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ΑΡΧΗ ΔΙΑΣΦΑΛΙΣΗΣ ΚΑΙ ΠΙΣΤΟΠΟΙΗΣΗΣ  
ΤΗΣ ΠΟΙΟΤΗΤΑΣ ΣΤΗΝ ΑΝΩΤΑΤΗ ΕΚΠΑΙΔΕΥΣΗ

HELLENIC REPUBLIC

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HELLENIC QUALITY ASSURANCE  
AND ACCREDITATION AGENCY

# Accreditation Report for the Undergraduate Study Programme of:

Chemistry

Institution: National Kapodistrian University of Athens

Date: 15 – 03- 2019

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



Report of the Panel appointed by the HQA to undertake the review of the  
Undergraduate Study Programme of  
**Chemistry of the National Kapodistrian University of Athens**  
for the purposes of granting accreditation

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## **PART A: BACKGROUND AND CONTEXT OF THE REVIEW**

### **I. The Accreditation Panel**

The Panel responsible for the Accreditation Review of the Undergraduate Study Programme of **Chemistry of the National Kapodistrian University of Athens (NKUA)** comprised the following five (5) members, drawn from the HQA Register, in accordance with the Law 4009/2011:

- 1. Athanassios Giannis, MD, PhD (Chair)**  
Professor of Chemistry  
Institute of Organic Chemistry,  
University of Leipzig, Germany
  
- 2. Dimitris Argyropoulos, PhD**  
Professor of Chemistry  
North Carolina State University, USA
  
- 3. Georgia Kyriakakou, PhD**  
Association of Greek Chemists
  
- 4. Christos Takoudis, PhD**  
Professor of Chemical Engineering and Bioengineering  
University of Illinois, Chicago, USA
  
- 5. Emmanuel Theodorakis, PhD**  
Professor of Chemistry  
University of California San Diego, USA

## II. Review Procedure and Documentation

*Please refer briefly to the Panel preparation for the study programme review, as well as to the documentation provided and considered by the Panel. State the dates and of the site visit and describe the visit schedule and the meetings held. Feel free to mention any additional information regarding the procedure, as appropriate.*

### • General information and review material

All relevant review material was received by all members of the Accreditation Panel (AP) about 3 weeks prior to the accreditation process. Additional material with extensive detailed information concerning research and educational aspects/activities was received during the site visit.

### • Dates of the site visit

The visit at NKUA was carried out from Tuesday February 19, 2019 until Wednesday February 20, 2019.

### • Committee meetings

On Tuesday February 19, 2019, a briefing took place at the ADIP offices from 9.30 to 11:00 am. Dr. Besta, the current General Director of ADIP, informed the AP committee about the overall goals of the visit. The committee was then transported to “Kostis Palamas” building where they met with Prof. Napoleon Maravegias, Vice Rector of Administrative Affairs and President of MODIP, Prof. Kostas Buraselis, Advisor of the Rectorate on Academic Affairs, and Prof. Christiana Mitsopoulou, Head of the Chemistry Department, NKUA. At 3:30 pm the AP members also met Assoc. Prof. Dimitris Georgiadis, Assoc. Prof. George Souliotis and Prof. Nikolaos Thomaidis, members of OMEA, as well as Konstantinos Bourletidis, Secretary of MODIP, and Sofia Krousianiotaki, Administrative Support for MODIP. The meeting ended at 5:30 pm and the AP members were transported back to the hotel.

On Wednesday February 20, 2019, the AP members were transported to the Chemistry Department of NKUA where they met with several Professors and OMEA/MODIP representatives to discuss professional development, workload, interface between teaching and research and undergraduate curriculum development. Informal discussions took place with several 2<sup>nd</sup> and 3<sup>rd</sup> year undergraduate students regarding their study experience and student welfare and subsequently with graduate students to discuss career paths. The AP committee also visited selected teaching and research facilities of the Department. In the afternoon, the committee was transported to the “Kostis Palamas” building where they met with Department alumni and industrial partners to discuss networking opportunities between the Department and the private/public sector. At 4:00 pm, the panel met with OMEA and MODIP representatives to discuss updates and clarifications and at 5:00 pm Prof. Giannis, the Chair of the AP panel, presented the findings of the visit and made closing remarks to both MODIP/OMEA members and Prof. Mitsopoulou.

**Summary:** The Department of Chemistry at NKUA organized an extensive schedule that allowed meetings and discussions with members of all divisions of the Department. Unfortunately, during the second day of the visit some students interrupted the ongoing discussions and forced a minor alteration of the visitation schedule. In the meetings held, the majority but not all members of the teaching staff or group leaders were able to participate. The AP committee had the opportunity to informally and briefly visit some undergraduate laboratories as well as two research laboratories. The panel also met formally and informally with representatives of the students. Furthermore, the panel met with alumni, selected stakeholders and representatives of MODIP and OMEA.

### III. Study Programme Profile

*Please provide a brief overview of the Study Programme with reference to the following: history, academic remit, duration of studies, qualification awarded, employment opportunities, orientation challenges or any other key background information. Also you may provide a short description of the home Department and Institution, with reference to student population, campus or any other facts, as deemed appropriate.*

- The Department of Chemistry (within the Zografou campus) of the National Kapodistrian University of Athens (NKUA) belongs to an institution with an acknowledged national and international reputation. Founded in 1918, the Department of Chemistry at NKUA offers a rigorous undergraduate study programme that aims to educate a skilled workforce in the chemical sciences. Completion of the programme provides the necessary qualifications and scientific background for employment at a National and International level, thus addressing the needs of the local and broader economy. As such, the programme is of comparable structural depth and quality to its international peers.
- The overall duration of the undergraduate studies requires a minimum of 4 years (8 semesters total). The undergraduate programme consists of: (a) obligatory classes/labs that offer fundamental education/training on the main topics of modern chemical sciences including inorganic chemistry, organic chemistry, analytical chemistry, industrial chemistry, physical chemistry, environmental chemistry, food chemistry and biochemistry; and (b) elective classes/labs that offer further education on the above areas and introduction to various special topics. In total, the programme offers 24 obligatory theoretical courses, 10 obligatory laboratory courses, 40 elective courses, one obligatory diploma thesis (πτυχιακή εργασία) and one 3-month internship (that also counts as an elective class). Awarding the degree (B.Sc. in Chemistry) requires a total of 240 units that can be acquired by completing all obligatory courses/labs (179 units), 9 elective courses (47 units) and the diploma thesis (14 units).
- The Department of Chemistry at NKUA has a dedicated building for the education/training of about 150 students/year that includes 2 state-of-the-art amphitheatres (capacity about 350 students each), 9 smaller lecture rooms (capacity between 30-120 students each) and 40 lab rooms (capacity about 40 students each). All lecture rooms and labs are equipped with internet and audiovisual facilities. Approximately 13% of the incoming students graduate within 4 years, 23% within 5 years, 16% within 6 years. In the recent years, the human resources of the Department is composed of about 80 people that include about 60 teaching/research personnel as well as about 20 members with technical and administrative responsibilities.
- The Department of Chemistry at NKUA has created a good infrastructure for the guidance and orientation of all students. The degree of employment and relevant opportunities offered were not discussed in detail for a thorough evaluation. However, comments in relation to diverse employment opportunities provided by the students were seen as favorable.

## 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 realise 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 labour 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

- In accordance with the ongoing process of evaluation and accreditation, the Department has instituted a functional internal evaluation mechanism (OMEA).
- During the discussions with the students as well as during the study of the curriculum, the AP concluded that the structure and organization of the curriculum was adequate and effective.
- Effective efforts are made to ensure and promote the quality and value of teaching by applying novel methods of teaching and implementing student-centered learning processes.

- The qualifications of the teaching staff are in general of high quality and there is a notable number of highly dedicated individuals. The AP members had no opportunity to examine in detail and judge the qualifications and teaching effectiveness of the support teaching staff.
- The level of demand for qualified graduates in the labor market cannot be adequately determined by the AP committee since no tangible data was provided.
- The student services office is well organized with distributed responsibilities that allow the secretariat to stay open throughout the calendar year. The library of the department was described as an exemplary facility; however, the AP members had no opportunity to visit it.
- The AP was assured that the study programme undergoes annual reviews including internal audits and ad hoc alterations of the curriculum as a result of urgent programmatic needs. New books have been adopted, and several modern courses have been added to the curriculum while out-dated classes/material has been eliminated. Detailed related information for the last two years was provided to the AP members.
- Overall, the AP has witnessed the effective, thorough and continuous efforts of the Department to improve its educational activities and create a seamless academic programme with tangible effective outcomes. This is evidenced by comparing the curricula prior to 2012 and their development during the period 2012 to present.

### Panel judgement

*Please tick one of the following:*

<b>Principle 1: Institution policy for Quality Assurance</b>	
Fully compliant	<b>X</b>
Substantially compliant	
Partially compliant	
Non-compliant	

### Panel Recommendations

*Please provide your recommendations with regard to issues that need to be addressed, as appropriate.*

1. Various professional development opportunities (e.g, sabbaticals and ERASMUS projects) are available to faculty members. Participation in these programmes should be strongly encouraged by the Department to further enhance the quality of teaching/research activities.
2. Additional efforts should be pursued to link and translate general education to specific chemistry topics. One example is the math course sequence that appears to be heavy and not effectively tuned to the needs of physical or materials chemistry. Instructors of mathematics and physical chemistry should coordinate their efforts to minimize disparity and maximize impact of their teaching material.
3. An external committee should review the programme every 4-5 years to provide recommendations of the curriculum and teaching activities.

## 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 organisation, 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 labour 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

*Please comment on the compliance with the Principle.*

- The department has responded favorably and diligently toward implementing an educational programme at the undergraduate level that took into account all earlier recommendations.
- The upgraded and modernized curriculum currently offers a streamlined and frequently visited educational programme with emphasis toward the application of modern methods of material dissemination that goes beyond the traditional lecturing approach. In some cases, these activities include inquiry-based learning, group projects and tutoring.
- The inclusion of some internationally renowned texts translated in Greek (especially in core chemical subjects such as Organic Chemistry) offers additional confidence related to the availability of adequate instructional materials.
- The students participate in the development and enhancement of their study programmes by being an integral part of the relevant committee as well as being able to provide feedback in the corresponding class evaluation questionnaires.
- The external stakeholders of the department show an increased interest in the quality of the department's graduates.
- The updated structure of the curriculum is of comparable depth and value as those at international peer institutions.

- Overall the progression of students from stage to stage is smooth with some notable exceptions that are related to the subject of mathematics. The Department has developed a plan to address this issue as presented to the AP committee during the visit.
- Undergraduate laboratory attendance is mandatory and by extension successful. This is of significant relevance when one considers the student workload in relation to the European Credit Transfer and Accumulation System.
- The Department has implemented several ways to link teaching with research including a diploma thesis (πτυχιακή εργασία), a 3-month paid internship in local companies (πρακτική άσκηση) and a student poster session (ημερίδα φοιτητών). In addition, students are encouraged to attend seminars organized by the department and scientific meetings inside and outside the University.
- The diploma thesis (πτυχιακή εργασία) is obligatory for all students and has a research focus. It spans over a period of two semesters (usually in the 4<sup>th</sup> year of study) and introduces all students to research methodology and current scientific literature. All students present their thesis results in a lecture room in the Department and, when appropriate at scientific meetings.
- The 3-month paid internship (πρακτική άσκηση) is offered as an elective class (15 credits) and also includes a written report and a powerpoint presentation that are produced by the student. As such, it links students with scientists and potential future employers from the local industry. ESPA and related programmes offer financial support for this activity. There is significant interest by the students to participate in this class as evidenced by the increasing demand (e.g., in 2018 there were 86 student applications for 54 internship positions while in 2015 they were 22 student applications for 17 positions).
- There is a relevant regulatory body, termed Επιτροπή Πανεπιστημιακών Σπουδών (ΕΠΣ), (commonly referred to as Curriculum Committee), that monitors the educational programme with appropriate feedback loops that include student course questionnaires and overall programmatic improvements and enhancements of the curriculum.

### Panel judgement

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

### Panel Recommendations

*Please provide your recommendations with regard to issues that need to be addressed, as appropriate.*

4. Given the success and high demand of the paid internships, the Department should secure additional funds and sponsors both the campus and the public/private sectors. Ideally, all interested students should have an opportunity to participate in such internships.
5. There is a clear need for a better and wider integration of the external stakeholders and alumni of the Department to the departmental educational/training activities. Such integration will benefit not only the students but also the local industry. To this end, the Department could establish an “Industry-Academia Day” where members of the public/private sector can easily interact with

students. In addition, the Department should create an “External Advisory Board” to further improve the relationship and networking with the public/private sectors.

**6.** An increased emphasis should be placed in promoting scientific presentation and writing skills of the students. The ideal forum for this would be the Chemistry Day already organized by the Department and/or similar events as proposed above.

### Principle 3: Student-centered 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

*Please comment on the compliance with the Principle.*

- The Department has established an Undergraduate Affairs Committee (ΕΠΣ), (also commonly referred to as Undergraduate Curriculum Committee) that meets regularly and reviews/evaluates issues related to undergraduate student curricula and activities. Its goal is to regularly update the curriculum (classes, notes and laboratories) by considering both the curricula of several European Universities and the Greek environment (both public and private sector), as well as new challenges and directions of chemical, biological and material sciences.
- Each faculty member is assigned as the undergraduate advisor of four students.

- There are organized seminar activities where the students present their research projects and posters. There are several 3-month internships where the students can work in local companies and develop additional independent technical skills.
- The Department has adopted a student-centered approach to teaching that also takes into consideration students with special needs. When needed, a specific Teaching Assistant (TA) is assigned to a student with special needs.
- The Department uses a combination of lectures and small-group sessions to enhance learning in both the class and the laboratory. The small-group sessions that take place between students and Teaching Assistants (TAs) or professors, encourage the question/answer format thus benefiting the students. Laboratory activities enhance interactive learning. In several classes the material is based on recent scientific publications where the interaction between students and professors is encouraged. Other classes include visits to local companies where the students can be exposed to and become familiar with real-life problems and likely job opportunities.
- Students of the Department have access to a multimedia room where they can work with specialized chemistry software and consult electronic libraries.
- All information (table of contents, problems, notes, etc.) related to a course or a laboratory is uploaded on e-class and is readily available to all students in advance.
- The ratio of input/output of students in the Department is quite low. The past 4 years, from an average number of ca 140 students only 13% graduate within 4 years, 38% total in 5 years, 53% total in 6 years, 65% total in 7 years and 77% total over 8 years. This low number suggests that more than 30 students/year are left behind and may increase the already large pool of 1576 students without degree.

### Panel judgement

<b>Principle 3: Student- centered Learning, Teaching and Assessment</b>	
Fully compliant	
Substantially compliant	<b>X</b>
Partially compliant	
Non-compliant	

### Panel Recommendations

*Please provide your recommendations with regard to issues that need to be addressed, as appropriate.*

7. Infrastructure improvements are needed for accessibility of classrooms and labs for students with physical disabilities.
8. Exit interviews of graduating seniors with the Head of the Department will further assist the Department in its educational and networking endeavors.
9. The time-to-degree of the student pool should be considerably shortened as it leaves several students (ca 20% of the admitted pool) who have not obtained their degree even after 8 years of enrolment. This is a worrisome observation and needs to be effectively addressed.

## 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 Department provided the AP with a thorough manual entitled “Οδηγος Σπουδων” that covers in detail all aspects of the students’ needs from the moment he/she enters the Department to graduation including details regulating the final graduation theses.
- Student services handle many aspects of the activities of the students ranging from admissions and extending to numerous administrative matters.
- ESPA is of great importance in promoting practical training for a significant segment of the student population.

### Panel judgement

Principle 4: Student Admission, Progression, Recognition and Certification	
Fully compliant	
Substantially compliant	<b>X</b>
Partially compliant	
Non-compliant	

### Panel Recommendations

*Please provide your recommendations with regard to issues that need to be addressed, as appropriate.*

**10.** In terms of student mobility and internationalization of the undergraduate programme, focused efforts within the Department would help to augment the Department’s participation and

contribution to programmes like ERASMUS. In addition to language challenges, enhanced availability of university housing for accepting foreign students would be instrumental.

**11.** Formation of an External Advisory Board that combines members from the local and national industry, and international academic institutions could only enhance the education of the undergraduate students of the Department.

**12.** There is a need for the graduating students to be able to receive thorough documentation evidencing their studies and degree of expertise via well documented and translated educational transcripts in English; this is essential for international programmes like ERASMUS.

**13.** It is highly recommended that the Department adapts a policy of promoting and rewarding academic excellence. For instance, students with excellent academic records could be rewarded by inclusions in tools such as a “Dean’s List of Excellence”. If possible, names and pictures should also be uploaded in the departmental website.

## 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

*Please comment on the compliance with the Principle.*

- The Department has adopted a series of well-defined procedures as imposed by state law to recruit and hire qualified teaching staff. The processes used are transparent and viable within the local reality. One needs to take into account that the competitive and cutting edge nature of any Department in the realm of research and teaching is developed by fostering and recruiting excellence that does not always necessarily reside within the Department.
- The AP is not aware of any apparent mechanisms for rewarding excellence in teaching. Alternatively, research may be rewarding via indirect gratification channels when funding is received and quality research is published in high impact journals.
- In terms of channels of encouraging scholarly activity to strengthen teaching by linking it to research, the AP was exposed to one fine example of such an initiative that was done on an ad hoc basis and purely based on the motivation of the individual faculty. As an example, undergraduate students are exposed to modern advanced instrumentation or other relevant activities.
- The research output of the Department is certainly aided by the fact that research active faculty has access to highly motivated and qualified final year chemistry students that are working on their graduation theses for two semesters. This is an indispensable asset that offers many tangible benefits with continuing efforts to further promote its vital nature.
- The role of the students in promoting quality assurance for all staff is seen as very important in determining its effectiveness. Consequently, the students should be encouraged and empowered so as to be able to display an active interest in the affairs of the Department within the realm of quality indicators of its staff.

## Panel judgement

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

## Panel Recommendations

*Please provide your recommendations with regard to issues that need to be addressed, as appropriate.*

**14.** It is highly recommended that the Department adopts a policy of looking outside its own confines for recruiting new outstanding talent. Mobility of both students and scientific personnel should be strongly encouraged. On the other hand, continuation of the studies in a single Institution with the aim to secure a professional position should be strongly discouraged. In addition, conflicts of interest during recruitment should be avoided.

**15.** It is highly recommended that the Department adopts a policy of promoting and rewarding initiatives by encouraging scholarly activity that strengthens teaching and its link to research.

**16.** Excellence should be rewarded for teaching and service. The AP is not aware of any such formal mechanisms in place. It is recommended that a process of peer evaluation system is adopted that allows for a frank and collegial input on an annual basis. For instance, the students could be asked each year to recommend a professor based on his/her teaching service. These nominations can help select and reward the "Teacher of the Year". Similarly, administrative personnel and related professionals who perform an outstanding service could be rewarded with an "Exemplary Service Award".

## 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-centred learning and the adoption of flexible modes of learning and teaching. Support activities and facilities may be organised 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

*Please comment on the compliance with the Principle.*

- The Department has a dedicated building for the education/training of about 150 undergraduate students/year that includes 2 state-of-the-art amphitheatres (capacity about 350 students each), 9 smaller lecture rooms (capacity between 30-120 students each) and 40 lab rooms (capacity about 40 students each). All lecture rooms and labs are equipped with free wi-fi and audiovisual facilities. In addition, there is a multi-media room with access to various computers and electronic databases (Reaxys, World of Science etc.). The library of Natural Sciences is in close proximity and provides significant amount of books/journals to the students as well as space for study. Inside the Chemistry building there is a coffee/snack bar area and within walking distance there are student restaurants, a hospital and other facilities for exercise and socializing.
- All class and lab material (notes, reports, exercises, powerpoint presentations) are uploaded onto the web and are readily available to all enrolled students. The e-class and related software are available to all students and provides comprehensive syllabi and updates for all classes.
- In several classes and labs the education is interactive and actively engages the students in the learning process. In several advanced classes, teaching is based on scientific analysis of recently published research papers. In other classes, students are encouraged to visit local companies in order to learn about real-world problems and potential future job opportunities. These efforts are coordinated by the professors/TAs and require active participation of all students.

- Despite the insufficient funding from the Ministry of Education, the Department makes honest efforts to update laboratory instruments and provide needed consumables for all undergraduate students thus ensuring and enhancing the quality of education.
- The Department makes a strong effort to advise all student by assigning a student advisor who facilitates their integration into the educational process.
- The Department offers opportunities for student exchange programmes (e.g., ERASMUS) that encourage mobility, networking and the acquiring of potentially new skills.
- During their practical training (offered as an elective class), students have the opportunity to perform research in local companies and research laboratories thus strengthening their technical skills. In addition, they are asked to present their research in a poster session format.

### Panel judgement

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

### Panel Recommendations

*Please provide your recommendations with regard to issues that need to be addressed, as appropriate.*

17. It is clear that the Department has severely limited funding for the education and training of the undergraduate students. The budget for these efforts should increase.
18. The AP committee is aware that there are student dormitories but they are not sufficient to accommodate all students. There was no information on students boarding and social activities related to the student life. Related efforts should be enhanced at the University level.
19. The Department should further increase the interaction between students and local/international industry by inviting its alumni and other professionals to participate in various related activities.

## 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 organisation, 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 analysing 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

*Please comment on the compliance with the Principle.*

- The administrative personnel includes 8 persons who coordinate the information in the labs and the secretariat. They are responsible to maintain data on course evaluations and student performance.
- The Committee of Undergraduate Studies analyzes student data such as course evaluations, students' performance and comments, and it makes recommendations to the Department that after further consideration changes related to the undergraduate curriculum may be voted and become formally incorporated.
- OMEA, the internal evaluation committee, analyzes the student data and uses this information to improve performance of both students and all teaching personnel.

### Panel judgement

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

## **Panel Recommendations**

*Please provide your recommendations with regard to issues that need to be addressed, as appropriate.*

**20.** The limited participation of the students in the course evaluation is worrisome, since it does not facilitate drawing conclusions, recommendations and actions. The Department should intensify its efforts to motivate the students to participate in this very important activity.

## 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 programmes 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

*Please comment on the compliance with the Principle.*

- The Department maintains a highly visible posture with regard to its ongoing and current activities as evidenced by the multitude of announcements, lectures, scientific events, participation and/or organization of scientific conferences, student centered dissemination activities, public outreach efforts etc. With regard to the programmes offered by the Department again it is evident that the material is well structured for an effective dissemination. For example, the study guide, “Οδηγός Σπουδών”, is an exemplary resource document with a wealth of information. Furthermore, the study guide is explicit as to the grading structures, pass /fail, re-examination and course re-take steps and procedures.
- The Department maintains an active website that contains all information regarding its educational and research activities. The information is well categorized and easily accessed.
- With regard to the rates of successful student graduation and other related statistical data, the Department is required to process such records and provide them to its regulating bodies (both internal and external).
- Unfortunately, the AP was not provided with employment information after graduation or the presence of a process that attempts to monitor and follow up such a vital statistic. Admittedly, this is a rather difficult and cumbersome task that relies on the willingness of the graduates to maintain links and inform the Department of various career moves.

### Panel judgement

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

### Panel Recommendations

*Please provide your recommendations with regard to issues that need to be addressed, as appropriate.*

- 21.** The AP would have benefited from publications and brochures related to the specialized courses offered to external stakeholders for a fee.
- 22.** It is recommended that a better structure that connects the alumni of the Department with the Department is created and formalized and this unit may act as a repository of employment information after graduation. The Greek Chemists Association may also serve as a conduit and a resource for the accumulation of such vital information.
- 23.** The Department should further intensify its efforts to advertise its activities in its website. Educational activities, research accomplishments and societal contributions of the entire body and the individual members (students, professors, employees) should be recognized and broadcasted. Dissemination of such activities should be geared towards the benefit of the society as a whole.

## 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 analysed and the programme is adapted to ensure that it is up-to-date. Revised programme specifications are published.*

### Study Programme compliance

*Please comment on the compliance with the Principle.*

- The Department has established an Internal Evaluation Committee, named OMEA, that is composed of 3 faculty members and 2 administrators. Its function is to collect and analyze all data from the undergraduate programme.
- The Department has also created an Undergraduate Curriculum Committee (named ΕΠΣ) that oversees the undergraduate programme, ensures its smooth operation and makes recommendations for improvements. Recommendations include updates/revisions of the curriculum and take into account revisions of relevant European universities and latest developments in chemical sciences and technologies. Revisions also address issues related to student needs, student expectations and social changes.
- The undergraduate programme is evaluated on an annual basis both by OMEA and the Undergraduate Curriculum Committee in order to improve its overall operation and achieve the stated goals.

### Panel judgement

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

### **Panel Recommendations**

*Please provide your recommendations with regard to issues that need to be addressed, as appropriate.*

**None**

## Principle 10: Regular External Evaluation of Undergraduate Programmes

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

*HQA is responsible for administering the programme accreditation process which is realised as an external evaluation procedure, and implemented by a committee of independent experts. HQA grants accreditation of programmes, with a specific term of validity, following to which revision is required. The accreditation of the quality of the programmes acts as a means of verification of the compliance of the programme 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

*Please comment on the compliance with the Principle.*

- The current accreditation is in compliance with the Greek law (3374/2005) and has benefited from the excellent function and effective interaction between various agencies and committees including OMEA, MODIP and HQA. The Department's internal evaluation committee (OMEA) has a continuous and productive collaboration with MODIP, the quality-assurance committee of NKUA. All members of staff contributed to the review processes and evidence was provided that they appreciate the importance of both professional body accreditation and HQA peer review. All members of HQA, MODIP and OMEA should be praised for their diligent and synchronized efforts that greatly facilitated the work of the AP members.
- The Panel drew evidence from representatives of all stakeholders (students, faculty, alumni and employers). The follow-up actions recommended by the previous external evaluation committee have been implemented within the constraints of the Department. The stakeholders have expressed their willingness to contribute to the programme in various ways thus enhancing student education and career orientation.

### Panel judgement

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

## Panel Recommendations

*Please provide your recommendations with regard to issues that need to be addressed, as appropriate.*

**24.** The processes of evaluation and accreditation should be performed on a regular basis and according to the international guidelines. When possible, the external evaluation/accreditation panel should be of a relatively uniform composition and involve distinguished scientists aware of new areas of chemical sciences.

**25.** A 5-year strategic plan at the time of the accreditation could contribute to innovative thinking for the optimization of the quality of the Department in the future. Therefore, a strategic planning committee that would look into where the Department wants to be 5 and 10 years down the road is recommended and should be included with the material sent by the Department for review.

## **PART C: CONCLUSIONS**

### **I. Features of Good Practice**

*Please state aspects of good practice identified, with regard to the Study Programme.*

The undergraduate programme at NKUA is in full compliance with that of its peer institutions. The goals and functions of the Chemistry Department are well documented and its strategic plan is updated and reflects the current societal needs. The infrastructure of the Department (building, facilities, library etc.) is appropriate for its educational and research goals. The personnel are well trained and a few additional hires will enhance vitality. All class/lab-related material (e.g., class goals, notes, syllabi, grading requirements etc.) is readily available to all students. Moreover, the teaching approaches have been modernized to encourage student-centered learning and promote student-instructor interactions. Good efforts have been made to accommodate students with special needs. The Department has established an internal committee that deals with all undergraduate affairs including undergraduate curriculum. In coordination with the internal evaluation committee (OMEA) they oversee and modernize the curriculum. The service of the Department toward the local and broader society (e.g., open doors days, participation in various professional activities/organizations, layman seminars, and preparation of the International Chemistry Olympiad for high school students) is significant and of high impact. On this front, the Department should be commended for its recent achievements in the Chemistry Olympiad.

### **II. Areas of Weakness**

*Please state weak areas identified, with regard to the Study Programme.*

Certain weaknesses have been identified that once addressed will further elevate the current undergraduate programme. These are:

- (a) The heavy load and material disconnect of certain classes such as mathematics that is needed as a prerequisite for other core curriculum classes. The insufficient preparation of a group of incoming students in mathematics, together with the late admission of the transfer students during the 1<sup>st</sup> year of undergraduate studies increases this challenge and creates a bottleneck in the studies. The committee on undergraduate education should fine-tune the required material to maximize its efficiency (see also recommendation #2 below).
- (b) Funding of the undergraduate programme is not commensurate with the number of students the Department teaches, especially regarding laboratory instrumentations and consumables. The Department is doing a significant job in allocating its limited resources for the training of the students. This training will be substantially improved by increasing the Ministry-allocated budget for the educational programme (see also recommendation #15 below).
- (c) The student participation to the online class evaluation is limited and in certain cases insufficient to draw conclusions and recommend revisions to the curriculum. The Department should increase its efforts to inform the students not only of the use of this questionnaire but of the benefit of such data for the modernization and revision of the education. Efforts should be made to streamline the evaluation process and advertise the benefits of the student participation (see recommendation #18 below).

- (d) The role of academic advising for the education of a student should be further strengthened and advertised by the Department. Although the Department has assigned academic advisors to all students, it is apparent that many students do not take advantage of this service and do not benefit from it.
- (e) The interactions between the Department and its alumni as well as local professionals should be strengthened and further expanded. This will be beneficial to all participants and will have a significant impact in the undergraduate programme (see also recommendations #5, #11 and #22 below).
- (f) Student academic excellence, teaching excellence as well as exemplary professional service should be better recognized by the Department (see recommendations #13, #15, #16).
- (g) The ratio of student input/output is very low. Only ca 13% of the incoming students graduate after 4 years, 53% graduate after 6 years while more than 20% remain as students even after 8 years. Such a low output leaves several young guys outside the workforce (see recommendation #9).

As indicated above, the listed weaknesses are found in most international undergraduate programmes. As such, they do not affect accreditation nor compliance with the International standards.

### III. Recommendations for Follow-up Actions

*Please make any specific recommendations for development.*

**Note:** The recommendations below are a repetition of the ones suggested in each principle. Thus, their numbering does not reflect relative importance.

1. Various professional development opportunities (e.g, sabbaticals and ERASMUS projects) are available to faculty members. Participation in these programmes should be strongly encouraged by the Department to further enhance the quality of teaching/research activities.
2. Additional efforts should be pursued to link and translate general education to specific chemistry topics. One example is the math course sequence that appears to be heavy and not effectively tuned to the needs of physical or materials chemistry. Instructors of mathematics and physical chemistry should coordinate their efforts to minimize disparity and maximize impact of their teaching material.
3. An external committee should review the programme every 4-5 years to provide recommendations of the curriculum and teaching activities.
4. Given the success and high demand of the paid internships, the Department should secure additional funds and sponsors from both the campus and the public/private sectors. Ideally, all interested students should have an opportunity to participate in such internships.
5. There is a clear need for a better and wider integration of the external stakeholders and alumni of the Department to the departmental educational/training activities. Such integration will benefit not only the students but also the local industry. To this end, the Department could establish an "Industry-Academia Day" where members of the public/private sector can easily interact with students. In addition, the Department should create an "External Advisory Board" to further improve the relationship and networking with the public/private sectors.
6. An increased emphasis should be placed in promoting scientific presentation and writing skills of the students. The ideal forum for this would be the Chemistry Day already organized by the Department and/or similar events as proposed above.

- 7.** Infrastructure improvements are needed for accessibility of classrooms and labs for students with physical disabilities.
- 8.** Exit interviews of graduating seniors with the Head of the Department will further assist the Department in its educational and networking endeavors.
- 9.** The time-to-degree of the student pool should be considerably shortened as it leaves several students (ca 20% of the admitted pool) who have not obtained their degree even after 8 years of enrolment. This is a worrisome observation and needs to be effectively addressed.
- 10.** In terms of student mobility and internationalization of the undergraduate programme, focused efforts within the Department would help to augment the Department's participation and contribution to programmes like ERASMUS. In addition to language challenges, enhanced availability of university housing for accepting foreign students would be instrumental.
- 11.** Formation of an External Advisory Board that combines members from the local and national industry, and international academic institutions could only enhance the education of the undergraduate students of the Department.
- 12.** There is a need for the graduating students to be able to receive thorough documentation evidencing their studies and degree of expertise via well documented and translated educational transcripts in English; this is essential for international programmes like ERASMUS.
- 13.** It is highly recommended that the Department adopts a policy of promoting and rewarding academic excellence. For instance, students with excellent academic records could be rewarded by inclusions in tools such as a "Dean's List of Excellence". If possible, names and pictures should also be uploaded in the departmental website.
- 14.** It is highly recommended that the Department adopts a policy of looking outside its own confines for recruiting new outstanding talent. Mobility of both students and scientific personnel should be strongly encouraged. On the other hand, continuation of the studies in a single Institution with the aim to secure a professional position should be strongly discouraged. In addition, conflicts of interest during recruitment should be avoided.
- 15.** It is highly recommended that the Department adopts a policy of promoting and rewarding initiatives by encouraging scholarly activity that strengthens teaching and its link to research.
- 16.** Excellence should be rewarded for teaching and service. The AP is not aware of any such formal mechanisms in place. It is recommended that a process of peer evaluation system is adopted that allows for a frank and collegial input on an annual basis. For instance, the students could be asked each year to recommend a professor based on his/her teaching service. These nominations can help select and reward the "Teacher of the Year". Similarly, administrative personnel and related professionals who perform an outstanding service could be rewarded with an "Exemplary Service Award".
- 17.** It is clear that the Department has severely limited funding for the education and training of the undergraduate students. The budget for these efforts should increase.
- 18.** The AP committee is aware that there are student dormitories but they are not sufficient to accommodate all students. There was no information on students boarding and social activities related to the student life. Related efforts should be enhanced at the University level.
- 19.** The Department should further increase the interaction between students and local/international industry by inviting its alumni and other professionals to participate in various related activities.
- 20.** The limited participation of the students in the course evaluation is worrisome, since it does not facilitate drawing conclusions, recommendations and actions. The Department should intensify its efforts to motivate the students to participate in this very important activity.

- 21.** The AP would have benefited from publications and brochures related to the specialized courses offered to external stakeholders for a fee.
- 22.** It is recommended that a better structure that connects the alumni of the Department with the Department is created and formalized and this unit may act as a repository of employment information after graduation. The Greek Chemists Association may also serve as a conduit and a resource for the accumulation of such vital information.
- 23.** The Department should further intensify its efforts to advertise its activities in its website. Educational activities, research accomplishments and societal contributions of the entire body and the individual members (students, professors, employees) should be recognized and broadcasted. Dissemination of such activities should be geared towards the benefit of the society as a whole.
- 24.** The processes of evaluation and accreditation should be performed on a regular basis and according to the international guidelines. When possible, the external evaluation/accreditation panel should be of a relatively uniform composition and involve distinguished scientists aware of new areas of chemical sciences.
- 25.** A 5-year strategic plan at the time of the accreditation could contribute to innovative thinking for the optimization of the quality of the Department in the future. Therefore, a strategic planning committee that would look into where the Department wants to be 5 and 10 years down the road is recommended and should be included with the material sent by the Department for review.

#### **IV. Summary & Overall Assessment**

The Principles where full compliance has been achieved are:

**1, 6, 7, 8, 9, 10**

The Principles where substantial compliance has been achieved are:

**2, 3, 4, 5**

The Principles where partial compliance has been achieved are:

**NONE**

The Principles where failure of compliance was identified are:

**NONE**

<b>Overall Judgement</b>	
Fully compliant	<b>X</b>
Substantially compliant	
Partially compliant	
Non-compliant	

## The members of the Accreditation Panel

Name and Surname	Signature
<p><b>1. Athanassios Giannis, MD, PhD</b> Professor of Chemistry Institute of Organic Chemistry, University of Leipzig, Germany</p>	
<p><b>2. Dimitris Argyropoulos, PhD</b> Professor of Chemistry North Carolina State University, USA</p>	
<p><b>3. Georgia Kyriakakou, PhD</b> Association of Greek Chemists</p>	
<p><b>4. Christos Takoudis, PhD</b> Professor of Chemical Engineering and Bioengineering University of Illinois, Chicago, USA</p>	
<p><b>5. Emmanuel Theodorakis, PhD</b> Professor of Chemistry University of California San Diego, USA</p>	