



ΕΛΛΗΝΙΚΗ ΔΗΜΟΚΡΑΤΙΑ  
HELLENIC REPUBLIC



Εθνική Αρχή  
Ανώτατης Εκπαίδευσης  
Hellenic Authority  
for Higher Education

Αριστείδου 1 & Ευριπίδου 2 • 10559 Αθήνα | 1 Aristidou str. & 2 Evripidou str. • 10559 Athens, Greece  
T. +30 210 9220 944 • F. +30 210 9220 143 • E. secretariat@ethaae.gr • [www.ethaae.gr](http://www.ethaae.gr)

**Accreditation Report**  
**for the Undergraduate Study Programme of:**  
**Chemistry**  
**Institution: Aristotle University of Thessaloniki**  
**Date: 5 June 2021**

Report of the Panel appointed by the HAHE to undertake the review of the Undergraduate Study Programme of **Chemistry** of the **Aristotle University of Thessaloniki** for the purposes of granting accreditation

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

### **I. The External Evaluation & External Evaluation and Accreditation Panel**

The Panel responsible for the Accreditation Review of the Undergraduate Study Programme of **Chemistry** of the **Aristotle University of Thessaloniki** comprised the following five (5) members, drawn from the HAHE Register, in accordance with Laws 4009/2011 & 4653/2020:

- 1. Professor. Christos G. Takoudis (Chair)**  
University of Illinois at Chicago, Chicago, United States of America
  
- 2. Professor Spiros Agathos**  
Université Catholique de Louvain, Louvain-la-Neuve, Belgium
  
- 3. Professor Peter Englezos**  
University of British Columbia, Vancouver, Canada
  
- 4. Professor Styliani-Anna (Stella) E. Tsirka**  
Stony Brook University, New York, United States of America
  
- 5. Dr. Petros Sotiriou**  
Member of the Association of Greek Chemists, Greece

## II. Review Procedure and Documentation

The Hellenic Authority for Higher Education (HAHE) appointed an external and independent panel of experts (External Evaluation & Accreditation Panel, EEAP) to assess the compliance of the Undergraduate Study Programme (UGP) of Chemistry of the Aristotle University of Thessaloniki (AUTH) for the purpose of accreditation, in accordance with the HAHE Quality Assurance requirements (laws 4009/2011 & 4653/2020). The assessment was conducted through document reviews and online interviews. The method used was an evidence-based process centred on a sampling of the Department's activities and it was aimed at evaluating the data related to the programme under evaluation, and operational and educational fulfilment of the HAHE requirements of the relevant Quality Standard of the UGP and commenting on its compliance, effectiveness and applicability for the scope of the requirements.

In preparation for the visit, the panel received a multitude of material before the onset of the accreditation exercise the EEAP received plentiful and detailed support material from a HAHE Cloud link, which contained the folders (a) Chemistry – Aristotle University of Thessaloniki Material and (b) HAHE Material. This included background information on accreditation, detailed data.

The information provided by the Department was assumed to be factually correct.

Due to COVID-19 restrictions the review was conducted via teleconference (Zoom). It was organized and coordinated by HAHE with the active assistance of the Department of Chemistry of AUTH. The schedule and agenda of the Zoom meetings were as follows:

Monday, May 31, 2021: Preliminary private meeting of the EEAP.

Tuesday, June 1, 2021: Consecutive meetings with the following agenda

- a) Welcome and short overview of the UGP with the AUTH Vice-Rector/President of MODIP (D. Koveos) and the Chair of the Chemistry Department (P. Spathis), followed by discussion with the EEAP.
- b) Discussion of degree compliance of the UGP to the quality standards for accreditation with OMEA members and MODIP representatives and staff following presentations by the MODIP member (A. Goulas) and the OMEA Coordinator (M. Tsimidou).
- c) Private debriefing (EEAP panel members only)

Wednesday, June 2, 2021: Consecutive meetings with the following agenda

- a) Discussion with teaching faculty members
- b) Discussion with current undergraduate students (from 1<sup>st</sup> to 6<sup>th</sup> year)
- c) Virtual tour of classrooms, lecture halls, libraries, laboratories, and other facilities and discussion about these facilities with Chemistry faculty members
- d) Private debriefing (EEAP panel members only)

Thursday, June 3, 2021: Consecutive meetings with the following agenda

- a) Extra meeting (requested by the EEAP panel) and discussion with Chemistry Department faculty members including heads of Department sections
- b) Discussion with programme graduates
- c) Discussion with employers and social partners
- d) Private debriefing (EEAP panel members only)
- e) Discussion with OMEA and MODIP representatives on points needing clarification
- f) Closing informal presentation of the EEAP panel's key findings to the Vice-Rector, the Chair of the Department as well as OMEA and MODIP representatives

Friday, June 4, 2021: Private meeting of the panel on content and organization of accreditation report (AR) writing

Saturday, June 5, 2021: Private meeting of the panel on AR writing and revision

Sunday, June 6, 2021: Electronic (e-mail and google-drive) communication among panel members to finalize AR

The EEAP notes the cooperation of the Chemistry Department in supporting AUTH's policy of quality assurance and its commitment to comply with HAHE. The EEAP wishes to thank the Department and University authorities (including OMEA and MODIP) as well as all faculty members, students and staff interviewed for their cooperation, helpfulness in providing all information requested as well as the fruitful discussions.

### III. Study Programme Profile

The Department of Chemistry of the Aristotle University of Thessaloniki was established in 1943 and since 1982 it is divided into four sections with the corresponding educational and research laboratories (General and Inorganic Chemistry; Organic Chemistry and Biochemistry; Physical, Analytical and Environmental Chemistry; and Chemical Technology and Industrial Chemistry).

The stated mission of the Department of Chemistry of AUTH is the education of its students in the discipline of Chemistry and its modern applications so that its graduates possess basic and specialized knowledge, laboratory experience and other high-quality skills. Moreover, the Department aims at promoting research partnerships and exploitation of results for the benefit of society. Members of the faculty (teaching and research, laboratory teaching, and technical) and administrative staff are committed to implementing the Quality Policy of the Department and make a continuous effort to achieve its goals.

In the panel's point of view, these statements can also be considered as also pertaining to the undergraduate programme's *educational objectives*. This mission statement is rather generic and could have been presented more clearly and with more specifics.

The current faculty is made up of 60 members (DEP), who are assisted in their academic and other activities by 12 EDIP members (laboratory teaching staff) and an additional 8 ETEP (technical staff members) and 7 members of administrative staff.

The Department offers an undergraduate programme (UGP) in Chemistry (4 years, 240 ECTS) and it is implicated in several postgraduate programmes as well as a doctoral programme and postdoctoral studies. The UGP offers both theoretical and laboratory courses, a practical internship, and a diploma thesis, all of which require the active involvement of the students.

The program is structured by semesters. The first 3 years (6 semesters) consist of mandatory/core courses. After the end of the 6th semester the students under the guidance of faculty and with the help of the Study Guide can choose their Specialization among the following: Theoretical Chemistry and Chemical Education; Chemical Analysis/Environmental Chemistry/Electrochemistry; Chemical Synthesis/Biochemistry and Bio-applications; Chemical Technology and Industrial Chemistry.

Only ~21% of the students complete their studies within the four-year timescale. The Department has good infrastructure that includes well-equipped lecturing rooms, two large amphitheatres, laboratories and library facilities.

## PART B: COMPLIANCE WITH THE PRINCIPLES

### Principle 1: Academic Unit Policy for Quality Assurance

**INSTITUTIONS SHOULD EAPPLY 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

- The Department of Chemistry has established a Quality Assurance Policy for the undergraduate programme which includes a commitment to satisfy applicable requirements and to continuously improve the curriculum. All faculty and educational and technical support members are aware and comply with the commitment of the department. The purpose of the educational program is to develop and equip the graduates with skills that will ascertain that they are successful in their professional development and in their potential graduate training.
- In accordance with the ongoing process of evaluation, accreditation and designed quality scheme, the Department has instituted a functional team known as internal evaluation



committee (OMEA). This team is linked to the Quality Assurance Unit of the institution (MODIP) chaired by Vice Rector Prof. Dimitrios Koveos. A Quality plan has been in place since 2012-2013. Annual targets and reports are uploaded to recently (2018), built QMS Central web platform.

- The study programme undergoes annual reviews by the Undergraduate Committee that oversees the curriculum and the textbook selection. OMEA presented to EEAP a plan of annual review of the study programme. Reviews are initiated by students' comments and internal performance evaluation results. Each course in the programme of study includes the specific topics that will be taught. Most of the topics tend towards incorporating material on new trends and developments in the field of Chemistry. Significant efforts are made to ensure and promote the quality and value of teaching by applying newer methods of teaching and implementing student-centered learning processes as described in the department's study guide.
- The qualifications of the teaching staff are in general of high quality and there is a notable number of highly dedicated individuals. Recently hired faculty members make positive contributions, although there has been a significant attrition in the faculty. Notably for every 4 faculty who left the department (due to retirements or departures), only 1 new has been hired, resulting in a total of 60 faculty in the current year (vs 99 in the academic year 2008-2009). Nonetheless the total number of faculty ( $\Delta\text{E}\Pi$ ) is probably still adequate, relevant to the number of students enrolled. The number of other teaching faculty ( $\text{E}\Delta\text{I}\Pi$ ) has also decreased over the years, from 27 in 2008-09 to 20 in the current year. So, has the number of technical support staff ( $\text{E}\text{T}\text{E}\Pi$ ) from 7 to 6.
- Continuous improvement in the materials taught is promoted through correlations of the final student outcomes. Key performance indicators (KPI) for this are the increase in graduation rates of the students (with 20.3% of the students graduating after 4 years of study, 50.6% of the students completing their degree in 5 years, 68.9% after 6 years and 71.6% in subsequent years; this is an improvement over the previous reporting period) and the increase in their academic performance (GPA increased from 6.73 during the previous evaluation in 2011 to 7.22 in the current year). There has been a significant increase in the number of students (10 students, 5.46%) who achieved excellence in their GPA (between 8.5 and 10), with a higher percentage of these students being female (68.7%).
- The Quality Assurance Policy is communicated to all teaching faculty and staff and the students. Options for critical and constructive feedback are given towards the end of the academic year in the form of surveys. Student feedback is sought and discussed by the faculty. Although the process is in place, only a small percentage of students participate in these feedback surveys, either because of low interest, or because of fear of non-anonymity of the survey. Additionally, such feedback tends to be given only once by the students, and not continuously or for all courses.
- The academic unit has set specific, measurable, achievable, and relevant goals for the study programme, and especially in respect of teaching methods. These were presented to the committee but are not necessarily present in the study guide or on the website (currently available through the e-Study Guide). The teaching evaluations provide measurable feedback for the faculty, and an increasing trend in satisfaction is observed. It was not fully clear how, however, the teaching evaluations have helped shape or deliver the academic programme. There are links between education and research, mostly at the Diploma Thesis stage and during

the four Specializations of the programme (7th-8th semester). Similarly, there is a link between education and the workplace through placements, visits and other interactions.

- The structure and organization of the programme of study includes a comprehensive curriculum focusing on Chemistry and its applications. The learning objectives, outcomes and qualifications are in accordance with the European and the National Qualifications Framework for Higher Education. There are considerable efforts and plenty of enthusiasm by the Faculty who participate in the teaching and learning.
- Based on alumni, stakeholder and student interviews, the External Evaluation and Accreditation Panel (EEAP) concluded that the level of demand for qualified graduates in the labour market is targeted toward academic careers, food industry, environmental agencies, pharmaceutical industry at the National and EU levels.

### Panel Judgement

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

### Panel Recommendations

- A clear description of the Department's educational mission is not obvious in the Study guide and the departmental website, and this would be necessary, as it constitutes the compass towards which the educational target objectives are focused. These objectives should include long-term plans, five to ten years, and curriculum mapping to clearly articulate the Department's strategic direction and allow for adjustments as necessary.
- Adoption of formal quantifiable means for selecting the criteria that guide curriculum updates. These should reflect the mission statement of the Department, and be aligned with clearly defined long-term goals and educational objectives.
- Interactions with alumni and other stakeholders could be exploited as a potential means of informing the decision-making process with regards to future educational directions.

## 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

- The stated Quality Policy of the department of Chemistry was presented in the presentation of the Chair of the department, Prof. Spathis, who indicated that the Department of Chemistry aims to 'educate in the Science of Chemistry and in its current applications, such that the graduates of the department have basic and specialized knowledge, laboratory experience and other competencies of high quality'.
- The student programme is based on international standards to offer both theoretical and practical knowledge, to introduce modern technologies and methodologies through a series of laboratory exercises, practical internship, and a diploma thesis, all of them needing the active involvement of the students.
- The programme is structured by semesters. The first 3 years (6 semesters) are comprised of mandatory/core courses. After the end of the 6th semester the students can consult with faculty and the study guide to select the Specialization (Τομέα/Κατεύθυνση) they want to pursue. 4 such directions are offered: Theoretical Chemistry and Chemical Education; Chemical Analysis/Environmental Chemistry/Electrochemistry; Chemical Synthesis/Biochemistry and Bio-applications; Chemical Technology and Industrial Chemistry.
- Although the majority of the programme is rational, well-designed and articulated, in some cases it lacks obvious staging (e.g., prerequisite courses that need to be successfully finished

before other courses are taken). Similarly, several important courses (e.g., statistics) are given as electives, while it would be important for research rigor to make such courses mandatory.

- Two-month training sessions/practical internship for the students is performed in external companies or state laboratories around Greece. This initiative is highly appreciated by both students, instructors and social partners. The external stakeholders indicated that the quality of the students is high, and they are easy to train and work with. However, they expressed the desire to have this experience extend longer (potentially 4 months) to make it a more productive experience with tangible outcomes. A concern for such extension is mostly financial, as the students are supported during the 2 months by state/university funds; it would be preferred that the external stakeholders support the remaining months. A Specialization towards Food Chemistry and the certificate on Oenology are commendable, as they are taking into consideration the local opportunities.
- During the final year (semesters 7 and 8) the students can pursue an elective Diploma project that is experimentally oriented and requires completion of a research project (20 ECTS) or a literature review (10 ECTS). A prerequisite is the completion of 90 relevant ECTS. Approximately 70% of students qualify at the end of the 6th semester for a Diploma project. Complementary actions involve summer training and Erasmus program exchanges. The students have the ability to present the results of their projects during annual conferences held in common with the graduate students and the Association of Greek Chemists (Ενωση Ελλήνων Χημικών, ΕΕΧ).
- The curriculum is evaluated and revised periodically according to the recommendations of OMEA based on their feedback as well as on the (limited) student course evaluations. Beyond that, however, there is no formal input from other stakeholders, namely the social/community partners, industry or graduates. Such feedback could be significantly important for adapting and directing the curriculum and learning objectives towards the current directions and needs of the discipline. The department indicated that adaptation and changes in the curriculum are also occurring in discussions and collaborations with other departments of Chemistry in the country, although this was not abundantly evident, yet it would be highly recommended.
- The Student Guide is quite comprehensive describing the Specializations (Κατευθύνσεις) and all the mandatory, semi-elective and elective courses. The descriptions of the Practical Internship and Diploma-related projects are described extensively, along with the criteria and student selection algorithms, as well as the grading and evaluation. Each course syllabus is clearly spelled out and the length and credits (ECTS) that the students will receive are appropriately defined. What is not described within the guide is the learning objectives of each course, and the competencies to be acquired by the students. The length of the Study Guide may make it a bit difficult to navigate.
- Effort is made by the Department and the AUTH to accommodate students with special needs (visible or invisible), and this effort is commendable.
- The program follows the European Credit Transfer (ECTS). Although the workload is estimated high, the panel has not received serious complaints about the workload from the Faculty members or the students. Some of the graduates suggested that the core/mandatory curriculum could be decreased, such that the students can select their Specialization earlier and pursue that path with more elective courses. The panel estimates that several traditional courses could be revisited by incorporating all new developments in these fields.

## Panel Judgement

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

## Panel Recommendations

- It is evident from the numbers of students who are selecting the Chemical Synthesis/Biochemistry and Bio-applications Specialization as well as by the annual number of diploma thesis in the Laboratory of Biochemistry (120 over 10 years, very comparable or higher than other laboratories in other Specializations) that this direction is sought after by the students, yet the Laboratory has only 4 faculty. This will need to be rectified as it imposes a significant educational responsibility on the faculty, most likely distracting from their research activities.
- It would be recommended to consider extending the practical internship with external agencies to 4 months to allow the students to have a better and more meaningful experience. The external agencies/stakeholders will have to assume the financial support of such extension.
- Besides the one-day events with EEX, the students would be interested in having additional one day events (career days, organized by the Department, that would allow the students to familiarize themselves with actual job opportunities (academics, industrial, secondary education, biotechnology, etc.).

## Principle 3: Student- centred Learning, Teaching and Assessment

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

*Student-centred 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-centred learning and teaching process*

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

*In addition :*

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

### Study Programme Compliance

- The undergraduate curriculum at the Department of Chemistry of the AUTH is quite comprehensive reflecting a wide range of chemical subdisciplines. It is structured using a balanced mix of mandatory courses and electives as well as theoretical and laboratory-based courses and is offered with a commitment to student-centred learning, using a variety of pedagogical methods and supports (textbooks, PowerPoint presentations, tutorials, lab demonstrations, etc.). Both current undergraduate students and recently graduated alumni stressed their satisfaction with the quality of their received training, noting in addition that they learned how to adapt quickly in unforeseen situations. The University's digital platform elearning.auth.gr (Moodle) is a significant asset enabling personalised and asynchronous learning and promotes the students' skills in finding and using relevant information.

However, the panel believes that several chemical subjects that are still being taught in a rather traditional manner could be consolidated to make room for topics of increasing importance in the modern-day application of chemical science (Chemical Biology, Green Chemistry and Engineering, Quality Assurance Standards and Regulatory Compliance, ...).

- The UGP represents a total effort of 240 ECTS over 4 years (8 semesters) and upon completion it leads to a Diploma in Chemistry ensuring full professional work rights and is complemented by a Diploma Supplement in accordance with EU regulations. The UGP is built with basic courses in the Chemical Sciences over the first 6 semesters and continues with Specialization courses in the remaining 2 semesters, where the students can follow one out of four Specialization and perform a (non-mandatory) final diploma thesis project based on experimental (20 ECTS) or bibliographic research (10 ECTS).
- The students receive fundamental theoretical knowledge in Chemistry, acquire ample laboratory skills and are exposed to current analytical techniques. In addition to these learning outcomes, an effort is made to introduce the students to issues of experimental design, critical assessment of their results and the application of the scientific method in new situations, highly appreciated by the students in the workplace or in graduate studies abroad.
- Incoming students are admitted with high qualifications (typically > 16000 points in the national entry examination), however their initial number requested by the Department is practically doubled and further increased through transfers and other paths leading to over 250 first-year students. In recent years there have been inconsistencies in their admission qualifications (weak chemistry or math backgrounds) putting an extra burden on their training during the initial semesters.
- Students are well informed of their study path possibilities through a “model curriculum” that can be completed in 8 semesters, together with course offerings through the well-written and updated Study Guide, clear course outlines, and access to instructors’ electronic websites.
- Given the pivotal position of Chemistry among natural sciences and its connections to many other disciplines affecting global challenges (Life Sciences, Big Data, Engineering), the emphasis on fundamentals should be tempered in a way allowing students to choose their preferred Specialization earlier in their studies. Although the students can choose from several elective and semi-mandatory courses in the current programme, more flexibility in their study paths would be desirable starting from the third year (5<sup>th</sup> or 6<sup>th</sup> semester).
- The teaching methods are generally flexible and multifaceted and there is a well-organized system of student access to textbooks and instructional material (EUDOXOS and e-learning platform). Generally, students and faculty members endured well the difficult period of remote teaching/learning during the ongoing COVID-19 pandemic.
- The assessment of the students’ performance involves written final and mid-term exams for theoretical courses and reports for laboratory courses. It would be desirable to have a more flexible system of student assessment such as quizzes and continual verification that learning outcomes are reached.
- The panel notes the good interactive relationship between students and teaching faculty members and the effort made by the instructors to respond to students’ needs.
- Student surveys for course and instructor evaluation are carried out once per semester and in a transparent manner. There is a system of evaluation of each course in place, *via* questionnaires. It would be desirable for the outcomes of these evaluations to be used in a more structured manner for possible amendments to the curriculum and other corrective actions. However, the participation of students in course evaluations is rather modest. A more systematic effort should be made to increase student participation in the course

evaluation process, which contributes to the continual improvement of courses and teaching.

- There are good possibilities of student mobility via the Erasmus+ programme. More students should be encouraged to seek such placements. Similarly, Practical Training Internships should become more widely available for students, by coordinating with more stakeholders from both the private and public sectors.
- There is a strong commitment to the care of students with special needs and those with physical or learning disabilities are looked after efficiently and with respect.
- The role of the Academic Advisor needs to be communicated to the students more effectively so that the students can take full advantage of their guidance.

### Panel Judgement

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

### Panel Recommendations

To further improve adherence to this Principle, the panel recommends the following actions:

- Make an effort towards a careful curriculum mapping in connection with achieving the desired learning outcomes based on quantitative skills (mathematics / statistics) and multidisciplinary through flexible exposure to modern topics (Green Chemistry, Big Data, Quality Assurance and Regulatory Compliance, etc.).
- Specialized orientation currently possible in the fourth year (7<sup>th</sup> and 8<sup>th</sup> semesters) should start from the third year of study and should be implemented through relevant consolidation of existing subjects and introduction of new ones that reflect relevant Specializations, as indicated in the previous point.
- The role of Academic Advisor should be enhanced: all students must be assigned to a member of academic staff (personal tutor) who will act as a mentor and provide guidance throughout the course of study. A formal procedure must be developed for the assessment of Academic Advisors by students. The praiseworthy voluntary student initiative ReActiON ([reactionteam.gr](http://reactionteam.gr)) could also benefit from the guidance of an Academic Advisor from among Chemistry faculty members, thus enhancing its scope and ensuring closer interaction with the Department. This could serve as a model for additional student initiatives.



- The curriculum must be enhanced to encourage entrepreneurship among the graduating students, potentially in collaboration with other departments and co- or extra-curricular activities.
- The Department must implement strategies towards increased student participation in course evaluations (for example, data collection during class hours or before an exam); each instructor must communicate the importance of participation in the evaluation process.
- Students with gaps in their basic knowledge (e.g. Mathematics) must be given the opportunity to catch up through directed tutorials and other tailor-made interventions. A review of the curriculum must be conducted, and appropriate changes must be made to balance the workload across all years of the programme.
- Incentives and support must be given to faculty members to learn and deploy new pedagogical approaches and methodologies aimed at improving the students' learning experience. Such courses should be made mandatory for all junior faculty. In parallel, it should be investigated whether such courses can be taken at other departments of the university or indeed at other universities with the possible assistance of the Chemistry Department's faculty involved in the Specialization of Theoretical Chemistry and Chemical Education.

## 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 majority of students who enrol in the Department complete the national entrance exam requirements. In recent years, students have had the ability to enter the Department through multiple paths, thus entering with a variety of backgrounds, some having limited mathematics or even chemistry background. To rectify the limited mathematics background, the Department has implemented a math course more relevant to the needs of the students.
- Another significant number of students enrol in the Department through transfers from other schools or by other mechanisms. This results in a significant increase in the numbers of students who will attend the mandatory/core classes and need to be accommodated in the laboratories. Specifically, although the Department consistently requests that only 120 students enrol yearly in the program, the state mandates ~180 to enrol and then additional students transfer, such that the final entering class amounts to about 250 students. Given that in the end a percentage of the graduates are not able to gain employment (22% unemployment reported), it would seem necessary that the government takes measures to decrease the final number of students in the incoming class.
- The Department has well-established processes towards the completion of the degree, ensuring student progress, and using specific and published terms and conditions for participation into Specializations, diploma thesis, practical internship and student mobility. Student mobility is based on the Erasmus+ rules augmented by Departmental (e.g., emphasis on placement) and University guidelines. According to European practice, the Department's recognition of student credits is based on the ECTS which is clearly and consistently applied across the curriculum.
- Only students who fulfil all requirements of the curriculum can progress to graduation. Only about 20% of the students graduate soon after the 8th semester, in line with many other departments and universities in Greece.
- The study Guide provides extensive information for students so that they understand the ECTS units included in the final grade reported in the Diploma degree and the units reported in the Diploma Supplement (transcript). All information is available to students in electronic form.
- One of the Specializations provides the opportunity to the students to learn how to effectively teach Chemistry in secondary education, although fewer students seem to be interested over the years in this Specialization.

- The interaction with EEX is commendable, and some of the faculty are very active members in the local chapters of the Association.
- The voluntary student initiative called **ReActiON** is commendable. More such clubs should be encouraged and supported by the Department through mentoring, advising by faculty, and access to Departmental resources.

### Panel Judgement

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

### Panel Recommendations

- Appropriate measures should be taken by the government to assure that the number of incoming students is closer to that recommended and requested by the Department faculty; this will allow for a more comprehensive educational program which will result in decreased unemployment of the graduates.
- An effort should be made to assist students who fail to complete their studies on time, given the fact that a vast majority of the enrolled students fall in that category. In addition to a more decisive application of prerequisites wherever possible, solutions should be sought within the current governance framework, e.g., by questionnaires and surveys aimed at enrolled students who are beyond their 4th year of studies. The panel understands the political and institutional constraints which preclude the firm application of prerequisites to ensure the smooth progression of students through their undergraduate programme, however it encourages the application of checks and balances to mitigate student stagnation and drop-out.

## 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 Program Compliance

- The Department has a merit-based but not extroverted attitude in recruitment of new faculty.
- It is not clear how the Department offers opportunities for professional development to its staff and faculty members. Administrative staff and support personnel have opportunities to further develop their knowledge and skills by attending training events and seminars that are organized by the AUTH or external parties.
- It is not clear whether the Department offers limited administrative and teaching duties to new assistant professors so they can focus on research. In general, the workload is reasonable although the number of students is very high.
- Teaching is not linked extensively and at all years of study to research. Undergraduate students are exposed to some modern advanced instrumentation or other relevant activities. There is no organized approach to offer opportunities to educate students in modern research.
- The research output of the Department could be enhanced by the fact that research active faculty have access to highly motivated and qualified final year chemistry students. This may be an asset that offers additional 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.
- 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 External Evaluation and Accreditation Panel 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, undergraduate students are exposed to some modern advanced instrumentation or other relevant activities.
- There seems to be no strategic plan on where the Department would like to be in 3-6 years from now, in terms of adding some new courses based on new accumulating knowledge, while some traditional perhaps peripheral courses are slowly being phased out.
- Given the current low ratio of (# of female assistant professors) / (all assistant professors), there is a fair amount of room for improvement in this aspect. It is noted that the percentage of female students in the Department is significant.

### Panel Judgement

Principle 5: Teaching Staff	
Fully compliant	
Substantially compliant	<b>X</b>
Partially compliant	
Non-compliant	

### Panel Recommendations

- The faculty members should make additional efforts to attract interested undergraduate students in their labs as a way to successfully link teaching and research. In addition, faculty members should incorporate recent exciting examples from their research activities into teaching as a way to link teaching and research even further.
- Without compromising adherence to meritocracy, the Department must be more sensitive to issues like gender diversity when looking at new hires. The Department should also encourage their best female undergraduate/graduate students to pursue academic careers.
- The Department should establish formal mechanisms to reward excellence for both teaching and service. It is recommended that a process of peer evaluation is adopted that allows for a frank and collegial input on an annual basis. Alternatively, or in addition, senior students could be asked each year to recommend a professor based on his/her teaching and with no involvement of the faculty. These nominations can help select the “Teacher of the Year”. Similarly, administrative personnel and related professionals who perform outstanding service could be rewarded with an “Exemplary Service Award”.

- 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.
- It is advised that the Department adopts a policy of looking outside its own confines with active recruitment strategies for new outstanding candidates who excel nationally and internationally.
- 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.

## 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

- The External Evaluation and Accreditation Panel (EEAP) noted that the Department operates under two significant constraints which create enormous challenges. First, the budget allocation for the Department has been substantially reduced in the past several years. Specifically, from an annual allocation of about 300,000 Euros in 2010 to about 50,000 in the last few years. The second constraint is the fact that the Department welcomes nearly 250 new students every year in spite of the fact that the University considers that the proper number of students should be 120. These two constraints must be taken into account when principle 6 is assessed.
- The Department occupied two buildings which date back to the 1950s and 1970s and we noted that 60% of the facilities have been renovated since 2010. The panel was offered a virtual tour of the facilities but the film was not narrated. The various labs, teaching spaces and the library appeared to be neat and in good state. The EEAP noted that lab occupants in some cases were not wearing all the PPE and were told that this is not the case when actual labs are in operation but for the filming purposes the labs were staged. In addition, to the documents provided before the virtual visit the Department shared with us their presentations that they made during our meetings. This was helpful. The EEAP noted the presence of equipment and facilities like AFM, ICP-MS, NMR, XRD etc. that one normally expects to find in a Chemistry Department. The Department has its own library with two staff members (ΕΔΙΠ, ΕΤΕΠ) and the students have access to the University's main library which is located nearby. The libraries are used extensively as informal learning spaces and the local/Department library also has an adjacent meeting/work space available to the students.
- In spite of the enormous challenges posed by the limited budget and the doubling of the number of students in the first year, the Department provides a range of services which complement and facilitate the core teaching and learning activities. Among them the panel noted the advising/welcome/orientation to new students; the active support of co-curricular professional development and networking activities such as conferences and exposure to industry

professionals; and the support to facilitate student mobility within Europe. The EEAP noted the sensitivity and eagerness of the teaching staff to address the needs of minorities and students who need various kinds of accommodations. The panel was told that the Department makes use of digital technology to support e-learning, data management and a suite of services to support the students and the Department's operations. The Department has a computer room for 30-40 spaces supported with 15 computers, one printer and one projector. The EEAP understands that there is comprehensive Wi-Fi coverage.

- The Department has a well subscribed undergraduate research opportunities program which used to be compulsory but is now elective. The Department supports practical/hands on experience in private or other organizations which is funded by ΕΣΠΑ. The panel understands that there is also the opportunity for practical internship that is facilitated centrally from the office of practical internship (Γραφείο Πρακτικής Ασκησης). In other cases, the Department has agreements with the host organizations. In this case, however, the EEAP understands that there is a problem due to the lack of insurance coverage. This is an area that the University should perhaps in coordination with the Government negotiate with an Insurance organization and ensure that there is a formula for automatic coverage of the students.
- One area that the Department is in desperate need is the limited/lack of support from technical staff with specialized skills and knowledge (ΕΤΕΠ). The following table summarizes the number of Teaching staff (ΔΕΠ), ΕΔΙΠ and ΕΤΕΠ in each one of the four Specializations (ΤΟΜΕΙΣ). One sees that the Inorganic Chemistry and the Industrial Chemistry sections do not have any technical support staff. Also, the Inorganic and Organic sections have one ΕΔΙΠ.

	INORGANIC	ORGANIC	PHYSICAL/ENV	INDUSTRIAL
<b>ΔΕΠ (Full/Associate/Assistant)</b>	4/3/3	7/5/1	17/2/3	11/4/4
<b>ΔΕΠ (Total)</b>	10	13	22	19
<b>ΕΔΙΠ</b>	1	1	4	5
<b>ΕΤΕΠ</b>	0	3	2	0

### Panel Judgement

<b>Principle 6: Learning Resources and Student Support</b>	
Fully compliant	
Substantially compliant	<b>X</b>
Partially compliant	
Non-compliant	



## Panel Recommendations

- The Department should continuously evaluate the overall allocation of teaching and support personnel resources among the four sections, prioritize and strongly lobby for the addition/hiring of technical support staff (ΕΤΕΠ).
- Most of the equipment used for training is indirectly supported by the research activities. While the University is working towards supporting the maintenance of facilities, the panel believes that an active chemistry department can further increase the quality of technical services by having some central contingency funds to address unexpected issues in a timely manner.
- The panel understands that safety is addressed in each laboratory and safety training is integrated in the lab course work. The Department also has a standing Health and Safety Committee. This is an area where further improvements can be made. The Department could be supported to build a more formal safety program through the budgetary support to hire a safety coordinator (ΕΔΕΠ). Such a staff person will work with the ΔΕΠ and ΕΔΙΠ members to ensure uniform policies across the sections, building and promoting a culture of safety and health, mechanisms for incident reporting and a “lessons learned” etc.
- The University should perhaps in coordination with the Government negotiate with an Insurance organization and ensure that there is a formula for automatic coverage of the students.

## 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

- In the Aristotle University of Thessaloniki and under the current legislative framework, MODIP is the central Unit of the University, which sets and disseminates the procedures for the internal and external evaluation of the Academic Departments and of the entire University.
- The AUTH has already established and operates an excellent information system for managing and monitoring data concerning students, teaching staff, course structure and organization which is called Πληροφοριακό Σύστημα Διαχείρισης Ποιότητας (<https://qs.auth.gr>). This information system serves to collect KPIs as instructed by HQA.
- The Department of Chemistry (OMEA) has developed a satisfactory information management system for its current students. Suitable KPIs have been established, and there is clear availability of learning resources (through the infrastructure of MODIP), as well as student support both formally and informally. Student progression, success, and stagnation rates are monitored.
- The Department has excellent collaborations with some of its alumni that include both joint research and educational activities. The career paths of graduates are not monitored systematically; although the panel does understand the complicated nature of such a task, initiatives should be considered towards the collection of relevant data.

## Panel Judgement

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

## Panel Recommendations

- The limited participation of the students in the course evaluation is worrisome, since it does not facilitate drawing conclusions, recommendations and actions. This is a common problem encountered in most universities. The Department should intensify its efforts to motivate the students to participate in this very important activity, using the Student Associations to advertise participation.
- A dedicated alumni portal may be developed to promote post-graduation interactions. This community may contribute to the Department's financial support and could facilitate important networking interactions among graduates.
- The voluntary student initiative called **ReActiON** is commendable. More such clubs should be encouraged and supported by the Department through mentoring, advising by faculty, and access to Departmental resources.

## Principle 8: Public Information

**INSTITUTIONS SHOULD PUBLISH INFORMATION ABOUT THEIR TEACHING AND ACADEMIC ACTIVITIES WHICH IS CLEAR, ACCURATE, OBJECTIVE, UGP-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

- The Department has developed a website that contains all information regarding its educational and research activities. The information is well categorized and easily accessible. Pertinent student-related information is available (study program, classes, news and events).
- The Department has an extensive network of external stakeholders, some of whom are actively involved in its activities, including EEX. All the stakeholders with whom the panel interacted expressed their willingness to help the Department achieve its goals.
- The Department participates in various educational and outreach activities including high school visits, public talks by staff etc. Many of these activities are advertised on the Departmental site.

### Panel Judgement

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

### Panel Recommendations

- The Department should develop an effective internal and external communication strategy with students, alumni and other stakeholders, for example by issuing periodic newsletters detailing initiatives, awards, success stories, etc.
- The panel is of the opinion that establishing an External Advisory Council with selected members from the pool of alumni, local industry, other stakeholders and the wider scientific community will be beneficial to the Department and have a societal impact.
- The voluntary student initiative called **ReActiON** is commendable. More such clubs should be encouraged and supported by the department through mentoring, advising by faculty, and access to Departmental resources.

## 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

- The panel had the opportunity to hear about the University's efforts through (ΜΟΔΙΠ) to establish and promote an effective accreditation and continuous improvement set of processes following European recognized approaches. The system includes the external evaluation (like the one our committee is charged to carry out), internal evaluations and the introduction of the Online Student Evaluations of Teaching. The Department has established a committee with members of the teaching staff (ΟΜΕΑ) to implement the internal evaluation process. The Chair of the Department in his presentation stated the commitment of the teaching and support staff to implement a quality assurance process for the continuous improvement of the program of study.
- As a result of the internal self-evaluation, the Department has identified areas of weakness and needing attention. They highlighted to us eight specific actions underway with a completion deadline of December 2021. The EEAP noted that this collection of actions ranges considerably and in some cases the motivation or critical need is more obvious. For example, it is recommended to develop actions to offer courses in English so that they attract foreign students. This is a huge undertaking. On the other hand, the continuous efforts to advise students by the establishment of advisors appears to be a more pressing and obvious need.

## Panel Judgement

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

## Panel Recommendations

The Department has a coordinated effort and we believe that it can be further improved by a number of additional actions

- A systematic effort should be devoted to ensure that all courses meet the minimum participation/response rate depending on enrolment to guarantee that the results from the evaluations of teaching are statistically significant. They must engage with the student to make it clear to them that their feedback is taken into account with the aim to improve the learning environment and help teachers reflect on their teaching effectiveness, style and approach and improve their teaching. Moreover, they must work to highlight the confidential nature of the evaluation and ensure that students feel safe to engage in this process.
- The Department offers informal opportunities to the current students and recent alumni such as graduate students in the Department and abroad to provide feedback about the various aspects of the programs. A more formal student engagement through well thought and targeted surveys may offer significant insight into the program strengths and weaknesses as well as the opportunities for growth.
- The establishment of an External Advisory Council to act as a sounding board when the Department considers new ideas, directions etc. The role would be strictly advisory.
- It was noted by an industry stakeholder that the Department's need to improve their skills and success in process chemistry and process development. This suggestion prompted the panel to recommend that the Department's industrial chemistry section works closely with the Chemical engineering department to identify synergies and establish clear pathways to students who wish to build such skills as well as process control and design. Similarly, the Department could engage in more interactions and collaborative efforts with other relevant departments, for example Biology, Pharmaceutical Sciences, Physics, Agronomy, the (Veterinary) Medicine, CERTH and others.

## Principle 10: Regular External Evaluation of Undergraduate Programmes

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

*HAHE is responsible for administrating the programme accreditation process which is realised as an external evaluation procedure, and implemented by a committee of independent experts. HAHE 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

- The panel believes that the Department made a serious effort to address and respond to the recommendations of the 2011 evaluation. From the discussion with students and other stakeholders it was evident that the climate in the Department has improved through better relations between students and faculty. The Department also improved a number of indicators. They reduced the number of courses, the time to completion, the average graduation grade, and introduced safety procedures etc.
- Among the areas to address, the panel noted room for improvement in the still large number of instructors per course e.g. Unit Operations (Φυσικές Διεργασίες). Collaborative teaching is not a bad idea, but it has to be done with μέτρο, purpose, and in a coordinated manner. The EEAP heard from the students for example that in one course, the fact that Easter was late this year affected the pace of the lectures and the assigned workload was not uniform before and after Easter, nor was the course evaluation equally possible. Another area for improvement, as noted above, would be increasing the number of students who participate in the online evaluation of teaching.
- A more general issue is the case of Biochemistry and more broadly the field of Life Sciences (Chemical Biology). This is still weak in spite of the introduction of some courses as recommended in 2011. We believe that this area represents a missed opportunity for the Department to be in an extremely important, fast growing and high-impact area.

## Panel Judgement

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

## Panel Recommendations

We recommend that the Department makes a systematic and dedicated effort to

- Create a set of guidelines and procedures that justify and govern collaborative teaching, including how the course is coordinated re: uniformity of teaching, grading, and evaluation.
- Determine through curriculum mapping possible redundancies and duplications to reduce the number of courses further and make room for the introduction of new topics or needs as identified by the various feedback mechanisms from students, alumni, stakeholders etc.
- Routinely assess the level of compliance to each of the recommendations and explain/justify the changes made in response to these external recommendations.



## PART C: CONCLUSIONS

### I. Features of Good Practice

The undergraduate programme at Chemistry-AUTH is in compliance with that of its peer institutions. The goals and functions of the Chemistry Department are well documented although there is no apparent strategic plan to reflect 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 with a few additional hires as specialized technical personnel (ΕΤΕΠ) it will be operating at full speed. All class/lab-related material (e.g., class goals, notes, syllabi, grading requirements etc) is 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. In coordination with the internal evaluation committee (OMEA) they oversee and try to 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) is significant and of high impact. Along these lines, the Department should be commended for its participation in the annual meeting at which trainees at all levels have a chance to present their work/research as appropriate.

### II. Areas of Weakness

A few weaknesses have been identified that, once addressed, will further elevate the current undergraduate program. These are:

- 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 create a bottleneck in the studies.
- Funding of the undergraduate programme is not sufficient, especially regarding laboratory instrumentation and consumables. The Department is doing a significant job in allocating the limited resources for the training of the students.
- The student participation in the online class evaluation is limited and in certain cases insufficient to draw conclusions and recommend revisions to the curriculum. There are probably a number of contributing factors, including the Greek tradition of not evaluating instructors, or the lack of understanding of the benefits of student participation.
- The role of academic advising for the education of a student is not sufficiently strong and advertised by the Department. Although the Department has assigned academic advisors to all students, it is apparent that the students do not take advantage of this function and do not benefit from this service.
- The interactions between the Department and its alumni are reasonable, but not at their full potential.
- Student academic excellence, teaching excellence as well as exemplary professional service are not adequately recognized by the Department.
- There is a noticeable lack of a commensurate number of specialized technical personnel (τεχνικό προσωπικό) for the teaching and research needs of the Department.

- Collaborative interactions between the Department and the other Chemistry departments in Greece are limited. The same is true for the interactions with relevant departments and centers in the rest of the country.

### **III. Recommendations for Follow-up Actions**

- 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 in the future is recommended and should be included with the material sent by the Department for review.
- An external committee should review the program every 4-5 years to provide recommendations of the curriculum and teaching activities.
- Given the numbers of faculty who retired or left the Department in recent years, it is advised 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. Without compromising adherence to meritocracy, the Department must be more sensitive to issues like gender diversity when looking at new hires. The Department should also encourage their best female undergraduate/ graduate students to pursue academic careers.
- Various professional development opportunities (e.g., sabbaticals and ERASMUS projects) are available to faculty members. Participation in these programs should be strongly encouraged by the Department to further enhance the quality of teaching and research activities.
- The Department should establish formal mechanisms to reward excellence for both teaching and service. It is recommended that a process of peer evaluation system is adopted that allows for a frank and collegial input on an annual basis. Alternatively, or in addition, senior students could be asked each year to recommend a professor based on his/her teaching and with no involvement of the faculty. These nominations can help select the “Teacher of the Year”. Similarly, administrative personnel and related professionals who perform outstanding service could be rewarded with an “Exemplary Service Award”.
- 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.
- To enhance excellence in research and to pursue scientific questions of high impact, there is an urgent need to recruit EDIP and ETEP staff to maintain and upgrade the experimental infrastructure.
- There is a need to evaluate teaching and /or support and administrative staff. The External Evaluation and Accreditation Panel 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.
- 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.
- 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 “Academia-Industry Day” where members of the public/private sector can easily interact with students. In addition, the Department should create an “External Advisory Council” to further improve the relationship and networking with the public/private sectors, and whose suggestions may enhance the education of the undergraduate students of the Department.

- The Department needs to more systematically explore new pedagogical methods that go beyond the traditional lecture-based format. There is substantial discussion internationally on ways to use available technology to better engage students. For example, the “flipped classroom”, short instructional videos, web-based problem solving, or cell phone-based classroom interaction could, if used wisely, improve learning outcomes and student satisfaction. Further continued education workshops on pedagogical methods would be beneficial for the faculty (potentially organized and offered by the Specialization in Theoretical Chemistry & Chemical Education).
- The Department should create a flyer or short brochure with information on Departmental activities, events, student/instructor awards/recognitions. The flyer/brochure could be electronically disseminated to the alumni and may be accompanied by a request for support.
- Additional efforts should be pursued to link and translate general education to specific chemistry topics. Instructors of mathematics could coordinate their efforts to minimize disparity and maximize impact of their teaching material.
- The Department should make a greater effort to smoothen the transition from high school to higher education. This could be accomplished perhaps by improving the initial orientation and certainly by bridging the gap between 1<sup>st</sup> year students and advisors. The advisor should take the extra step to approach the students who are often intimidated. The Department could also implement mentorship award(s) to promote interactions and reward success. Improvement in advising will allow better monitoring of the progress of each student.
- The Department could make an effort towards a careful curriculum mapping in connection with achieving the desired learning outcomes based on quantitative skills (mathematics / statistics) and multidisciplinary through flexible exposure to modern topics (Green Chemistry, Big Data, Quality Assurance and Regulatory Compliance, etc.).
- It would be desirable to have a more flexible system, not just a final exam, of student assessment, such as mid-term evaluations, quizzes and continual verification that learning outcomes are reached.
- 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 programs like ERASMUS. In addition to language challenges, enhanced availability of university housing for accepting foreign students would be really helpful.
- The limited participation of the students in the course evaluation (questionnaire) 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.
- Paid internships should be considered by the Department which would secure additional funds and sponsors both on campus and in the public/private sectors. The University should perhaps in coordination with the Government negotiate with an Insurance organization and ensure that there is a formula for automatic coverage of the students.
- 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 Annual Meeting already organized by the Department and EEX.
- Exit interviews of graduating seniors with the Chair of the Department may further assist the Department in its educational endeavours.
- 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 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. The Association of Greek Chemists (EEX) may also serve as a conduit and a resource for the accumulation of such vital information.

- The Department should intensify its efforts to advertise its activities on 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. Disseminations of such activities should be geared towards the benefit of the society as a whole and not reflect specific political views.
- It is highly recommended that the Department adopt 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 “Chair’s List of Excellence”. If possible, names and pictures should also be uploaded to the Departmental website.
- The Department could engage in more interactions and collaborative efforts with other relevant departments, for example Biology, Pharmaceutical Sciences, Physics, Agronomy, the (Veterinary) Medicine, CERTH and others.

#### IV. Summary & Overall Assessment

The Principles where full compliance has been achieved are: **1, 2, 4, 7, 8, and 9.**

The Principles where substantial compliance has been achieved are: **3, 5, 6, and 10.**

The Principles where partial compliance has been achieved are: **None.**

The Principles where failure of compliance was identified are: **None.**

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

## The members of the External Evaluation & External Evaluation and Accreditation Panel

Name and Surname

Signature

- 1. Professor. Christos G. Takoudis (Chair)**  
University of Illinois at Chicago, Chicago, United States of America
- 2. Professor Spiros Agathos**  
Université Catholique de Louvain, Louvain-la-Neuve, Belgium
- 3. Professor Peter Englezos**  
University of British Columbia, Vancouver, Canada
- 4. Professor Styliani-Anna (Stella) E. Tsirka**  
Stony Brook University, New York, United States of America
- 5. Dr. Petros Sotiriou**  
Member of the Association of Greek Chemists, Greece