΕΚΤΡΟΛΟΓΙΑΣ**

UNIVERSITY /ΤΕΙ: **ΤΕΙ ΚΑΒΑΛΑΣ**

## TABLE OF CONTENTS

### The External Evaluation Committee

#### Introduction

#### I. The External Evaluation Procedure

Brief account of documents examined, of the Site Visit, meetings and facilities visited.

#### II. The Internal Evaluation Procedure

Comments on the quality and completeness of the documentation provided and on the overall acceptance of and participation in the Quality Assurance procedures by the Department .

#### A. Curriculum

#### APPROACH

Goals and objectives of the Curriculum, structure and content, intended learning outcomes.

#### IMPLEMENTATION

Rationality, functionality, effectiveness of the Curriculum.

#### RESULTS

Maximizing success and dealing with potential inhibiting factors.

#### IMPROVEMENT

Planned improvements.

#### B. Teaching

#### APPROACH:

Pedagogic policy and methodology, means and resources.

#### IMPLEMENTATION

Quality and evaluation of teaching procedures, teaching materials and resources, mobility.

#### RESULTS

Efficacy of teaching, understanding of positive or negative results.

#### IMPROVEMENT

Proposed methods for improvement.

### C. Research

#### APPROACH

Research policy and main objectives.

#### IMPLEMENTATION

Research promotion and assessment, quality of support and infrastructure.

#### RESULTS

Research projects and collaborations, scientific publications and applied results.

#### IMPROVEMENT

Proposed initiatives aiming at improvement.

#### D. All Other Services

##### APPROACH

Quality and effectiveness of services provided by the Department.

##### IMPLEMENTATION

Organization and infrastructure of the Department's administration (e.g. secretariat of the Department).

##### RESULTS

Adequateness and functionality of administrative and other services.

##### IMPROVEMENTS

Proposed initiatives aiming at improvement.

Collaboration with social, cultural and production organizations

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

Short-, medium- and long-term goals and plans of action proposed by the Department.

#### F. Final Conclusions and recommendations of the EEC on:

The development and present situation of the Department, good practices and weaknesses identified through the External Evaluation process, recommendations for improvement.

#### External Evaluation Committee

The Committee responsible for the External Evaluation of the Department Electrical Engineering of the Technical Institution of Kavala consisted of the following five (5) expert evaluators drawn from the Registry constituted by the HQAA in accordance with Law 3374/2005 :

1. Prof. Nikitas Dimopoulos, University of Victoria, Greater Victoria, British Columbia, Canada (President)
2. Prof. Vassilios Agelidis, The University of New South Wales, Sydney, Australia
3. Dr. Nick Buris, Institute of Electrical and Electronics Engineers (IEEE), New York, U.S.A.
4. Prof. Christoforos Chadjicostis, University of Cyprus, Nicosia, Cyprus
5. Prof. Panos Liatsis, City University London, London, United Kingdom

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

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

## **Introduction**

### I. The External Evaluation Procedure

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

### II. The Internal Evaluation Procedure

Please comment on:

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

### **I. The External Evaluation Procedure**

The External Evaluation Committee (EEC) visited the Department from Monday 26 March 2012 (Arrival time 2 pm) till Wednesday 28 March 2012 (Departure time 12 noon).

During the visit, the EEC met with permanent academic staff, casual and contract teaching and academic staff, technical and general support staff, students from years 2, 3 and 4, graduates (1980s, 1990s, and 2000s) and representatives from industry employing graduates from the Department.

The EEC also met with the Institution’s President on Monday 26 March 2012. During the meeting, key staff from the Department was also present. The Institute’s President expressed no major concerns about the Institute. He praised the Department’s reputation and output singling out the recent investments in research and teaching infrastructure and the international journal edited by the Department.

The main meeting during the visit took place in a board room and the Department staff prepared well organized presentations. The EEC wishes to acknowledge a particularly inspiring, and evidence supported presentation about the Department’s recent efforts to address key challenges and issues, achievements and esteem in general.

However, the Department had not prepared individual course folders for the entire undergraduate curriculum; this was the expectation of the EEC members. Such folders include detailed course description, course syllabus, and course learning objectives and outcomes, documentation for laboratory experiments, samples of past exam papers, student performance statistics over the last few years, samples of marked student examination booklets covering the entire performance spectrum (fail, good, very good, excellent), the course textbook(s) used, course evaluation reports and statistics and other relevant teaching support reference books and teaching notes. This material is of paramount importance for the members of the EEC in the process of evaluating the curriculum offered, its objectives

and overall impact.

The Department advised the EEC that it operates an electronic portal (e-Class) for all undergraduate courses and uses the said portal to make relevant announcements to students and include some teaching material. This portal is currently an open one, and the EEC had the opportunity to examine its contents.

It is the opinion of the EEC that such portal (e-Class) should make available teaching and learning materials, including teaching slides of all lectures, lecture notes, tutorial documentation, past exam papers and solutions, laboratory student lists, etc. The e-Class is currently incomplete as there are many courses that lack up-to-date information.

The EEC requested a number of key documents and information. The Department with pleasure, full cooperation and a positive attitude made available, the following requested documents:

- Notes of selected courses and selected laboratory experiments.
- A number of textbooks used in certain courses.
- Samples of marked exam papers and exam questions from some courses.
- The policy and regulations of the undergraduate student graduation thesis.
- The policy and regulations for the mandatory 6-month practical industry student placement.
- The formal student diary/passport that serves as a record of the student learning activities in the industrial and professional environment.
- The formal announcements for undergraduate graduation thesis being offered for each semester/year.
- The form that assigns an undergraduate student project.
- The form that records an undergraduate thesis examination results.
- Lists of the 2009-2010, 2010-2011, 2011-2012 undergraduate project titles along with student ID numbers, marks, and names of academic supervisors.
- Memorandum of understanding with industrial organizations and local authorities.
- Examples of past hardware-based projects and apparatus built by students as part of the projects.
- The Department's strategic plan (Ακαδημαϊκό – Αναπτυξιακό Πρόγραμμα 2008-2012).
- The proposal and short plans of the two postgraduate programs that the Department proposes to introduce: Master of Science in Econophysics and Master of Science Innovation in Technology and Entrepreneurship.

The EEC requested the following information that unfortunately was not provided either during the visit or afterwards by email:

- List of the last four years of the student practical and professional placement records that included the name of the organization and the period of student training.

The EEC visited teaching and research laboratory facilities as well as the Institution's dining facilities. The EEC, due to time limitations, did not visit classrooms. Moreover, the EEC did not visit the Institution's physical training and athletic facilities and the library. The EEC received electronic information about the adequacy of classrooms.

## **II. The Internal Evaluation Procedure:**

The Department provided detailed information about the course evaluation for 2010-11. The EEC noted that the evaluation report given to the students included questions irrelevant to

the course evaluation process and the form as suggested by the HQAA. The questions exaggerate the student impression about the level of their academic title and/or education. The EEC noted that such information being continuously reminded to students constitutes a feedback loop that creates inappropriate attitudes and limitations to learning and excellence and should be avoided. The Department is, of course, free to gauge the views of its students and staff for any issues by using surveys and questionnaires at any time, however this should be done independently of the teaching and learning process. The Department assured the EEC that these questions have now been removed from the standard evaluation form.

The Internal Evaluation Report (IER) documentation provided and its appendices were well organized and of high quality. The quality of the recommended textbooks for most of the courses was considered good. A number of courses had a long bibliography of current textbooks, however it was hard to assess how such list informs the actual teaching and learning of the students, as in many cases, the actual notes given to students were not up-to-date. The quality of the documentation to support laboratory experiments was in many cases unsatisfactory due to the quality of the presentation and the information, the low quality of many figures, missing page numbers, etc. The EEC recommends that a quality control procedure for all documents given to students should be implemented as soon as possible to set higher standards for students. This will improve the overall teaching and learning experience.

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

## **A. Curriculum**

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

### **APPROACH**

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

### **UNDERGRADUATE CURRICULUM**

The curriculum of the Department appears to be a classical electrical engineering technology curriculum. Topics that deal with the generation, transmission, distribution, use and control of electrical power, including electrical industrial installations and buildings, are extensively represented in the taught material. Additionally, topics that cover the basics of electronics, control, computers and communications are also represented in the curriculum. Such a curriculum structure is quite common and reflects the needs of the electrical power generation industry as well as residential and commercial use of electrical power.

Additionally, the curriculum includes complementary studies courses (ΔΟΝΑ) areas of which include Law, Economics, Culture, Society etc. These topics are necessary in the education of an engineering technologist so as he/she will be able to understand the complexities of modern society and the associated impact and use of the technology.

The curriculum is structured as a single stream requiring all students to take mostly the same set of courses. However, there are elective courses. Elective courses are mostly concentrated in the humanities with one slot for a technical elective (a choice between two courses) and one more slot, where the student could choose a technical course or a complementary studies course.

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

The curriculum has evolved over the years with revisions occurring approximately every three years. The most recent revision is that of 2012. The curriculum is adopted by the Departmental Council (ΓΕΝΙΚΗ ΣΥΝΕΛΕΥΣΗ). However, the EEC was not able to determine the process through which revisions are proposed, elaborated and adopted, that is whether a Curriculum Committee exists that handles curriculum issues.

### **GRADUATE CURRICULUM**

The Department does not have an established graduate program. However, the Department has recently proposed the establishment of two Masters Degree programs, which are under consideration by the Ministry of Education.

The two proposed programs are as follows:

- MSc in Econophysics (jointly with the Department of Economics, University of

Thessaly).

- MSc Innovation in Technology and Entrepreneurship.

Both programs include 10 courses organized over a 2-semester period and a Masters thesis occupying the entire third semester, extending the overall full-time period of study to 1 ½ years.

The first program focuses in the new field of “Econophysics”, which purportedly uses mathematical physics approaches in analysing economic activity. Such an approach is currently being researched by several groups world wide. However, it is the opinion of the EEC that the field although actively researched, is not sufficiently mature to warrant a graduate degree to be offered and to allow industry to absorb such graduates.

The proposed graduate program includes a set of standard courses in economics such as Macroeconomic Theory, Managerial Finance, Financial Institutions and Markets, Quantitative Topics in Economics. It also includes a set of diverse courses, some requiring advanced mathematical skills. These include Neural Networks and forecasting, Chaos Theory and Economics, Catastrophe Theory and Game Theory, Statistical and Thermodynamic approach to Economics, and Econophysics. The only mathematics course included in the curriculum covers diverse topics equivalent to a first-year engineering (undergraduate) calculus course, differential equations, numerical methods, probability and statistics.

The second program, in Technology and Entrepreneurship, combines management and technology to produce graduates with skills in management and a wide awareness of technology.

The proposed program includes a set of standard management courses, including Managing Innovation and Creativity, Enterprises and Entrepreneurship, Product Design and Development, Strategic Management and Innovation and Research Methods. It also includes a set of diverse courses in technology that range from Principles of Measurement Systems to Nanotechnology and Bioengineering to Artificial Intelligence and Image Processing to Web Applications Design and Mobile Communications. As we will elaborate upon later on in this section of the report, such a program is highly desirable, however a number of improvements could be made.

#### IMPLEMENTATION

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

#### **UNDERGRADUATE PROGRAMS**

The curriculum is effectively implemented with a clear delineation of core, and elective courses. The program clearly indicates which semester a course is offered and is expected to be attended by the students. However, the curriculum is somewhat lacking in that it does not offer many elective course opportunities. Additionally, a prerequisites structure is not as yet

implemented, although the Department stated that this is something they plan to introduce. The EEC recommends that prerequisites for all courses, if applicable, be defined.

The curriculum covers amply all of the subjects expected in a modern electrical engineering technology curriculum. However, there are some areas that could be improved.

The EEC feels that the introductory course in Informatics (Πληροφορική) is not sufficiently academic and does not fit within the current curriculum. The EEC is of the opinion that some of the topics presented there (i.e., the use of Access, Powerpoint, Excel and Word) could be covered by seminars or in a course that supports professional skills such as oral and written communication skills, ethics, entrepreneurship, innovation, project management, etc.

The EEC feels that the course in Electromagnetic Theory offered in the second semester of the first year of studies, is perhaps placed too early in the curriculum and as such, the students may have difficulty in absorbing its material.

The EEC is of the opinion that the microprocessor (MC68000) used in the labs of the microprocessors course is quite dated and does not correspond to the current state of the art in processor design. Although the basic principles could be taught using such a dated component, it does not provide the students with the opportunity to be exposed to issues such as peripherals that are beyond simple UARTs, the impact of large address spaces, current bus structures, etc.

Safety issues are covered in the fifth-semester course “Legislation and Work Safety”. However, this course is optional and hence not all students would attempt it. It is the opinion of the EEC that this course should become mandatory as safety is a critical issue of the work environment.

The EEC could not identify a course where current electrical standards are presented. These are necessary topics and are normally included in any modern engineering/technology curriculum.

The EEC felt that the recently introduced course on Programmable Logic Controllers (PLC) should be made mandatory rather than being offered as elective. PLCs are in widespread use in industry and a desirable skill by the graduates. This opinion was also expressed by the current students during their meeting with the EEC.

The course on Philosophy of Science perhaps is not as well received by the students. The opinion of the EEC is that it should be either redesigned or eliminated from the curriculum.

The Graduation Thesis is an excellent mechanism through which a student may integrate the knowledge he/she has attained over his/her studies. However, the present implementation of the graduation thesis needs some streamlining and improvements regarding the focus of the topics proposed and the administration of the process of dividing the work between the students, and reporting the results. More details are discussed in sections B and C below.

## **GRADUATE PROGRAMS**

The graduate programs have not been established yet. As such, the EEC cannot fully evaluate their implementation.

However, the EEC would like to offer the following observations.

### *MSc in Econophysics*

While Econophysics is presently pursued as a research topic by several groups internationally, the EEC is of the opinion that this area has not matured yet and as such, it is not an appropriate topic for a Masters degree program.

Further, the EEC is of the opinion that several courses in the proposed MSc curriculum are highly mathematical, and that the included course in mathematics is not adequate as a prerequisite to the highly specialized topics of the program. Related to this concern is the fact that the proposal does not adequately specify the prerequisite mathematical skills and background of the students this program targets.

The EEC would like to suggest that the Department should attempt to offer some graduation thesis topics (Πτυχιακές Εργασίες) in Econophysics, monitor the graduates as to their absorption in appropriate industries, and revisit the program proposal once the Department has gained appropriate statistical data and experience including prospective students, target industries and appropriate mix of courses.

#### *MSc Innovation in Technology and Entrepreneurship*

The EEC considers that such a program could be very desirable. Similar programs are well established internationally and their graduates are sought after by industry.

However, despite the proposed program providing adequate coverage of management and entrepreneurship, courses pertaining to technology cover a very wide area and as such, they cannot have the required depth. It is the opinion of the EEC that this part should be organized in thematic groups, and that students should concentrate their studies in one of the thematic groups, with perhaps a minor in a different thematic group.

As examples, please refer to the organization of similar programs at the Australian School of Business:

[http://www.asb.unsw.edu.au/futurestudents/postgraduate/Pages/programdetails.aspx?](http://www.asb.unsw.edu.au/futurestudents/postgraduate/Pages/programdetails.aspx?AspXPage=g_8EE89775EAB748BB9F2EB5FA10DD0C80:Program%255Ftitle%3DTechnology%2520and%2520Innovation%2520Management)

[AspXPage=g\\_8EE89775EAB748BB9F2EB5FA10DD0C80:](http://www.asb.unsw.edu.au/futurestudents/postgraduate/Pages/programdetails.aspx?AspXPage=g_8EE89775EAB748BB9F2EB5FA10DD0C80:Program%255Ftitle%3DTechnology%2520and%2520Innovation%2520Management)

[Program%255Ftitle%3DTechnology%2520and%2520Innovation%2520Management](http://www.asb.unsw.edu.au/futurestudents/postgraduate/Pages/programdetails.aspx?AspXPage=g_8EE89775EAB748BB9F2EB5FA10DD0C80:Program%255Ftitle%3DTechnology%2520and%2520Innovation%2520Management)

and at Carleton University in Canada: <http://www3.carleton.ca/tim/details.html>

#### *General Comments on the proposed Graduate Programs*

It would be optimum if, at first, the proposed Master programs were purely course-based rather than course and thesis-based as they are currently proposed. Replacing the thesis with courses will provide greater flexibility in designing and enriching the curriculum and making it more manageable. Further, it will be rather difficult to supervise the projected number of graduate students (30 per program) on an annual basis on distinct thesis topics. A thesis option could be made available at a later time, when sufficient experience has been gathered and the resources of the TEI are appropriately utilized to handle the monitoring of several theses pursued concurrently.

The EEC could not readily identify the faculty members who will assume additional teaching duties in developing and teaching of the proposed graduate curricula. The EEC feels that it would be counterproductive should the current faculty members be asked to also teach the graduate curriculum in addition to their assigned undergraduate teaching loads. If contract staff is envisaged to take up the new responsibilities, this would directly impact on the quality and overall student experience and will compromise the reputation of the course itself, an important parameter contributing to the reputation of the Department.

#### RESULTS

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

The present curriculum achieves most of the stated goals and objectives of the Department. The inclusion of laboratory courses is a distinct advantage as these expose the practical aspects of the curriculum and ensure that the students understand the application of the theory in real environments.

However, as stated previously, there is room for improvement by realigning and refocusing some of the material and introducing some of the missing material.

The EEC heard that class attendance (as opposed to lab attendance) is not compulsory and that many students do not attend theory classes regularly. This puts these students at a disadvantage especially with respect to their preparation and understanding of lab work. The EEC recommends that the Department develop a strategy to encourage student attendance. This will improve student performance as well.

#### IMPROVEMENT

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

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

Given the Department's experience with the evolution and operation of its curriculum thus far, and given the Department's collaboration with industry, it is now an opportune moment to re-assess the organization of the curriculum, seeking input from industry in this process. It is also an opportune moment to establish a formal Curriculum Committee structure that will be active continuously, will take ownership of the curriculum and will establish procedures and mechanisms for its (curriculum) revision and improvement. The majority of students that the EEC spoke to, felt that more regular and appropriately planned visits to local industries would facilitate their future career development; the Department can perhaps take advantage of its good ties to industry to facilitate such visits. This would also help in better matching students when it comes to their practical training semester in industry.

It is also recommended that the Department consider the introduction of a Special Topics Course. Such a course could be offered opportunistically and cover state of the art topics, especially by instructors who happen to be visiting or by instructors who would like to test the feasibility of developing a new course before such a course becomes a regular part of the curriculum. Some of the Econophysics topics could, perhaps, be considered under this Special Topics Course. This will also help to independently gauge the perceived value of the said subject by the students.

## ***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 organisation of the teaching approach and pedagogical methodology in the Department is appropriate. Each module runs for a period of 13 weeks. Courses are usually delivered in the form of formal lectures, tutorials and laboratory exercises. Students spend approximately 30% of their time in the lab, with the remaining 70% attending lectures and tutorials. Attendance in formal lectures is optional, while it is at the discretion of the member of staff in the case of tutorial exercises. Attendance in laboratory exercises is mandatory. In our discussions with both teaching staff and students, moderate to high levels of attendance were reported in all aspects of module delivery. Students are encouraged to participate and indeed, the enthusiasm and positive relationship between staff members and the student body was clearly conveyed during the EEC's visit.

The Department consists of 12 permanent members of teaching staff, appropriately supported by contract-based, temporary staff. By and large, permanent staff focuses on the delivery of the theoretical aspects of modules, while temporary staff is responsible for the delivery of tutorials and laboratory exercises. Overall, the student/staff ratio, when considering permanent members of staff only, is high, however the support of temporary/visiting teaching staff significantly addresses this matter. The average teaching load for permanent and temporary staff is 13,1 and 7,98 hours/week, respectively. Permanent members of staff reported that in the immediate future, the number of temporary staff recruited will be significantly reduced as a result of the financial crisis affecting the country. This matter was also raised by the representatives of the students, who reported some issues in the orderly and effective running of the laboratory classes. The EEC is seriously concerned of the impact reductions in the financial support of the department will have on the quality of education delivered to its students especially if concomitant restructuring in terms of numbers of students admitted, and perhaps curriculum does not take place.

This needs to be urgently addressed by an evidence-based analysis of the overall load of staff in the Department versus its target student intake.

The EEC had the opportunity to visit selected teaching and research laboratories. It was observed that the state of teaching laboratory equipment varies significantly between laboratories. The state of some of the teaching laboratories of the Department is certainly an area that needs improvement. In particular, beyond the enthusiasm and commitment of the teaching staff, the equipment in the Laboratory of Interior Electrical Installations is outdated, and requires urgent upgrading so as to appropriately support student training with state-of-the-art equipment.

Moreover, the Digital Systems and Microcomputers Laboratory has obsolete equipment that

has to be updated immediately. If only a relatively small amount from the funds obtained this year from the State via the local authority (Περιφέρεια Ανατολικής Μακεδονίας) were used towards this end, the Department could have easily solved this problem. If it is possible, perhaps some re-budgeting can take place this year in order to serve this goal. Several other laboratories also need updating or are missing crucial components (e.g., the Electric Machines Laboratory seems to be missing a component for monitoring and machine diagnostics).

A systematic evaluation of each Laboratory within the Department should be carried out, considering the practical skills that the students need to acquire, in order to identify and prioritise areas of improvement in the Departmental planning. This would also feed into the launch of an enhanced range of practical and experimental graduation thesis topics. With respect to the latter, it has been observed that a large number of graduation thesis projects are disproportionately composed of scientific review and simulation components, lacking in the more practical (experimental, system building and testing) aspects of education and training. In our discussion with representatives of the students, the vast majority expressed enthusiastically the need to work on graduation thesis projects involving more practical skills. Indeed, the Department has recently been successful in a bid of approximately 2,5 million euro for the purchase of laboratory equipment; however, the vast majority of this equipment is advanced and will facilitate the development of research, rather than supporting the fundamental needs of undergraduate teaching laboratories. The EEC recommends that the Department develop a strategic plan to make use of all appropriate research equipment, which has been ordered or is to be ordered, in supporting undergraduate training, through laboratory exercises and graduation thesis projects. A further aspect of laboratory training is the development of key programming skills, which will enhance future student employability. Two such examples, which have been identified, are AUTOCAD and SCADA. It is recommended that the Department commence a self-evaluation exercise in order to identify the most relevant simulation packages, in each module (as applicable), so as to develop an action plan with specific deadlines, subject to budgetary constraints.

The IER course evaluation (p. 113-115) provided the following information about software use to support learning in specific courses:

- Technical Drawing with Computer: use of AUTOCAD is mentioned. However, the e-Class entry for ED136 Electrical Drawing course description has no evidence that AUTOCAD is used in the course.
- Power Electronics: EMTP-ATP is mentioned as the software package to be used. It seems that such software is more suitable for other courses and different systems. There are alternative software packages such as DIGSILENT, PLECS, PSCAD, which are more suitable for power electronics.
- System Modeling :No use of specific software. No evidence presented in e-Class.
- Electronics I and II: There is no mention of a software and there is no evidence that a software package is used to enhance learning and support analysis and design.
- Machines I and II: No mention of the use of software, and no evidence presented in e-Class.
- Electrical Circuits I and II: No mention of the use of software, and no evidence presented in e-Class.
- Electrical Motor Drives: EMTP-ATP is mentioned. It seems that such program is better suited to more power systems orientated work. A different software would be more suitable and more appropriate such as PLECS linking with MATLAB routines.

- Electrical Energy Systems I and II: No mention of the use of software, and no evidence presented in e-Class. No modern software is used to support short-circuit analysis, fault analysis, etc. An excellent package, for this purpose, would be DIGSILENT, supporting integration of renewable energy sources with the electricity grid and hence supporting Renewable Energy II. Other ones supporting faults and system analysis are Easypower and ETAP.
- Technology of High Voltage: No mention of the use of software, and no evidence presented in e-Class. EMTP-ATP maybe more suitable for this course to support system dynamics.
- The package HOMER is mentioned in other documents received by the EEC but the Department supplied no further evidence of how such a package is integrated within the curriculum.

The above list of courses is not exhaustive as one could also give other examples, where the use of software would raise the level of the student learning experience and would make the curriculum more up-to-date.

The current use of software in most courses is considered inadequate. Perhaps, additional software resources may already have been integrated, and more documentation may have been created to improve most of the undergraduate courses; however, no evidence to such effect was provided. The EEC requested evidence for software use through the documentation given to students for specific software and for specific courses, however to date no such information was received, and what has been supplied for two courses confirms the need for further improvement. The EEC recommends that more software be integrated within the undergraduate teaching and detailed high quality documentation be produced to support learning in most courses; taking such a step is imperative.

With respect to e-Class, the EEC observed that the material available for online access lacks some key information related to student learning. In particular, all courses currently taught should contain a clear description of the course aim and objectives, specifying the course prerequisites, and supported by a complete list of all learning units (including extensive keywords), with up-to-date links to lecture notes and presentations. It is recommended that the Department nominate an e-Class Coordinator who would act as a central point, thus ensuring Quality Control, with regards to the completeness and uniformity of the course information on e-Class.

With respect to more specific issues with the e-Class system, the EEC went through all courses and material currently available online. The main observation is that it is work in-progress, requiring immediate attention to raise both quality and completeness.

A number of courses, that seemed better organized than others, had no evidence that a 13-week lecture schedule was followed.

Of the courses listed on the e-Class system, a number of courses do not provide any information at all; for the ones that contain some information, this is limited to one or two lecturers only. There is a limited number of power point presentations, and there is limited evidence that the Department has finalized these courses with consistent, mature information and a well organized structure.

In a given course, for instance, some online material gave the impression that only 8 lectures were provided. Other courses had no evidence that a 13-week plan was followed. For the same courses, there was no weekly schedule available to assess how all 13 weeks were contributing to student learning.

It is vital that the information becomes available in PDF format, where possible, to avoid compatibility problems and improve quality. All documents should be controlled with

respect to the date they are written so that one can be confident about the currency of the information. Pages should all be numbered. Numerous documents the EEC has seen online have no page numbers at all.

The information is not presented in a coherent way. For instance, printing 6 slides in one page is not student friendly and creates issues with respect to the size of the letters and the clarity of figures, despite the fact that such printing reduces the printing costs. In many documents, the figures within the document have no captions and are not numbered properly. In most documents, the equations are not properly edited. Many figures in course notes and laboratory exercises are scanned in such low quality that is impossible to clearly see and follow and that limits student learning and satisfaction.

The department should provide guidelines to teaching staff with regards to the presentation of notes/slides to students, e.g., page numbering, quality of figures and equations, etc

It is important that the course description becomes a more detailed document that incorporates the weekly plan (currently a separate document) without specific dates so as to remain current until curriculum changes occur.

The laboratory regulations concerning health and safety, and rules of conduct must be given to all students for every laboratory in a well-documented way to avoid liability issues in the unlikely event of an accident.

The duration and frequency of the laboratory experiments are not consistent across all courses. For example, some courses specify only 5 experiments. However, there is no information as to the length or complexity of these experiments. It may be the case that some of the experiments require several weeks to complete. In other instances, it may be the case that only 5 lab sessions are necessary to cover the material of a particular course. In all cases, the lab experience must be accurately documented, and reflected in the credit units (ECTS), claimed for the course.

The EEC recommends that all the inconsistencies concerning course material, course outlines, e-Class content and structure, etc. as discussed above, be immediately addressed and rectified.

The Department uses a variety of means to evaluate student learning, depending on the nature of the component, i.e., theoretical or practical. The EEC had the opportunity to go through a variety of past exam papers and observed that the examination questions were primarily focusing on information recall, rather than supporting critical thinking through analysis and design. The member(s) of staff responsible for the course should be given regular instructions to ensure that exam questions are convincingly able to measure the success of meeting the learning outcomes of the course. The EEC recommends the development of good-practice procedures for setting and validating examination questions. Such procedures could for example require that the proposed examination questions for each course, be verified by another faculty member, not teaching the course, to ensure validity and completeness. These procedures should be well documented and be verifiable.

### IMPLEMENTATION

Please comment on:

- Quality of teaching procedures
- Quality and adequacy of teaching materials and resources.
- Quality of course material. Is it brought up to date?
- Linking of research with teaching
- Mobility of academic staff and students
- Evaluation by the students of (a) the teaching and (b) the course content and

### study material/resources

The EEC reviewed the available course material. The notes and books provided were of varying quality, some of them reflecting the state-of-the-art, while others requiring updating.

#### *Graduation Thesis*

The EEC looked through a number of final year graduation thesis reports. It was found that most of these reports lacked in terms of practical/experimental work.

The presentation of the material in the graduation thesis reports is of varying quality, lacking in essential aspects such as the appropriate editing of equations, quality of scanned figures and tables, and appropriate academic referencing and attribution. During the process of report sampling, the EEC noted that an instance was detected, where aspects of one report in 2011 (an entire chapter, in this case) were copied verbatim from a 2010 report, without suitable acknowledgement of the original source.

The overwhelming majority of projects are jointly carried by two students, resulting in the submission of a single graduation thesis. The practice of submitting a co-authored graduation thesis should be discontinued, as it does not support the evaluation of each student's contribution to the thesis work and learning objectives. For the majority of the cases, both members of the group were awarded identical marks. However for a small number of cases, the marks awarded were different. It was not clear though why this was the case and how such marking was arrived at.

The EEC requested copies of the descriptions of the graduation thesis topics, which were on offer in the current academic year. It was noted that these descriptions were lacking in detail, in terms of the overall aim and objectives of the work. The majority of the descriptions were limited to just the title of the project

The EEC has noted with pleasure that the Department has established and published clear guidelines of how a graduation thesis should be written and presented, including a template of the final document. However, as discussed earlier, the EEC has seen evidence of inappropriate use of material and absence of attribution.

The EEC therefore, strongly recommends that the established guidelines be enforced.

Further, the EEC recommends that the thesis topics be clearly described and include adequate detail of the objectives of the proposed topics so as to better determine the expected learning outcomes of the proposed project.

Based on the information presented to the EEC, it appears that in most courses the teaching material does not cover the latest R&D developments in the field.

#### *International Collaborations*

The Department lists a large number of international collaborations with a number of European institutions. This level of activity is commendable. However, the EEC noted that only two faculty members from the Department have taken advantage of this opportunity (one faculty has presented short courses in 11 instances and another one in 2 instances). The Department also hosted in 12 instances, 10 faculty members from sister institutions in the EU delivering short courses. Based on the provided documentation, it was not clear what was covered in the short courses nor was the duration and attendance of these short courses.

The EEC also noted that 10 students of the Department took advantage of student exchanges and worked on their graduation thesis projects at a variety of collaborating institutions in the EU. The EEC would like to encourage the further development of mobility programs and the increased participation to these programs by students of the Department.

#### *Course and Instructor Evaluations*

The courses offered by the Department and the instructors teaching these courses, have been evaluated by students in the past three years, using the form proposed by the HQAA. In most cases, a statistically good number of questionnaires were completed, providing feedback on

the various aspects of course delivery, preparation and overall learning objectives. However, the procedures for ensuring action is taken to resolve issues identified by the evaluation process, and whether such action resolves the identified problems, is not clear. It is recommended that the Department establish a teaching review committee, which will specifically look into issues related to student feedback and recommend suitable actions. The EEC noted with pleasure that during the interviews with the students, they were very complimentary regarding the level of technical knowledge, enthusiasm, availability and accessibility of members of teaching staff; this is highly commendable.

### 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 EEC did not have access to individual examination results, however inspection of the graduation statistics over the past 6 years demonstrated that there were no students who graduated with an overall grade in the range 8,5-10, while the percentage of students graduating with an overall grade in the range of 7,0-8,4 was 4.3%, on average. The average overall grade in the period between 2005-2011 varied in the range between 6,03-6,37. Teaching staff mentioned that there is an improvement in overall examination statistics over the past year or so, however it is not clear what specific procedures have been put in place to ensure good progression and graduation statistics. Poor examination results have been also raised in the discussions with students, who identified courses of concern. It is understood that a sizeable percentage of entering students do not have a suitable mathematical background and therefore find more theoretical subjects difficult to follow. The Department should consider the development of appropriate 'bridging' courses with the necessary mathematical skills, taught on a compulsory basis, to support such students, so as to improve their overall success. In terms of graduation time, the vast majority of students (50,6%) graduate in 6 years, while only 2,4% of the students graduate within the normal period of studies. Overall, the Department must become more proactive by putting in place robust procedures to analyse examination results and progression statistics so as to take rectifying actions, as appropriate, on an annual basis.

### IMPROVEMENT

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

The Department suggests a number of potential opportunities for improvement in its teaching activities. During the visit, two positive aspects were put forward as the main improvement directions, specifically the organisation of postgraduate studies and the provision of ISO certification for some of the Department's research laboratories.

The EEC feels that a detailed review of the undergraduate teaching activities should be carried out, along the lines highlighted in the items of this section, so as to identify and eliminate systemic deficiencies (e.g., teaching material provision, teaching laboratories upgrade, practical final year projects, examination statistics).

## **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?

One stated goal of the department is a thrust toward, and better synergy between education and research. This is indeed a correct, lofty and worthwhile goal and has the potential of increasing the impact of the Institute to its students and the communities it serves.

In regards to the research component of the Department's goal, the EEC observed that a commendable and significant level of initiative was recently demonstrated with the participation in and the subsequent award of a TEI wide proposal for equipment that could be used in both educational and research activities. In particular, the procured equipment includes a Transmission Electron Microscope (TEM), a magnetron sputtering machine, a system of testing and measurement equipment with remote monitoring and control capability as well as a fiber optical splicer and time domain reflectometer.

The EEC, however, notes that some of the equipment procured by the Department is for research that may not be commensurate or well matched with the established focus areas of the Department and is more suited to accommodate local industrial development needs. The choice of the TEM acquisition appears to have been influenced by the Department's collaboration with a single company. Additionally, no specific long term plan was presented to the EEC that outlines how and what kind of collaboration would be pursued with other institutions and/or industry to best take advantage of the new equipment. Equally absent were plans to create new and advanced laboratory exercises that the new equipment allows which could bolster student interest and prepare the ground for more advanced research. The latter is clearly an opportunity towards accomplishing the Department's stated goal mentioned above.

The EEC noted that the Department contemplates the acquisition of computational infrastructure to establish a node linked to CERN's computational Grid. Such a purchase could be proven expensive to maintain with unclear direct research benefits to the Department.

One of the standards used by the Department to assess research is the list of publications of its staff in peer reviewed journals. While this is a convenient and measurable criterion, it is not a good indicator of the quality and the impact of its research outputs. In fact, if the number of publications is over-emphasized at the expense of quality, publications become a distraction and may have undesirable consequences.

### 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 demonstrated keen initiative in reaching out to industry and other institutions inside and outside Greece. However, the EEC observes that these efforts did not appear focused to specific topics, appropriate with the size and background of its staff and the resources of the Department. As a result, the collaborations, the scientific publications and their impact are not reaching their full potential.

Some synergy in the research projects has to be pursued as it possesses multiplicative power and increases the efficiency of small Departments with limited staff and resources.

### RESULTS

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

The EEC notes that while the number of papers is acceptable, the publication venues are of limited audience and with performance criteria which, in turn, reduce the potential of impact to the community at large and may actually impede the development opportunities of the staff. In fact, it is noted that several of the publications by the staff are submitted to and accepted by the institute's own journal, the Journal of Engineering Science and Technology Review (JESTR). This carries the appearance of an easy publication route and further decreases the impact of the publications.

The TEI has a mandatory graduation thesis (πτυχιακή) requirement. This is a great opportunity to increase the research output of the Department. These graduation theses could be better used as a vehicle of conducting and introducing students to research. The EEC has noted that the nature of many of these theses was that of a review. Well planned thesis projects, in conjunction with some of the newly acquired equipment could provide students an opportunity to publish, if not to a reputable research journal, to trade magazines, appropriate for practical and valuable contributions. Additionally, an effort to publish graduation theses externally would reinforce to the students lessons learned in class such as publication accuracy, rigor, appropriate literature review and, equally importantly, suitable referencing of sources and prior work.

### IMPROVEMENT

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

The investment made by the state and local government development programs in new equipment for the institute is substantial. The far-reaching features and capabilities of this equipment, however, place increased gravity and importance in the much-needed planning

going forward. Said equipment carries substantial maintenance care and costs. A comprehensive plan is needed to fully exploit this equipment. It is the position of the EEC that the Department is at a very critical point of its evolution. If the aforementioned equipment is not taken advantage of and exploited in creating new laboratories and/or fostering research collaborations with universities and industry, the weight of the investment may have negative impact on the overall academic and financial health of the Department.

In an effort to improve the research outcome of the Department, the EEC makes the following recommendations:

1. to the government and the ministry of education
  - a. Issue a simple concise and clear mission statement and role for Universities and Technological Educational Institutions (TEI). This document should provide clear guidelines of what segments of the national and international educational and research needs are to be addressed by these two categories of institutions. Such document should be flexible enough to allow for the dynamics of the societal needs in education and research, and should be typically reviewed no more than once every 5 years.
2. to the TEI of Kavala
  - a. Request that individual Departments create, bi-annually review, and if needed, adjust their mission statements and cohesive plans of academic and research goals.
  - b. Refocus the JESTR journal activity. Convert JESTR into a Greek and, possibly, international, TEI focused journal, inviting articles for the educational and industrial segments that TEI serve. See further details at the end of Section D "All Other Activities".
  - c. Establish advisory boards, ultimately one for each department, which would consist of individuals representing the entire range of stakeholders, including business, university and other TEI. These advisory boards would meet once a year face to face for departmental reviews and recommendations and issue a brief report to the TEI president. Each departmental advisory board would have a chair. The chairs of all these departmental advisory boards would make up a TEI wide advisory board, which would also include the TEI president and the TEI department heads. This Institution-wide advisory board would also meet annually to review the TEI's objectives, accomplishments, direction and strategic investments in educational and research activities. Membership in these boards should be judiciously rotated so that no external member serves for more than 3 years in every 7 year period.
3. to the Department
  - a. Create a comprehensive, actionable and feasible plan to form productive collaborations with local and international businesses, universities and TEI that would take advantage of the TEM and some of the other recently acquired equipment.
  - b. Seek and establish relations that would provide for the cost sharing of the maintenance and possible upgrades of the TEM. A consortium may be a good vehicle for that, perhaps one that includes nearby Universities.
  - c. Create new laboratory experiments and exercises that incorporate the new equipment. Some of the equipment can be easily used for dual purposes, i.e., educational and research, and that plays well with the department's goal of a better synergy between education and research. As an example, the EEC

envisages a set of individual labs, all revolving around the advanced measurement systems with remote monitoring and control capabilities. Many student graduation thesis projects could also be designed resulting in practical and impactful graduation theses with the potential of external publications and further TEI recognition.

- d. Establish a Departmental advisory board as mentioned in the recommendations to the TEI (see above). Ensure that Departmental decisions and planning is made with full and critical consultation of the advisory board.

The EEC is sensitive to the negative impact of bureaucracy and, despite unexamined appearances, the recommendations above do not intend to increase bureaucracy. Rather, the EEC applauds some of the initiative and entrepreneurial spirit that some staff have demonstrated. Making creative quick decisions is to be commended. The EEC, however, feels that the risk of large investments being underutilized and underexploited by the TEI of Kavala is high. Therefore, the EEC strongly urges that its recommendations be addressed by the TEI and the Department in order to maximize and realize the full potential of the research output, quality and impact.

## ***D. All Other Services***

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

### APPROACH

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

The Department is very actively trying to fulfil its role as a higher education institution by providing a variety of services to its students and teaching staff, to local industry and authorities, and the community as a whole.

Regarding services to students, the Department has a centralized administration office and uses an electronic system to facilitate the management of student records. The electronic system functions adequately and appears to sufficiently serve the needs of the student population. Specifically, the EEC did not hear any complaints about the electronic system (by either the members of staff, or the Departmental faculty, or the students) even when it specifically asked people to comment on it. The Department uses an electronic system (e-Class) to manage course material online. Overall, students appear to be quite satisfied with the system though several courses (as well as several laboratory courses) have not made their material fully available online.

The Department and the Institution have adopted the state procedures for promotion and hiring of academic personnel. These processes are followed each semester when the Department has to hire a high number of temporary teaching personnel. The bi-annual process of hiring temporary teaching personnel is certainly a big overhead for the Department and the Institution: apart from the long process and the bureaucracy involved, the constant uncertainty about the availability, capability and expertise of temporary teaching personnel creates many organizational difficulties. Part of the problem here needs to be addressed outside the Department and Institution (namely, the Ministry of Education).

The Department does not seem to have a policy that is geared towards increasing the student presence on campus. The overall attitude is that student attendance is adequate even in theory courses, where attendance is not required. It was difficult for the EEC to assess student participation in theory classes (where attendance is not compulsory) because the number of registered students is typically higher than the number of students that actually intend to take a course. Nevertheless, if one compares the number of students taking the final exam of a theory course against the number of students regularly attending the course, the ratio appears to be 2:1 (in some cases even lower). The Department should address this issue and devise a plan to increase student attendance in theory courses.

The student cafeteria program and student organization activities can certainly be used to attract students to the campus.

Regarding facilities, the EEC observed that several students and staff smoked in areas that

were closed and in the proximity of teaching and research laboratories. As a result, not only odour, but also some dust could be detected. It is recommended that the institution strongly enforce the rules of no smoking and instil in students and staff the need for cleanness as a prerequisite to a good educational and research experience. Some of the newly acquired equipment is too sensitive and expensive to operate in environments where people do not take the effects of smoke in the air seriously.

The building where the majority of the meetings between the EEC and the Department were held had no bathrooms. A nearby bathroom was available just outside. However, said bathroom facility was not clearly designated for men or women.

#### 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 counselling, athletic- cultural activity etc.).

The Department has a centralized office staffed with two secretaries whose primary role is to serve the needs of the student population. This office regularly receives help from one or two training students from another Department of the Institution. This arrangement seems to be functioning in a satisfactory manner for both the staff and the students. It is worth pointing out that the two secretaries in this office also handle administrative matters having to do with main Departmental functions (e.g., minutes of meetings, decisions for promotions, etc.) but are not charged with serving individual faculty needs. Regarding the handling of financial issues (e.g., with regards to research funding, purchase of equipment, etc.), a separate Research Office (Επιτροπή Ερευνών) in the Institution provides assistance. This is certainly very helpful and the Institution should be commended for maintaining such an office despite many financial difficulties.

Free wireless Internet is available for faculty and students in the buildings of the Department (e.g., the laboratories). Several of the labs also have PCs that the students could use, but it is unclear whether these PCs are available for student use outside laboratory hours. There is a computer room but the EEC did not enter it because it was locked. From pictures provided afterwards to the EEC via email, the computer room seems to be well equipped. The EEC did not visit the library of the Institute but, from the discussions with faculty and staff, it got the impression that it offers adequate service. The EEC passed by athletic facilities but did not visit them explicitly; they appear to be functioning and are in frequent use by the students.

#### RESULTS

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

Overall, the administrative and other services of the Department appear to be functional. Many of the services are electronic, which makes the process very efficient for both the students and the administrative personnel. The Department appears to be satisfied with the state of affairs regarding administration, however, more effort and financial resources should be directed towards updating the instructional laboratories.

### IMPROVEMENTS

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

The Department understands the financial limitations and is quite happy with the level of administration service that is provided by the two secretaries and the one or two trainees that staff the Department's administration office.

It might be useful for the Department to offer a shared office (or shared offices) to its large number of temporary teaching personnel. This will enable them to spend more time in the Department, potentially increasing their interaction with permanent faculty and fostering research interaction. It would also increase the availability of temporary teaching personnel to students.

As a final remark, one should point out that the restaurant facilities at the institution were very nice, clean and well maintained. However, the restrooms need modernizing and need to be better kept and maintained.

### **Collaboration with social, cultural and production organizations**

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

The Department is very active in terms of interaction with local industry and authorities, as well as the community as a whole. The Department also collaborates with a number of professional organizations and institutions, in both the state and private sectors; these organizations serve as employers for the students during their mandatory six-month practical work experience. The requirement of students to have a practical work experience prior to graduation (mandatory for all Technological Educational Institutions in Greece) offers a significant advantage to graduating students and can be used to provide mutual benefits to the Department/Institution and the collaborating organizations. The Department needs to build more systematic ways of collaborating with these organizations, in order to have a steady flow of students hosted at their premises for practical experience. For instance, it appears that governmental organizations (like ΔΕΗ) are not as accommodating to accepting student trainees as in the past, and it would be beneficial for the Department to find ways to interact with them in a more fluent manner. Also, even though the Department has a very good relationship with the Prisma company, it appears that there are no plans in place for a steady inflow of trainees to this company. The Department appears to have discussions for placing trainees (15 each year, which appears rather high) to CERN. This is certainly a worthwhile effort but it is still in its early stages.

The Department has shown efforts to involve local community in its activities. For example, the Department held (together with Prisma) two events, one in Kavala and one in Alexandroupoli, where CERN activities were presented. Both of these events were well attended by the public and were deemed successful. Such activity is certainly desirable and

the Department should be commended about it. More efforts should be placed in outreach activities to bring the Department closer to local high school students.

The Department has engaged in the organization of conferences such as the International Conference on EconoPhysics (ICE) which was held in its premises in 2011. This is a good effort that brings international visibility to the Department and the Institution as a whole, as well as inspires students (though it was felt that the topic is not aligned with the mainstream activities of an Electrical Technologist).

Finally, the Department has also engaged in the publication of a scientific journal, the *Journal of Engineering Science and Technology Review* (JESTR). JESTR is four years old and is the only English scientific journal published in Greece. This effort is certainly interesting. However, one needs to be careful in order to ensure high standards that would make the journal successful and not simply one of a large number of publications that the scientific community does not pay attention to. If not treated properly, JESTR could be a distraction, rather than an asset to the TEI. It already has attracted many publications by staff of the TEI of Kavala and that risks the appearance that staff writes articles to fill its pages. Instead, JESTR could act as a catalyst to guide the TEI of Kavala towards the goal of being the top TEI in Greece in the area of disseminating technological information for all TEI students and practitioners of the technological arts. To this end, the EEC proposes that the following recommendation be strongly considered:

Refocus JESTR. Give it the mission of disseminating technological information for the students and graduates of TEI in Greece and, perhaps, internationally. As such, it could focus in publications, which include reviews, lessons learned, practical measurement approaches, good practices, applied research, etc. The EEC believes that such a journal is needed and would better serve the needs of practitioners of the technological fields. The new JESTR should reject publications of "half-baked" research articles that many institutions worldwide try to publish in an effort to increase the volume of their publication output without materially helping either the state of the art or the students, graduates and industry that the TEI serves.

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

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

Please, comment on the Department's:

- Potential inhibiting factors at State, Institutional and Departmental level, and proposals on ways to overcome them.
- Short-, medium- and long-term goals.
- Plan and actions for improvement by the Department/Academic Unit
- Long-term actions proposed by the Department.

There are many factors that inhibit the optimal operation of the Department, and many of them are beyond the immediate control of the Department. The EEC felt that the Department should continue to take advantage of the opportunities (e.g., with research programs and with collaboration with industry) and maintain an inspiring environment,

where younger staff can contribute towards research within the Department. There is also significant hope that the new law on Higher Education might alleviate some of the existing problems.

The ECC would have liked to see a more detailed description of what the Department aims to do in the next five years. In particular, there seems to be a lack of a hiring strategy and a clear vision as to the areas (directions) in which the teaching and research efforts of the Department will focus on. For instance, the ECC would have liked to see a strategy (adopted by all the members of the Department) about how faculty that will retire over the next few years will be replaced and how visiting faculty will be selected (e.g., the areas that the Department will focus in). Similarly, even though certain faculty members have been active in promoting particular research directions, a cohesive strategy for the Department to follow appears to be lacking.

The Strategic Plan (ΣΤΡΑΤΗΓΙΚΗ ΑΚΑΔΗΜΑΪΚΗΣ ΑΝΑΠΤΥΞΗΣ) that the Department submitted to the EEC, includes a number of sections and addresses issues such as growth, infrastructure, postgraduate programs, research activity, and links to industry and governmental organizations. However, it fails to outline specific ways to address certain problems as well as methods to measure the outcomes of this effort. In particular, the EEC would like to point out the following:

- There should be a clearly defined and realistic vision for the Department (e.g. becoming Greece's top ranked TEI in Electrical Technology ).
- The research plan lacks clear direction and a systematic strategy needs to be articulated, in a way that involves as many members of the Department as possible. For example, what are the main/key areas of the Department and which people are involved? In this regard, it would help to organize the Department in terms of research areas and assign a director for each area. Perhaps one should set clear/tangible/measurable research goals as well in order to be able to better assess the progress towards this goal.
- The infrastructure of the Department needs improvement and there has to be a systematic plan for equipment upgrades. In addition, a systematic approach for incorporating the latest technological developments into the curriculum (and keeping laboratory equipment up to date) needs to be devised.
- There should be an in depth discussion and specified goals about academic needs and future research directions for the Department. In particular, the analysis of research areas and expertise required for growth (timelines, etc.) needs to be carefully developed by the Department. This is imperative since many academic staff members are close to retirement.
- It would be useful for the Department to systematically pursue interactions with industry through seminars (in a way that allows students and industry to better interact and plan for the practical aspects of the student studies).
- The Department should continue to get involved in conference or workshop organisation. In particular, the Department should focus its efforts into attracting industrial participation and not only research organizations.

#### 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 Department has evolved since its inception many years ago and transitioned from KATEE to TEI.

The Department offers a solid program in Electrical Engineering Technology (Ηλεκτρολογία) with a good number of students that have increased recently.

Its graduates have found employment and the evidence shows that their knowledge and skills are appreciated by employers.

The faculty is a cohesive group and are committed to their research activities. There is good rapport with local industry, and there is at least one example of close industrial collaboration.

The Department and the Institution are aggressively seeking improvements primarily in issues related to research. The Department and the Institution through the Acting director, the Vice President Academic and the President of the Institution did present research as one of their primary goals.

However, the EEC found that there may be issues associated with the goals set forth and their implementation.

The EEC finds that a number of the actions associated with the goals set forth are of high risk and rely heavily on a single individual or a limited number of individuals. Should this individual(s) depart, the associated action will be difficult to continue. This is particularly true for the proposed graduate program in econophysics and the acquisition of expensive, unique and highly specialized research infrastructure (e.g., TEM).

As previously mentioned, the department opted to acquire expensive, unique and highly specialized research infrastructure. There is no evidence of a cost/benefit analysis in deciding on this acquisition. As a result, some of the teaching infrastructure was not renewed and some of the labs operate with equipment that is out of date. There is also no plan of how to fully utilize and maintain this expensive infrastructure during its useful life.

The uniqueness of this infrastructure provides the Department with a unique opportunity to contribute to the research activities of the region. It would be ideal if this infrastructure became the nucleus of a self-supported and self-governed entity that included and supported the research activities of a wide group of researchers in the region. Such an entity could support both academic and industrial research activities of all Academic Institutions in Northern Greece.

The research activities of some of the faculty members of the Department are heavily weighted toward quantity to the detriment of quality. A large number of publications appear

in journals that are not of high impact or wide recognition by the scientific community.

Some of these efforts may stem from the fact that the mission of TEI as an academic institution is not well defined in the country. The EEC heard on numerous occasions that the goal of the TEI Kavala is to become a University and that as an institution they should be allowed to award doctoral degrees.

The EEC is of the opinion that TEI as institutions of higher learning have a critical role to play in educating and training people in technology and applied research. The EEC feels strongly that the Greek State must clarify the distinct roles of Universities and TEI and ensure that the professional rights (επαγγελματικά δικαιώματα) of the graduates of both Universities and TEI are better clarified and updated. This was evident from the EEC's interaction with students that the latter was one of the biggest concerns of the student population.

Members of the EEC feel privileged to have had the opportunity to offer their heart felt and sincere opinions in the hopes that the implementation of their recommendations will benefit the Electrical Engineering Department of the TEI Kavala, its student body, its staff and the communities they serve.

## **APPENDIX**

### *Summary of Recommendations*

#### **A. Curriculum**

1. The EEC recommends that prerequisites for all courses, if applicable, are defined
2. The EEC feels that the introductory course in Informatics (Πληροφορική) is not an academic course and does not have a place in an academic curriculum. The EEC is of the opinion that some of the subjects presented there (i.e., the use of Access, Powerpoint, Excel and Word) could be covered by seminars or in a course that supports professional skills such as oral and written communication skills, ethics, entrepreneurship, innovation, project management, etc.
3. The EEC feels that the course in Electromagnetic Theory offered in the second semester of the first year of studies, is perhaps placed too early in the curriculum and as such, the students may have difficulty in absorbing its material.
4. The EEC is of the opinion that the microprocessor (MC68000) used in the labs of the microprocessor course is quite dated and does not correspond to the current state of the art in processor design. Although the basic principles could be taught using such a dated component, it does not provide the students with the opportunity to be exposed to issues such as peripherals that are beyond simple UARTs, the impact of large address spaces, current bus structures, etc.
5. Safety issues are covered in the fifth-semester course “Legislation and Work Safety”. However, this course is optional and hence not all students would attempt it. It is the opinion of the EEC that this course should become mandatory as safety is a critical issue of the work environment.
6. The EEC could not identify a course where current electrical standards are presented. These are necessary topics and are normally included in any modern engineering/technology curriculum.
7. The EEC felt that the recently introduced course on Programmable Logic Controllers (PLC) should be made mandatory rather than being elective as it currently is. PLCs are widespread in industry and a desirable skill by the graduates. This opinion was expressed by the students during their meeting with the EEC.
8. The course on Philosophy of Science perhaps is not well received by the students. The opinion of the EEC is that it should be either redesigned or eliminated from the curriculum.
9. The Graduation Thesis is an excellent mechanism through which a student may integrate the knowledge he/she has attained over his/her studies. However, the present implementation of the graduation thesis needs some streamlining and improvements regarding the focus of the topics proposed and the administration of the process of dividing the work between the students, and reporting the results. More details are discussed in sections B and C below.
10. While Econophysics is presently pursued as a research topic by several groups internationally, the EEC is of the opinion that this area has not matured yet and as such, it is not an appropriate topic for a Masters degree program
11. The EEC would like to suggest that the Department should attempt to offer some graduation thesis topics (Πτυχιακές Εργασίες) in Econophysics, monitor the graduates as to their absorption in appropriate industries, and revisit the program proposal once the Department has gained appropriate experience including prospective students, target industries and appropriate mix of courses
12. The EEC considers that a graduate program in *Innovation in Technology and Entrepreneurship* could be very desirable. The proposed program although it provides adequate coverage of the management and entrepreneurship courses, the courses pertaining to technology cover a very wide area and by necessity, they cannot

have the required depth. It is the opinion of the EEC that this part should be organized in thematic groups, and that students should concentrate their studies in one of the thematic groups with perhaps a minor in a different thematic group

13. It would be optimum, if the proposed Master programs were purely course-based rather than thesis-based as they are currently proposed.
14. It is now an opportune moment to re-assess the organization of the curriculum seeking input from the industry in this process. It is also an opportune moment to establish a formal Curriculum Committee structure that will be active continuously, will take ownership of the curriculum and establish procedures and mechanisms for its revision and improvement.
15. It is recommended that the Department consider the introduction of a Special Topics Course. Such a course could be offered opportunistically and cover state of the art topics especially by instructors who happen to be visiting or by instructors who would like to test the feasibility of developing a new course before such a course becomes a regular part of the curriculum.

## **B. Teaching**

1. The EEC recommends an urgent upgrade/replacement of the equipment in the Laboratory of Interior Electrical Installations and the Laboratory of Digital Systems and Microcomputers
2. The EEC recommends that a systematic evaluation of each Laboratory within the Department be carried out, considering the practical skills that the students need to acquire, in order to identify and prioritise areas of improvement in the Departmental planning
3. The EEC recommends that the Department develop a strategic plan to make use of all appropriate research equipment, which has been ordered or is to be ordered, in supporting undergraduate training, through laboratory exercises and graduation thesis projects.
4. The EEC recommends that the Department commence a self-evaluation exercise in order to identify the most relevant simulation packages, in each module (as applicable), so as to develop an action plan with specific deadlines, subject to budgetary constraints.
5. The EEC recommends that more software be integrated with the undergraduate teaching and detailed high quality documentation is generated to support learning in most courses that such step is imperative.
6. The EEC recommends that the Department nominate an e-Class Coordinator who would act as a central point, thus ensuring Quality Control, with regards to the completeness and uniformity of the course information on e-Class.
7. The EEC recommends that all the inconsistencies concerning course material, course outlines, e-Class content and structure, etc. as discussed section B, be immediately addressed and rectified
8. The EEC recommends the development of good-practise procedures of deriving and validating examination questions. Such procedures should require that proposed examination questions for each course, be verified by another faculty member, not teaching the course, to ensure validity and completeness.. These procedures should be well documented and verifiable.
9. The EEC recommends that the practice of submitting a co-authored graduation thesis should be discontinued, as it does not support the evaluation of each student's contribution to the thesis work and learning objectives
10. The EEC recommends that the established and published clear guidelines of how a graduation thesis should be written and presented be enforced since the EEC has seen evidence of inappropriate use of material and absence of attribution.

11. The EEC recommends that the thesis topics be clearly described and include adequate detail of the objectives of the proposed topics so as to better determine the expected learning outcomes of the proposed project.
12. The EEC recommends that the Department establish a teaching review committee, which will specifically look into issues related to student feedback and informing module content with current research practises
13. The EEC recommends that the Department consider the development of appropriate 'bridging' courses with the necessary mathematical skills, taught on a compulsory basis, to support students who lack the necessary mathematical skills, so as to improve their overall success.
14. The EEC recommends that the Department become more proactive by putting in place robust procedures to analyse examination results and progression statistics so as to take rectifying actions, as appropriate, on an annual basis.
15. The EEC feels that a detailed review of the undergraduate teaching activities should be carried out, along the recommendations listed above, so as to identify and eliminate systemic deficiencies (e.g., teaching material provision, teaching laboratories upgrade, practical final year projects, examination statistics)

## ***C Research***

1. The EEC makes the following recommendations
  - a. to the government and the ministry of education
    - i. Issue a simple concise and clear mission statement and role for the Universities and the Technological Educational Institutions (TEI). This document should provide guidelines of what segments of the national and international educational and research needs are to be addressed by these two categories of institutions. Such document should be flexible enough to allow for the dynamics of the societal needs in education and research, and should be typically reviewed no more frequently than every 5 years
  - b. to the Kavala TEI
    - i. Request that individual Departments create and bi-annually review and, if needed, adjust their mission statements and cohesive plans of academic and research goals.
    - ii. Refocus the JESTR journal activity. Convert JESTR into a Greek and, possibly, international, TEI focused journal, inviting articles for the educational and industrial segments that TEI serve. See further details at the end of Section D "All Other Activities".
    - iii. Establish advisory boards, ultimately one for each department, which would consist of individuals representing business, university and other TEI. These advisory boards would meet once a year face to face for departmental reviews and recommendations and issue a brief report to the TEI president. Each departmental advisory board would have a chair. The chairs of all these departmental advisory boards would make up a TEI wide advisory board which would also include the TEI president and the TEI department heads. This advisory board would also meet annually to review TEI's objectives, accomplishments, direction and strategic investments in educational and research activities. Membership in these boards should be judiciously rotated so that no external member serves for more than 3 years in every 7 year period.
  - c. to the Department

- i. Create a comprehensive, actionable and feasible plan to form productive collaborations with local and international businesses, universities and TEI that would take advantage of the TEM and some of the other recently acquired equipment.
- ii. Seek and establish relations that would provide for the cost sharing of the maintenance and possible upgrades of the TEM. A consortium may be a good vehicle for that, perhaps one that includes nearby Universities.
- iii. Create new laboratory experiments and exercises that incorporate the new equipment. Some of the equipment can be easily used for dual purposes, i.e. educational and research, and that plays well with the department's goal of a better synergy between education and research. As an example, the EEC envisions a set of individual labs, all evolving around the advanced measurement systems with remote monitoring and control capability. Many student graduation thesis projects could also be designed resulting in practical and impactful graduation theses with the potential of external publications and further TEI recognition.
- iv. Establish a Department advisory board as mentioned in the recommendations to TEI (above). Ensure that Departmental decisions and planning is made with full and critical consultation of the advisory board.

#### ***D. All other Services***

1. The problem of hiring many temporary teaching staff needs to be addressed outside the Department and Institution (namely, the Ministry).
2. It is recommended that the institution strongly enforce the rules of smoking and instil in students and staff the need for cleanness as a prerequisite to a good educational and research experience.
3. It might be useful for the Department to offer a shared office (or shared offices) to its large number of temporary teaching personnel. This will enable them to spend more time in the Department, potentially increasing their interaction with permanent faculty and fostering research interaction. It would also increase the availability of temporary teaching personnel to students
4. Refocus JESTR. Give it the mission of disseminating technological information for the students and graduates of TEI in Greece and, perhaps, internationally. As such it should consist of articles that could include reviews, lessons learned, practical measurement approaches, good practices, applied research, etc. The EEC believes that such a journal is needed and would better serve the practitioners of the technological fields. The new JESTR should reject publications of "half-baked" research articles that many institutions worldwide try to publish in an effort to increase the number of their publication output without materially helping neither the state of the art nor the students, graduates and industry that the TEI serves.

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

1. There should be a clearly defined and realistic vision for the Department (e.g. becoming Greece's top ranked TEI in Electrotechnology).
2. The research plan lacks clear direction and a systematic strategy needs to be articulated, in a way that involves as many members of the Department as possible. For example, what are the main/key areas of the Department and which people are involved? In this regard, it would help to organize the

Department in terms of research areas and assign a director for each area. Perhaps one should set clear/tangible/measurable research goals as well in order to be able to better assess the progress towards this goal.

3. The infrastructure of the Department needs improvement and there has to be a systematic plan for equipment upgrades. In addition, a systematic approach for incorporating the latest technological developments into the curriculum (and keeping laboratory equipment up to date) needs to be devised.
4. There should be an in depth discussion and goals about academic needs and future research directions for the Department. In particular, the analysis of research areas and expertise required for growth (timelines, etc.) needs to be carefully developed by the Department. This is imperative since many academic staff members are close to retirement.
5. It would be useful for the Department to systematically pursue industry interaction through seminars (in a way that allows students and industry to better interact and plan for the practical aspect of the student studies).
6. The Department should continue to get involved in conference or workshop organisation. In particular, the Department should focus its efforts into attracting industrial participation and not only research organization

The Members of the Committee

**TECHNOLOGICAL EDUCATIONAL  
INSTITUTE OF KAVALA  
DEPARTMENT OF ELECTRICAL  
ENGINEERING**

Name and Surname

Signature

**Prof. Nikitas Dimopoulos**

University of Victoria, Greater Victoria, British Columbia, Canada

**Prof. Vassilios Agelidis**

The University of New South Wales, Sydney, Australia

**Dr. Nick Buris**

Institute of Electrical and Electronics Engineers (IEEE), New York, U.S.A.

**Prof. Christoforos Chadjicostis**

University of Cyprus, Nicosia, Cyprus

**Prof. Panos Liatsis**

City University London, London, United Kingdom