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HELLENIC REPUBLIC

H.Q.A.A.

HELLENIC QUALITY ASSURANCE AGENCY
FOR HIGHER EDUCATION

EXTERNAL EVALUATION REPORT

DEPARTMENT INFORMATICS & TELECOMMUNICATIONS

NATIONAL & KAPODISTRIAN UNIVERSITY OF ATHENS

Version 1.0

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External Evaluation Committee

The Committee responsible for the External Evaluation of the Department of Informatics & Telecommunications of the National & Kapodistrian University of Athens consisted of the following five (5) expert evaluators drawn from the Registry constituted by the HQAA in accordance with Law 3374/2005 :

1. Prof. Yiannis Aloimonos, University of Maryland, USA   *President*
2. Prof. Georgios B. Giannakis, University of Minnesota, USA
3. Prof. Constantinos S. Pattichis, University of Cyprus
4. Prof. Maria Petrou, Imperial College, UK
5. Prof. Nikos Paragios, Ecole Centrale de Paris, France

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 committee, consisting of :

1. Prof. Yiannis Aloimonos, University of Maryland, USA   *President*
2. Prof. Georgios B. Giannakis, University of Minnesota, USA
3. Prof. Constantinos S. Pattichis, University of Cyprus
4. Prof. Maria Petrou, Imperial College, UK
5. Prof. Nikos Paragios, Ecole Centrale de Paris, France

visited the Department on Monday May 9 and Tuesday May 10, 2011. The visit consisted of attending formal presentations given by Department members mostly on research on Monday afternoon, and mostly on teaching on Tuesday. The committee had also the chance to speak to individual faculty members (from all sectors of research and all levels) as well as representatives of students, technical support staff and administrative staff members. In addition, the committee, divided into two subgroups that visited students during lectures and had the chance to talk to them in private and without the presence of any faculty members. The committee found these discussions extremely useful, as they had the chance to talk directly to students at their teaching environment, and not through their representatives only. The committee, visited the Departmental Secretariat and talked with the six people working there, visited the new Reading Room constructed for the students, where they also met students at their natural working place. Finally, the committee saw the labs and the toilets for the students. In the afternoon, individual members of the committee spoke with individual members of the staff in their offices, in private. They also spoke with two alumni, representatives of the master students and two PhD candidates. The committee considers that all these formal and informal contacts allowed it to form a global view of the status of the Department, the morale of its staff and students and to gain an understanding of their problems, their strengths and their weaknesses as well as their aspirations.

In addition, the Department had made available to the committee, a large volume of data, including samples of final year project reports, doctoral theses, CVs of faculty members, statistics of student performance, student status and student intake and graduating numbers, extensive reports on strategic plans, as well as plans for curriculum improvement currently under discussion. In particular, the following documents were made available to the committee:

➢ Assessment of the work of the Department: goals for 2008-2013
➢ Curriculum Vitae of the faculty members
➢ Description of courses offered at the undergraduate level
➢ Timetable of courses offered and room allocation
➢ List of publications

- List of R&D projects
- Course Regulations
- Studies Guide
- Samples of final year projects and M.Sc. theses
- Abstracts of Ph.D. theses
- Application of management and reporting/forecasting of departmental activities
- Assessment of the activities of members of the Department in 2006
- Copies of slides of all presentations made
- Brief (one-page) CVs of all faculty members.

II. The Internal Evaluation Procedure

The committee felt that all resources made available to them for the execution of their work were very helpful and informative. However, it was felt that the information supplied was too much and the task of the committee was quite hard in identifying through all presentations and documentation the information needed to write this report. If the Department were aware of the questionnaire that was given to the external evaluation committee, the work of the committee would have been made easier by receiving more targeted information. At the same time, the work of the Department would have been made easier by producing less and more focused material. This comment by no means reflects bad to the Department; it rather concerns the process of evaluation itself.

Despite the above mentioned difficulties, the committee was able to perform its work effectively. It was felt that the targets and goals set by the Department in their Internal Report were largely true and supported by the evidence gathered. Overall, the committee felt that this is an excellent Department, one of the best in the country (certainly the best among 4-year programmes in the subject of study) that deserves support and encouragement by the Greek State and the National Kapodistrian University of Athens.

A. Curriculum *Undergraduate Programme*

APPROACH – *Undergraduate Programme*

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

The goal is to offer to the students a broad culture in Informatics and Electrical and Computer Engineering – Systems (ECE-Systems); henceforth, Systems refers to signal processing, telecommunications and networking.

This is achieved by separating the curriculum in two parts, namely the compulsory courses (25 technical courses, plus 6 courses on general education, plus a final year project that counts as two courses) and the optional courses (15 courses, up to three of which are chosen from among the courses taught by the whole university).

- *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?*

The objectives were decided based on historical reasons of the department emerging from a Physics-Maths school, as well as by the desire to offer a unique and competitive programme in Greece at the cross road of Informatics and ECE-Systems. The core curriculum satisfies known benchmarks of Informatics and ECE-Systems, while the directions offered adhere to the aforementioned goals, while taking into account the diverse expertise of the faculty. In the current revision of the programme, the Department is standardising the programme according to international benchmarks, by taking into consideration the guidelines offered by the American Computing Machinery (ACM) association and the Institute of Electrical and Electronic Engineering (IEEE). The job market in this area is dynamic, and it is challenging for any curriculum to track such changes. In the current curriculum revision, although the students' input is taken into consideration, it would have been more helpful if the opinion of the alumni and the potential employers of the graduates nationally and internationally were also being considered.

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

The curriculum has been revised in the past and it is currently under revision. Thus, the department is currently in the unique position to make due and timely changes and update the scope of the curriculum, so that it can be on par with top departments in Europe.

The Department has worked thoroughly for the purpose of revising the curriculum.

IMPLEMENTATION – *Undergraduate Programme*

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

The curriculum is implemented quite effectively in terms of separation of core and optional classes, and the identification of pre-requisite courses for certain courses. The curriculum is ambitious resulting in a rather high course volume that most students find difficult to

complete in 4 years (the average of students graduate in about 5.5 years). About 50% of the students have been registered for more than 6 years, a problem that is common to all Greek universities due to the inability of the universities to drop students that have effectively withdrawn. Part of the problem appears also to be due to the system of student transfers from peripheral universities, where the admission level is far from comparable with that of the directly entering to the Department students. (About 50% of the students in the recent years have been from transfers using non-meritocratic criteria.)

The structure of the curriculum is realistic with the optional courses built upon the previously taught courses. The curriculum is coherent with respect to the core courses, but the goal of offering a broad exposure to informatics and engineering comes at the price of compromising coherence.

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

The implementation of curriculum is not fully comparable with universally accepted standards. EU- and US-comparable programs do not offer the ability to students to enrol from one year to the next unless students have succeeded to all requirements of the previous year. This definitely is not the case at the department where one observes students being admitted to the final year without having succeeded to very important introductory classes. Furthermore, the department is not consistent the EU guidelines of 3+2+3 of Bologna Agreement where basic computer science should be taught in three years. The department might reconsider the core curriculum in that perspective. Furthermore, the department does not meet the requirements with respect to the European Credit Transfer system in terms of course load.

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

The structure of the curriculum is clear, the choice of core courses is well motivated (in general), provide the necessary background to the students and often precede the elective ones. There is a rich choice of elective courses even within the different areas.

- *Is the curriculum coherent and functional?*

The curriculum could be strengthened and improved both in terms of coherence as well in terms of functionality. The committee believes that the department objectives are spread in a number of disciplines. Meeting such objectives is very challenging within a four-year program. There is certain lack of coherence due to the ambition of cross-disciplines education which results in a broad core basis and is further exacerbated because the students are allowed to mix courses from different streams.

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

The largest fraction of courses does contain appropriate content. The time offered is sufficient; however, course prerequisites are not uniformly enforced.

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

The department does have the appropriate resources at least at the lecture component level to implement the curriculum. The associated faculty members are highly qualified and well trained. However, the department lacks dramatically of trained staff and teaching assistants (for lab exercises) in particular if one considers the nature of the discipline taught.

RESULTS – *Undergraduate Programme*

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

The current implementation provides satisfactory results but needs also significant improvement. This is due to the overload of courses being considered within a four-year program as well as the spread of courses. The problem is mostly dealt with by the students through the extension of the duration of their studies by almost 50%.

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

The department is aware of the problem, and currently is in the process of revising the undergraduate curriculum. On the other hand, it seems that there is no discussion on re-adjusting the spread of the courses and the core curriculum.

IMPROVEMENT – *Undergraduate Programme*

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

The department is aware of the problem regarding the duration of the studies and the ambition of the curriculum. Their effort towards addressing this issue is hindered by existing culture which calls for every faculty member to teach a core course.

- *Which improvements does the Department plan to introduce?*

The department plans within the new undergraduate curriculum to reduce the course load by approx 20% while preserving the strength and the spread of the offered courses. This will be achieved through the conversion of a subset of core to elective courses.

A. Curriculum   Graduate and Doctoral Programmes

APPROACH – *Graduate (M.Sc. and Ph.D.) Programmes*

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

The goals and objectives of the graduate (encompassing basic M.Sc., cross-disciplinary and cross-departmental specialized M.Sc. options as well as Ph.D.) curricula are to:

(i) further the education of students beyond their B.Sc. (basic 4-year diploma) studies;

(ii) enhance their career opportunities in today's dynamic market in informatics and telecommunications; and

(iii) produce high-quality research supported by competitive, peer-reviewed funding sources, and prepare the new cadre of qualified researchers to fill in advanced positions in Industry and Academia nationally and internationally.

The plan implemented since 1993 (year that the graduate program of the department was established) and updated in 2000 and 2004, entails core courses, M.Sc. courses in six (6) areas of specialization, a compulsory M.Sc. thesis or report, cross-disciplinary/cross-departmental M.Sc. options, and a Ph.D. thesis required for the doctoral program. A graduate committee reviews applicants based on well-defined meritocratic criteria (B.Sc. or M.Sc. (for the PhD) grade point average, recommendation letters, interviews, possible publications, and special provisions for work-study, continuing education, and applicants from other universities. Completion of the M.Sc. program requires a minimum of 10-12 courses depending on the specialization, and a mandatory thesis. Tuition fees are not required for regular M.Sc. students who serve as teaching assistants (those not choosing to serve, pay approx. 600Euros per semester), while continuing education M.Sc. students have to pay approx. 1500Euros per semester to attend M.Sc. evening classes. No fees are required for Ph.D. students who also serve as teaching assistants, while receiving stipend coming either from national or international funding sources (typically EU programs), if available. The plan also includes seminars from expert speakers, and student awards in the form of waving teaching assistantship responsibilities, recently instituted yearly progress reports, faculty student advisors (for both M.Sc. and Ph.D. students), and graduate thesis committees (3 members for M.Sc. and 7 members for Ph.D. defense).

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

The objectives were judiciously decided to conform with:

(i) international benchmarks of the ACM and the IEEE;

(ii) the faculty expertise and leverage the unique strengths of the department in its effort to find a niche securing a competitive edge in the plethora of post-graduate programs in Greece, and the dynamically evolving needs of the Informatics and Telecommunications market; and

(iii) the strict intervention, tardy adjustment, and stringent constraints imposed by the Ministry of Education and Greek government rules and regulations.

The student body has provided input in forming the objectives through their formal representation in the decision making process; and likewise for the faculty members.

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

Indeed, the objectives of the graduate curriculum are in par with international benchmarks, with the requirements of society, and with the rules and regulations imposed by the Ministry of Education.

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

The curriculum was decided based on the aforementioned factors, and for the most part all stakeholders had the opportunity to offer input toward this decision.

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

As far as the basic M.Sc. and Ph.D. studies are concerned, revisions and updates are decided and implemented by the graduate committee. Two updates have already occurred in 2000 and 2004, but the third is frozen since 2009 due to pending decisions by the Ministry of Education. With regards to the cross-disciplinary M.Sc. studies, the procedures and curricula are set by a cross-departmental committee without cross-approval by the departmental graduate committee.

IMPLEMENTATION – *Graduate (M.Sc. and Ph.D.) Programmes*

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

Testified by broadly-accepted metrics (quantity and quality of publications as well as standard citation indices), effectiveness of the graduate program in the research and funding categories is deemed as outstanding. The relatively long graduation times and difficulties facing the job-hunting efforts of graduating students can be only partly attributed to an overloaded schedule of classes, and suboptimum career placement efforts, especially if one takes into account the challenging financial times of the University system nationwide, and of the nation as a whole.

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

Given the relatively recent establishment of this department (less than 30 years), its graduate program compares very favourably worldwide, and certainly it is arguably among the 2-3 best in Greece (certainly the best among their 4-year counterparts in the specific area of study).

- *Is the structure of the curriculum rational and clearly articulated? Coherent? Functional? Is the material for each course appropriate and the time offered sufficient?*

The structure of the graduate curriculum is certainly rational, coherent, functional, and clearly articulated. The per-course material content is appropriate, and the recently proposed reduction in the number of credit hours required for the M.Sc. degree is expected to shorten the sizeable delays incurred by most students' graduation time. As of October 2010, the graduate committee has started sending out notifications to students who have stayed for more than 3 years in the programme that they will be eliminated if they do not return to complete their studies within a year. This will considerably bring down the backlog, and drastically reduce graduation delays as soon as the 3-year maximum rule for M.Sc. studies is

enforced.

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

The available resources are marginally adequate given the number of students, the magnitude of teaching, research and funding activities, as well as the popularity of the subject matter, which is only expected to grow in the future. Increasing the number of government-funded teaching assistants is a must, in view of the fact that this graduate curriculum can truly benefit from additional laboratories and design projects.

RESULTS – *Graduate (M.Sc. and Ph.D.) Programmes*

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

Especially after recent updates of the curriculum, implementation of the predefined goals scores very highly, thanks to streamlining admission requirements at the M.Sc. and Ph.D. programs; through establishing yearly progress reports; by securing a steady level of external EU funding to support graduate students; in maintaining a high average of research productivity per faculty member (2 journal and 2.5 conference papers in high-quality venues); and through adhering to the requirement of upper bounding the number of Ph.D. students per faculty member (5).

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

Lowering the number of excessively delayed graduation time is an area of concern, common to all undergraduate and graduate curricula throughout the country. This delay will be reduced as the application of the 5 Ph.D.–students-per-faculty rule is expected to lower the number of stale cases or motivate faster graduation (to open up slots for newcomers). A second area pertains to monitoring and feedback from M.Sc. and Ph.D graduates, which has been partly dealt with by collecting limited data sets from a database, and involving the alumni association in the updates of the graduate program.

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

Points of failure have been understood and limiting factors have been identified, but for the most part have been justifiably attributed to the constraints, rules and regulations stemming from the lack of efficiency, agility, and prevention of University self-governance by the Ministry of Education.

IMPROVEMENT – *Graduate (M.Sc. and Ph.D.) Programmes*

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

Most of the means for improving the curriculum have been correctly identified.

- *Which improvements does the Department plan to introduce?*

The proposed directions for improving the graduate curriculum include:

(i)   monitoring and explicit incorporation of feedback from their graduates;

(ii)   revamping of M.Sc. areas of specialization in response to current trends in research and market demands;

(iii)   organization and better use of teaching assistants, creation of departmental scholarships and fellowships, as well as mobility of their faculty;

(iv)   consideration of developing a worldwide competitive program of graduate studies in Informatics and Telecommunications in English;

(v)   mechanisms to increase the probability of securing jobs to their graduates; and

(vi)   re-negotiation with the University administration to increase the percentage of overhead returned to the department.

B. Teaching

APPROACH

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

The Department uses traditional teaching methods as well as modern web-based teaching systems. The Department has developed several web-based teaching environments where the students can upload assignments, look up lecture notes, contact the teacher etc. In addition, the Department uses a video based system, where the lecturer has the option to allow his/her lecture to be broadcast to students or to a broader viewing audience and/or to be recorded for later viewing. About 40% of the lecturers agree to this and the students have the chance to catch up with any missed lectures.

The core courses which are addressed to large audiences are offered in parallel to subsets of students by two different lecturers, so the classes are of manageable size.

The student to staff ratio is significantly above the international norm. It may be calculated in various ways, depending on whether one counts the students that are registered but effectively withdrawn or not. Counting only the students that are active, i.e. the students that have been registered for less than or equal to 6 years, the undergraduate student to staff ratio is 1499 students to 42 members of staff (approximately 36:1).

There seems to be good staff-student collaboration, with the students mostly reporting that they were happy with the response they are getting from their teachers and the interaction they have with them. Several students stay in the Department after their graduation, for post-graduate studies. In addition, the final year project topics and the themes for Master theses that are offered are closely related with the research projects of members of the Department. A small fraction (about 20%) of the Master students benefit from this approach as they are also offered some grants for their contribution to the projects.

The high student to staff ratio in conjunction with the recent retirement of some support technical staff has caused problems in the running of the lab sessions of the courses. The students would have liked to have more courses with a lab component, but under the present staffing status this requirement is too difficult to meet. The lab infrastructure is adequate.

The department has two modern computing labs (one with Linux and one with Windows PCs), accessible to students freely from 9am to 9pm as well as after hours with the use of an access card. The labs are fully supported by technical staff from 9am to 9pm. The Department makes use of the large number of the Masters and Doctoral students it has to support teaching, either in the form of marking assignments or of invigilating (proctoring) exams.

As mentioned above, the department makes full use of information technologies for teaching, with several packages having been developed in house for this purpose. The students particularly mentioned very favourably the recent development of EVDOXOS, a system that allows the selection of textbooks for each course.

The examination system is the traditional one with exams offered for most of the courses twice a year. For some of the courses there is a strong lab/assignment component which counts for 40% of the final mark, with the remaining 60% coming from the written exam. The students expressed the desire for more courses like that, as well as the possibility to have the option to do the assignment component during the summer vacation. The Department recognises the benefits of continuous assessment for some courses and it is in its plans to move in that direction, the hindrance being the level of staffing for this task.

IMPLEMENTATION

The students were happy with most of the followed teaching procedures, the teaching material and available resources. In some cases there seems to be a difference in the emphasis given to the contents of a course by the two different lecturers that teach the two halves of the class in parallel, as well as in the number of assignments they offer. The students requested a better coordination between the two lecturers so that these discrepancies disappear. The regular revision of the course content of the undergraduate course allows its up-to-date content. In addition, the association of the final year project themes with the research interests of the lecturers allows the students to be in touch with recent advances in research. So, both undergraduate and postgraduate students benefit from the high research quality of the Department. However, it is difficult to keep upgrading the curriculum of the Master courses, as any change requires the approval of the Ministry of Education.

The Department tries to bypass these difficulties by enhancing the syllabus but also by offering to the students a series of seminars by prominent Greek and foreign researchers that educate them in the recent advances of their subjects.

Thus, there is strong linking between research and teaching and this is one of the strong points of the Department. At the same time, it creates the culture among some members of staff that the course a lecturer teaches has to be strongly linked with the research he/she does. This creates the feeling among the staff that certain courses cannot be withdrawn or replaced by others in the undergraduate level, because there is no staff qualified to teach a particular course. Such a feeling is not commonly found in Universities of other countries, where what one teaches to the undergraduate level may not be directly related to what one is doing research on.

The students are usually offered the option of one of a few recommended books for each course. There was a general consensus that one book usually does not cover the full breadth of the course and there was a clear requirement by the students to have access to all books. There is a library available to the students for this, but it happens to be located in a separate

building some distance from the Department.

There is a reasonable level of mobility of students and staff. For a start, several members of staff are involved in European research projects and this gives them (and to their PhD students and post-doctors) the chance to be in regular contact with Institutions in Europe. In addition, there is a sabbatical programme. During our visit two members of the staff were absent on sabbatical visits to Spain and to USA. Further, the Department has recruited many high profile researchers from abroad, with excellent contacts in top class Departments in the world. This allows the exchange of visits for students and staff. Finally, the Department participates in Erasmus exchanges and sends students to other Universities for extensive periods of time. As an example, in the year 2011-2012, thanks to collaborations with universities in Austria, Italy, France, Poland, Finland and the UK, 10 student visits are planned to corresponding Universities. This number could be higher given the number of students of the Department. However, the number of incoming students is too low to allow the fair exchange of labour with the partner institutions. In the year 2010-2011 there were only two incoming students, and this was rather high in comparison with other years. A basic reason for this is the language barrier. Students who have been abroad have clearly felt the benefits of the exchange and it seems that they offered to help the Department increase the incoming students by translating the lecture presentations and notes into English.

The Department has recently started a highly acclaimed Master course in Bioinformatics, which is thinking of internationalising by offering it in English. Similar thoughts exist for some of the other Master courses it offers. Such a move will clearly increase the international profile of the Department as a teaching place of excellence and it will help increase the mobility of the students.

The Department has implemented an on-line anonymous system of course evaluation. After the initial student mistrust and a few stages of refinement, the system now seems to have become more acceptable to the students. However, only 5-8% of the students complete the 15-questions long questionnaire. The problems might be several: possibly the inertia of the students to bother to do it; possibly that they do not think it will have any effect. The Department is now planning to move into a paper-based system that will be completed during class and invigilated by people not related with teaching, so the students feel totally safe to be frank in their comments.

RESULTS

The teaching practices of the Department are quite efficient. Several of the courses taught at the Master level are offered to more than one streaming directions. In addition, the use of information technology has streamlined many aspects of teaching. With the exception of Electronics, which seems to be considered a "difficult" course by students, the students felt that their courses were good and fairly examined, apart from some discrepancies mentioned above between parallel teaching to two halves of the class. The Department, however, suffers from a large number of stagnating students, i.e. students that were first registered more than 6 years ago (about 1000 in the undergraduate level and about 500 in the Masters level). The department recognises as the reasons for such low completion rates for the undergraduate level: (a) the volume and difficulty of the course content, and (b) the large number of students transferred from other universities with lower admission criteria, who come and find it difficult to cope with the course content. For the master level, the reason is thought to be the various distractions to the students by external factors, like work commitments etc.

IMPROVEMENT

The Department is currently is the process of revising its undergraduate syllabus so the volume of the taught material reduces (from 48 courses to 43), without compromising the quality of the degree. The Department unfortunately cannot do anything to control the number of incoming students, as this is controlled directly by the government.

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?*

The department has a well-defined policy of research striking the desirable balance between fundamentals, analytical and applied subjects. Such an effort is well organized thanks to the creation of research areas and within these areas research teams which put together more than one faculty working in connected fields. This is mostly guided from the curriculum structure organized into three main directions, each comprising elective courses. Such a clustering of research activities parallels the ongoing research activities of individual faculty. The main objective is research work of excellent scientific quality supported by external funding sources through a peer-reviewed, competitive process.

- *Has the Department set internal standards for assessing research?*

Standards for students have been set through the graduate programme (M.Sc. and Ph.D) as well as for faculty members throughout their appointment and promotion process.

IMPLEMENTATION
- *How does the Department promote and support research?*

During the visit, it was felt that the overall atmosphere of the department was conducive to excelling in research. Testament to this extent, is provided by the fact that most of the recent openings were filled by internationally known researchers. In addition, the University recently returned a percentage of grant overheads to the Department that will be hopefully used to support graduate research instead of infrastructure-related projects such as the Reading Room, which was supposed to be constructed using State funds.

- *Quality and adequacy of research infrastructure and support*

It seems that there is limited infrastructure support for research at the department. This was observed in a couple of instances. For example, there is no dedicated person helping with grant preparation, negotiation, signing and follow up. This is somewhat unexpected for a research and funding programme of this magnitude.

- *Scientific publications*

The Department takes pride in high-quality and high-impact publications in the general areas of theoretical/applied Informatics and ECE-Systems.

- *Research projects*

The research projects are diverse. The historically first projects were mainly on infrastructure, mostly funded by the Greek government from the beginning to the middle of the last decade towards standardizing practices in the IT sector in Greece. Subsequently, most projects were funded from Greek Research and EU Programmes. Part of the EU funding comes from projects with less basic research components, which are not conducive to high-quality Ph.D. research.

- *Research collaborations*

There are three types of research collaborations observed at the department. The first type pertains to intra-sector research; the second involves collaborations between individual

faculty and their past advisees participating in EU projects. The last type consists of formal collaborations between the department and other international institutions (like INRIA).

RESULTS
- *How successfully were the Department's research objectives implemented?*

Even though research areas are well-clustered and poles of excellence are present in the department, it seems that the research success is mostly due to the ambition of the individuals rather than the synergies between them (which eventually could have even greater impact). Certain intra-sector collaborations do exist, but inter-sector collaborations are rather limited.

- *Scientific publications*

Albeit non-uniform across faculty members, the average number and quality of the publications are excellent. The faculty publishes in both top conferences and journals of the corresponding domains including flagship journals (e.g., NATURE). Furthermore, the impact of the department is significant across areas as demonstrated from the number of citations. There is certain variation in terms of quantity across research areas mostly due to the nature of domains.

- *Research projects*

The department has been very successful in securing funds for infrastructure, national and EU-research. The source of funding for infrastructure comprises support for network and e-services. The second source of funding, which has gradually grown to become the most important one, comes from the EU. The department has been very active in this direction and was able to replace the infrastructure source - that was the dominant one at the beginning of its existence - with EU funding, which includes numerous Future Emerging Technologies (FET) projects that are highly selective, and desirable (over those putting emphasis on mundane deliverables) because they can support quality Ph.D. theses. The last funding source consists of research support for PhD candidates and Post-doctoral associates through competitive Greek programs (PENED/IRAKLEITOS). Here too, the department performs very well. On the other hand, such programs impose constraints on the duration of the PhD studies, which in certain cases compromises the quality of the doctoral work.

- *Research collaborations*

Through the individual professors' motivation and portfolio, the department has a solid track record in scientific collaborations.

- *Efficacy of research work. Applied results. Patents etc.*

The faculty members have patents granted although no evidence was provided as to whether they have been licensed. The committee observed a number of technologies with strong potential for commercialization.

- *Is the Department's research acknowledged and visible outside the Department? Rewards and awards.*

The department has outstanding excellent visibility world-wide. In its discipline, it is ranked well above the average ranking of the mother-University and is the best nationally among 4-year programs in Informatics. This is due the academic record and the high reputation of most faculty members, their professional activities, and their distinctions (IEEE/ACM Fellows, etc). In addition, the department includes two ERC-starting grant laureates (considered to be the most prestigious individual grant at the EU level) that is an outstanding

achievement and puts the department among the top in Europe with respect to this criterion.

IMPROVEMENT

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

The Department is in the process of having yearly progress reports of Ph.D. students, and introducing a form of examination at the end of the first year of research.

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).*

The administrative services, including secretarial and technical support are offered with professionalism covering the needs of both the academic staff and the students. Also, the number of personnel in support of these duties seemed appropriate. A number of positions were filled by over qualified personnel (3 with PhDs, 1 in secretarial support, and 2 in technical support).

The Department takes very seriously the services provided to students with special needs housing in its premises an office dedicated to that. Particularly impressive is the offer of brail services and high technology access to the web services for blind students.

Further the Department supports the network infrastructure and services for the whole University.

- *Does the Department have a policy to simplify administrative procedures? Are most procedures processed electronically?*

The support of undergraduate students via electronic services seemed to be working satisfactorily and adequately, as indicated by all parties involved, academic staff, students, and secretarial personnel. However, this is not the case for the support of graduate students where e-services are somewhat limited, including the paper-based processing of the application forms, registration, and related services.

- *Does the Department have a policy to increase student presence on Campus?*

Even though such a policy is not in place, the Department has made efforts to increase the presence of students on campus, for example through the recent opening of the reading room with 130 work positions.

Quite impressive even at an international level are the University-wide efforts to provide services to students with special needs and facilitate their presence on campus.

IMPLEMENTATION

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

The organization and infrastructure of the Department's administration - secretariat of the Department - seemed to be working smoothly and effectively. The personnel have a clear understanding of the services that they have to offer. However, the structure and job description of the Department's administration – technical personnel was not sufficiently well defined.

- *Form and function of academic services and infrastructure for students (e.g. library, PCs and free internet access, student counseling, athletic- cultural activity etc.).*

The Department is to be highly credited for its recent opening of the reading room that was funded exclusively from Departmental own funds. The reading room in addition to its numerous positions has wireless internet access, electronic access to journals, and has the potential to include loaning journals and books. Also the Department has two lab spaces one unix based and one windows based with an adequate number of machines.

The Department has adopted and uses the student's personal academic advisor (tutor) concept for both the undergraduate and graduate students. Students are requested to meet with their advisors at least once in the beginning of each semester. However, it seems that the students do not take advantage of this service.

Athletic facilities are available in close proximity to the Department. Moreover, the buildings were clean, and they included clean and fully supplied toilets.

RESULTS

- *Are administrative and other services adequate and functional?*

Administrative and technical services are highly adequate and functional, and these are offered by well-qualified personnel in almost all cases as mentioned earlier.

- *How does the Department view the particular results.*

The Department is doing its best in supporting these activities.

IMPROVEMENTS

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

The Department has been working towards web-based services for the graduate programmes (M.Sc. and Ph.D.).

The Department is to be credited for its digital services, and to students with special needs offered for the whole University.

Collaboration with social, cultural and production organizations

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

Members of the very active professionally in a wide spectrum of professional organisations, associations and governmental bodies (ACM, IEEE,EURASIP, Greek Ministry of Economics, Greek Ministry of Internal Affairs, etc).

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.

An existing inhibiting factor coming from the **State** has to do with the transfer of students to the Department, from other departments across the country. This has two consequences. First, the number of students ends up being twice as much as the number of students which the department was designed for. Second, and most important, the level of the students admitted through transfers is considerably below the level of the students that passed the entrance examination.

In an ideal situation, the State could recommend to the Department a number of candidate transfer students but the Department should be given the final responsibility of admitting the students or not.

Another inhibiting factor is coming from the **Institution**, and specifically in the way it treats the overhead from the sponsored research programs. In an ideal situation, there would be no problem. However, the Department of Informatics and Telecommunications brings a substantial portion of the overall research funding in the whole university. As a result, the Department is subsidizing a large number of different departments.

By increasing the amount of the overhead funds that the University returns to the Department, the Department may be able to increase the quality of teaching by increasing substantially the number of laboratories in the core courses.

A final inhibiting factor stems from the **Department** itself, and has to do with their self perception as well as their scientific and technological predispositions. Although they are one of the best departments in the country, they do not resemble modern departments in research universities across the globe, because they are a hybrid development, representing an amalgam of Informatics (Computer Science – CS) and Electrical and Computer Engineering (ECE - Systems). More specifically, the Department comprises three sectors, A, B and C. Sector A represents (theoretical) Computer Science (10 faculty members), B represents Information Systems

(a): The Department today

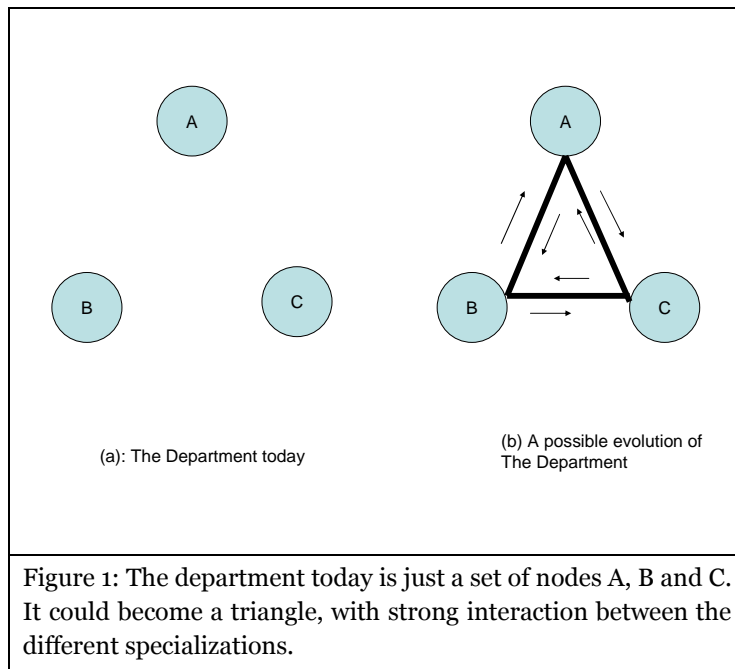(b) A possible evolution of The Department

Figure 1: The department today is just a set of nodes A, B and C. It could become a triangle, with strong interaction between the different specializations.

(16 faculty members) and C represents the ECE –Systems component, namely signal/image processing, telecommunications and networking (16 faculty members).

Clearly, the Department has several options for growth. Its dual character as a CS and ECE-Systems teaching and research unit could prompt further growth either toward the CS or the ECE direction. In terms of CS, the Department is already nicely positioned, since most of the critical areas are covered. A possible area of CS growth could include Computer Vision, Speech and Language Processing. As far as ECE-Systems is concerned, rather than pursuing growth in traditional engineering areas (in a relentless effort to compete with 5-year Engineering programmes), it is prudent to invest on gluing thrusts to enhance cross-

collaboration and complement existing strengths in areas of paramount importance. Those include: (a) Information Theory; (b) Optimisation Theory; and (c) Robotics. The first two are on fundamental principles underpinning all basic areas in Informatics and Engineering, whereas the third offers exemplars of integrating analytical and applied disciplines of the Department.

Figure 1 depicts two views of the Department, one today and the other envisioned in the proposed strategic plan. Currently, the Department really consists of A, B and C. In the future however, the Department could be seen as a triangle ABC, with interaction happening between A and B, A and C and between B and C. This interaction is in sync with interdisciplinary research and funding trends that are popular in recent years nationally and internationally.

A milestone for the future could be the development of the cross-disciplinary/cross-departmental M.Sc. programme on Informatics in Medicine/Biology into a profit making platform attracting participants from Europe, the Middle East and South East Asia.

Another important goal is to revise the curriculum towards a more hands-on approach with considerably fewer courses that are enriched by the appropriate laboratory experiences. The Department could provide incentives for the creation of such new courses.

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

Recommendations for Curriculum – *Undergraduate Programme*

The Department is planning to restructure the undergraduate programme of studies, by taking into consideration the ACM/IEEE curricula guidelines. The Committee thinks that this is one of the most important actions that the Department can take in the short-term. We recommend that, in the new curriculum, the lab component of both the compulsory and the elective courses is significantly increased (this would require additional resources in both manpower and equipment). Also, the enforcement of course pre-requisites could be taken into account. Moreover, the new curriculum has to be structured so that the students are exposed to a more uniform workload.

Recommendations for Curriculum –*M.Sc. and Ph.D. Programmes*

1) Consider forming a set of B.Sc./M.Sc. "mezzanine-level" courses that can be taken both by undergraduate as well as by graduate students, which will provide opportunities for undergraduates to "taste" research problems, and also accelerate the graduation time towards their M.Sc. diploma.

2) Explore the possibility of offering basic M.Sc. options without theses (courses-only to replace the pass/fail M.Sc. report option), which may also prove helpful in reducing the number of M.Sc. students enrolled but not graduating after 3-4 years.

3) Transfer certain M.Sc. courses and possibly add new advanced courses to the

Ph.D. curriculum, which will reduce the M.Sc. program load and also enrich the curriculum of Ph.D. students with a number of courses prior to, or in parallel with, their dissertation research.

4) Institute a (written or oral) qualifying exam for doctoral studies (given once or twice per year), which will further serve not only as a means of filtering out less qualified Ph.D. students, but also enable accepted Ph.D. students to review pertinent background courses prior to commencing with their research topic. To this end, consider extending the thesis proposal to the 18th month of the Ph.D. programme.

5) Ensure tangible input from alumni, and possibly from an *external advisory board*, offering feedback from student placement and needs of the market.

6) Institute mechanisms and create funding opportunities (perhaps through the income coming from increased percentage of overhead returned from the University and tuition fees from the Continuing Education program) for graduate student internships, attendance of M.Sc. and Ph.D. students to international conferences, and rotating research staff to top-caliber research groups worldwide, which will certainly boost visibility and research experiences. In general, pots of "soft money" available to the Department should be used for efforts such as enriching the graduate programme, while funds from the Ministry of Education should be those charging infrastructure-related expenses such as those spent for the Reading Room.

7) In an effort to reduce the inflation of (at least partially overlapping) cross-disciplinary/cross-departmental M.Sc. programs throughout all Greek Universities, and thus improve utilization of the resources spent into those (teaching manpower and funding), consider for instance absorbing the one on "Microelectronics" into the basic M.Sc. areas of specialization, while strengthening the one on "Informatics for Medicine and Biology," which truly leverages the unique strengths of the Department and the University as a whole, and also promises to thrive in the decades to come.

8) Most importantly **(towards the Ministry of Education)**, institute self-governance of the Universities, and let the free market shape up graduate programs through intellectual competitiveness. In addition, increase the number of government-funded teaching assistantships and scholarships. Finally, develop a *regular* program for national funding opportunities, and *minimize delays* in deciding and funding awarded grants, which adversely affect support of graduate students.

Recommendations for Teaching

To the Department

It is recommended that lecturers who teach the same course to two halves of the class, coordinate their material of teaching and the labs and assignments they give to the students, so that the students feel that both halves are equally treated in terms of course content and workload.

One complaint the students had about teaching was that there is no formal mechanism to report problems with sub-optimal instruction. The student's advisor scheme does not seem to work, as the student does not feel comfortable and immune to repercussions to personally and individually reporting such cases. On the other hand, the course appraisal system,

happening at the end of the course seems irrelevant to the students who have just had the experience of the sub-optimally performed instruction. A possible solution is to establish a "staff-student liaison committee" with minutes kept, where student representatives can report problems and actions are taken to close the loop.

The issue about the availability of all course books to the students via the library may be easily resolved by making all books available for reading in the recently established reading room of the Department.

When discussing with students, it was expressed that they had a sense of not "belonging to" or "sufficiently respected by" the Department. It is obviously important for the students to feel part of the Department. This maybe achieved with Departmental initiatives in collaboration with the student union for an "end of year" barbecue in the forecourt of the Department, where students and staff will participate. One of the committee members felt that it may be a good idea for various Department areas/facilities (such as lounges, kitchens, and bathrooms) to be commonly used by students and staff – a possibly effective gesture that may strengthen the student-Department bond.

It is suggested that the video of the lectures may be used to improve the teaching techniques of faculty members in individual consultation with education experts.

The general knowledge courses (concerning project management and EU policies, etc.) offered to undergraduate students should be made compulsory to Ph.D. students.

To the University

There seems to be a large enough number of academics that can easily cover all the needs of the department in teaching both lecturing and lab work. However, a large fraction of the academics' life seems to be taken by administrative work that could easily be done by administrative staff, if the right authority were given to them. For example, teaching room allocation, time-tabling etc seem to require the overseeing if not the direct work of a member of staff. The justification is that unless it is a member of the staff that oversees these activities, other members of the staff will not adhere to the decisions. This is a culture that the University might seek to change, if it vests enough authority to administrative personnel. We estimate that about 80% of the work of the "Λογοθἐσια" may be done by administrative staff. This way, valuable staff time will be liberated to allow academics to do real academic duties like exam invigilation and lab supervision. This way, work done in the lab of each experiment will be fully integrated with the students' teaching experience on each course, as it will be an integral part of the lecturing component. Further, issues of lack of lab specialised staff will be removed. The exam will be freed from conflicts of interest.

To the Government

The problem of inadequate teaching-related resources is largely caused by the inability of the Department and the University to control their own number of incoming students. It is recommended that each Department is allowed to control the number of accepted students per year and be proportionally funded by the government, to the level that the Department will have commensurate incentive to accept as many students as it can cope with, without over-stretching its resources.

<u>Recommendations for Research</u>

To the Department

The department has to create mechanisms to promote collaborative research among faculty

across different sectors, possibly including partners from the industry.

Visibility of faculty research as well as diversity of graduate student experience could be enhanced by strengthening their mobility to top-quality research groups world-wide in the form of regular visits during the course of their research. One possible avenue to this end, is to explore possibilities with the EU - Mundus programme.

Contrary to the status quo of in-breeding present in Greek academia, the department has done for the most part, a good job in hiring faculty members of quality exceeding the departmental running average. This should be continued to minimize in-breeding and consider filling the following existing research gaps: a. Information Theory, b. Optimization Theory, and c. Computer Vision which leverages the unique strengths of the department in Informatics and ECE-Systems.

To the University
The department/university could strengthen efforts towards technology transfer and commercialisation, for example through an incubator which could facilitate setting up start-up companies and linkages with industry partners interested in commercializing faculty-generated research.

It is recommended for the University/School to consider hiring accountant personnel to offer pre-proposal and post-award support to individual faculty investigators.

Recommendations for All Other Services

Administrative

- Evaluation of secretarial personnel and services (currently in place but not followed)
- Designated secretarial support for the Departmental Chair
- Evaluation of technical support personnel and services (currently in place but not followed)
- Job descriptions needed for technical personnel
- Organisational structure needed for technical personnel.

Academic

- Inclusion of Departmental/School/University service provided by faculty members as a performance metric in their yearly reports, and promotion cases.

e-Services

- Provision of electronic services to M.Sc. and Ph.D. students, including application forms, and registration.

The Members of the Committee

Name and Surname   Signature

1. Prof. Yiannis Aloimonos, University of Maryland, USA   *President*

2. Prof. Georgios B. Giannakis, University of Minnesota, USA

3. Prof. Constantinos S. Pattichis, University of Cyprus

4. Prof. Maria Petrou, Imperial College, UK

5. Prof. Nikos Paragios, Ecole Centrale de Paris, France