ΕΛΛΗΝΙΚΗ ΔΗΜΟΚΡΑΤΙΑ

## Α.ΔΙ.Π.

ΑΡΧΗ ΔΙΑΣΦΑΛΙΣΗΣ ΚΑΙ
ΠΙΣΤΟΠΟΙΗΣΗΣ ΤΗΣ ΠΟΙΟΤΗΤΑΣ
ΣΤΗΝ ΑΝΩΤΑΤΗ ΕΚΠΑΙΔΕΥΣΗ

HELLENIC REPUBLIC

## H.Q.A.

HELLENIC QUALITY ASSURANCE AND
ACCREDITATION AGENCY

# EXTERNAL EVALUATION REPORT

## DEPARTMENT OF ELECTRICAL ENGINEERING

## TEI OF CENTRAL GREECE AT XALKIDA

Version 2.0
February 2014

OPERATIONAL PROGRAMME
EDUCATION AND LIFELONG LEARNING
*investing in knowledge society*
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**External Evaluation Committee**

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

1. Professor George K STYLIOS _____(President)
   (Title)         (Name and Surname)

   Heriot Watt University, UK_____
   (Institution of origin)


2. Dr Panos Bakalis_____
   (Title)         (Name and Surname)

   University of Greenwich, London, UK_____
   (Institution of origin)

3. Dr Spyros Skarvelis-Kazakos_____
   (Title)         (Name and Surname)

   University of Greenwich, London, UK _____
   (Institution of origin)


4. Dr Kostantinos Kopsidas_____
   (Title)         (Name and Surname)

   The University of Manchester, UK_____
   (Institution of origin)


5. Professor Panagiota Morfouli_____
   (Title)         (Name and Surname)

   Institut Polytechnique de Grenoble, Grenoble, France_____
   (Institution of origin)

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

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

## *Introduction*

### I.   The External Evaluation Procedure

The External Evaluation Committee (EEC) met from the 17th of December to the 19th of December 2013 to conduct the external assessment of the Department of Electrical Engineering of the Technological Educational Institute (TEI) of Xalkida, Greece, referred to as "Department" and "Institution" respectively in this report.

The EEC was briefed by the Hellenic Quality Assurance Agency (HQAA) in the morning of the 17th of December 2013. Later, on the same day, the EEC visited the campus of the Institution under evaluation where they had a short meeting with the Head of the Department and other senior staff of the Institution. A meeting with the President and vice president of the TEI was made on the 17th December. The 17th and 18th of December were spent with specific visits to facilities and discussions with staff and students, on the 19th of December 2013 and prior to the departure from the Institution, a preliminary presentation of the findings was given to a group of delegates of the Department, the Head of the Department and the OMEA committee.

The visit to the Institution involved meetings with the following executive and academic faculty members of the Institution:

- President Prof K Anastasiou
- Head of the Local Quality Assurance Committee and Vice-Presidents
- Head of the Department Prof S Voliotis
- Members of academic staff of the Department who were also responsible for the internal assessment report (OMEA); S. Voliotis, C. Manasis, D. Bargiotas
- Members of permanent academic staff
- Non-permanent academic staff
- Lab assistants
- Technical support staff
- Students (from different year of study)
- Administration staff

Prior to arrival at the institution the HQAA provided, in electronic form to the EEC the following documents:

- the 2009-2010 internal evaluation report prepared under HQAA rules
- an updated supplementary version of the internal evaluation report of the period 2012-2013
- the programme of undergraduate studies
- a detailed list of publications of the academic staff of the Department

- the questionnaire used for the evaluation of modules by the students
- the template used for reporting the academic activities of staff members
- the template used by the academic staff for module description

During the visit to the Institution the EEC was also given or demanded copies of:
- the programme of undergraduate studies
- the guide for industrial placements
- samples of exam papers and coursework briefs
- samples of exam and coursework scripts, and dissertations
- samples of module grades including coursework, exams and dissertations
- samples of textbooks and other learning resources (e.g., lecture notes)
- the course syllabus and specifications

The EEC was given an especially prepared for the evaluation folder which contains: (1) the presentations given to the EEC by the Departmental members.

The EEC visited the following facilities of the Institution:
- lecture theatres / rooms
- the conference centre
- undergraduate and research student laboratories
- academic staff and administration offices
- the library
- the secretariat
- hall of residence
- student and staff refectories and
- the sport facilities (the gym)

The EEC is aware that some remarks/suggestions contained in this report may not meet the existing institutional and legal framework of Greece, but are consistent with the policy of their own institutions and that of the EU.

II. The Internal Evaluation Procedure

The Internal Evaluation procedure was followed by the Department in accordance with the HQAA directive. The appropriate template was used and all members of the academic staff were involved for the preparation of internal assessment report.

According to the report, the sources used were taken from:
- the departmental archive
- reports related to programmes of undergraduate studies and instructional / teaching evaluation
- data collected from the questionnaire for module evaluation, module description and academic activity reporting
- departmental general meetings
- archive of student grades

Module evaluation obtained from students was low and the EEC encourages the Department

to think how to increase it and to consider student involvement in both the questionnaire design and in data analysis and feed- back. Furthermore, it recommends to the Department to communicate to students more effectively the module evaluation procedures and its purpose.

The EEC members were given access to the internal assessment report which was found to lack clear strategy or future plans and actions dealing with the weak points identified in the internal evaluation. Specific comments on these issues follow in the corresponding sections of this external evaluation report.

The EEC feels that aspects of the internal evaluation report were partially met: Important steps dealing with quality in teaching and curriculum have been attempted through the module evaluation by students and module description by the academic staff, but the participation and the implementation were poor. A more critical consideration of some of the assessment report points is needed for helping the Department to improve in curriculum, teaching and research. Concerning research the Department needs to define a clear strategy and show how they will improve the research output and impact. While the research achievement on some individual level is high, the research strategy at Departmental level is poor. Moreover, significant research achievements are poorly presented and promoted outside the Department.

One of the most important aspects, however, is that all Departmental staff members welcome and accept that the evaluation process is an opportunity to gain external feedback for improving the Department, its students and the institution.

ACKNOWLEDGEMENTS

The EEC would like to thank the HQAA which has been very effective in organising our visit and providing all necessary papers, and for being very helpful and accessible for advice and guidance throughout our evaluation process.

## A. Curriculum

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

APPROACH

The department focuses in two specialised fields :

1. Energy and Metrology and

2. Electronics, Control Systems and Informatics

The new curriculum was developed based on careful planning and taking into account the desired graduate profile, along with the individual expertise of staff. Clear learning outcomes have been defined for the programme of study and these seem to be supported by the curriculum and the specialisations. It was mentioned that the academics made use of experience from the industry as well as other institutions abroad. They mentioned that they consulted curricula from other Universities, when deciding on the development of their own curriculum. Specific examples of influence on curriculum development are: Athens Technical University (EMP), University of Patras, McGill University, University of Minnesota, University Polytechnic of Madrid (UPM) and University of Rome.

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An inquiry was made with regards to the procedures for deciding the curriculum, and the committee was informed that this was done through a General Meeting of the Department, which involved the students themselves, through student representatives.

It was explained to the committee that the department has set the goal of converging its focus on Smart Grids, Renewable Energy and Distributed Generation/microgrids, through the two specialisations. Implementation is planned through the allocation of final year projects in these subject areas. These are very relevant areas in current industry and it is important that the graduates are knowledge able in such concepts. Through a brief sampling and examination of the lecturing materials, e.g. for the course on Renewable Energy Sources, the structure was found to be sound and in accordance with current developments. Samples of final year projects were also examined and found to focus on such important topics.

Although the curriculum and learning outcomes set the target of converging to Smart Grids, and are strongly supported by the academic staff during the visit, it was found that the actual course specification needs to be slightly amended to include this focus. As an example, the topic of microgrids was not included in the Power Systems course specification. The course tutor explained that this is included in the lectures, but a more explicit statement in the specification documentation would be necessary.

The committee was informed that the Department is following the legislative framework for reviewing the curriculum, as mentioned in the internal review document. The committee believes that the Department should adhere to the framework but not be limited by it, i.e. making further frequent attempts to review the curriculum continuously, to ensure that it is following current developments.

Overall, there seems to be a structured approach to curriculum design, which is very positive and the committee supports the continuation of this effort with further reviews. However, some additional work should be done in explicitly breaking down and clarifying the steps necessary to achieve the Department's goals, with more planning, outcomes and milestones than intuition.

IMPLEMENTATION

It was explained that the Department follows the "common practice" that the students are required to register for all courses that they have not completed successfully in previous semesters and at that if they have not reached the maximum course hours allowance (32 h/week), they are allowed to register for additional courses from later semesters.

The curriculum also includes "chain courses", where the students are not allowed to register for specific courses unless they complete specific pre-requisites. This is positive since it prevents students from carrying forward courses without understanding and background knowledge.

The above two points form a good practice which ensures that the students do not carry trailing courses throughout the years. However, a student may still be allowed to carry a specific course which is not necessarily linked to other courses. Hence, it is recommended that this practice should ensure the sequential development of the student's knowledge.

It was mentioned that the Department is in close liaison with the industry as well as with overseas institutions, observing teaching practices and equipment, for implementation of the curriculum in accordance with international standards on the subject area. This practice can be further improved if the Department carefully justifies the selection of institutions that the curriculum is compared with, and it is suggested to also use structured questionnaires to its stakeholders.

The curriculum seems to have a fairly clear structure with a mixture of theoretical and practical/experimental work. However, the structure of the specific course specifications should be further clarified and more importantly, the linking of specific courses to the overall goal should be clearly stated. The course material seems to be appropriate, as well as the lecture content and delivery. The total workload (including self-study) is estimated at 50 hours per week, which is slightly heavy, but not excessive. The concept of self-learning/problem solving was discussed in relation to over-teaching.

The Department does not offer courses in languages other than Greek, which prevents foreign students to be attracted to e.g. Erasmus programmes, or are disadvantaged for jobs outside Greece. The Department is aware of this and needs to take it on board. One thing that is positive in the Department is that teaching and learning theories and practices (such as peer-assessment, inclusivity) seem to have been taken into account to some extent for curriculum development. This can be further enhanced in further curriculum revisions, by fully integrating learning theories for enhancing student learning.

The academic staff have informed the committee that the resources for improving the implementation of the curriculum are extremely limited. Much of the equipment is either being donated by the industry, or developed by the students themselves on their own expenses. Appropriate provision should be made to improve resources and update equipment. The first point of call should be official channels, but in the case that funding is not available, the Department should seek other means of securing appropriate resourcing for fulfilling the curriculum. Having said that, the Department seems to be doing a reasonably good job equipping its labs adequately. However human resources need to be addressed. A possible solution that has emerged during discussions was the possibility of using postgraduate students for assisting with lab work, but this has the prerequisite that the Department should be allowed to run such postgraduate programmes.

With regards to the two planned postgraduate programmes, care must be taken to ensure that appropriate resource planning is undertaken prior to the launch of such programmes. Potential suggestions for titles include:

- MSc in Renewable Energy [and/or] Smart Grids

- MSc in Distributed Energy Resources
- MSc in Renewable Energy Integration
- MSc in Energy

The Department is urged to start such a course and to examine the possibility of fees. If English speaking it may also attract students from abroad and additional fees.

Some academic staff have informed the committee that the run time of the courses was limited from running every semester, to running every other semester. This regulatory restriction is preventing all students to attend some of the required courses and should be modified.

Finally, although this has been mentioned in the internal review document, the bibliography needs to also be amended in the course descriptions, since many of the books are referred to their first editions and are 20 years old. A few suggestions for additional bibliography would be:

- For Power Systems: Wood, Allen J., and Bruce F. Wollenberg, "Power generation, operation, and control", John Wiley & Sons, 2012.
- For Power Electronics: Rashid, Muhammad H., ed. "Power electronics handbook", Academic Pr, 2001.
- For Renewable Energy: [The new (2012) version of Boyle, Renewable Energy] and Freris, Leon, and David Infield, "Renewable energy in power systems", John Wiley & Sons, 2008.
- For Artificial Intelligence: Wooldridge, Michael, "An introduction to multiagent systems", Wiley, 2008.

RESULTS

After discussions with the academic staff of the Department, it seems that the revised curriculum is well under way. There is no way of really knowing how effective the new curriculum would be, since there are no graduates yet, but areas of attention have been discussed and agreed.

The effectiveness of the new curriculum can be ensured by involving the stakeholders, by contacting the alumni of the Department and to seek the views of their studies. Some contact was established already, although not as much as the committee would have hoped, and mixed comments have been reported. One of the comments was that students further in their career found it difficult to follow theoretical aspects, whereas other students reported that the Department equipped them with a strong practical background to continue, which was not found in other institutions abroad.

The committee feels that the Department should re-think about the balance between practical/laboratory focus and theoretical background content. The mix of abilities of student intake should be addressed and means of bringing students to a common level of knowledge should be implemented. The committee recognises the importance of the practical aspect of the specific sector of Higher Education, and strongly supports the laboratory sessions in the student experience.

Finally, the curriculum suffers from low pass rates in some courses. This is most likely due to course delivery, student intake and attendance and other external factors. The Department needs to investigate and make sure that the design and delivery of the curriculum is not affecting this issue in any way (e.g. too much load on specific semesters). It was evident that one course was particularly difficult and had unacceptably low pass rates and very low

student progression, and the lecturer was asked to redesign its course to allow students to learn, pass and progress.

IMPROVEMENT

Through discussions with the academic staff, it was found that there is a clear intention of improving the curriculum, a fact which was stressed repeatedly throughout the visit. This is planned to be done by getting feedback from a number of source, including this report.

Two topics that were suggested to be introduced for strengthening the curriculum were:

(1) Introduction of a course on Programming, in the ICT specialisation

(2) Strengthening the existing course on Power Electronics

## B. Teaching

APPROACH

The Department of Electrical Engineering covers subjects in the field of operation and control of electric energy systems and installations, design and implementation of electronics, IT, telecommunications systems - devices and automation systems. The purpose of the department, according to the oldest but also the revised curriculum is to provide high quality education with modern scientific and technical knowledge, as well as the development of skills necessary for practicing the profession of Electrical Engineering.

Due to the nature of the curriculum, it is necessary to give a strong emphasis on practical exercises and lab activities which are complemented by lectures. The EEC finds that the Department's facilities, laboratories, and equipment are satisfactory.

Students seem to enhance their experience by practical work in a lab environment which provides real opportunities and practical benefits. Additionally and in accordance to students' comments, the EEC notes that some of these labs are saturated due to the large number of students who have not attended them in earlier years and on the right time, something that often penalizes those who want to take the labs within the normal course allocation. Therefore, an approach offering group work in problem solving with task allocation and team working may be an effective way of complementing existing traditional teaching.

The EEC also notes the low student attendance rate in lectures (20% - 30%), which is optional, whilst in laboratories being compulsory is 100%. The legal framework, which does not oblige students to attend, lectures maybe a significant contributor to this problem, and this may also influence the fairly low degree completion rate. Another possible explanation could be that conventional teaching methods do not attract the new generations of students. Again, an approach offering group work in problem solving with task allocation and team working may be an effective way of complementing existing traditional teaching.

The student/teaching staff ratio is very high, and can reach 70:1. In the cases of laboratories, this can reach 25:1, which can be risky in terms of Health and Safety good practice. Potential

solutions to this problem can include reducing the student queues or increasing staff. The former would be preferable, as it would also free other resources.

The EEC would like to note the low number of non-permanent academic staff, at present the department has 5 temporary instructors. It is clear that the number of temporary faculty members is insufficient, and as a result, the program, mainly laboratories are performed under very difficult conditions, which are not satisfactory to staff and particularly students.

Students are assessed by written examinations in all courses each semester in February and July. In September they are entitled to repeat the examinations in all courses of the previous academic year. The method of examination is usually closed book, but is not rare when a teacher may decide to consider open books. In laboratory classes, whose attendance is mandatory, students are evaluated on a weekly basis. The final mark consists of 60% on student's performance in laboratory exercises and intermediate test and the remaining 40% on performance in the final examination. Lastly, but rarely, it is possible to assign a complex work that requires workload corresponding to ECTS course to one or to a group of students, successful completion of which may be the only criterion for the evaluation. The transparency and meritocracy of the evaluation process is ensured by public announcement of the results and by access of student's written exam scripts, as well as feedback discussion with the teaching staff. Anonymous marking is encouraged.

High failure rates have been identified as a major issue in the Department. Although this is characteristic of the whole educational system, low pass rates sometimes indicate an issue with course delivery. Although part of the blame can be put on students for non-attendance and lack of effort, but the onus is on the teaching staff to incentivise and attract the students to the class, as well as to deliver the content as efficiently as possible bringing students to the same academic level. Although challenging, it is the responsibility of the Department and the institution. This is where the teaching methods and practices may help. As an example, to ensure that the student's attention is on the delivery, the lecturer may ask random questions in the class. This way there is a chance that they will be more alert and take more interest by thinking.

In some cases, specific lecturers had consistently low pass rates in all their courses, which may indicate that the problem could lie with the lecturer. Course groups with characteristically low pass rates were:
  - Electric Circuits I/II and Economics
  - Mathematics/Physics/Mathematics for engineers/Mathematics III
  - Digital Systems I/II
  - Power Electronics – Industrial Electronics: For this course, it was indicated that the laboratory resource restriction was to blame for the low pass rates, but it was found that the theory had also a very low pass rate (18%). Clearly an unacceptable problem that the Department should immediately address.

The evaluation of the dissertation ("πτυχιακή") is examined by a three-member committee actioned by the Head of Department upon the request of the student. Some concern was raised in delays of the examination of the dissertation, so Departmental procedures may need to be re-evaluated to expedite this process.

Regarding the policy for postgraduate studies, the Department does not offer any postgraduate program at Master's level. The EEC members believe that it could be a good

idea to set up an MSc course which will allow a realistic connection between research and teaching activity, which is necessary. An important point that needs to be addressed about the MSc would be the direction to which the MSc should be oriented in order to truly differentiate the department from others, whilst maintaining and enhancing the strengths of expertise of the members of the Department. The Department could think for a co-sponsorship of an MSc course with another department of another institution with complementary expertise which might be a much more effective and realistic solution.

IMPLEMENTATION

The level and quality of teaching and teaching preparation of the course seems to be good and students seem to be satisfied with the teaching procedures and quality. Problems arise primarily due to the large number of students, because the Department has to accommodate approximately 50%-100% more than the planned number of students, as we can see in the following table.

| Year | Total of registered students | Total offered places | Total occupied places | % more students |
|------|------------------------------|----------------------|-----------------------|-----------------|
| 2008 | 2076 | 140 | 192 | 37 |
| 2009 | 2094 | 140 | 177 | 26.5 |
| 2010 | 2349 | 160 | 315 | 97 |
| 2011 | 1777 | 160 | 237 | 48 |
| 2012 | 1422 | 100 | 197 | 64 |

Table 1. *Number of places offered and accepted*

The course or laboratory material consists of books, theory notes, laboratory notes, PowerPoint presentations, articles, etc. The distribution of books is given to students through the ΕΥΔΟΞΟΣ system. Students can choose a book from a proposed list per lesson but the EEC members find that the library of the institution is operating inefficiently (content, limited hours of operation, not working computers, small size of shared PC room).

Based on discussions with academic staff, it was found that the use of teaching methods, including visual aids, is sporadic, and at the discretion of the lecturer. The committee recommends that a formal engagement in the use of teaching methodologies should be made. Ideally, teaching qualifications should be introduced to the Department and the institution as in some EU countries. Reference to teaching good practice is encouraged to be taken up by the management of the school. Also feedback of the assessment results from the students should become mandatory to motivate their course/study participation.

Concerning the evaluation of the courses and the laboratories (results presented in the internal evaluation report of 2008-2009), it is noted that the analysis of the results is not very easy to understand. We do not know the exact number of distributed questionnaires versus the number of analyzed, but at first glance and following discussion with the students the percentage of questionnaires returned seems to be extremely low, because in the opinion of the students, this assessment will not achieve any changes. This method used does not motivate students to increase participation, and teaching staff are encouraged to improve

student's understanding, implement changes based on student evaluation with transparency so that the student participation in increased. It seems that the outcome/findings are not used to further enhance the Departments' performance since there is no formal procedure to discuss and reflect on these results, and in doing so develop ways to integrate the needs of the students in teaching improvement and course development.

RESULTS

The Department is established in 1977. Throughout this evaluation, the EEC observed a high level of commitment from staff and students towards improvement of the Department.

The efficacy of teaching is generally good, but students note that some lectures do not adhere to recent curriculum changes. The EEC strongly suggests that a greater involvement of the industrial sector in bringing elements closer to their recent activities is requested from the Department.

The average time to graduation is too high and needs to be improved. It has been revealed that some students cannot follow the course due to personal reasons (mainly financial problems), while others have difficulty in following certain subjects of the curriculum. Part of this problem is the quality of student intake, with insufficient background (students can enter from Lyceum and from technical schools). This significantly contributes to delaying their graduation. The Department can find ways to incentivise the students to attend more consistently and they should record student attendance, as this may help the teaching staff to enhance their practice.

The number of students completing their studies in a reasonable time (10 to 12 semesters) is really very low (< 10%) as can be seen in the following table.

| Year of entry | Total years of schooling | Percentage of graduates |
|---|---|---|
| 2002 | 11 | 43.7% |
| 2003 | 10 | 39.6% |
| 2004 | 9 | 30.3% |
| 2005 | 8 | 19.7% |
| 2006 | 7 | 19.2% |

| | | | |
|---|---|---|---|
| 2007 | 6 | 9.7% | |
| 2008 | 5 | 1.6% | |
| 2009 | 4 | 0% | |

Table 2. *Total years of studying*

The average time of study before graduation seems to be 17 semesters, against a normal duration of 8 semesters. This is an unsustainable problem of major importance and must be resolved as a priority. The new legislation (which will be applied from next year) and which specifies a maximum of 6 semesters for completion of studies should be implemented.

It is noted that the average degree award grade is consistently low, with a tendency to a slight decrease in the last 6 years. (i.e. ~ 6,5/10 from 2003 to 2007 and ~ 6.25/10 thereafter until today). Also, the percentage of students obtaining first class awards, i.e., awards with an overall mark between 7 and 8.5/10 is extremely low (around 4%), while the percentage of students obtaining an average around 5.5/10 is relatively high (~ 25%). It is the responsibility of the Department to make sure that its students learn and graduate to an appropriate standard.

Moreover it is quite difficult to establish indicators of good quality educational provision, such as the good employment rate of the Department's, because there is no systematic monitoring of graduates and their professional destinations. The TEI Xalkidas never developed sufficiently corresponding structures (Liaison Office) to access of such data.

IMPROVEMENT

The Department would like to see teaching load reduced, at least as a first step. The EEC strongly supports this demand that would certainly improve quality of teaching. A reduction in the contractual staff for the year 2012-2013, from 40 to 5 persons, is unacceptable. This directly impacts on the quality of teaching offered and it is hoped that limiting the years of study is going to improve this inappropriate situation

The Department and the EEC are concerned with the fact that for several years, students with an average of 10/20 or below on the overall entry exam will be given the opportunity to enroll and study. If this can be improved, it would lead to less disparity within the group and more effective teaching.

Based on discussions with students, it was found that the evaluation of teaching methods is sporadic, and it is left courtesy of the lecturer, and in some cases this is not considered at all. The committee recommends that a formal and systematic evaluation of teaching should be made. Ideally, teaching qualifications should be introduced as a requirement, and teaching practice improvement should be set as a minimum requirement.

As a result of the actual economic situation in Greece, many students originating from Athens attend lectures only a few days the week. This results to a very low attendance in certain modules, which is of great concern. This may also contribute to the low graduation rates. Thus, in those modules that the assessment is only by exams and as such attendance is not required, the EEC encourages the department to reflect and consider ways that this can be changed i.e., mid-term exams, assignments, or assessment by multiple choice (MCQ). A significant component of learning through problem solving coupled with interaction of lectures and laboratories need to be addressed as part of solving student progression. The department should also consider and formalize ways to assist the weaker students when they enroll and to align student intake backgrounds to a common level.

Concerning the very useful industrial placement, perhaps a closer and more formal relationship with companies and students monitored by visits, where possible, can eliminate problems and improve the experience. Ex-graduates may be involved more effectively for finding industrial placements but also more actively involved for advancing the teaching and research aims of the Department by setting up for instance and industrial advisory committee. Finally, the EEC would like to encourage   the exchanges abroad through the ERASMUS programmes which should be intensified to allow higher international experience by students and staff.

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

APPROACH

Despite the low staff to students ratio and taking into account that TEI institutions cannot award postgraduate and research degrees the Department's research and scholarship effort of certain individuals is commendable. Although not clearly stated in the strategic objectives of the Department some research areas especially in wireless sensing communications and energy are recognised with state as well as EU funded research. PhD student supervision is low and takes place through collaborations with Universities. Some research facilities and laboratories established by project funding exist and staff are well qualified to supervise students for carrying out research.

There is some structure of research groups in the Department through technical laboratories which are well maintained and are being used mainly for teaching purposes.  The Department has undertaken a commendable job in carrying out research by externally funded projects through state and EU research projects, and having the leading role in some of them. The Department has to reinforce its strategy of developing cross-group collaborations within the Department and to capitalise in its partnerships with other institutions and with industry at national and EU level. The research at present is limited to a few individuals and a more formalised approach to research strategy, aims and milestones may be necessary.

The Department sees the formal provision of postgraduate studies as a strategic means for enhancing its research activities and to this end it is thinking for setting up of a relevant M.Sc. programme. This possibility is encouraged especially if it was able to increase its staff to student ratio with permanent well qualified lecturers.

Currently, the Department has no formal framework for encouraging and assessing the research performance of staff, but some of its research through individual efforts is at a high level, against difficult institutional and state conditions.

IMPLEMENTATION

The research in the Department takes place through individual laboratories and in line with academic staff expertise. There are a number of national and EU research activities that the school is involved by leading in a number of them. The state funding of the laboratories for replacement of equipment is limited and the Department is actively seeking funding in order to certify their laboratory services, improve their equipment and become competitive in their teaching and research areas. The laboratories offer opportunities for engagement in research to the final year students as part of their industrial placement scheme and/or dissertations. To this effect there are some exceptional final year projects that have been conducted by students.

The Department has developed a number of collaborations with external institutions at home and abroad and with industry. These collaborations should offer further opportunities for engagement in research by more academic staff and students. Opportunities for research visits, collaborative research, and bidding for research funds take place, and they are encouraged to enhance these activities by formal organising and managing. Addressing the key limitation that arises due to the current legal framework of the operation of TEIs, notably their inability to award PhD degrees and offer research-based education at this level is paramount and requires urgent resolution.

RESULTS

The EEC believes that the research results of the Department are reasonable but fragmented to a few individuals. The school is managed well, the rap our and enthusiasm of staff is high and their expertise, qualifications and experience in the private sector, with any university in the EU and elsewhere. It is disappointing that staff cannot focus on their teaching, research and administration and are required to look after totally unrelated issues such as is the case of certifying the quality of the food in the canteen for instance. The existing resources available need to be re-addressed to increase the impact that the research of the Department is capable of having.

*Scientific publications*
The Department's publications are provided in the internal evaluation report (2012), whilst the full list of publications can be found in the internal assessment report.

It should be noted that the list of publications includes internationally reputable refereed journals and other peer reviewed publications, but it is mainly based on a small number of research staff. The credit of a shared staff output who work in the same Department should be given, by agreement, to one person, or fractions attributed to more than one person in accordance with their research effort. The attribution of scientific outputs has pre-occupied the scientific community for many years and recently a robust and fairer accounting has become common practice; each paper output of the Department is attributed to one member of staff only. In consequence the Department in encouraged finding ways to increase participation of the compliment of its staff in research and scholarship.

*List of research projects and impact*
Through a limited number of staff, implementation and leading delivery of a commendable

number of research projects, funded by the EU and the state, has taken place over this assessment period with high quality outputs, as seen in Table 3.

| PROJECT | Journal Papers | Book Contributions | Conference Contributions | Contributions to Standards |
|---|---|---|---|---|
| AWISSENET | 5 | 1 | 10 | 1 |
| VITRO | 5 | 1 | 8 | 5 |
| ARTEMIS/SMART | 4 | | 3 | |

Table 3. *Project outputs*

*Research collaborations*

The Department has developed research collaborations with external institutions at national and international level and with companies. As documented in the internal evaluation report of 2012, external research collaborations with industry include Philips, Thales, Selex, Alcatel-Lucent, Telefonica Spain and Northern Ventures Cyprus, and with universities such as the University of Helsinki and the Computer Technology Institute in Greece.

*Applications of research and uses*

A good number of final year projects have also been related with the funded research over this period of assessment. It is good practice to involve students with research where possible and the Department is actively engaging students in research, this is welcomed and should become good practice for other Departments.

The research activity needs to have strategy through an action plan and performance feed back to those engaged with the delivery of the plan, to include a higher complement of staff and students and to become more outward looking through industry engagement and business development for sustainability at home and abroad.

*Acknowledgement and visibility of research*

Over the period of assessment 2009 – 2013 the Department has participated in 7 projects; FP7, State funded ARTEMIS, state and ERDF funded ESPA, and in state funded ARCHIMIDES II and III, totalling almost a commendable 1.5 Million Euros, including the funding of student practical course placements.

The publications of the Department have a notably high number of citations but they are nevertheless provided by the same small number of research intensive staff. The same applies also on funded research projects, these points may prove unsustainable for the long term development of the Department and need addressing. The Department should capitalise on the expertise, contacts and efforts of those staff in order to expand its research visibility to the complement of its entire staff. As it is common practice in similar institutions abroad, staff performance beyond promotion should target annual assessment of research and teaching.

IMPROVEMENT

The Department has intensified its effort to carry out research by obtaining research funding

and increase its presence in state and EU calls. It is particularly commendable that some of these projects were led by the Department and successfully completed with a number of good outputs. At present the 13 staff members of the Department share between them scientific outputs. In the EU the credit of a shared output within the same Department is given, by agreement, to one person, or fractions attributed to more than one person in accordance with their research effort. In this way the counting and attribution of scientific outputs is robust and fairer. Therefore the fact that only a limited number of staff are involved in these activities needs addressing because the research sustainability and expansion will only be achieved by wider staff participation. Scientific outputs will increase and involvement of students will also be improved. Staff should also be encouraged to co-supervise PhD students by colleagues at the universities; this practice has been found in other Departments. The Department is therefore encouraged to use its network to collaborate in PhD programs awarded by universities at home or abroad. They can use their experience and facilities to co-supervise PhD students, something that is relatively easy nowadays with universities in the EU.

The Department's high but fragmented performance in research would be sustainable and benefit further from the development of a clear and structured research strategy, the identification of areas of strategic importance for research development, and the subsequent targeted allocation of available resources to such areas. Furthermore, the establishment of a framework for assessing research performance at departmental, group (laboratory) and at individual level would enable staff to focus better their efforts and to achieve full potential individually and departmentally.

It is worth noting, that there may be opportunities for increasing the research income of the Department by technical consultancy work which need to be fully explored, therefore interaction with the industry and practised based consultancy which should be systematically encouraged.

# D. All Other Services
*For each particular matter, please distinguish between under- and post-graduate level, if necessary.*

APPROACH

The Department uses the facilities provided by the TEI to support the research and teaching activities as well as extracurricular (social, entertainment and cultural) activities for students and staff. The services provided by the Department for these activities are: administration office, library, catering, accommodation, IT support and internet, student support, athletic and cultural activities. The Administration, catering and accommodation operate at a very good standard while the IT support, internet access, library, PC cluster, and student support, are of a questionable operational level.

Most of the department's internal administrative processes are performed electronically. However, there is no existing plan to increase the efficiency of the administrative procedures. Furthermore, no plan was reported (during the visit or in the internal evaluation report) on

increasing the student presence in the campus and engagement with the Department's activities (curricular and extracurricular).

IMPLEMENTATION

*Administration Office*

The administration load of the department is distributed to one permanent member and one 50% part-time member of staff. During our visit the permanent member was with a sick leave and enquiries regarding the processes of the administration office were addressed by the part-time staff. The space of the office is two connected large rooms, one acting mainly as storage of archives and the other was sitting space the administrators. The administration office handles student registrations to individual modules and laboratories, recording/processing examination and coursework results, final year dissertations, industrial placements and issuing certificates (student cards, diplomas, etc.). The administration office also hosts the student progress files and archives both in hard and soft copy. The office is well organized and the working load is managed effectively. However, some concerns raised on the operating times of the office and the communication to students.

*Administrative support to academic staff*

The administration office provides secretariat assistance to the academics on the delivery of courses and exams as well as on continuously updating the information on the e-class platform. This involves assistance on printing material when required, updating the entries on the systems related with detailed information about module structure, additional training materials, tutorials, exercises, bibliography, useful links, etc. Additionally, assistance is provided to the academics on procurement of any equipment and purchase of consumables especially regarding the running of laboratories. Finally it provides secretariat support to the Head of the Department.

*Industrial Placements*

The Departmental administration assists students on finding suitable industrial placements required to be undertaken during the last year of their study. During their placements students use an "industrial placement log book" to weekly record their involved activities/tasks which is submitted to the administration office at the end for evaluation. From the inspection of several submitted log books it was found that frequently there are no comments from the industrial supervisor, questioning the effectiveness of the book. In the book there is no space allocated for the academic supervisor and neither one is allocated. It seems that there is no academic involvement during the industrial placement at all which is odd as industrial experience is supposed to be a part of the academic curriculum. The institution lacks a liaison office and needs to establish one.

*Library*

The library for the department is spacious, well organised and manned with 1 member of staff. The library is said to have enough books related to departmental subjects, serviced automatically by an online system called ADVANCE (installed in 2005), and linked to other libraries throughout Greece offering interlibrary services. Additionally, it provides access to many scientific journals through HEAL-Link (Hellenic Academic Libraries Link). The library also maintains hardcopies of all final year project dissertations. There are 20 private study spaces for the needs of all departments which is inadequate. The library also facilitates a single PC cluster that is available to all students with 15 PC stations. During our visit 11 PC

stations were found not-operational which indicated lack of IT support. The library's student opening hours, 9:00 to 13:00, are not clearly indicated to the students as well as to the documentation provided to the external committee. Interviewed students also raised this point along with the limited PC cluster support with some students commenting as "virtually non-existent".

*IT support and Internet access*

Wi-Fi and internet access is freely provided within the premises of the TEI, however, it is difficult to comment on the quality and efficiency of this service since it was non-operational during our 3-days visit. Internet access is provided via wired connection using the sockets available in academic and other offices. In addition the large number of non-operational PC stations in the library indicates the poor IT support of the department.

*Student Support*

An academic member is nominated as "student advisor" per calendar semester to provide support to the students related with any curriculum or other activities during their study. However, student interviews indicated that no students knew their academic advisor and this service.

*Catering services*

Inside the campus there is one specious main refectory, providing good quality and low cost meals (lunch and dinner) to students and staff. There is another student refectory outside the student campus (in the city centre) and although set up to help students who live in the city, careful consideration should be given so that students are not encouraged to stay away from campus. Academic institutions should strive to create a community and to enhance the student experience by socialising and working together. The campus also has a spacious coffee store that provides beverages and sandwiches at low cost.

*Student accommodation*

There is a student accommodation within the campus of TEI Xalkidas that provides residence to students. During the visit the accommodation hall is found to be very clean and operating efficiently. Students who were interviewed on the site regarding the service are fairly satisfied by the operational efficiency of the accommodation facilities.

*Social and athletic activities*

The TEI website indicates that the campus hosts 6 courts for tennis, volley, and basketball; however, during our visit all the athletic facilities provided by the TEI were non-operational. A small room with some indoor exercising tools and weight lifting equipment is also provided to the students but it is not in a useable condition and possibly hazardous. The report provided to external committee by Mr Antonis Prionas is dated on 15-5-06. The report indicates that student sport activities (football, volleyball, table tennis, etc) are facilitated outside the campus using national infrastructure. This questions the maintenance and utilisation efficiency of TEI infrastructure.

*Accessibility*

The Department and Institution have clear accessibility policy, however, the main elevator to

the first floor is non-operational and therefore access to first floor lecture rooms, labs, library and other services is non-available to disabled students.

*Security and health & safety*

The security within the student campus is inadequate in many facilities of the Department and TEI. Missing and/or broken windows, missing roof panels, and missing doors in the toilets are found. Access to accommodation premises is not constrained to those staying in the accommodation. The lighting outside the perimeter of the campus, which is in a remote area outside of the city, is inadequate. Most of labs have not accessible first aid kits and fire extinguisher and in the HV lab some obvious hazards are found putting the student and staff at risk.

RESULTS

The Departmental services related with the administrative procedures are well organized and efficiently managed. The collaboration between staff (academic and non-academic) is at a very good level and the communication between the students and the staff (academic and administrative) via e-class seems to be functioning. However, there is a need of increased and continuing fostering other means for enhancing the communication between the staff and the students. This is evidence from the very poor attendance of students to teaching and social activities of the Department.

There are no extracurricular activities within the campus to motivate students and staff to actively participate to Department's social life. The infrastructure available to the department is not effectively utilised. Some rooms and facilities are abandoned and non-functional. There is an obvious lack of student common rooms to facilitate individual or team working activities (team projects, revision etc.). The library's student opening hours are very constrained (9:00 to 13:00) and its PC cluster, is inadequate, not functioning efficiently, indicating very poor IT support.

The existing student counselling support provided by the academic staff during the teaching semesters, although it is present, is not effective since students do not know about this service. The health and safety measures of the department are very questionable. In most of the labs there is no accessible first aid kid neither a fire extinguisher to provide the first means of action in case of hazardous events. HV lab needs a risk and assessment survey to reduce existing hazards. The department's Quality Assessment is ineffective and it does not consider at all in the internal review documentation.

IMPROVEMENTS

The Electrical Engineering department of TEI Xalkidas seems to function with collegiality and coherency. . This is evidence from the student's positive feedback.

Representatives from all groups of stakeholders should be invited to Departmental meetings as they are the main mechanism of decision making. Therefore, participation from student, administration and technical staff should be encouraged. This will reinforce the communication between the students, administrators, technical support and academics.

The Department should provide an induction week with events from academics, administrators, existing students, and industrialists, to welcome the new students and introduce the department's facilities as well as TEI extracurricular activities. This will

increase the communication motivate and welcome students to their new environment.

Collaboration with local social, cultural organizations and charities should be promoted through free allocation of available space within the campus reinforcing both the security of the campus as well as the student participation to social activities.

The student counselling should change structure as it is proved ineffective. A suggestion is to allocate students to academics and individual academics arrange a meeting to inform their students the purpose of student support.

Health and safety monitoring procedures should also be developed and reported in the internal evaluation of the department along with the actions taken to ensure the labs have the minimum required H&S standards. Discussions on reducing the risk of hazards in the HL lab of the university indicate some initial suggestions of improvement.

Internal quality assessment is one of the most common ways of continuous improvement and its establishment should be further reinforced by arranging meetings and recording minutes as well as suggested actions. Aspects such as IT support, health & safety, security, student engagement should also been discussed within the meeting and report any actions taken in the internal evaluation. It is also important that the QA acts as a mechanism to monitor and report the effective utilisation of the Department's available space and student engagement/motivation to Department's activities within the internal evaluation report.

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

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

The Committee did not see evidence of a written strategic plan that clearly describes the Department's mission, establishes goals and identifies mechanisms for achieving them.

The major strategic planning objectives that we see fit may be summarized as follows:

- The Department should facilitate the necessary partnerships by interfacing at its boundaries with other Departments within TEI Xalkidas and hence improving, expanding, sustaining and complementing undergraduate and research activities.
- Continuous improvement of curriculum, based on academic criteria and responding to modern requirements.
- Establishment of postgraduate programs
- Collaborations in PhD degree co-supervision where possible.
- A managed approach to industry

Some key inhibiting factors are:
- The framework and adverse economic conditions render heavy teaching and

administrative loads thus inhibiting research growth;

- The legislative framework that allows students to remain enrolled indefinitely irrespective of their academic performance, thus creating a large body of inactive students although now legislated need to be implemented.

- Economic hardship of the students is a problem needing a sustained strategy.

- Implementation of degree completion by limiting the length of registrations in accordance to latest state rules. Some improvement of the building infrastructure, the lab equipment to support teaching and research activities of the department.

- Lack of formal centralized procedures for assessing attainment of teaching and learning objectives;

- Reduced professional rights to the department's graduates as described by the law. As a result, the department becomes less attractive to good applicants. The academic level of the department's student is further affected by a societal perception (lower class than polytechnic/university level) related to Technological Institutions (TEI).

- The acceptance of new students with low grades, mixed backgrounds and against their choice creates a number of difficulties in teaching, degree completion, low morale and identity perception of graduates.

- Disproportionate low fraction of research budget allocation to the Technological Education Institutes when compared to the universities

- The legislation framework that does not allow the Department to offer post-graduate degrees and PhDs.

- Lack of accreditation of research laboratories;

- Increasing the presence of students on campus by providing main catering within the TEI premises.

- Increase the student culture and experience by providing cultural events.

- Sport facilities within the TEI are not provided to students and this should be resolved.

- Quality provision of IT to students and staff (the wireless system was not operational).

- Library hours should be increased and access to periodicals resolved. The infrastructure of the library in terms of availability of working computers and access of lager study rooms should also be addressed.

- Lifts and provision for disable students and staff needs immediate attention; lifts were not working.

- Health and safety issues also need constant examining within the Department as is the case of the HV lab and generally within the other services provision of the TEI.

Most of the strategic planning factors seemed to be shared by all Departments in TEI. The number and quality of student entrants are explicitly or implicitly specified by the Ministry of education. The Ministry sets the exact number of entrants for each department. By increasing the number of entrants it reduces the quality of students, as applicants with high entrance scores choose to study other subjects and/or in universities or other institutions. Having placed the Universities and the Technical Education Institutes at the same educational level, the State needs to clarify some contradicting features that have emerged since the transition of the Institutes from technical to university status.

Further inhibiting factors identified from within the department include the lack of a centralised procedure to assess the extent to which the learning and teaching objectives have been achieved, the low average marks achieved by the students, the lack of continuous student engagement with their studies, the uneven knowledge of science subjects like maths rendering difficulties in progression, the synchronisation of lectures and labs and the replacement of some lab work with demonstrations. Although there is an increase in student graduations (20%) and a reduction of time to graduation, which are very encouraging, the introduction of pre-requisite modules to continuing with the more advanced ones in succession, and the reducing the maximum duration of the study seem to be needed for improving the course provision. Economic hardship forces some students to work in parallel with their studies resulting in not having enough time to study falling behind in their studies.

The Department does not run any Masters programme and the Committee encourages such a venture, as discussed. It is unclear to what extend provision for research degrees (MPhil and PhDs) and laboratories will be made in future legislation. Given the current financial circumstances, it is difficult to foresee the release of any substantial State funds. In view of that, the Department and Institute could plan in raising external funding from third party resources. The establishment of taught and research postgraduate programs as well as enhanced interaction with the industry could attract further funds in this direction. Consulting to companies, research and development services and the use of laboratories by companies maybe areas that may attract outside income.

## F. Final Conclusions and recommendations of the EEC
*For each particular matter, please distinguish between under- and post-graduate level, if necessary.*

The overall picture of the Department as formed through this evaluation procedure is positive in that the Department is well organised and delivers high quality applied electrical engineering skills to its graduates. The Department maintains a well-developed curriculum which is published and easily accessible. The curriculum is in-line with best practice nationally and internationally for Electrical Electronic Engineering BEng degrees (or equivalent) with a strong hands-on training element, which is seen as advantageous. The learning and training of graduates is underpinned by functioning laboratories delivering the educational mission of the department to provide practical experience to their graduates.

Quality of teaching is high and many good teaching/learning practices are already in place and student satisfaction is good. The overall student experience appears to be positive with relatively simple procedures for administering student matters (such as enrolment, registrations, dissemination of marks etc.). Based on the discussions with the students it appears that the Department is in good rapport with their cohort. To a large extend, this is also attributed to the attitude of the members of the staff, who show high level of commitment to the learning and teaching process and on average maintain high level of motivation for research. Evidence of collegiality among the faculty and commitment to the common task of promoting the Department's profile was also apparent during the visit.

The Research activity and output are commendable but fragmented, particularly when considered within the context of the heavy teaching load, the national legal framework and limited resources. Some staff members are research active and the Department hosts pockets of national and international excellence as a result. The EEC further saw evidence of funded research and impact of the research by publications. Alumni of the Department need to play a pivotal role for its promotion and further development.

The EEC brings to attention that national legislation presently has contradictory elements in relation to the operation of TEIs. In the case of engineering departments, such as the Department being assessed, this is reflected in the limited professional rights of its graduates. The law further makes no provision for the award of PhD degrees from any TEI Department, posing unnecessary impediments to the research sustainability of these Institutions. In the case of the Department being assessed, this restriction is imposed despite the fact that the vast majority of faculty is trained at PhD level and maintain an active research profile. The fact that career progression of faculty is assessed against their research performance this is a further contradiction of the current legislative framework. The EEC believes that the State should reconsider the framework within which TEIs operate to resolve such contradictions. Increased autonomy of academic institutes could provide pathways for maximising the efficiency of the available resources and the benefits they offer to the Greek society.

At institutional level, the EEC understands that the Department has very limited autonomy; for example, there is no Departmental budget despite the relevant provision by the law. Staff advised that a case should be made to the Institute centrally even for everyday consumables. This brings unnecessary inefficiencies as a result of the increased bureaucracy.

Provisions of library, study rooms, common PCs and wireless IT need improving as a matter of urgency. Disability access, health and safety and toilette hygiene are also areas of concern.

**Recommendations**

Within the aforementioned limitations that originate outside the Department's authority, the EEC believes there is space for improvement:

➢ The Department would benefit from a more outward looking attitude that will promote its educational and research services nationally and internationally. A strategic plan of the Department should identify the mission and identify the uniqueness of the educational and research aspects they wish to develop, namely what they want to achieve, who is the target audience and what would the relationship be between this Department and departments in a similar subject area from other higher education institutions nationally and internationally. Emphasising the strong hands-on aspects of the education delivered may be seen as a comparative advantage. In relation to research, the Department would benefit from a more structured research strategy that will allow a higher number of staff to participate and hence increase funding opportunities and deliver increased impact.

➢ A key challenge is identified in the quantity and quality of the Department's student population and mainly the variety of educational backgrounds of first year students. The Department could benefit from the design of a strategic approach for teaching/learning to address this challenge. The EEC encourages the Department to consider the role of e.g. the student tutor; peer mentoring; supporting teaching sessions; lectures from

alumni and industry; revisiting the curriculum along the lines of best practice nationally and internationally; in addressing the low average marks, the low morale of students, their perception and prolonged studies period.

➢ The Department would benefit from a more structured approach in their interaction with the industry; this could be implemented for example through the establishment of an industrial advisory board and/or the implementation of a database of industrial contacts. Such a mechanism would provide feedback for improving the educational program, enhance the employability of graduates, and increase the Departmental visibility. The Department could also benefit from a formal mechanism for maintaining contact with its alumni. Evidence of progress in this direction is available and further efforts in this direction are encouraged. Use of tools such as the Wold-Wide Web and social media would enhance the image of the Department in the society at large.

➢ The Department is capable to offer postgraduate degrees at Masters and MPhil/PhD level, with appropriate collaborations with other universities at home and abroad; and with industry. It is encouraged to agree a strategy with a measurable action plan which will bring students and funds and hence enable its long term sustainability.

➢ Other services that influence the performance of the Department that need improving is the library, the sports provision within the TEI, its cultural even planning, health and safety and disable access to buildings.

The Members of the Committee

**TECHNOLOGICAL EDUCATIONAL INSTITUTE OF CENTRAL GREECE**
**DEPARTMENT OF ELECTRICAL ENGINEERING**

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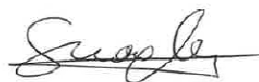
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