



ΕΛΛΗΝΙΚΗ ΔΗΜΟΚΡΑΤΙΑ

HELLENIC REPUBLIC

**Α.ΔΙ.Π.**

**H.Q.A.**

ΑΡΧΗ ΔΙΑΣΦΑΛΙΣΗΣ & ΠΙΣΤΟΠΟΙΗΣΗΣ ΤΗΣ  
ΠΟΙΟΤΗΤΑΣ

HELLENIC QUALITY ASSURANCE AND  
ACCREDITATION AGENCY

ΣΤΗΝ ΑΝΩΤΑΤΗ ΕΚΠΑΙΔΕΥΣΗ

## **EXTERNAL EVALUATION REPORT**

DEPARTMENT OF MATHEMATICS

ARISTOTLE UNIVERSITY OF THESSALONIKI

Version 1.0

October 2011

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### External Evaluation Committee

The Committee responsible for the External Evaluation of the Department of Mathematics of the Aristotle University of Thessaloniki consisted of the following five (5) expert evaluators drawn from the Registry constituted by the HQA in accordance with Law 3374/2005 :

1. Professor Manoussos Grillakis (President)  
(Title) (Name and Surname)

Department of Mathematics, University of Maryland, College Park, MD, USA  
(Institution of origin)

2. Professor Stavros Garoufalidis  
(Title) (Name and Surname)

School of Mathematics, Georgia Institute of Technology, Atlanta, GA, USA  
(Institution of origin)

3. Professor Yannis Manoussakis  
(Title) (Name and Surname)

Department of Computer Science, University Paris-Sud, Orsay, France  
(Institution of origin)

4. Professor Yiorgos-Sokratis Smyrlis  
(Title) (Name and Surname)

Department of Mathematics & Statistics, University of Cyprus, Nicosia, Cyprus  
(Institution of origin)

5. Professor Nikos Stylianopoulos  
(Title) (Name and Surname)

Department of Mathematics & Statistics, University of Cyprus, Nicosia, Cyprus  
(Institution of origin)

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

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

## **Introduction**

### I. The External Evaluation Procedure

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

### II. The Internal Evaluation Procedure

Please comment on:

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

The Committee arrived in Thessaloniki on October 10<sup>th</sup>, 2011, and was welcomed by the Chairman Prof. G. Tsaklidis and the Vice-Chairman Prof. A. Siskakis. Soon after, the Committee had an introductory meeting with Vice-Rector Prof. D. Lialiou. Next, the Committee was brought to the Department of Mathematics where a brief introduction by the Dean of the Faculty of Sciences Prof. S. Pavlidis and the Chairman of the Department was followed by a presentation of the Sections, the Programs and the Internal Evaluation Committee (OMEA) of the Department.

The presentation consisted of:

- Statistical analysis of the report of the Internal Evaluation Committee (OMEA) by Prof. A. Papistas.
- Presentation of the Undergraduate Program (IIIΣ) by Prof. P. Moyssiadis.
- Presentation of the ERASMUS program by Prof. Th. Theochari.

On October 11<sup>th</sup>, the presentation was continued with the following topics:

- Presentation of the Section of *Algebra, Number Theory and Mathematical Logic* by Prof. Th. Theochari.
- Presentation of the Section of *Mathematical Analysis* by Prof. D. Betsakos.
- Presentation of the Section of *Geometry* by Prof. S. Stamatakis.
- Presentation of the Section of *Numerical Analysis and Computer Sciences* by Prof. N. Karampetakis.
- Presentation of the Section of *Statistics and Operations Research* by Prof. N. Farmakis.

Next, the Committee visited faculty members individually. The Committee also visited administrative staff and computer laboratories for undergraduate and graduate instruction. In the afternoon, the presentation was continued with the following topics:

- Presentation of the Graduate Program by Prof. H. Charalambous.
- Presentation of the specialization in *Pure Mathematics* by Prof. H. Charalambous.
- Presentation of the specialization in *Theoretical Information and Theory of Control and Systems* by Prof. A.-I. Vardoulakis.
- Presentation of the specialization in *Statistics and Mathematical Modeling* by Prof. A. Papadopoulou.
- Presentation of the Graduate Program in *Web Science* by Prof. I. Antoniou.

After these presentations, the Committee had an acrimonious “discussion” with approximately five undergraduate students, followed by a productive discussion with approximately twenty undergraduate students of the Department of Mathematics. Next, the Committee had a joint meeting with approximately ten M.Sc. students and Ph.D. candidates of the Department of Mathematics. On October 12, the Committee met individually and held discussions with faculty members from all Sections of the Department. In addition, there was a presentation of the library services and of the Network Operations Center. Finally, there was a brief visit to the library servicing the Mathematics Department.

The Committee examined the following items:

- Internal evaluation report.
- Student guide of undergraduate and graduate studies.
- ECTS guide.
- Statistical data concerning the ERASMUS program.
- A sample of undergraduate textbooks: Linear Algebra, Introduction to Geometry, Analytic Geometry, Introduction to Metric Space Topology, Introduction to mathematical theory of signal, systems and control, etc.
- Student evaluations.
- Sample of Masters and Ph.D. theses.
- Budget of the Department for the last eight years.
- A report of the Section of *Numerical Analysis and Computer Sciences*.
- Curricula vitae of the faculty.
- Budget of the Graduate Program in Web Science.

The documents provided are appropriate. The quality and completeness of the evidence reviewed and provided was excellent. Indeed, the Department made a commendable effort to cooperate with the External Evaluation Committee. The Department made a serious effort to produce an adequate internal report.

## **A. Curriculum**

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

### APPROACH

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

The goal of the undergraduate Curriculum is to provide a solid education in Mathematics. The Masters program aims in the dissemination of knowledge and research in Mathematics and its applications. The target of the Ph.D. program is to promote research and produce research scientists in Mathematics and its applications with international standards.

The objectives were decided by the general assembly of the Department. Overall, the Committee feels that appropriate standards were met.

The curriculum is indeed consistent with the Curriculum.

The curriculum was approved by the General Assembly of the Department of Mathematics.

To this Committee's knowledge, the Department has not set a procedure for curriculum revision.

### IMPLEMENTATION

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

Given the dramatic reduction in size of the faculty during the last three years (27 from 43 with 5 pending appointments) and the size of the student body (1106 current students and 1780 students past the fourth year of studies), the faculty makes a commendable effort to service the courses in their program.

The Committee feels that the undergraduate curriculum is somewhat outdated and in need of serious and thorough revision. Concerning the graduate program on Web Science, the Committee feels that it is in need of more substance.

Within its context, the structure of the curriculum is rational and clearly articulated.

The curriculum is coherent. However, its functionality is compromised due to the lack of registration deadlines, lockouts, and the huge student to faculty ratio.

The Committee believes that the material and the time offered were appropriate.

The Department has indeed qualified members. However its size is inadequate. See comments above.

#### RESULTS

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

The implementation achieves the Department's goals and objectives to certain extend. This is due to the fact that the Department is seriously understaffed with a very large number of students, both current and past. In addition, the infrastructure is antiquated and insufficient. A good number of members of the Department understand the achievements as well as the failures of the program.

#### IMPROVEMENT

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

Due to structural problems, caused by segmentation of the Department in Sections, there is a divergence of opinions.

There are no current plans because the Department expects the implementation of the new law concerning the Universities to take effect.



## ***B. Teaching***

### APPROACH:

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

Please comment on :

- Teaching methods used
- Teaching staff/ student ratio
- Teacher/student collaboration
- Adequacy of means and resources
- Use of information technologies
- Examination system

The teaching method is the traditional one consisting of lectures complemented by recitations. The total time devoted to each course varies from three to five hours. In some graduate courses, the instruction has the form of a series of seminars.

The instructor to student ratio varies widely and is especially large for introductory required courses.

The faculty has regular office hours.

Certain resources (such as textbooks and e-notes) are widely and freely available. Other resources (such as computers, classroom infrastructure) are inadequate.

Information technology is used to some extent, but it is not used to its full potential. For example, there are some Wi-Fi hotspots, and the students have access to electronic library and registration services.

In the majority of the undergraduate courses, there is a single final exam which determines the overall grade. This is administered in two successive examination periods. On the graduate level, there is a variety of student evaluations combining projects, homework and exams.

### IMPLEMENTATION

Please comment on:

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

As can be seen from the above comments, the teaching procedure is traditional with room for improvement.

In general, the course material/textbooks is of good quality. However certain textbooks need to be brought up-to-date. The majority of the textbooks are Greek in origin and there is a need to broaden their educational horizons. We also saw textbooks of exceptional quality.

The department participates in the ERASMUS program. However the participation is limited since a small fraction of the faculty is involved and a miniscule part of the student body participated. During the academic year 2010-11, 8 students left and 3 visited.

The Department instituted recently a system where the students evaluate teaching and course content.

## RESULTS

Please comment on:

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

The efficacy of teaching is somewhat compromised given the remarks made previously. The Department admits approximately 150 students through regular entrance exams. This number is approximately doubled through other admitting procedures. Both these numbers are not controlled by the Department. About 200 per year graduated during the last three years. Of the above 200 students, about 160 graduated in four years. The Department is well-aware of the reasons for these results.

## IMPROVEMENT

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

No.

The Department awaits the new University Law to take effect.

## **C. Research**

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

### **APPROACH**

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

The Department's policy is to cultivate and propagate research in areas of Mathematics and its applications.

Besides the obvious method of counting publications and announcements, the Department assesses the quality of research using the number of non self-citations via MathSciNet, Google Scholar and the Web of Knowledge.

### **IMPLEMENTATION**

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

The Department has very small internal funding to support travel to meetings.

Apart from the adequacy of the library, there is very little other infrastructure to support research.

With the exception of the Sector of Geometry, the other sectors have research programs. A substantial number of them are through the European Union.

Faculty members have national and international collaborations on an individual basis.

### **RESULTS**

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

The Committee thinks that about 40% of the faculty members have a record of publications from good to excellent, and that at least a third of the faculty members have an inadequate publication record. However, the Department does not have an internal mechanism to

assess and reward research. There is a need to take seriously into account the research in the evaluation, promotion and hiring of faculty members.

With the exception of the Sector of Statistics and Operations Research, the Committee was able to verify the citations quoted in the internal evaluation report and the presentation through MathSciNet, Google Scholar and the Web of Knowledge.

Although some faculty members have international collaborations, the Department needs to increase its visibility abroad.

#### IMPROVEMENT

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

To the best of the Committee's knowledge, there is no mechanism of support and improvement 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).
- Does the Department have a policy to simplify administrative procedures? Are most procedures processed electronically?
- Does the Department have a policy to increase student presence on Campus?

The Department views positively the various services provided to the academic community. However, the Departmental Library is seriously understaffed.

The Department has a policy to provide and encourage electronic access to services.

To the Committee's knowledge, the Department does not have a policy to increase student presence on Campus.

**IMPLEMENTATION**

- Organization and infrastructure of the Department's administration (e.g. secretariat of the Department).
- Form and function of academic services and infrastructure for students (e.g. library, PCs and free internet access, student counseling, athletic- cultural activity etc.).

The Department has 6 secretarial staff for its general services, 2 secretarial staff for the administrative needs of the sections and 6 other members for the library, computer labs and mail-room services.

**RESULTS**

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

The administrative and other services are adequate, but are in need of restructuring. This Committee noticed that the posted hours of the general Secretariat of the department are 12-1 pm.

**IMPROVEMENTS**

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

The Department wants to convert all student records and registration fully electronically. The Department is in the process of doing so.

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

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

The Committee has no comments on this question.

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

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

Please, comment on the Department's:

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

Within AUTH, the School of Mathematics is a tiny department servicing a disproportional large number of students. The faculty to student ratio for the Department is 1:40 whereas for the entire university is 1:15. A consequence of this is the large number of students registered for certain courses, creating attendance and organization problems.

The infrastructure (i.e., buildings, equipment) is outdated and in need of improvement. This situation is exacerbated by the lack of funding.

There is no communication and coordination at a pedagogical and research level (for example, service courses) between the School of Mathematics and other departments in AUTH. Regrettably, this is a general phenomenon in Greek universities.

The present examination system is counterproductive and a burden to both students and faculty.

Apart from a tiny minority, the students do not take advantage of opportunities for international mobility.

There is a lack of organization concerning registration information, dates and deadlines that creates chaos in university life.

The current uncertainty concerning the governance and financing of the University at large does not permit long term planning.

Presently the University is in turmoil due to social unrest and the Department is unsure about its future.

## ***F. Final Conclusions and recommendations of the EEC***

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

Conclusions and recommendations of the EEC on:

- the development of the Department to this date and its present situation, including explicit comments on good practices and weaknesses identified through the External Evaluation process and recommendations for improvement
- the Department's readiness and capability to change/improve
- the Department's quality assurance.

AUth is the major university in northern Greece. As such, it should be a centre cultivating and promoting teaching and research. Towards this goal, the Department of Mathematics should play a major role. Nevertheless, the number of faculty is very small and burdened with heavy duties. The Committee realizes that faculty is making a heroic effort to meet their obligations.

The undergraduate program needs a thorough revision. In particular:

- Courses need to be updated and streamlined. For example, the textbook for the required courses in Analytic Geometry I, II was first published in 1976 and was last updated in 1984. Another example, the required courses from the Section of Statistics and Operations Research include some rather specialized topics such as (a) Stochastic Strategies, (b) Mathematical Methods in Operations Research, and does not include a course in Stochastic Processes.
- This revision has to be a collaborative effort among all members of the Department in order to avoid duplication of content.
- A judicious selection of prerequisites should be an integral part of the revised curriculum.
- Once a well-thought and thorough curriculum is in place, the faculty should adapt to it instead of the other way around.
- Required courses should be made available for teaching to all members of the Department.
- The Department should offer a selection of elective courses geared towards students interested in secondary education.

Concerning the Masters and Ph.D. programs,

- Perhaps a better coordination between faculty and students regarding funding opportunities is needed.
- Regarding the Web Science Masters Program, there is a need of courses with more mathematical and technological substance and depth. Moreover, the mathematical content should be adapted to the particular object of study. The present structure of instruction with multiple lecturers is somewhat dubious and fits more to the idea of a seminar than a regular course. Some of the courses should have a more traditional style of instruction. Perhaps it will help if a number of elective courses in the undergraduate curriculum are geared towards this particular subject of study.

Regarding teaching,

- The current evaluation method with a single final exam at the end of the course is counterproductive. A better method of student evaluation is through regular in-class examinations and homework projects. In this aspect, a better use of technology should be of help.
- The Department should take advantage of every opportunity to reduce the number of inactive students.

Regarding research, hiring and promotions,

- The Department should institute and follow more rigorous standards regarding hiring and promotions.
- For the long term health and survival of the Department, inbreeding should be avoided at all costs.
- The Department should institute a culture and a long term goal in which regular research production and publications in recognized journals is expected from every faculty member.
- The Geometry group is seriously endangered. This is a delicate problem which can only be resolved through collaboration of the Department as a whole.

Regarding the department governance and organization,

- With the exception of a 4-year period, since 1982, the chairman of the Department has been a member of the group of Statistics. This Committee feels that the chair should rotate among all department groups.
- The general Secretariat should have regular hours for students, at least 5 hours a day. Moreover, the secretariat is in need of reorganization.
- The academic schedule and other pertinent information and material should be ready and available to the students well in advance of the start of each semester.
- The current system of examinations which last for 4 weeks per period, totalling 3 months per year, should be drastically shortened.



The Members of the Committee

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