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HELLENIC QUALITY ASSURANCE
AGENCY
FOR HIGHER EDUCATION

EXTERNAL EVALUATION REPORT

**SCHOOL OF MINING & METALLURGICAL ENGINEERING
NATIONAL TECHNICAL UNIVERSITY OF ATHENS**

December 2013



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External Evaluation Committee

The Committee responsible for the External Evaluation of the **School of Mining & Metallurgical Engineering** of the **National Technical University of Athens, Greece** consisted of the following four expert evaluators drawn from the Registry constituted by the HQAA in accordance with Law 3374/2005 :

1. Dr. Georges Kipouros (Coordinator)
Dean and Professor of Materials Engineering, College of Engineering, University of Saskatchewan, Saskatoon, Canada
2. Dr. George Demopoulos
Professor of Materials Engineering, Department of Mining and Materials Engineering, McGill University, Montreal, Quebec, Canada.
3. Dr. George Voulgaris
Professor of Earth and Ocean Sciences, Department of Earth and Ocean Sciences, University of South Carolina, Columbia, SC, USA
4. Dr. Nick Vayenas
Head, Mining Automation Laboratory, Bharti School of Engineering Laurentian University, Sudbury, Ontario, Canada

Introduction

I. The External Evaluation Procedure

The external committee consisting of

1. Dr. Georges Kipouros (University of Saskatchewan, Canada)
2. Dr. George Demopoulos (McGill University, Canada)
3. Dr. George Voulgaris (University of South Carolina, USA)
4. Dr. Nick Vayenas (Laurentian University, Canada)

met with representatives of the School from Tuesday, Dec. 17th to Thursday, Dec. 19th, 2013. The meeting took place at the offices of the Hellenic Quality Assurance and Accreditation Agency (H.Q.A.) of Greece for Dec. 17th and Dec. 18th. On Thursday, Dec. 19th the Committee visited the School.

The programme of the visit during the first two days, Tuesday, Dec. 17 and Wednesday, Dec. 18, involved full-day formal presentation and discussion of the teaching and research activities of the School made by the Dean (Kosmitora) and faculty members of the School. During the meeting, the School made available to the committee the requested up to date information and documents (printed and electronic versions).

On Thursday, Dec. 19th the Committee visited the premises of the School where it had the opportunity to see the laboratory facilities and meet with support technical/research/teaching staff working in the different laboratories. In addition we met with the Vice Rector for Academic Affairs (Dr. Moropoulou) and the Rector of the University (Dr. Simopoulos). Finally the Committee met with approximately 35 undergraduate students.

Because of the short time spent on campus the ERC was not able to visit and assess places related to support services such as library, computer laboratories, or School administrative offices involved with the operation of the School.

The discussions between the committee members and the people we met as well as information contained in the self-study report prepared by the School was used to compile this report. The documentation submitted to the committee prior to the site visit was: (i) Internal Assessment Report (OMEA) and (ii) A list of all publications for the period 2006 – 2010. More updated information was presented to the committee during the first two days of the evaluation. Copies of the presentations made by faculty members during the first two days of the meeting were provided to the ERC as well.

HQAA provided the committee with a template for the report identifying in detail the main points that should be covered in it. However, the committee members felt that some of the questions / points were repetitive, some questions from the original template were omitted additional information is provided on important aspects concerning the School.

This report focuses on the key strengths and weaknesses identified; however because of the diversity of the areas covered by the School not all comments presented apply uniformly across the whole School. The comments tend to focus on the total impression as a whole and do not address individual Divisions or Laboratories.

The External Review Committee would like to thank the leadership and faculty of the School as well as the Hellenic Quality Assurance Agency (HQAA) for Higher Education for their hospitality during our stay and for facilitating the review process including the arrangement of meetings-interviews with laboratory staff and students.

II. The Internal Evaluation Procedure

The internal evaluation report made available to the committee was detailed and provided a thorough account on the history, organization and activities of the School. Although outdated by the time the review took place, it is clear that a lot of time and

effort was placed on trying to collect and compile all relevant information, something greatly appreciated by the external committee members. Full up-to-date data on staff and student statistics were distributed during the meeting.

The report and site visit reveals a School with a wider scope and range of activities than those portrayed by the School's name (i.e., mining and metallurgical engineering). However it is not clear from the report which areas the School considers strategic for its future development.

Since both publications and training of students are key research performance indicators, it would have been very informative if in the list of publications provided in the report the student (undergraduate and graduates) names were highlighted. Furthermore, the publications should have been sorted by categories of (i) International Peer Reviewed Journals; (ii) Domestic Peer Reviewed Journals; (iii) Peer Reviewed papers from Conference Proceedings; (iv) Non-Peer Reviewed Conference publications; (v) Published Abstracts; and finally (vi) Technical Reports and Other Publications. Such publication categorization facilitates assessment of research productivity and provides an excellent illustration of the link between teaching and research.

The School's Self Evaluation Report dated June 2011 was complete and covered the five-year period ending 2010. However, due to the gap of time between the writing of the report and conducting the external review additional, up-to-date (2009-2013) information had been prepared and provided to the External Review Committee (ERC). Furthermore, it should be commented that the template for the internal evaluation report appears to have had requested input into questions – at least in part - different than those of the template that the ERC had to complete. This apparent discrepancy was brought to the attention of HQAA (A.ΔI.II.)

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?*

The main goal of the curriculum, as presented in the Internal Report (see section 2.3.1), reflected the original founding legislation for the School dated back in 1946, which states: The principal mission of the School is to educate students and to conduct research in the areas of exploration, exploitation, processing, and recovery-production of metallic and energy minerals; the design, development and operation of mines and metallurgical plants; and finally the further processing and transformation of the produced metals in various product forms.

Over the past 10-15 years the School has expanded the scope of the curriculum in adjacent areas such as underground tunnels (national major infrastructure works), environmental technologies relating to metal industries (sustainable development paradigm) and new advanced materials (as per international evolution of metallurgical programmes).

The current curriculum as outlined in the relevant presentation has set as additional objectives the preparation of graduates with the following characteristics:

- a. Graduates scientifically prepared and capable of functioning in a continuously changing environment
- b. Well-rounded engineers and able to positively contribute to the society
- c. Life learning capability and scientific inquiry and critical thinking

The curriculum consists of compulsory courses and elective courses. The choice of courses and lab practice are comparable with those of foreign corresponding departments. A successful graduation requires the submission and presentation of a Diploma thesis.

The curriculum follows the general approach of National Technical University of Athens (NTUA), which consists of foundation engineering courses (i.e., Mathematics, Physics, Chemistry, Mechanics) followed by compulsory courses in the main disciplines of the School. This takes place during the first seven terms, while the subsequent two terms are made of a mixture of compulsory and elective courses leading to the following five directions :

- Environmental Engineering and Geo-Environment
- Mining Technology
- Geotechnical Engineering
- Metallurgical Processes
- Material Science and Technology

A diploma thesis is required and is conducted during the 10th term of the studies, which completes the study cycle.

All the above lead to a five year consolidated degree of "Mining and Metallurgical Engineering", which NTUA considers to be equivalent to a combined Bachelor and Master's degree, although not relevant equivalences have been established yet through international degree organizations.

In order to implement the above five directions the faculty members are distributed amongst 3 major Divisions (Τομείς):

- a) Division of Geological Sciences
- b) Division of Mining, and
- c) Division of Metallurgy and Materials Technology

- *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 of the curriculum were developed in 2000 (and implemented in 2002) by committees composed of faculty members and approved by the School's General Assembly. The curriculum developed attempts to follow the perceived state of the industry, market forces and stakeholders according to the conditions existed in 2000s.

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

The Curriculum is consistent with the set objectives and the curriculum was consistent with the requirements of the society in 2000 (i.e., the Environment, Large Scale Infrastructure Projects, Project Management and New Materials). The present curriculum served well the graduates for the past 10 years, however, due to changes in societal needs the curriculum needs to be revisited.

IMPLEMENTATION

- *How effectively is the curriculum implemented?*

The implementation is a combination of class room teaching, tutorials, laboratories and, where applicable, field work.

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

Due to the uniqueness of the Diploma (Mining and Metallurgical Engineering) a

comparison with universally accepted standards for the discipline is difficult, as the dual name of the Diploma reflects a curriculum broader than the typical curricula of the individual disciplines of mining (1) and metallurgy (2).

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

The structure of the curriculum is rational and clearly articulated.

- *Is the curriculum coherent and functional?*

In general, the curriculum is coherent. However, the ERC made the following observations, some of which were acknowledged by School members as well during their presentations:

- There are too many directions
- It comprises of many course subjects
- There is course overlapping
- There are not prerequisites
- Chemistry knowledge is not adequate for those pursuing the metallurgical and environmental directions.
- Limited exposure to Technical and Project Presentations and Scientific Professional Writing
- There is not sufficient training in Safety
- Although there is a general course in Economy, there is not a specialized course in Engineering Economics

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

The ERC did not have sufficient time to review the syllabus of each course.

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

Yes.

RESULTS

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

In general, the goals could be considered as achieved. However, the number of courses used is too large and the lack of prerequisites makes the curriculum difficult to follow. In addition, several courses are suffering from overlapping and they can be combined so that the implementation will be more effective.

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

Yes, the School understands this issue. Discussions with faculty members and their presentations revealed that they understand the need for changes.

IMPROVEMENT

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

The School is open to suggestions that aim at improving the quality and the effectiveness of the curriculum.

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

The School recognizes the importance of improving the curriculum and adapting it

accordingly with the new challenges and opportunities related to the potential of hydrocarbon deposit discoveries and exploitation in Greece.

The School indicated that it plans to reduce the total number of courses offered to eliminate significant overlap.

The introduction of prerequisites should be seriously considered and adopted.

The School should consider the conversion of existing elective courses suitable for both upper level (years 4 and 5) undergraduates and post-graduate students. This could potentially reduce teaching load and increase class sizes.

B. Teaching

APPROACH:

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

No specific pedagogic policy was discussed, however, the School makes use of a range of teaching tools including online course material delivery, videos, and power point presentations.

The ERC was informed by the faculty members that student attendance is poor. Equally low is student participation in the evaluation process of teaching. The latter should not only be more broadly applied but also the questionnaire should be expanded to include evaluation of the laboratory exercises and the effectiveness of those in charge.

The discussion forum between the ERC and a sample of the undergraduate body revealed the following:

- There is not an introductory level course that explains the professional expectations of the discipline to first year students
- There is a concern regarding the recent significantly increased new student intake and the presently available classroom space.
- There is a number of textbooks/sets of course notes that appear archaic to the students and require both language and content updating. Expanding bibliography beyond the "single textbook" concept should also be promoted where feasible.
- There is not an evaluation process for the laboratory components of the courses by the students
- The students place a lot of value into the Practical Exercise, a core and unique for NTUA component of the programme that, needs to be maintained at any cost, in spite of budget restrictions
- A perception of not consistent grading scheme amongst different courses / Professors exists amongst the students. Grading should include evaluation of students' learning efforts beyond the final exam, i.e. introduce assignments, presentations, participation, quizzes etc.
- There is a lack of exposure to research and / or professional seminars by neither faculty members nor external invited speakers.

Please comment on:

- *Teaching methods used*

The teaching methods used are up to date.

- *Teaching staff/ student ratio*

According to the information provided to the ERC the student / faculty ratio (accounting all registered students) is 14:1. However, using the number of students

that are registered every year this ratio reduces to 8-10:1. In addition, the distribution of teaching load per faculty member appears to be uneven.

- *Adequacy of means and resources*

The resources according to the presentations for the teaching of undergraduate and post-graduate/doctoral students appear to be adequate.

- *Use of information technologies*

The majority of the presentations and other material related to the teaching are available on line.

The School web site is an additional tool serving the teaching as all course syllabi and reading bibliography are listed in there.

Specific software tools are available as well although not clear how often are used in teaching as some licences have expired.

- *Examination system*

The examination system relies heavily on final written tests. This could be addressed through the incorporation of assignments and/or interim exams that contribute to the calculation of the final grade. This was also proposed to the ERC by the students.

IMPLEMENTATION

Please comment on:

- *Linking of research with teaching*

Presently, research is linked to teaching mainly through the Diploma thesis work carried out during the last semester of studies. However, given the wide range of research activity, undergraduate students should be offered more opportunities to participate in research (e.g., student volunteers in research laboratories etc.).

- *Mobility of academic staff and students*

The mobility of academic staff and students is considered limited and it should be increased. For example, more utilization of the ERASMUS programme by the students should be considered.

RESULTS

Please comment on:

- *Efficacy of teaching.*

The data presented in the internal assessment report (see Section 4.1.1) indicate satisfactory performance in organization, communication, responsibility and teacher/student collaboration.

- *Discrepancies in the success/failure percentage between courses and how they are justified.*

The data (see Section 4.2.4 of the Internal Report) indicate a mean failure rate of 20% with higher success rates occurring in elective courses, these numbers are considered standard.

- *Differences between students in (a) the time to graduation, and (b) final degree grades.*

The average time of graduation ranges from 5 to 6 years while the average final degree grade is approximately 7.3 (out of 10). The percentage of students with grade higher than 8.5 ranges from 0% (in 2005-06) to 8.5% (in 2009-10). There is an apparent deviation between the number of admitted and registered students. For example for the 2009-10 academic year only 60% of the total registered student body appears to be active in attending the programme.

- *Whether the Department understands the reasons of such positive or negative results?*

The most important negative result is the high percentage of inactive student population (~40%). The School attributes this to the entry examination system currently in use that admits students in a discipline that it might not be in the top priority of the student. This disinterested population especially at the early years of the programme and the fact that the students do not attend the classes lead to this negative result.

IMPROVEMENT

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

The ERC did not identify a clear School direction on this issue.

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?*

Research is a priority for the School as indicated with the various general in scope measures identified in Section 5.1.1 to 5.1.4 of the Internal Report. Research is linked to the undergraduate Diploma thesis which is part of the curriculum and more importantly to the Doctoral programme. However, we are not aware of a specific research plan something that needs some attention.

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

The ERC did not identify any internal standards. However, the Internal Report provides evidence of active research in terms of publications, funding and doctoral level training but not in a clear format.

IMPLEMENTATION

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

The School promotes and supports research by allocation of space and the aggregation of available funds for the setup of commonly used major instrumentation (horizontal labs). However, policy of space allocation among faculty members is not clear; funding for research is based on individual faculty members' initiatives.

- *Quality and adequacy of research infrastructure and support.*

From the presentations and the site visit it appears that the quality of research infrastructure in each unit is high with state-of-the art instrumentation and the technical support is adequate.

- *Scientific publications*

The total output of scientific publications is satisfactory. However, the ERC found that the international peer reviewed journal publications need to be increased. Furthermore, in future reports, publications should be listed according to the type (i.e., International Journal, Domestic Journal, Conference Paper, Conference Presentation and other).

- *Research projects.*

The Committee found a few of the faculty members have research projects funded competitively from European programmes. These funds represent approximately 18% of all funds received by the university over the last five years. It is important though that more faculty members participate in seeking European and other externally funding projects.

In the past, the School has benefited from infrastructure projects and had research funding from Greek Agencies. However, the economic crisis severely limits opportunities in this area. No information was provided on number of proposals submitted versus proposals funded for the ERC to evaluate the faculty members' effort and success rate.

The School nevertheless is active providing applied research services to local industry and communities.

- *Research collaborations.*

By definition the European funded projects imply an extensive collaboration among partners. However, the internal synergy within the School needs to be improved.

RESULTS

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

The efficacy of research work is mainly based on publications, awards, patents and training of students and it appears to be adequate as a whole but not necessarily uniform amongst all individual faculty members.

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

As per the Internal Report, research is visible outside the School at the national level. However, more visibility and exposure will be welcomed particularly in the international level through collaborations, doctoral students' exchanges and conference participation.

IMPROVEMENT

- *Improvements in research proposed by the Department, if necessary.*

The formal "laboratory" organization structure within each Division sometimes might be the cause of isolation. Even it might be considered as a strict hierarchical structure that impedes creativity and initiative especially for junior members. A more pro-active effort of inter-laboratory collaboration and utilization of infrastructure could lead to new areas of research and increased productivity.

The recent expansion of the Laboratory of Physical Metallurgy to new research areas that cover non-metallic materials (i.e., ceramics, nanomaterials, etc.) is not currently reflected in the name of the laboratory, inhibiting visibility. A new laboratory name reflecting this expansion (e.g., Laboratory of Physical Metallurgy and Materials or something similar), in line with international practices should be considered.

The option of writing the Doctoral thesis in **English** should be available as this can

contribute to increased school dynamism and visibility.

Time to complete PhD Theses should be reduced to 5 years.

A recommendation of a minimum of two international peer reviewed publications per doctoral thesis should be established.

The School should investigate the possibility of providing opportunities for English-speaking foreign students to enrol and effectively attend the postgraduate and doctoral programmes offered.

Less bureaucratic procedures to facilitate research (i.e. no need of General Assembly approval of doctoral thesis candidates and subjects).

The School should ensure that each doctoral candidate gives a public seminar once a year.

The School should develop a regular research seminar series publicly announced (e.g. homepage). This will enhance communication amongst researchers and expose undergraduate students to the current trends in their discipline.

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).*

According to the provided documents and from the presentations the School considers the services to be adequate.

Also, both faculty members and students noted that due to budget constraints the students are not well served in the implementation of the Practical (field) Exercises and in conducting the experimental research required for the Diploma theses.

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

According to the provided documents and from the presentations the administrative procedures are a combination of both electronically (i.e., booking of access to horizontal laboratory facilities) and in traditional paper and committee-based ways.

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

The School identifies the absence of student attendance as a major problem, something inherent to the Greek higher educational system.

IMPLEMENTATION

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

An adequate administrative structure was presented and no signs of dysfunction were identified. However, no meeting with administrative personnel was arranged.

RESULTS

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

The administrative and other services appear to be adequate and functional although

some of them appear to be extremely bureaucratic.

Collaboration with social, cultural and production organizations

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

The school has taken the leading role in creating the technological park in Lavrio, an old historical abandoned mining site near Athens.

The recent creation of a modern mineralogical museum on campus (Geo-orama) and the interactive displays developed provide an excellent outreach activity worth of further support.

Members of the School have been actively involved with the Mining Industry Association, the Technical Chamber of Greece and the Greek Business Association.

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.

The School has to overcome a large number of inhibiting factors that are common in many other departments and university schools in Greece. At the state level, this includes bureaucracy, insufficient funding, unclear chartered-status of the graduates, funding of the Ph.D. students, lack of specific actions to help young research faculty members, delays in appointing elected faculty, long delays for receiving the funding from some programmes, and very long procedures for submitting (and resubmitting) research proposals.

An environment of continuously changing state legislation creates an uncertain future that inhibits proper planning. For example the new proposed educational directions suggested for high school students do not include the profession of Mining and Metallurgical Engineer, demoralizing existing students and faculty members of the School.

Bureaucratic procedures at institutional and school level need to be simplified. For example, research equipment purchases, traveling authorization for faculty members, Ph.D. Dissertation approval decisions by the General Assembly and the use of many committees for simple decisions should be simplified.

The inability of the School to define by itself the number of new undergraduate students admitted every year in accordance to existing laboratory and teaching infrastructure is of great concern as it will potentially affect the quality of education.

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.*

We should note that we were provided with a plethora of information in a short period of time and maybe not all information is addressed in this report. Our effort was placed in addressing the most important issues that we think have a broader implication in the operation and success of the School.

The committee is fully aware that some of the issues encountered are systemic or State-imposed regulations and bureaucracy, while other relate to the current economic crisis. We hope that appropriate changes can happen at State legislature level so that both NTUA and Schools within are empowered to become more efficient and better cope with the changes due to the rapid development of science and technology. However, we encourage the School, even with the present system limitations, to be more proactive in addressing the current issues internally through creativity, better communication and collaboration efforts

In summary we can state the following:

- (1) We found a dynamic School engaged in both teaching and research activities.
- (2) The School is well respected by the higher administration within NTUA.
- (3) The School has succeeded in recent years to expand its scope beyond mining and metallurgy (as its name indicates) into adjacent areas of engineering (tunnelling engineering, environment, and materials technologies) not covered in the same way by other units of the university. Sometimes, this creates perception issues regarding the focus and identity of the School that should be addressed.
- (4) The expansion of the School into a variety of activities can bring into question the long term sustainability.
- (5) The faculty and support staff are of high quality, but mechanisms need to be developed to fully unleash the potential of the faculty at large and in particular the lower ranked faculty members.
- (6) The School is currently characterized by limited external visibility.
- (7) Internally the various laboratories are not fully aware of the activities of other labs and tend to operate in isolation. As a result, faculty members, especially from different Divisions/Laboratories, appear not to be interacting among themselves and students.

Based on the above findings, we make the following recommendations:

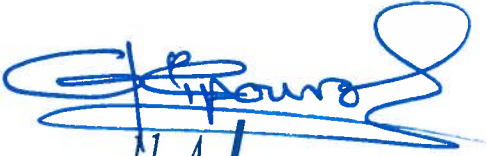
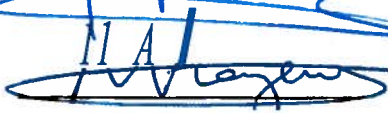
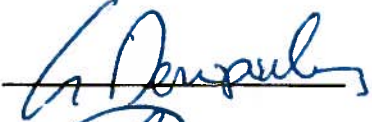

- (1) The five directions of the curriculum should be reduced; the same should be applied to the number of courses taught. Pre-requisite requirements must be established.
- (2) An effort should be made to update language and content of existing textbooks / notes that are out of date.
- (3) Emphasis should be placed in Technical and Project Presentations and Scientific-Professional Writing by the students. In addition, a culture of safety awareness should be cultivated throughout the course, laboratory work and industrial practice.
- (4) There is a need for the students to be introduced to Engineering Economics beyond the presently taught general Economy course. This could be common for the whole NTUA.
- (5) The School has succeeded in expanding to broader areas of engineering not completely covered by other units of the university; however, concentration on a few focus areas for further, in depth expansion (e.g., through targeted future

hiring and/or infrastructure expenditure allocation) would eliminate wrong perceptions and increase the impact on both local and international scale. This will help in further developing the identity of the School.

- (6) Improvement in internal communications amongst faculty members and between faculty members and the student body as a whole is required to create a positive educational environment.
- (7) Internally the various laboratories are not fully aware of the activities of other labs and tend to operate in isolation. As a result, faculty members are not interacting among themselves and students. Ideally, the government imposed legislation should remove the administrative rigid structure of Divisions and Laboratories. Even within the existing legal framework, mechanisms should be developed that fully unleash the potential of the faculty at large, in particular of the lower ranked faculty members.
- (8) The School should take additional actions to improve their external visibility through stronger and visible associations with the relative industry (School marketing activities).
- (9) The graduate programme should ensure that Doctoral candidates complete their studies within 5 years and during that period emphasis is placed in disseminating the results in international, peer reviewed Journals.
- (10) The culture of teaching and PhD Thesis writing in English should be established as to expand the international character of the School and NTUA.
- (11) The School with the assistance of NTUA should establish an active Alumni Association that mobilize the plethora of alumni in Greece and abroad for the long-term benefit of the School (fund raising, networking etc.).

Finally the members of the ERC would like to thank the Hellenic Quality Assurance Agency for providing us with the opportunity to contribute to the further improvement of the Higher Education System of Greece.

The Members of the Committee

- | Name and Surname | Signature |
|---------------------------------------|--|
| 1. Dr. Georges Kipouros (Coordinator) |  |
| 2. Dr. Nick Vayenas |  |
| 3. Dr. George Demopoulos |  |
| 4. Dr. George Voulgaris |  |