ΕΛΛΗΝΙΚΗ ΔΗΜΟΚΡΑΤΙΑ
HELLENIC REPUBLIC

Εθνική Αρχή
Ανώτατης Εκπαίδευσης
Hellenic Authority
for Higher Education

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Αθήνα, 20/05/2021
Αρ. πρωτ. 22209

Προς

1. Τον Αντιπρύτανη Ακαδημαϊκών Υποθέσεων και Φοιτητικής Μέριμνας
   και Πρόεδρο της ΜΟΔΙΠ του Αριστοτελείου Πανεπιστημίου Θεσσαλονίκης
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2. Την Πρόεδρο του Τμήματος Χημικών Μηχανικών του Αριστοτελείου Πανεπιστημίου
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Θέμα: Πιστοποίηση του Προγράμματος Προπτυχιακών Σπουδών Χημικών Μηχανικών του Αριστοτελείου Πανεπιστημίου Θεσσαλονίκης

Αξιότιμε κ. Πρόεδρε της ΜΟΔΙΠ,
Αξιότιμη κ. Πρόεδρε,

Είμαστε στην ευχάριστη θέση να σας πληροφορήσουμε ότι το Συμβούλιο Αξιολόγησης και Πιστοποίησης (ΣΑΠ) της ΕΘΑΑΕ, κατά τη Συνεδρίαση 12/07-05-2021, αποφάσισε τη χορήγηση πιστοποίησης στο Πρόγραμμα Προπτυχιακών Σπουδών Χημικών Μηχανικών του Αριστοτελείου Πανεπιστημίου Θεσσαλονίκης με διάρκεια ισχύος τεσσάρων ετών, από 07-05-2021 έως 06-05-2025.

Το Συμβούλιο έκανε δεκτή την Έκθεση της Επιτροπής Εξωτερικής Αξιολόγησης & Πιστοποίησης, βάσει της οποίας το Πρόγραμμα Προπτυχιακών Σπουδών Χημικών Μηχανικών του Ιδρύματός σας συμμορφώνεται πλήρως με τις αρχές του Προτύπου Ποιότητας ΠΠΣ της ΕΘΑΑΕ και τις Αρχές Διασφάλισης Ποιότητας του Ευρωπαϊκού Χώρου Ανώτατης Εκπαίδευσης (ESG).

Δεχθείτε, τέλος, τα συγχαρητήριά μας για την άριστη ανταπόκριση του Τμήματος και του Ιδρύματός σας στη διαδικασία πιστοποίησης του εν λόγω ΠΠΣ.

Συνημμένα σας αποστέλλουμε:

α) την Έκθεση Πιστοποίησης

β) την Απόφαση του Συμβουλίου Αξιολόγησης και Πιστοποίησης της ΕΘΑΑΕ

Με εκτίμηση

Ο Πρόεδρος της ΕΘΑΑΕ

Καθηγητής Περικλής Α. Μήτκας

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

Ευρωπαϊκή Ένωση
Ευρωπαϊκό Κοινωνικό Ταμείο

ΕΣΠΑ
2014-2020

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ΕΛΛΗΝΙΚΗ ΔΗΜΟΚΡΑΤΙΑ
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Αθήνα, 20/05/2021
Αρ. πρωτ.: 22194

ΑΠΟΦΑΣΗ ΠΙΣΤΟΠΟΙΗΣΗΣ

Το Συμβούλιο Αξιολόγησης και Πιστοποίησης της Εθνικής Αρχής Ανώτατης Εκπαίδευσης (ΕΘΑΑΕ)

Έχοντας υπόψη:

1. Τις διατάξεις των άρθρων 14, 64, 65, 66, 67, 68, 69, 70, 71, 72 και 80 του Ν. 4009/2011 (ΦΕΚ 195/Α΄/06-09-2011) «Δομή, λειτουργία, διασφάλιση της ποιότητας των σπουδών και διεθνοποίηση των ανωτάτων εκπαιδευτικών ιδρυμάτων», όπως τροποποιήθηκε και ισχύει.

2. Τις διατάξεις των άρθρων 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13 και 59 του Ν. 4653/2020 (ΦΕΚ 12/Α΄/24-01-2020) «Εθνική Αρχή Ανώτατης Εκπαίδευσης. Ειδικοί Λογαριασμοί Κονδυλίων Έρευνας Ανώτατων Εκπαιδευτικών Ιδρυμάτων, Ερευνητικών και Τεχνολογικών Φορέων και άλλες Διατάξεις».

3. Την υπ᾽ αριθμ. 18135/Ζ1/7-2-2020 Απόφαση της Υπουργού Παιδείας και Θρησκευμάτων (ΦΕΚ 94/τεύχος ΥΟΔΔ/7-2-2020), περί διορισμού του Προέδρου του Ανώτατου Συμβουλίου της Εθνικής Αρχής Ανώτατης Εκπαίδευσης (ΕΘΑΑΕ).

4. Την υπ᾽ αριθμ. 15650/23-04-2020 Απόφαση του Προέδρου της ΕΘΑΑΕ (ΦΕΚ 329/τ.᾽ ΥΟΔΔ/04-05-2020) «Ορισμός των μελών του Συμβουλίου Αξιολόγησης και Πιστοποίησης (ΣΑΠ) της Εθνικής Αρχής Ανώτατης Εκπαίδευσης (ΕΘΑΑΕ)».

5. Την 12η/07-05-2021 συνεδρίαση του Συμβουλίου Αξιολόγησης και Πιστοποίησης, θέμα 2.1 «Έγκριση Εκθέσεων πιστοποίησης - Χορήγηση Πιστοποίησης».

ΠΙΣΤΟΠΟΙΕΙ ΟΤΙ

το Πρόγραμμα Προπτυχιακών Σπουδών

Χημικών Μηχανικών του Αριστοτελείου Πανεπιστημίου Θεσσαλονίκης

συμμορφώνεται πλήρως με τις αρχές του Προτύπου Ποιότητας ΠΠΣ της ΕΘΑΑΕ και τις Αρχές Διασφάλισης Ποιότητας του Ευρωπαϊκού Χώρου Ανώτατης Εκπαίδευσης (ESG 2015) για το επίπεδο σπουδών 7 του Εθνικού και Ευρωπαϊκού Πλαισίου Προσόντων.

Η διάρκεια ισχύος της πιστοποίησης ορίζεται για τέσσερα έτη, από 07-05-2021 έως 06-05-2025.

Ο Πρόεδρος της ΕΘΑΑΕ

Καθηγητής Περικλής Α. Μήτκας

Επιχειρησιακό Πρόγραμμα
Ανάπτυξη Ανθρώπινου Δυναμικού,
Εκπαίδευση και Διά Βίου Μάθηση
ΕΣΠΑ 2014-2020
Με τη συγχρηματοδότηση της Ελλάδας και της Ευρωπαϊκής Ένωσης
Ευρωπαϊκή Ένωση
Ευρωπαϊκό Κοινωνικό Ταμείο

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Accreditation Report
for the Undergraduate Study Programme
(Integrated Master) of:

Chemical Engineering
Institution: Aristotle University of Thessaloniki
Date: 6 February 2021

Report of the Panel appointed by the HAHE to undertake the review of the
Undergraduate Study Programme (Integrated Master) of
Chemical Engineering 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 & Accreditation Panel

The Panel responsible for the Accreditation Review of the Undergraduate Study Programme (Integrated Master) of **Chemical Engineering** 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 Ioannis P. Androulakis (Chair)**
    Rutgers, The State University of New Jersey, USA

2. **Ms. Despina Dimitriadis**
    Member of the Technical Chamber of Greece, Greece

3. **Professor Marios Ioannidis**
    University of Waterloo, Canada

4. **Professor Georgios M. Kontogeorgis**
    Technical University of Denmark (DTU), Denmark

5. **Professor Vladimiros Papangelakis**
    University of Toronto, Canada

II.   Review Procedure and Documentation

The members of the review Panel held their first (private) meeting on Monday, February 1, 2021. This, and all teleconference meetings were held remotely, via *Zoom*, were organized and coordinated with HAHE and the help of the Chemical Engineering Department, Aristotle University of Thessaloniki (AUTH).

On Tuesday, February 2, 2021, the Panel held the following meetings:

a) Overview of the Undergraduate programme with the vice-Rector/President of QAU (MODIP) and the Head of the Department
b) Discussion of the degree of compliance with IEG (OMEA) and QAU (MODIP) representatives
c) Discussion with teaching staff members
d) Discussion with current undergraduate students

On Wednesday, February 3, 2021, the Panel held the following meetings:

a) Tour of the teaching and learning facilities and discussions with Admin, teaching and Support staff
b) Discussion with programme graduates
c) Discussion with employers of graduates and social partners of the programme
d) Separate discussion with the Assistant Professors
e) Short debriefing (Panel members only)
f) Meeting to request additional clarifications with IEG (OMEA) and QAU (MODIP) representatives
g) Informal presentation of preliminary key finding to the vice-rector, department head, IEG (OMEA), and QAU (MODIP) representatives

The Panel held private meetings on February 4, 5, 6 and 7 to finalize the report.

In preparation for the visit and discussions, the Panel received a multitude of materials which included: background information on accreditation, detailed data related to the programme under evaluation, operational and educational data. The Panel was in constant communication with IEG (OMEA) and QAU (MODIP) representatives who were extremely accommodating in providing additional information.

The IEG (OMEA) and QAU (MODIP) representatives as well as the faculty were extremely open and helpful in providing all and any information requested by the Panel.

III.   Study Programme Profile

The Chemical Engineering Department of the Aristotle University of Thessaloniki was established in 1972. In its 49-year history, the programme has trained over 4,000 students. The mission of the programme is to provide thorough training and broad education and prepare chemical engineers able to tackle complex, diverse, and global challenges; to conduct state-of-art research addressing pressing domestic and global challenges; enable all its graduates to develop critical and innovative thinking, while in line with the Standards and Guidelines for Quality Assurance in the European Higher Education context.

Currently, the Department comprises 25 faculty (15 full, 4 associate, and 5 assistant professors, as well as one lecturer), 20 members providing technical and educational support, and two administrative staff. Presently, there are 791 active students enrolled who have been with the programme for less than 7 years, while an additional 512 students have been in the programme for more than 7 years, which brings to the total number of students registered to 1,303 (active and inactive). The programme trains 84 Ph.D. students currently. The normal duration of studies is 5 years (10 semesters), and students are expected to successfully complete 41 core, 10 elective courses (out of a total of 54 elective courses offered) and a diploma thesis, totalling 300 ECTS leading to a Level 7 Qualification, according to the National & European Qualifications Network (Integrated Master). In addition to their teaching responsibilities, the faculty maintains a strong research portfolio, and the Department ranks fourth in research funding among the 42 Departments across AUTH. Its international ranking is respectable as reported in various international measurements.

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

The Department has established a quality assurance policy, which is fully compliant with the principle. In particular, the study programme is appropriate, and is regularly updated. Measurable and achievable goals are set, and these are monitored with key performance indicators (KPIs) and appropriately communicated to the broader society. The links between education and research are strong and students are exposed to several opportunities.

Panel Judgement

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

Panel Recommendations

- It is recommended that the programme develop clear mechanisms with measurable outcomes for implementing changes to improve student outcomes.
- The Department's graduates are very active and eager to support the programme. These interactions should be continued and enhanced. The alumni's views could be considered on several topics.
- Recent international trends in chemical engineering such as renewable energy/decarbonization, digitization, big data, emphasis on entrepreneurship, etc., should be followed more closely and considered in future updates of the study programme.

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 programme complies with Principle 2 to a substantial degree and the curriculum compares very well with internationally accepted standards including regulations of the European Federation of Chemical Engineering (EFCE) regarding the chemical engineering education. The programme has established internal procedures allowing for a thorough evaluation of the course content and coursework. Courses aim at fostering deep understanding of the fundamentals in chemical engineering. The programme compares favourably to programmes offered at top Chemical Engineering schools around the world, effectively preparing its graduates for competitive global careers in industry and academia. Significant opportunities exist for students to be involved in research as well as national and international work experiences.

However, the Panel determined that critical constituencies and stakeholders are not formally and actively involved in assisting programme renewal and improvement efforts.

Panel Judgement

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

Panel Recommendations

- It is recommended to involve more the external stakeholders, such as alumni and companies/organizations which employ graduates from the Department, in the formulation of the study programme and its periodic review.

- It is recommended to establish an External Advisory Board (EAB) consisting of representatives from some of the companies/organizations which employ graduates of the Department, as routinely done in other European and N. American universities e.g., https://www.kt.dtu.dk/english/about-us/organisation. The EAB should meet regularly, at least once a year, to discuss general topics of relevance to the Department, such as strategic planning, the study programme, and research directions. Ad hoc meetings may also be arranged with the EAB.

- It is recommended that in any future renewal of the study programme, a closer look at recent trends in chemical engineering training and education. Examples are renewable energy/decarbonization, climate change, water scarcity, digitization, entrepreneurship, big data, industry 4.0 which could be considered in the form of courses and related educational activities. It is recommended that a course on Innovation, Entrepreneurship, and Commercialization be considered mandatory for all chemical engineering students which is consistent with the views of industry and practice in many universities.

- The practical training programme of the students is a major strength; however, its two-month duration is relatively small. It requires restructuring to allow willing students to spend more time at their placement and gain additional and meaningful experience. Nevertheless, it should be seriously considered as it is standard practice in many institutions around the world.

- It is recommended that a greater fraction of diploma theses be conducted in collaboration with industry.

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-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 study programme is delivered in a student-centered environment that promotes mutual respect and includes all the basic tools for monitoring e.g., student satisfaction surveys, follow-ups resulting from student appeals. The faculty demonstrate a clear interest and enthusiasm in the educational process and their contact with students is very close at all levels. Overall, the students are very satisfied with their studies as evident from the interviews conducted. There is mutual respect between students and teachers. There is variety in the student learning paths via the many elective courses and the diploma thesis, including the practical training and internships.

Panel Judgement

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

Panel Recommendations

- A plethora of elective courses (~50; chosen with no constraints other than the semester of offering) affords flexibility but may confuse the rational organization of learning paths. The students have the opportunity to take electives from other Departments, however, this information is not clearly articulated in the student handbook. The list of elective courses is not the result of a systematic analysis of the curriculum reflecting strategic priorities. The Department needs to develop a clear strategy to reduce and consolidate existing electives with overlapping or similar content by ~50% and introduce up to five new electives in new emerging areas/trends in chemical engineering.
- An "Independent Research" elective course could be created preparing students for specific diploma thesis projects by enriching their research thinking.
- It is beneficial for students to take courses from other Departments; however, these should be counted towards the ECTS needed to fulfil the programme (with some restrictions to be decided by the curriculum committee). The students should be receiving credits for all educational tasks they are performing.
- The Department should focus more on students facing problems completing their studies on time, as significant number of enrolled students are in this category. Proposed solutions should be sought within the current governance framework. This may be a time-consuming process, but worth doing, e.g., by suitable questionnaires and surveys aimed at enrolled students who are beyond their 7th year of studies.
- Incentives and support for faculty members to deploy new pedagogies aiming at deep learning should be given serious consideration. Resources from other engineering Departments could be pulled together to realize this goal. It is also recommended that students are tested using a greater variety of examination methods, and not rely exclusively on a cumulative final exam – as appears to be the practice in several courses.
- The procedure for student appeals should be formalized and more amply communicated.

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 programme has established processes and mechanisms to provide support to incoming students and has created a welcoming and engaging environment. The programme has established mechanisms to monitor student satisfaction, while it has created and maintains an extensive database of student course evaluations. The programme requirements, and various related information, are available to prospective and current students on the Department's web page. The Panel determined that the students are aware and take advantage of this information. The diploma supplement is automatically provided to the students and the qualifications earned are automatically recognized by academic institutions worldwide. The student advising and support programme greatly assist in promoting a healthy environment.

It is understood that the student population increases at a steady rate without a proportional increase in additional resources despite requests to the Ministry of Education and Religious Affairs to (i) reduce the number of first-year intake; and (ii) limit the number of years a student can remain enrolled with no apparent progress. The continuation of this trend will have detrimental consequences to the quality of the programme and the value of the degree awarded.

Panel Judgement

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

Panel Recommendations

- A greater variety in the examination methods should be considered, for example more courses assessed via written examinations with "open books" and/or more project-based final assessments. Improving the low success rate in many exams should become a priority.

- For many courses, a course grade is determined by a final exam/assessment only. It is recommended that a variety of few in-semester evaluations of closely supervised nature (e.g., quizzes, midterms) and/or non-closely supervised nature (e.g., group assignments etc.) will help students not relying on a single final exam mark.

- The Panel feels that the course load could be better distributed as it overwhelms certain students, particularly in the final (5th) year due to the Techno-economic Analysis course.

- Practical training can be extended to more than two summer months. Students will benefit if the curriculum could be restructured to allow flexibility for a minimum of one semester (4 months at least) to a maximum of a full year of practical training (for willing students) before the student returns to complete the degree (e.g., https://uwaterloo.ca/engineering/future-undergraduate-students/co-op-experience).

- Providing one week free from course requirements before the start of the final exam period will help students manage their stress levels and minimize mental health issues.

- The Panel recommends that the Department takes advantage of social media creating, for example, an alumni LinkedIn group which all graduating students are encouraged to join and progressively build an extensive data base connecting alumni.

Principle 5: Teaching Staff

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

> *The Institutions and their academic units have a major responsibility as to the standard of their teaching staff providing them with a supportive environment that promotes the advancement of their scientific work. In particular, the academic unit should:*
>
> - *set up and follow clear, transparent and fair processes for the recruitment of properly qualified staff and offer them conditions of employment that recognize the importance of teaching and research;*
> - *offer opportunities and promote the professional development of the teaching staff;*
> - *encourage scholarly activity to strengthen the link between education and research;*
> - *encourage innovation in teaching methods and the use of new technologies;*
> - *promote the increase of the volume and quality of the research output within the academic unit;*
> - *follow quality assurance processes for all staff members (with respect to attendance requirements, performance, self-assessment, training etc.);*
> - *develop policies to attract highly qualified academic staff.*

Study Programme Compliance

The teaching staff is at a high morale and high cohesion level as an academic unit. The Department has a clear process for the recruitment of new faculty, which however is based primarily on Departmental teaching needs rather than on strategic directions. Despite the desire to be extrovert and outward-looking, the demographics of faculty do not show that this is the case. For example, all recent hires were graduates of the Department. The faculty gender distribution (18 male /7 female faculty) is 70% male – 30% female complement. Several of the faculty are very research active, while overall the faculty maintains a strong research output (publications and citations).

The professional development opportunities for the teaching staff are weak as the Department struggles to meet yearly teaching obligations for a very large number of courses (41 core – 54 electives). This results in heavy teaching loads that leave little room for development opportunities of the teaching staff.

There is strong evidence of linking teaching with research given the research output of the Department. However, not all faculty are equally active in research. The Department has not identified any specific research areas for strategic growth. The undergraduate programme has been consciously designed to offer a general chemical engineering degree with no option for specialization in any specific area.

The teaching staff is regularly evaluated by students through surveys. The quality indices have reached a value of about 70, with the spread ranging from 30 to 90 (max possible is 100). MODIP is doing a good job in collecting and analysing data, with aggregate numbers communicated to instructors and the Department. Although average student participation is on the rise over the past 4 years, it remains relatively low for certain courses and this may result in unrepresentative quality indices. Evaluation results are communicated to the teaching staff with no comparison to the Departmental and Polytechnic School averages.

Panel Judgement

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

Panel Recommendations

- To maintain the robustness of the programme, additional hires need to be secured. Imminent retirements put the Department in jeopardy to meet its current teaching obligations.
- New hires should ideally be qualified individuals with a variety of pedigrees (not exclusively AUTH graduates) to enrich exposure to new ideas, philosophies, and approaches to teaching (and research and organization).
- Ensure that new faculty hires are evaluated for their teaching ability separately from their research ability.
- Aim at hiring more female faculty to achieve a gender balance reflecting current student ratios of male to female (not provided).
- Create room (e.g., by reducing the number of electives offered, or merging committees) to afford professional development opportunities to faculty in terms of Sabbatical Leaves and/or training in modern engineering pedagogy approaches and best practices suited for the current new generation of students. Attendance of short courses/seminars in engineering pedagogy will be particularly useful to instructors with low teaching quality indices. Rationalizing course offering would also result in more appropriate teaching load for the faculty.
- Teaching evaluations communicated to individual instructors should have additional metrics to compare the individual instructor performance to the average evaluations of the Department and the Polytechnic School of the AUTH for all key performance questions.
- The Department should hire additional support staff, or coordinate with the central administration, to help with many non-academic responsibilities (i.e., financial, procurement, maintenance, timetable, and final exam scheduling) which are currently eroding productive time of faculty members.

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

Institutional infrastructure is very good and occasionally remarkable, for example the NMR and UPLC/MS facilities, comparable to what exists in larger institutions. State of the art library facilities offering access to major scientific repositories are available to all students. An excellent video presentation was made depicting space and lab facilities that is part of the Department communication strategy. Psychological, legal, medical, housing, and financial support services are provided to undergraduate students. The programme offers students the possibility to postpone their studies due to personal reasons. The administrative staff is properly informed and provides student support on a wide variety of non-academic issues as well.

Panel Judgement

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

Panel Recommendations

In view of the financial dependence of the Department on limited state funding, the Department needs to develop a sustainable strategy that prioritises actions to achieve specific goals. Optimization of the deployment of available resources by consolidating existing resources, such as libraries, computing facilities, etc., is one aspect of such strategy. Another aspect is optimization of the allocation of teaching tasks to faculty members.

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

The Department has developed a very satisfactory information management system for its current students. Surveys are carried out and analysed and actions/follow-ups are taken when is considered necessary. Committees are set and results are thoroughly analysed.

Student progression, success, and drop-out rates are closely monitored. The career paths of graduates are monitored less systematically, and this may be a very difficult task to do for all. Notwithstanding, the Department has excellent collaborations with many of its graduates, including joint research and educational activities, and this is particularly praised.

Panel Judgement

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

Panel Recommendations

- The Panel recommends that the student evaluations be considered formally by the "Undergraduate Curriculum Committee" at the end of each semester. The conclusions and decisions made by the committee should be communicated to the students so that they are aware of the results of the process and can appreciate its significance for improving the programme delivery.
- The Panel recommends that students be more actively encouraged by the faculty to participate in the evaluations of their courses. The Panel also recommends that the evaluation be extended also to all support staff in charge of in-class or laboratory teaching.
- The Panel recommends that the Department seeks for additional assistance from the AUTH as the number of bureaucracy-related activities at many levels is significant.

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

The Department has put a lot of effort into its website to include information on the activities, personnel, programmes, student and Department activities, and procedures. This information is vast. The Department has set a separate website for alumni which is very useful. The course outline, offerings, and timetable per semester in each year of study are listed online. The Departmental policy on quality assurance is published online and relies on the MODIP website. The concept of "Departmental Ambassador" is an excellent idea that the Department is implementing. The Department has a large set of external stakeholders who are eager to get engaged and help the Department achieve its goals, however these stakeholders are not fully informed about the Department's affairs.

Regrettably, in its current form, the information available online (https://cheng.auth.gr/) is available only in Greek, limiting international communication efficiency and outreach possibilities.

Panel Judgement

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

Panel Recommendations

- The website needs an English version, and this should be considered a point of immediate attention by the Department.
- Certain pages in the Department's website need to be updated frequently (e.g., society of graduate students).
- The website is not very easy to navigate. It also needs a better search engine.
- The departmental policy and philosophy on quality assurance should be published online and separately from QAU (MODIP).
- The Department may consider a more active communication approach with all its constituencies and stakeholders, by issuing and emailing periodic newsletters describing Department news, initiatives, awards, success stories, etc.
- The Department should communicate formal procedures for student-faculty conflict resolution.
- Certain announcements on the website need to indicate a closing date (i.e., applications for scholarships, Ph.D. positions, etc.).
- Faculty achievements and awards received should be prominently featured on the website.

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

A process and methodology exist to evaluate internally the curriculum, share the results with the academic unit and make decisions for improvements/changes. Some curriculum changes are made based on input from students and external stakeholders – albeit somewhat *ad hoc* and not systematic.

Panel Judgement

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

Panel Recommendations

- Establish quantifiable metrics for the analysis of assessment data and establish clear feedback mechanisms aiming at improving the programme.
- Assemble an external Advisory Board consisting of external stakeholders, including alumni and industry, to formalize structured external input and feedback to the Department. The

Panel also recommends engaging the stakeholders in the process of programme review and curriculum change.

- Communicate widely to the public that a continuous improvement process is in effect and explain the way it works.
- Communicate in the Department website any measures taken that led to actionable items and implementations to improve the study plans and curriculum.
- Communication of summaries of course evaluation data to students has not yet taken place. The timeline of the annual review spanning from data collection to implementation of decisions made is not consistent.

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

This is the first external accreditation for the programme administered by HAHE. The programme fully complies with Principle 10 at this point.

Panel Judgement

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

Panel Recommendations

- The Panel recommends experience-sharing with other departments (within AUTH and other Chemical Engineering Departments in Greece and Europe), so that best practices can eventually be developed. It is suggested that an accreditation session is organized as part of the Annual Chemical Engineering meeting, spearheaded by AUTH.

PART C: CONCLUSIONS

I.   Features of Good Practice

The Chemical Engineering Department of AUTH is very strong in terms of both teaching and research and is well respected worldwide. The faculty is enthusiastic and very dedicated to their mission: excellence in research and teaching. The morale in the department is very high and the student experience very positive. The enthusiasm of the current students as well as the graduates of the programme the Panel met with, is a testament to this. The students who graduate from the programme pursue very successful careers in academia and industry in Greece and abroad, as confirmed during the discussions with the faculty, industry employers and social partners.

The Department has implemented compliant mechanisms for monitoring and ensuring high quality of work and services. The quality assurance policy that is developed aims to align practices with the strategic objectives the Department has set.

II.   Areas of Weakness

The Panel identified two weakness areas: one relating to endogenous, and the other to exogenous reasons. The former is due to weaknesses in:

- The existing mechanisms for engaging stakeholders in the process of monitoring and improving its curriculum.
- The informal nature of processes to analyse and translate the findings of course assessments into curriculum improvements.
- The absence of activities that would generate unrestricted and autonomous income for the Department.
- The heavy faculty workload which limits growth opportunities.

It also became evident during our visit that the Department operates with limited degrees of freedom attributed to external constraints. These impose restrictions not only on the level of available operating funds but also, and more importantly, on the ability of the Department to independently undertake risks and develop and implement decisions that would benefit and improve its functions. To name two of these restrictions: the overwhelming bureaucratic web, and the imposed number of the yearly student intake. The above constraint the ability of the Department to operate in ways it deems optimal and severely hampers its ability to perform at a level commensurate to its full potential.

III.   Recommendations for Follow-up Actions

The Panel recommends the following be pursued within the degrees of freedom available to the Department:

- The Department needs to establish an External Advisory Board, consisting of industry and academic representatives, and needs to consult it regularly to receive tangible feedback on educational initiatives and directions. The employers and social partners the Panel met with, had only praise to offer for the Department and expressed strong willingness and eagerness to engage actively.

- Given the severe budgetary constraints within which the Department operates, innovative approaches must be developed to increase its revenue stream. It is strongly recommended that the Department explore alternative and independent avenues for increasing its income. These include, but are not limited to, exploring its state-of-the-art resources in equipment to perform contract work. For example, NMR analysis, consultancy on environmental problems, shot-course training in SEVESO policy and various regulations (IMDG, ADR, CLP, ECHA), software training, certifications.

- The curriculum of the Department needs to be re-examined and streamlined for several critical reasons: (i) to be better aligned with the rapidly changing world its graduates will enter, by incorporating aspects of innovation, entrepreneurship, sustainability, digitization and big data; (ii) to reduce the (very) many electives offered to half (by eliminating and combining electives with similar content) to reduce teaching loads on faculty (particularly junior) and make room for the implementation of the suggested changes; (iii) to develop curriculum flexibility allowing students to pursue additional training experiences such as more meaningful internships over extended periods (6 months to a year).

- The Department needs to develop a systematic process and methodology to evaluate internally the curriculum, assess the efficacy of student evaluations, compare individual course evaluations with Department and Engineering School averages, share comparative results with individual instructors and finally make decisions for improvements/changes, which will be communicated to students so that the latter feel that their evaluations are considered. Currently, the process appears to be based on *ad hoc* and incidental decisions. Using permanent committees, the programme must regularly use appropriately documented processes for assessing and evaluating the extent to which course outcomes are attained by the students. The results of these evaluations must be systematically utilized as input for the continuous improvement of the programme. Given the potential of the faculty and their demonstrated passion for outstanding teaching, such frameworks would tremendously improve the education the Department provides.

IV.   Summary & Overall Assessment

The Principles where full compliance has been achieved are: **1, 3, 4, 6, 7, 8, 9, and 10**

The Principles where substantial compliance has been achieved are: **2 and 5**

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

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

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

The External Evaluation & Accreditation Panel agrees that this Programme leads to a Level 7 Qualification according to the National & European Qualifications Network (Integrated Master)	YES	NO
	X	

The members of the External Evaluation & Accreditation Panel

Name and Surname   **Signature**

1. **Professor Ioannis P. Androulakis (Chair)**
   Rutgers, The State University of New Jersey, USA

2. **Ms. Despina Dimitriadis**
   Member of the Technical Chamber of Greece, Greece

3. **Professor Marios Ioannidis**
   University of Waterloo, Canada

4. **Professor Georgios M. Kontogeorgis**
   Technical University of Denmark (DTU), Denmark

5. **Professor Vladimiros Papangelakis**
   University of Toronto, Canada