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HELLENIC REPUBLIC

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Accreditation Report

for the Undergraduate Study Programme of:

Mathematics

Institution: National & Kapodistrian University of Athens

Date: 20 June 2020

Ευρωπαϊκή Ένωση
Ευρωπαϊκό Κοινωνικό Ταμείο

Επιχειρησιακό Πρόγραμμα
Ανάπτυξη Ανθρώπινου Δυναμικού,
Εκπαίδευση και Διά Βίου Μάθηση
Με τη συγχρηματοδότηση της Ελλάδας και της Ευρωπαϊκής Ένωσης

ΕΣΠΑ 2014-2020

enqa.

Report of the Panel appointed by the HAHE to undertake the review of the Undergraduate Study Programme of **Mathematics** of the **NKUA** for the purposes of granting accreditation

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PART A: BACKGROUND AND CONTEXT OF THE REVIEW

I. The External Evaluation & Accreditation Panel

The Panel responsible for the Accreditation Review of the Undergraduate Study Programme of **Mathematics** of the **NKUA** comprised the following four (4) members, drawn from the HAHE Register, in accordance with Laws 4009/2011 & 4653/2020:

1. **Prof. Alekos Vidras (Chair)**
   University of Cyprus, Nicosia, Cyprus

2. **Prof. Basilis Gidas**
   Brown University, Providence, Rhode Island, USA

3. **Prof. Alex Himonas**
   University of Notre Dame, Notre Dame, Indiana, USA

4. **Prof. Nikolaos Stylianopoulos**
   University of Cyprus, Nicosia, Cyprus

II. Review Procedure and Documentation

The External Evaluation & Accreditation Panel (henceforth: EEAP) conducted the accreditation evaluation of the undergraduate program of mathematics of the NKUA (henceforth: program) during the period 15-16th of June 2020. Due to the Covid-19 pandemic, EEAP could not visit the site physically, but conducted the accreditation evaluation via Zoom teleconferencing. From June 17th- 20th the EEAP prepared the report using Zoom teleconferencing meetings. On Thursday, June 12th, EEAP attended a Zoom teleconference briefing by HAHE's General Director Dr. Christina Besta, during which the procedures and rationale for the accreditation were outlined and explained. Afterwards, Dr. Besta' s presentation was sent to the EEAP members.

The EEAP members received in advance from HAHE the following documentation and supporting material:

1. Guidelines for accreditation, created by HAHE
2. The mapping grid, created by HAHE
3. A tabulation (prepared by HAHE) of the scores of the department regarding the quality indexes for the years 2015 – 2018
4. The accreditation information prepared by the department
5. A set of annexes to the accreditation proposal, including the study guide, course descriptions, etc.
6. Statistical data regarding the department and the specific program of studies
7. The Quality Assurance policy of the specific program of studies
8. A set of documents presenting quality indicators both for the department and the program
9. The report of the 2012 external evaluation conducted by HQA for the program
10. The results of the internal evaluation of the program

The EEAP also had access to links of the University and departmental websites, including the 2012 External Evaluation of the department. In addition, during the virtual on-site visit, the Department Head Prof. Apostolos Burnetas provided additional materials (electronic versions of power-point presentations prepared and presented by the department, selected undergraduate exams, problem sets and their solutions).

On Monday, June 15, the EEAP met the Vice Rector for Academic and Students Affairs /Vice-President of MODIP Prof. S. Papaioannou, and the Head of the Department of Mathematics Professor A. Burnetas. Subsequently, the Head of the Department introduced the members of OMEA and MODIP and gave a brief presentation, focusing on (a) the history and structure of the department, (b) teaching, (c) research, and (d) outreach activities and other matters related to the program. Discussion followed with emphasis on the revised program of studies that the department has implemented in the last few years as a result of the previous departmental external evaluation of 2012. The same day (Monday June 15), the EEAP had a series of teleconference meeting with departmental personnel, including:

1. The administration unit of the department
2. Members of teaching staff

3. Representatives of students

The day was concluded with EEAP's debriefing.

On Tuesday June 16, EEAP had an online video tour of the facilities of the department including lecture halls, classrooms, libraries, laboratories and other facilities. EEAP had the opportunity to evaluate the recourses available to the department, and to interact with the Head of the Department as well as with teaching staff and administrative staff members. The program of the day continued with teleconference meetings involving:

1. Graduates of the program

2. Employers and social partners

The day was concluded with a final teleconference meeting with OMEA members and MODIP representatives. During the Tuesday meetings the Panel had the chance to request additional clarifications regarding pending issues.

Due to the Covid-19 pandemic and the fact that classes had ended for the semester, EEAP did not have the opportunity to observe any teaching.

The schedule of the two-day e-visit was perfectly organized and gave to EEAP a thorough picture of the department's vision and efforts for the undergraduate student education. The quality of the department's undergraduate program is in perfect conform with international standards. As it will be indicated in the various parts of this report, EEAP was impressed by the dedication and commitment of the teaching staff, the department's rigorous procedures for checking the assurance quality and in general the effectiveness of their undergraduate program. As it will also be indicated in the report, while teaching and training of the students can be improved within the department, much of the weaknesses of undergraduate program are due to factors beyond the department, namely to factors stemming from the stringent and unwise regulations imposed by the ministry of education and to economic factors resulting from the national economic crisis of recent years.

On Wednesday June 17, EEAP began the preparation of this report, which was completed with EEAP on June 17-18-19-20. The report was submitted on the due date of June 20, 2020.

III. Study Programme Profile

The Department of Mathematics was established upon the creation of NKUA in 1837 as a unit within the School of Philosophy. The main purpose of the Philosophy School at that time was the preparation of High School teachers. In 1904, the Department of Mathematics and Physics was created. Since 1983, the mathematics department is a unit within the School of Natural Science which includes the departments of Chemistry, Physics, Geology, Pharmacy, Biology, Computer Science and Telecommunications, and Methodology & History & Theory of Science.

The Department of Mathematics has currently 45 faculty members (1 lecturer, 10 assistant professors, 11 associate professors, and 23 full professors), 8 instruction staff, 9 administrative personnel, and 1 computer lab assistant. The past 10 years more than 30 members (of all ranks) of the department have retired, but during the same period the department has been given only 5 positions. This includes 2 current openings for academic positions, one in Algebra and one in Numerical Analysis for Partial Differential Equations. On the basis of our meetings with alumni and other records, EEAP observed that the department has produced graduates who have ended up in top international universities or have been very successful in the business and industrial world, or have been distinguished in teaching in lower education. EEAP believes that in order for the department to continue this strong success and maintain its high-quality mathematical education, the Ministry of Education should replace at least half of the vacancies due to retirements. The department has 5 major scientific divisions: Analysis, Algebra and Geometry, Statistics and Operation Research, Mathematical Education, Computational and Applied Mathematics. In addition to the undergraduate program, the department has a Master program as well as a Ph.D. program.

The completion of a degree in the mathematics department at NKUA requires a minimum of 36 courses corresponding to 246 ECTS. The program is designed for 8 semesters or equivalently for 4 years. However, the majority of students take much longer than 4 years to complete their degree. According to the data provided to EEAP, the last five years (2015-2019) the average of the yearly medians of the number of years to complete the degree (averaged over five years) is 6.4. The corresponding average of medians over the previous four years (2011-2014) is 7.5. This is a reduction of slightly more than a year – a satisfactory reduction in the view of EEAP. We note that due to a small number of students who finish in more than 15 (or even 20) years, the median is a better indicator than the mean number of years to complete the degree. The average of the yearly averages for the same periods 2015-2019 and 2011-2014 are 7.2 and 8.1, respectively. Obviously, even in terms of the averages there is about one-year reduction during the last five years. Though the reduction of the time to graduation by one year is excellent, as we will indicate in Principle 2 below, EEAP feels that a further reduction should be made. The total number of currently enlisted undergraduate students is approximately 4700, while the number of actually registered (active) students is only about 2400. In EEAP's opinion this is very serious problem due to a number of factors some of which will be addressed in this report. EEAP recommends that the department in coordination with the University and higher government authorities analyze and address the problem of the relatively large number of students.

The latest data of the HAHE indicate that the undergraduate program admitted around 250 students per year for the period 2015-2018. The number of admitted students for the current academic year (2019-2020) was basically the same. The actual number of annually admitted students is substantially much higher (about 400 students) if one takes into account the students who transfer from other universities and through other mechanisms. While there are legitimate

reasons for the transfer, the large number of students resulting by the transfer policy seems to create problems in the education process and it contributes (though there are no data about it) to the large length of graduation period. The number (400) of entering students is dictated by the Ministry of Education; EEAP strongly feels that this number is very high for a department of 45 faculty members, and cannot be sustained; it has a negative impact on the quality of education. According to the data provided to the EEAP regarding the academic year 2017-2018, only about 6% of that year graduates did so in 4 years, about 19 % did so in 5 years and about 17.5 % did so in 6 years. The rest of the students who graduated in 2018 (about 57%) took more than 6 years to finish.

The Department of Mathematics confers a degree of mathematics with two directions:

- Pure Mathematics
- Applied Mathematics

It also has three optional specializations: Statistics and Operations Research, Computational Mathematics, and Mathematical Education.

The department offers a Ph.D. degree as well as a master program. The master program has 3 specializations:

- Pure Mathematics
- Applied Mathematics
- Statistics and Operation Research

The department also participates in inter-University programs that award 4 master's degrees:

- Algorithms, Logic and Discrete Mathematics (Αλγόριθμοι, Λογική και Διακριτά Μαθηματικά)
- Biostatistics (Βιοστατιστική)
- Business Mathematics (Μαθηματικά της Αγοράς και της Παραγωγής)
- Mathematics Education (Διδακτική και Μεθοδολογία των Μαθηματικών)

The department had an external evaluation review in 2012, and this was the last external review. On the basis of the recommendations made in that review, the department revised substantially many of its curriculum procedures in a positive way. However, some of the suggestions made in the review had not been yet addressed, primarily because of prolonged economic crisis in the country. Some of these suggestions will be re-visited in this report.

PART B: COMPLIANCE WITH THE PRINCIPLES

Principle 1: Academic Unit Policy for Quality Assurance

INSTITUTIONS SHOULD APPLY A QUALITY ASSURANCE POLICY AS PART OF THEIR STRATEGIC MANAGEMENT. THIS POLICY SHOULD EXPAND AND BE AIMED (WITH THE COLLABORATION OF EXTERNAL STAKEHOLDERS) AT ALL INSTITUTION'S AREAS OF ACTIVITY, AND PARTICULARLY AT THE FULFILMENT OF QUALITY REQUIREMENTS OF UNDERGRADUATE PROGRAMMES. THIS POLICY SHOULD BE PUBLISHED AND IMPLEMENTED BY ALL STAKEHOLDERS.

The quality assurance policy of the academic unit is in line with the Institutional policy on quality, and is included in a published statement that is implemented by all stakeholders. It focuses on the achievement of special objectives related to the quality assurance of study programmes offered by the academic unit.

The quality policy statement of the academic unit includes its commitment to implement a quality policy that will promote the academic profile and orientation of the programme, its purpose and field of study; it will realize the programme's strategic goals and it will determine the means and ways for attaining them; it will implement the appropriate quality procedures, aiming at the programme's continuous improvement.
In particular, in order to carry out this policy, the academic unit commits itself to put into practice quality procedures that will demonstrate:

a) the suitability of the structure and organization of the curriculum;
b) the pursuit of learning outcomes and qualifications in accordance with the European and the National Qualifications Framework for Higher Education;
c) the promotion of the quality and effectiveness of teaching;
d) the appropriateness of the qualifications of the teaching staff;
e) the enhancement of the quality and quantity of the research output among faculty members of the academic unit;
f) ways for linking teaching and research;
g) the level of demand for qualifications acquired by graduates, in the labor market;
h) the quality of support services such as the administrative services, the Library, and the student welfare office;
i) the conduct of an annual review and an internal audit of the quality assurance system of the undergraduate programme(s) offered, as well as the collaboration of the Internal Evaluation Group (IEG) with the Institution's Quality Assurance Unit (QAU).

Study Programme Compliance

The University has established an appropriate Quality Assurance Policy which fully satisfies relevant requirements. The Key Performance Indicators (KPIs) are regularly updated. The department follows the guidelines of the institutional policy. The MODIP monitors and enforces the Quality Assurance. The department's general assembly has the overall responsibility for

reviewing its entire study program and ensures its consistency with the institutional Quality Assurance standards.

The department initiated an important restructuring of its undergraduate curricula in 2002. It dropped courses that had not been offered for a long time, it eliminated elective courses or replaced some of them by new courses reflecting modern trends in mathematical sciences. These and other changes reduced, in a positive way, the 40+ courses previously required for a degree to 36. As it will be indicated in Principle 2 below, EEAP suggest that an effort should be made to reduce the number of required courses to 32. Nevertheless, the revised curriculum provides an excellent mathematical background and uses novel teaching methods that often leads students to undergraduate research. Overall, the undergraduate program meets international standards. EEAP met with a number of students and graduates who indicated that they are highly satisfied with the program and their education. However, a number of them stressed the need for closer connection of the mathematics education with present day industrial and societal needs and trends. EEAP has been informed that the department has already initiated a process towards that goal. Indeed, the department has already submitted a proposal (expected to be approved by the University Senate) to create two new directions in their undergraduate program, one in Statistics and Operations Research, and one in Mathematics Education.

The Department has high caliber researchers and this affects positively and broadens the students' undergraduate education; for example, many bright students are motivated for research and even write scientific articles with professors. At present there is no official process for recording annual activities of the academic staff.

While the department maintains information about research and academic activities of faculty members, this is not done in a comprehensive way. EEAP suggests that at the beginning of every academic year each faculty member submits an updated CV and a 2-3 pages "yearly activities" report. More suggestions about documentation regarding faculty academic activities are given in the section of Principle 5 of this report.

The QA policy is in place and the MODIP within the university structure oversees its proper and regular implementation.

Panel Judgement

Principle 1: Institution Policy for Quality Assurance	
Fully compliant	**X**
Substantially compliant	
Partially compliant	
Non-compliant	

Panel Recommendations

1. Continue to have all relevant policy documents pertaining to the department, readily available and accessible.

2. Each year, the faculty should provide information (1 or 2 pages) concerning their academic and scientific activities for previous academic year. [More detailed comments concerning this issue are given in Principle 5].

Principle 2: Design and Approval of Programmes

INSTITUTIONS SHOULD DEVELOP THEIR UNDERGRADUATE PROGRAMMES FOLLOWING A DEFINED WRITTEN PROCESS WHICH WILL INVOLVE THE PARTICIPANTS, INFORMATION SOURCES AND THE APPROVAL COMMITTEES FOR THE PROGRAMME. THE OBJECTIVES, THE EXPECTED LEARNING OUTCOMES, THE INTENDED PROFESSIONAL QUALIFICATIONS AND THE WAYS TO ACHIEVE THEM ARE SET OUT IN THE PROGRAMME DESIGN. THE ABOVE DETAILS AS WELL AS INFORMATION ON THE PROGRAMME'S STRUCTURE ARE PUBLISHED IN THE STUDENT GUIDE.

Academic units develop their programmes following a well-defined procedure. The academic profile and orientation of the programme, the objectives, the subject areas, the structure and organization, the expected learning outcomes and the intended professional qualifications according to the National Qualifications Framework for Higher Education are described at this stage. The approval or revision process for programmes includes a check of compliance with the basic requirements described in the Standards, on behalf of the Institution's Quality Assurance Unit (QAU).

Furthermore, the programme design should take into consideration the following:

- *the Institutional strategy*
- *the active participation of students*
- *the experience of external stakeholders from the labor market*
- *the smooth progression of students throughout the stages of the programme*
- *the anticipated student workload according to the European Credit Transfer and Accumulation System*
- *the option to provide work experience to the students*
- *the linking of teaching and research*
- *the relevant regulatory framework and the official procedure for the approval of the programme by the Institution*

Study Programme Compliance

The program is designed by a departmental committee and is considered and approved by the general assembly. EEAP believes that the overall structure aligns well with similar programs in Greece and overseas. The student guide is complete, concise, appropriate and well thought of. In designing the program, the department takes into account input from the stakeholders, external experts, students and alumni. The entire process, including program revisions, is overseen by the MODIP.

As we mentioned earlier in this report, currently the ECTS's required for the degree are (at least) 246, corresponding to 36 courses. According to the European Credit Transfer and Accumulation System this is relatively high. One way to reduce the number of ECTS is reduce the number of hours for some course. EEAP feels that the number of 36 courses is a bit too high and an effort should be made to reduce the number of courses to about 32, corresponding to 4 courses per semester (equivalently 8 courses per year). An issue that EEAP observed and perhaps needs to be addressed by the department is the fact that students have the option to register for a large number (up to 10) of courses/exams in a single semester. Another factor that needs to be seriously addressed by the Department (and maybe by the University) is the fact that the median

(or average) number of years for a student to graduate is large (the average median the last five years is 6.4, and the average mean for the same period is 7.2).

Panel Judgement

Principle 2: Design and Approval of Programmes	
Fully compliant	**X**
Substantially compliant	
Partially compliant	
Non-compliant	

Panel Recommendations

The EEAP recommends that the department should encourage the strengthening of the Alumni Society. A strong Alumni society could be very important in providing suggestions in the design of the educational program, and in assisting the graduates in their future endeavors. In addition, we suggest that the Department develops some systematics mechanism for getting input from Stakeholders.

Principle 3: Student- centred Learning, Teaching and Assessment

INSTITUTIONS SHOULD ENSURE THAT THE UNDERGRADUATE PROGRAMMES ARE DELIVERED IN A WAY THAT ENCOURAGES STUDENTS TO TAKE AN ACTIVE ROLE IN CREATING THE LEARNING PROCESS. THE ASSESSMENT METHODS SHOULD REFLECT THIS APPROACH.

Student-centered learning and teaching plays an important role in stimulating students' motivation, self-reflection and engagement in the learning process. The above entail continuous consideration of the programme's delivery and the assessment of the related outcomes.

The student-centered learning and teaching process

- *respects and attends to the diversity of students and their needs, enabling flexible learning paths;*
- *considers and uses different modes of delivery, where appropriate;*
- *flexibly uses a variety of pedagogical methods;*
- *regularly evaluates and adjusts the modes of delivery and pedagogical methods aiming at improvement;*
- *regularly evaluates the quality and effectiveness of teaching, as documented especially through student surveys;*
- *reinforces the student's sense of autonomy, while ensuring adequate guidance and support from the teaching staff;*
- *promotes mutual respect in the student - teacher relationship;*
- *applies appropriate procedures for dealing with students' complaints.*

In addition:

- *the academic staff are familiar with the existing examination system and methods and are supported in developing their own skills in this field;*
- *the assessment criteria and methods are published in advance;*
- *the assessment allows students to demonstrate the extent to which the intended learning outcomes have been achieved. Students are given feedback, which, if necessary is linked to advice on the learning process;*
- *student assessment is conducted by more than one examiner, where possible;*
- *the regulations for assessment take into account mitigating circumstances;*
- *assessment is consistent, fairly applied to all students and carried out in accordance with the stated procedures;*
- *a formal procedure for student appeals is in place.*

Study Programme Compliance

The department has clear assessment criteria, and these are communicated to the students at the beginning of each course, through a Guide (the "Περίγραμμα" Guide). This Guide is beautifully designed and should be posted on the Department's webpage. The Guide contains an extensive syllabus and detailed description of the course. EEAP suggests that the course description be sent to the student at the beginning of the semester. In addition, it would be very helpful if the instructors provide the students (at the beginning of the semester) with information about exams, homework, projects, presentation, office hours and factors that determine the final grade of the student; at present this is done only on a voluntary basis. Student complaints or

other student-instructor issues are handled properly. First the student discusses the issue with the corresponding instructor. If the two cannot resolve the problem between themselves, then the department itself addresses the issue. The Department has established fairly satisfactory procedures for advising the first-year students. But currently there is no official procedure for advising students beyond first year. EEAP strongly feels that advising should be more extensive. At a minimum, there should be a group of academic advisors for all the students. Ideally, every student should have an academic advisor.

EEAP realized that in many cases there is a substantial delay in returning exams as well as substantial delay in instructors posting the grades. We appreciated the immense difficulties an instructor has in correcting exams and posting grades within a reasonable period of time for classes with a huge number of students (for example of 300 or 500). However, we strongly recommend that the department creates coherent and explicit rules with specific time limits concerning the exam returns and grade posting.

At present students do not have the option for writing an honor thesis or taking “independent studies” courses. Also, students can take courses for a list of four other departments (Physics, Computer Science and Telecommunications, Economics, Education), but not from other departments such as Biology and Neuroscience. However, the students and Alumni who met with EEAP strongly indicated that they would like to have the above options. EEAP concurs with the students and strongly recommends that the department makes this possible. Also, the students indicated that it will be very useful for their education to have the option of taking graduate courses, some of which should be counted towards their degree. Moreover, they indicated that it would be useful if there were official mechanisms which would allow them to interact with graduate students (say, as TA’s or as tutors in a drop-in-for-help office). EEAP strongly suggest that the department and university establish procedures for allowing the students to take graduate courses and have close interactions with graduate students.

Traditional teaching methods (chalk and blackboard) are utilized in the required courses which have large audiences. In more advanced, specialty and elective courses, many professors use, in addition to traditional (chalk and blackboard) approach to teaching, modern methods such as computers, videos, and other information transfer technology means. They also employ (especially in elective courses) teaching procedures based on student participation via, for example, student lecturing. Moreover, in the majority of selective courses as well in some other courses, teaching faculty employ evaluation procedures complementary to those of written exams; e.g. student presentations, homework, and even small projects. Nevertheless, students strongly indicated that novel information technology methods should be more broadly utilized. EEAP concurs with the students and strongly suggest that: (i) novel pedagogical methods for teaching based on modern information technology be employed in all the courses, (ii) the evaluation procedures complementary to written exams, are strengthened and expanded.

Panel Judgement

Principle 3: Student- centered Learning, Teaching and Assessment	
Fully compliant	
Substantially compliant	**X**
Partially compliant	
Non-compliant	

Panel Recommendations

1. The EEAP believes that there should be a systematic interaction between graduate and undergraduate students. For example: graduate students could be used as teaching assistants in undergraduate courses, grading homework assignments, offering recitations, or be used as tutors in a drop-in-for-help office. This is an international practice. The department is only minimally successful in this direction mainly because of legal constraints imposed by the Ministry of education. Nevertheless, the EEAP encourages the department to seek an arrangement with the university whereby graduate students are employed, within the legal parameters, by the University for tasks as the ones above.

2. Advanced undergraduate students should have the option to attend graduate courses and earn credits and possibly count towards the 36 courses required to graduate; this will allow them to develop advanced skills. Unfortunately, currently this is not possible due to national legal constraints imposed by the Ministry of Education. EEAP remarks that these regulations are contrary to international trends and put highly motivated undergraduate students in a disadvantageous position when seeking international scholarships to continue their professional development.

3. The students strongly indicated that they should have the option to take courses from other departments, which are not in the current list allowed by the mathematics department (the current list includes the departments of Physics, Economics, Computer Science and Telecommunication, Education). Moreover, these courses should count towards their degree requirements, replacing certain mathematics elective or other courses. Of course, the students should choose such course upon consultation and approval by the department. In addition, the number of ECTS allowed for such substitutions should be decided by the Mathematics Department. The EAAP agrees with the students and strongly recommends that all present official/bureaucratic obstacles be removed.

4. The EEAP strongly recommends that the students should have the option to do an independent study and/or an honors thesis, for which they get credit. The students strongly indicated that they want to have that option (in fact the graduates we met strongly indicated that they would like to have that option). The EEAP is impressed by the students they met, and felt that all the students were highly qualified to write an attractive honor thesis. Though in many departments within Greece and internationally, undergraduate thesis is mandatory, the EEAP recommends that the department makes the writing of an undergraduate thesis optional. By an “independent study” option, we mean a study which is not associated with

any particular course, but it is a study (with ECTS) between an individual student (or a small group of students) and a professor.

5. In many advanced courses instructors incorporate projects (which include a write-up and a presentation) in addition to exams. This has excellent benefits in independence, problem solving ability and presentation skills. The EEAP encourages this practice and suggests that it is stream-lined in most advanced selective courses.

6. Currently there are two labs with total 65 (40+25) computers available. This is relatively small number of computers for the large student body of the Department. EEAP believes that serious effort should be made to increase the numbers of the computers (at a minimum to double the size of the lab). In addition, the computer facilities should be supported by modern and updated software.

7. The Department has a beautifully designed "Περίγραμμα" Guide containing an extensive syllabus and detailed description of the course. EEAP suggests that it should be posted on the Department's webpage. In addition, the course description be sent and communicated to the student at the beginning of the semester. It would be very helpful if the instructors provide the students (at the beginning of the semester) with information about exams, homework, projects, presentation, office hours and factors that determine the final grade of the student.

8. The department should create coherent and explicit rules with specific time limits concerning the exam returns and grade posting.

EEAP realizes that some of the above recommendations would be difficult to implement due to the small number of faculty, the large number of students and above all, the lack of funding and legal restrictions that are beyond the control of the department. However, the EEAP feels that despite these difficulties, a conscious effort should be made in this direction. The above principles are internationally accepted practices and have a definite positive impact in the educational process.

Principle 4: Student Admission, Progression, Recognition and Certification

INSTITUTIONS SHOULD DEVELOP AND APPLY PUBLISHED REGULATIONS COVERING ALL ASPECTS AND PHASES OF STUDIES (ADMISSION, PROGRESSION, RECOGNITION AND CERTIFICATION).

Institutions and academic units need to put in place both processes and tools to collect, manage and act on information regarding student progression.

Procedures concerning the award and recognition of higher education degrees, the duration of studies, rules ensuring students progression, terms and conditions for student mobility should be based on the institutional study regulations. Appropriate recognition procedures rely on institutional practice for recognition of credits among various European academic departments and Institutions, in line with the principles of the Lisbon Recognition Convention.

Graduation represents the culmination of the students΄study period. Students need to receive documentation explaining the qualification gained, including achieved learning outcomes and the context, level, content and status of the studies that were pursued and successfully completed (Diploma Supplement).

Study Programme Compliance.

The Study Guide includes instructions on several processes and services and is made available through the department's home page. An orientation week when students arrive in the campus, would be extremely helpful; in addition, a well-designed First Year Student Guide to be posted online in the university and departmental websites.

Apparently, the Department (and to EEAP understanding, the entire University) does not have a well-defined student progression monitoring process. Despite this issue, the Department's undergraduate program works sufficiently well, and indeed produces a relatively large body of excellent students. This fact is reflected by successful careers of the Alumni in a wide range of professions; for example, the acceptance students to top graduate schools all over the world for Ph.D. studies. Many of them end up with academic positions in top international Universities. Despite this, EEAP suggests that some type student progression monitoring method should be in place.

Student mobility is encouraged via the ERASMUS project as well as the concept of Practical Training. The students usually take advantage of these opportunities in the 6th through the 8th semester of studies. The ERASMUS option has been under-utilized. The Practical Training has been quite popular and successful according to information provided to EEAP by employers participating in the training.

ECTS is applied across the curriculum for the sake of student's recognition and certification. The department has made serious efforts to take into account student and faculty feedback, as well as the recommendations of the last external evaluation 2012. The workload of the courses is adjusted to the ECTS. At present, the Diploma supplement is provided upon request.

After discussions with students and external partners, it was evident that the department produces graduates of very high standard, who are ready to join the work environment. The Practical Training program is deemed very valuable and a preferred choice by many students. This experience is highly important for opening their horizon and future employment perspectives.

Panel Judgement

Principle 4: Student Admission, Progression, Recognition and Certification	
Fully compliant	**X**
Substantially compliant	
Partially compliant	
Non-compliant	

Panel Recommendations

1. The EEAP recommends that the university creates an orientation week upon student arrival in the campus or at least a well-designed First Year Student Guide providing practical information such as familiarity with facilities, housing and transportation.

2. The EEAP suggests that faculty encourages the students to take advantage of the ERASMUS mobility program despite the expenses involved.

3. As mentioned above the Department lacks a systematic student progression monitoring. EEAP suggests that some type of such mechanism should be in place though this is a challenging task given that there is no upper limit for the completion of a degree.

Principle 5: Teaching Staff

INSTITUTIONS SHOULD ASSURE THEMSELVES OF THE QUALIFICATIONS AND COMPETENCE OF THE TEACHING STAFF. THEY SHOULD APPLY FAIR AND TRANSPARENT PROCESSES FOR THE RECRUITMENT AND DEVELOPMENT OF THE TEACHING STAFF.

The Institutions and their academic units have a major responsibility as to the standard of their teaching staff providing them with a supportive environment that promotes the advancement of their scientific work. In particular, the academic unit should:

- *set up and follow clear, transparent and fair processes for the recruitment of properly qualified staff and offer them conditions of employment that recognize the importance of teaching and research;*
- *offer opportunities and promote the professional development of the teaching staff;*
- *encourage scholarly activity to strengthen the link between education and research;*
- *encourage innovation in teaching methods and the use of new technologies;*
- *promote the increase of the volume and quality of the research output within the academic unit;*
- *follow quality assurance processes for all staff members (with respect to attendance requirements, performance, self-assessment, training etc.);*
- *develop policies to attract highly qualified academic staff.*

Study Programme Compliance

The department has high quality faculty members and special teaching staff (EDIP) – committed to their duties. The department aims to attract and hire highly qualified researchers. They apply similar high standards in the promotion of the faculty. Hiring and promotion in the last few years demonstrate that the department aims at excellence. Furthermore, in addition to research, commitment to teaching weights considerably. Both hiring and promotion follow the criteria mandated by Greek law.

The EEAP was informed that the current annual budget of the Department is 38.500 Euros and a substantial part of it will be spent on maintenance of the Amphitheater and other infrastructure. Obviously, this is extremely limited budget for the size of the department. Under such a limited budget the department cannot sustain its high academic standards.

The student/faculty ratio is extremely high. As a consequence, the teaching load of the faculty is heavy. This is also amplified by the fact that the graduate students are not allowed to tutor or to assist in courses. EEAP was impressed that despite the heavy teaching load the faculty has high research output. This cannot be sustained without increasing of financial resources and new faculty hiring.

Linking teaching with research is an important mechanism to stimulate students. Currently, the department has established several mechanisms towards that goal. Such mechanisms include: undergraduate students publishing research papers, give regular research seminars, attend regular summer schools, conferences, regular annual workshops (such as Athens Probability Colloquium). EEAP suggest the establishment of a weekly or bi-weekly “undergraduate seminar” where the speakers could be graduate students, undergraduate students working on some

research project with a professor, or faculty members form the mathematics or other departments.

Presently the department has 5 distinct sections representing main research areas in mathematical sciences. Since its last external review (2012), the department has done very good job in attracting strong young mathematicians/scientists, resulting in the strengthening of existing areas as well as developing strength in new areas. A current trend in mathematics is the integration of different sub-areas. This is healthy both for research and teaching. EEAP observed healthy collaborative interactions among many faculty members in the department. It strongly recommends that the cross-fertilization among the sub-areas be continued and strengthened, and the department formulates an overall coherent vision for the future. This approach will facilitate the participation of members of the department in funded research projects.

A minimum requirement for maintaining and strengthening the already high quality of the department's members is that the university support the research and visibility of the young faculty. This is already done, but on a limited basis. Currently, the expenses for participation of individual faculty in conferences/workshops are covered by research grants. EEAP suggest the department allocates part of its small budget towards supporting the scientific activities of the young faculty members. However, because the departmental budget is so small, EEAP strongly urges the University to provide more support to the department for such purposes.

Beyond the above, EEAP suggests that the Department in coordination with the University Administration explore creative ways for funding from non-university sources. For example, funds could be secured from The Onassis and Niarchos Foundations to obtain funds for electronic subscriptions of MathSciNet. We understand that possibly under the current rules this cannot be done, however we believe that if there is a will there is a way.

Panel Judgement

Principle 5: Teaching Staff	
Fully compliant	**X**
Substantially compliant	
Partially compliant	
Non-compliant	

Panel Recommendations

1. As we indicated above, the university and the department should support young faculty in their research and visibility. In particular, it should support conference participation, visiting other institutions, research collaborations and preparation of research proposals.

2. The department should provide mentoring to its younger members. More precisely, the department should assign a "mentor" to each new hire (or young professor) to guide them in teaching, interactions with students, administrative issues, research possibilities with people across campus who have similar or overlapping scientific interests, and in general with the academic culture of the university. This type of mentoring is done in many institutions and it is effective. It helps integrate young faculty members into their new environment. EEAP

strongly complements the current mentoring practices employed by the department via the chairman of department and the director of the division (“τομέα”).

3. The department should establish a procedure for documenting annual faculty progress in research and related activities, including research publications, teaching, distributing lecture notes/books to students in a course, departmental service, university service, professional service and conference participation. Much of this is currently documented by the department, but EEAP feels that it should be done in a more rigorous and systematic way. In particular, EEAP suggests that at the beginning of every academic year each faculty member submits an updated CV and a 2-3 pages “yearly activities” report containing the above items. This report is then discussed by the Department and the progress of the faculty member is officially recorded.

Principle 6: Learning Resources and Student Support

INSTITUTIONS SHOULD HAVE ADEQUATE FUNDING TO COVER TEACHING AND LEARNING NEEDS. THEY SHOULD –ON THE ONE HAND– PROVIDE SATISFACTORY INFRASTRUCTURE AND SERVICES FOR LEARNING AND STUDENT SUPPORT AND –ON THE OTHER HAND– FACILITATE DIRECT ACCESS TO THEM BY ESTABLISHING INTERNAL RULES TO THIS END (E.G. LECTURE ROOMS, LABORATORIES, LIBRARIES, NETWORKS, BOARDING, CAREER AND SOCIAL POLICY SERVICES ETC.).

Institutions and their academic units must have sufficient funding and means to support learning and academic activity in general, so that they can offer to students the best possible level of studies. The above means could include facilities such as libraries, study rooms, educational and scientific equipment, information and communications services, support or counselling services.

When allocating the available resources, the needs of all students must be taken into consideration (e.g. whether they are full-time or part-time students, employed or international students, students with disabilities) and the shift towards student-centered learning and the adoption of flexible modes of learning and teaching. Support activities and facilities may be organized in various ways, depending on the institutional context. However, the internal quality assurance ensures that all resources are appropriate, adequate, and accessible, and that students are informed about the services available to them.

In delivering support services the role of support and administrative staff is crucial and therefore they need to be qualified and have opportunities to develop their competences.

Study Programme Compliance

The department is situated in its own beautiful building, containing the Caratheodory Amphitheater (with 300 seats) used for conferences, commencement or other ceremonies. It also has 4 smaller amphitheaters with 150 seats each and 3 small amphitheaters with 100 seats each. The department has 8 classrooms with 50 seats each. The class and amphitheaters are equipped with projectors and interactive screens. There is nice library of the School of Sciences containing mathematics books and journals and other literature math-documents. The Library has museum section for various scientific exhibits; for example, currently there is a nice exposition of Platonic and Archimedean shapes. The library contains plenty of space for students to study. The department has its own two computer labs, one with 40 computers and another with 25 computers. At the moment the available software covers most educational needs; the number for simultaneous for some software programs (e.g. MATLAB) is relatively limited for the size of the department.

A wide range of support services is available to students, including dormitories, counseling services, sport facilities etc. EEAP understanding is that the University has very limited facilities for students with disabilities. A number of students indicated that sanitary and some other facilities need a more proper maintenance. EEAP was informed that the administrative support is very nice and competent.

Panel Judgement

Principle 6: Learning Resources and Student Support	
Fully compliant	**X**
Substantially compliant	
Partially compliant	
Non-compliant	

Panel Recommendations

1. The building infrastructure, even though fully functional, requires maintenance and modernization. For example, the buildings require painting. Improving facilities for disabled student should become a priority for the entire university.

2. The size of computer labs (65 seats in total) should be significantly enlarged. Also, the licensed software programs that allow a limited number of simultaneous users should be modified to accommodate more simultaneous users.

Principle 7: Information Management

INSTITUTIONS BEAR FULL RESPONSIBILITY FOR COLLECTING, ANALYSING AND USING INFORMATION, AIMED AT THE EFFICIENT MANAGEMENT OF UNDERGRADUATE PROGRAMMES OF STUDY AND RELATED ACTIVITIES, IN AN INTEGRATED, EFFECTIVE AND EASILY ACCESSIBLE WAY.

Institutions are expected to establish and operate an information system for the management and monitoring of data concerning students, teaching staff, course structure and organization, teaching and provision of services to students as well as to the academic community.

Reliable data is essential for accurate information and for decision making, as well as for identifying areas of smooth operation and areas for improvement. Effective procedures for collecting and analyzing information on study programmes and other activities feed data into the internal system of quality assurance.

The information gathered depends, to some extent, on the type and mission of the Institution. The following are of interest:

- *key performance indicators*
- *student population profile*
- *student progression, success and drop-out rates*
- *student satisfaction with their programme(s)*
- *availability of learning resources and student support*
- *career paths of graduates*

A number of methods may be used for collecting information. It is important that students and staff are involved in providing and analyzing information and planning follow-up activities.

Study Programme Compliance

The Department has established satisfactory procedures for the collection of data about teaching methods, teaching progression, gender composition of the student body and other items related to undergraduate education. Information regarding students that follow teaching and academic paths is fairly complete. However, data about the employability in other sectors of economy is fairly limited. EEAP suggests that the Department utilizes and strengthens the existing Alumni Society of the Department's graduates for developing efficient mechanisms for the collection of data regarding the employment and carrier paths of its former students.

The completion rate of student surveys is very low, but it is taken seriously by the Department. The results already had an impact in the quality of teaching and supporting material. The Department could explore creative ways to encourage students to participate in the process in larger numbers.

Panel Judgement

Principle 7: Information Management	
Fully compliant	**X**
Substantially compliant	
Partially compliant	
Non-compliant	

Panel Recommendations

One way to increase student response rates for teaching evaluations is to make them mandatory as follows: the students cannot see their grades until they participate in the surveys, with the option of abstaining.

Principle 8: Public Information

INSTITUTIONS SHOULD PUBLISH INFORMATION ABOUT THEIR TEACHING AND ACADEMIC ACTIVITIES WHICH IS CLEAR, ACCURATE, OBJECTIVE, UP-TO-DATE AND READILY ACCESSIBLE.

Information on Institution's activities is useful for prospective and current students, graduates, other stakeholders and the public.

Therefore, institutions and their academic units provide information about their activities, including the programs they offer, the intended learning outcomes, the qualifications awarded, the teaching, learning and assessment procedures used, the pass rates and the learning opportunities available to their students, as well as graduate employment information.

Study Programme Compliance

The department's website contains information about its facilities, staff, undergraduate and graduate programs and guides, announcements, events, policy of quality assurance, and internal assessment reports. The website is available in Greek and English (the English version contains less information than the Greek version). The website is user friendly. However, EEAP feels that there should be more complete information about the Faculty. In particular, EEAP observed that large number of faculty members does not have a personal website. EEAP feels that the department should require a uniform basic CV version containing education, employment, scientific interest, and a short list of related publications. In addition, EAPP suggests optionally this webpage to contain links to a more detailed personal webpage.

Panel Judgement

Principle 8: Public Information	
Fully compliant	**X**
Substantially compliant	
Partially compliant	
Non-compliant	

Panel Recommendations

As indicated above, EEAP observed that large number of faculty members does not have a personal website. EEAP feels that the department should require a uniform basic CV version containing education, employment, scientific interest, and a short list of related publications. In addition, EAPP suggests optionally this webpage to contain links to a more detailed personal webpage. For example, the detailed information could include courses taught and resources developed by the instructors, list of grants, collaborations, conference organization and participation, departmental and professional service, complete list of publications and other individual significant activities.

Principle 9: On-going Monitoring and Periodic Internal Review of Programmes

INSTITUTIONS SHOULD HAVE IN PLACE AN INTERNAL QUALITY ASSURANCE SYSTEM FOR THE AUDIT AND ANNUAL INTERNAL REVIEW OF THEIR PROGRAMMES, SO AS TO ACHIEVE THE OBJECTIVES SET FOR THEM, THROUGH MONITORING AND AMENDMENTS, WITH A VIEW TO CONTINUOUS IMPROVEMENT. ANY ACTIONS TAKEN IN THE ABOVE CONTEXT SHOULD BE COMMUNICATED TO ALL PARTIES CONCERNED.

Regular monitoring, review and revision of study programmes aim to maintain the level of educational provision and to create a supportive and effective learning environment for students.

The above comprise the evaluation of:

- *the content of the programme in the light of the latest research in the given discipline, thus ensuring that the programme is up to date;*
- *the changing needs of society;*
- *the students' workload, progression and completion;*
- *the effectiveness of the procedures for the assessment of students;*
- *the students' expectations, needs and satisfaction in relation to the programme;*
- *the learning environment, support services and their fitness for purpose for the programme*

Programmes are reviewed and revised regularly involving students and other stakeholders. The information collected is analyzed and the programme is adapted to ensure that it is up-to-date. Revised programme specifications are published.

Study Programme Compliance

The department annually self-assesses its undergraduate program in a meticulous way and the learning resources and support services are equally well monitored. The undergraduate program has been simplified and streamlined in accordance to the recommendations of the external review (2012). The current program accommodates excellently internationally established norms for mathematical training. In addition, the department takes appropriate action for their improvement, whenever the need arises. The MODIP oversees the overall process.

Panel Judgement

Principle 9: On-going Monitoring and Periodic Internal Review of Programs	
Fully compliant	**X**
Substantially compliant	
Partially compliant	
Non-compliant	

Panel Recommendations

The EEAP comments the department for its rigorous monitoring and urges to continue with these sound practices.

Principle 10: Regular External Evaluation of Undergraduate Programs

PROGRAMMES SHOULD REGULARLY UNDERGO EVALUATION BY COMMITTEES OF EXTERNAL EXPERTS SET BY HAHE, AIMING AT ACCREDITATION. THE TERM OF VALIDITY OF THE ACCREDITATION IS DETERMINED BY HAHE.

HAHE is responsible for administrating the program accreditation process which is realized as an external evaluation procedure, and implemented by a committee of independent experts. HAHE grants accreditation of programs, with a specific term of validity, following to which revision is required. The accreditation of the quality of the programs acts as a means of verification of the compliance of the program with the template's requirements, and as a catalyst for improvement, while opening new perspectives towards the international standing of the awarded degrees.

Both academic units and institutions participate in the regular external quality assurance process, while respecting the requirements of the legislative framework in which they operate.

The quality assurance, in this case the accreditation, is an on-going process that does not end with the external feedback, or report or its follow-up process within the Institution. Therefore, Institutions and their academic units ensure that the progress made since the last external quality assurance activity is taken into consideration when preparing for the next one.

Study Programme Compliance

To EEAP knowledge this is the first external evaluation review of the undergraduate program in the mathematics department at NKUA. There was an external evaluation review for the department in the year 2012. According to EEAP opinion and the external review of 2012, the mathematical education in the Department of Mathematics at NKUA is impressive. In fact, we believe that the department and the university as a whole are well positioned to become models for university education in Greece.

As we have indicated in other parts of the report, the procedure of verifying the quality of academic education both at the Department and the University is very rigorous and done meticulously. Faculty and staff are overall highly dedicated to the students learning and education.

The input to EEAP from current, graduated students, and partners (who also graduated from the Department) was very positive. In particular, they strongly indicated that their mathematical studies were sound, thorough and prepared them in an excellent way to be competitive in academia and industry.

All the stakeholders, including lab personnel and administrative staff, appreciated the significance of the external review and were excited to participate, help and contribute to the success of the process.

Panel Judgement

Principle 10: Regular External Evaluation of Undergraduate Programmes	
Fully compliant	**X**
Substantially compliant	
Partially compliant	
Non-compliant	

Panel Recommendations

EEAP was impressed by the effectiveness of the monitoring mechanism and suggests to continue their rigorous process of self-evaluating. In addition, EEAP observed that the department successfully implemented many of the suggestions made in the last external review (2012). Moreover, EEAP felt that the entire faculty was open to constructive suggestions from external friends, collaborators, and external evaluators.

PART C: CONCLUSIONS

I. Features of Good Practice

The EEAP feels that the following points are well addressed by the department:

- The department's faculty is highly dedicated
- The curriculum is well designed in terms of compulsory and elective courses
- The study guide is well designed, informative and useful
- Undergraduate students write scientific papers with the department's faculty members
- In some areas the input of the social partners in the design of their academic program is extensively incorporated
- Excellent lecture notes for many courses
- Student feedback and comments are taken seriously into account
- Responsive to student's suggestions and requests for new courses

II. Areas of Weakness

In the view of the EEAP, the following items need some improvement. EEAP feels that the roots for many of the shortcomings are due the severe underfunding and the national rigid constrains imposed on the universities.

- The lack of framework that would allow graduate and advanced undergraduate students to tutor lower level undergraduate students
- The lack of an option that would allow undergraduate students to take graduate course and get credit for these courses towards their undergraduate degree
- The lack of an option that would allow undergraduate students to take courses in departments other than those contained in the current list of the Mathematics Department
- The lack of an option for an undergraduate student to write an honors thesis and/or have an independent study
- Incorporating projects, in addition to exams, in advanced courses; projects which include a write-up and a presentation
- Incorporation of novel technology in teaching, in addition to traditional methods
- Faculty's teaching load is relatively high
- Limited integration between teaching and research

III. Recommendations for Follow-up Actions

EEAP strongly recommends that the following be immediately addressed:

- Establishing the option of an honors thesis
- Strengthening the Alumni Society and input from the social partners

- Incorporation of novel technology in teaching
- Initiating an orientation week and designing a short First-Year Student Guide
- Addressing the financial support and mentoring of young faculty
- Documentation of annual faculty research and related activities
- Make teaching evaluations mandatory for students

IV. Summary & Overall Assessment

The Principles where full compliance has been achieved are: 1, 2, 4, 5, 6, 7, 8, 9, 10

The Principles where substantial compliance has been achieved are: 3

The Principles where partial compliance has been achieved are: None

The Principles where failure of compliance was identified are: None

Overall Judgement	
Fully compliant	**X**
Substantially compliant	
Partially compliant	
Non-compliant	

The members of the External Evaluation & Accreditation Panel

Name and Surname **Signature**

1. **Prof. Alexandros Himonas**, Notre Dame University, Indiana, USA
2. **Prof. Basilis Gidas**, Brown University, Providence, Rhode Island, USA
3. **Prof. Nikolaos Stylianopoulos**, University of Cyprus, Cyprus
4. **Prof. Alekos Vidras (Chair)**, University of Cyprus, Cyprus