



ΕΛΛΗΝΙΚΗ ΔΗΜΟΚΡΑΤΙΑ
HELLENIC REPUBLIC



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

Chemical and Environmental Engineering
Institution: Technical University of Crete
Date: 6 July 2022

Report of the Panel appointed by the HAHE to undertake the review of the Undergraduate Study Programme (Integrated Master) of **Chemical and Environmental Engineering** of the **Technical University of Crete** 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 and Environmental Engineering** of the **Technical University of Crete** comprised the following four (4) 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. Professor Emeritus Spiros Agathos**
Université Catholique de Louvain, Belgium

- 3. Mr. Konstantinos Mataras**
University of Patras, Greece

- 4. Professor Emeritus Spyros Pavlostathis**
Georgia Institute of Technology, USA

II. Review Procedure and Documentation

The review was conducted via teleconference (Zoom). It was organized and coordinated by HAHE with the help of the School of Chemical and Environmental Engineering, Technical University of Crete. The schedule and agenda of the review were as follows:

Monday, July 4, 2022:

- a) Preliminary private meeting of the Panel.
- a) Welcome and short overview of the undergraduate programme (UP) with the vice-Rector/President of MODIP and the Head of the School. Discussion of degree compliance of the UP to the quality standards for accreditation with OMEA members and staff and MODIP representatives.
- b) Private debriefing (Panel members only).

Tuesday, July 5, 2022:

- a) Discussion with faculty, teaching, and staff members.
- b) Discussion with current undergraduate students.
- c) Discussion about facilitates.
- d) Discussion with programme graduates.
- a) Discussion with employers and social partners.
- b) Private debriefing (Panel members only).

Wednesday, July 6, 2022:

- a) Discussion with OMEA and MODIP representatives on points needing clarification.
- b) Informal presentation of the EEAP key finding to the vice-Rector, Head of the School, OMEA, and MODIP.

Thursday, July 7, 2022:

Report writing.

Friday, July 8, 2022:

Report writing.

Saturday, July 9, 2022:

Report writing.

In preparation for the visit, the Panel received a multitude of material that included background information on accreditation, detailed data related to the programme under evaluation, and operational and educational data. The Panel was in close communication with OMEA and MODIP representatives who were very accommodating in providing additional information. The Panel also found that OMEA and MODIP representatives as well as the faculty, students, and staff interviewed were eager and helpful in providing all information requested by the Panel.

III. Study Programme Profile

The Chemical and Environmental Engineering (CHEMENVENG) School was established in 1995, originally as a School of Environmental Engineering, and the first students were admitted in 1997. In 2021 the School of Chemical and Environmental Engineering was established. The stated mission of the school is *“to train engineers with high qualifications and skills and provide the necessary background for them to deal with and serve the country's scientific process and market activities. At the same time, the School has a strong international presence in research aiming to develop innovative solutions to current environmental and sustainability problems.”* The School aims at providing advanced education of a high standard in environmental science and engineering and to prepare qualified engineers to measure, monitor, assess, and treat problems caused by human intervention in the environment. The task of the Panel was to evaluate the undergraduate educational programme, therefore this report will heavily focus on undergraduate education, although some comments related to graduate education and research will also be included below, as appropriate.

The School is housed in facilities encompassing 3,000 m^2 distributed across three buildings. The current faculty is comprised of 13 Full Professors, 8 Associate Professors, and 4 Assistant Professors. The overall activities are also supported by 18 members providing technical and educational support as well as three administrative staff members. The duration of the undergraduate studies is 5 years. According to the most recent data, 133 students are in their first year, 548 students are currently enrolled in years 1-5, 46 students are in their 6th year, 37 in their 7th years and 113 have been enrolled for more than 8 years. Students are expected to complete 300 ECTS distributed as follows:

	Chemical Engineering	Environmental Engineering
1 st year	60 ECTS core (common)	
2 nd year	60 ECTS core (common)	
3 rd year	57 core + 3 elective	60 core
4 th year	41 core + 19/20 elective	50 core + 10/12 elective
5 th year	20 core + 10 elective + 30 diploma thesis	25 core + 5 elective + 30 diploma thesis

The ECTS lead to a Level 7 Qualification (Integrated Master) on both concentrations.

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 organisation 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 CHEMENVENG School's mission is reflected well in the structure and the expected outcomes of the undergraduate programme and the means to achieve them. Teaching effectiveness is assessed by regularly monitoring student progress and student satisfaction. The faculty are motivated and clearly cares deeply about the students' progress. They are involved in a wide range of research activities, with sufficient variability among the different faculty. Such involvement is critical to enabling student exposure to the latest developments in Chemical Engineering and Environmental Engineering, which occurs primarily through the Diploma Thesis supervised by the faculty, thereby linking teaching and research. Opportunities also exist for students to be involved in industry-initiated Diploma Theses, thus further enhancing student exposure to industry needs. The School's teaching and administrative staff provide appropriate teaching, support, and administrative services to the programme and the School. The Internal Evaluation Group (OMEA) and the Institution Quality Assurance Unit (MODIP) review the programme's performance annually and communicate their findings to the faculty and the

School Dean. Discussions with alumni and employers further confirmed the high level of preparation graduates of the programme receive.

The Panel finds that overall, the programme fully complies with Principle 1.

Panel Judgement

Principle 1: Academic Unit Policy for Quality Assurance	
Fully compliant	X
Substantially compliant	
Partially compliant	
Non-compliant	

Panel Recommendations

The School has taken several steps to ensure high-quality education and preparation for its graduates. To further enhance adherence to the principle, the panel recommends the following:

- We recommend that the School more closely engages employers and social partners in discussions regarding curriculum updates. Both stakeholder groups had nothing but praise for the programme and expressed their strong interest in supporting the School.
- The School needs to pay close attention to the newly introduced Chemical Engineering concentration. The panel recognizes that this element of the curriculum was only recently introduced, therefore, no evidence is available at this point. Although the panel is confident that the School's past experience and successes will provide a solid foundation, it remains to be seen how this unique undertaking will eventually play out.

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 CHEMENVENG School has developed internal procedures for continuously assessing the effectiveness of the curriculum and teaching. The curriculum compares well with internationally accepted standards. Overall, the School prepares its graduates well, and it provides them with good opportunities for gaining work and research experience. Of note is the offering of Chinese as a foreign language.

At the same time, the Panel noted that input from critical constituencies and stakeholders, who will influence how the graduates meet the stated mission and/or educational objectives, is not solicited routinely and systematically. For the same reasons mentioned in the previous section, this lack of critical assessment and feedback limits the ability of the curriculum to keep up with the latest developments and needs in the field. In fact, it was not clear to the Panel what is the institutional strategy for ascertaining alignment.

Panel Judgement

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

Panel Recommendations

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

- As noted earlier, the Chemical Engineering concentration needs to be clearly articulated and assessed. However, it is understood that this is “work in progress.”
- Critical stakeholders (alumni, employers, and social partners) must actively participate in the continuous assessment, and possible improvement, of the curriculum. This participation should be done in a formal, systematic, and transparent way with clearly defined objectives, and with feedback solicited in a rigorous way. Importantly, all stakeholder representatives with whom the Panel met, expressed strong support and enthusiasm for furthering their interactions with the School.
- An External Advisory Board (EAB) should be formed, consisting of various stakeholder representatives, and with key objectives to provide useful guidance on teaching, research, and other high-impact activities, while also serving as champions and external advocates of the School. The EAB should meet at least annually. The Panel met with several such stakeholders who expressed enthusiastic support for this recommendation.
- The Panel recognizes the positive impact of the substantial changes recently implemented on the reduction of coursework, and the focus of electives, and applauds the School for being proactive.
- The practical training experience, aside from not being mandatory, is of short duration (2 summer months) which limits its impact. The Panel strongly recommends that the programme identifies new ways for increasing the length of this experience to increase its value and impact.
- The panel recommends the introduction of health and safety course earlier in the curriculum. A similar course exists, however, it is offered in the 3rd year of studies, while students can be involved with laboratories much earlier.
- More generally, the School should seek higher industry participation in the educational enterprise, for example by participating in capstone design projects, providing visitors for lectures, and perhaps also participating in helping select Diploma Thesis topics and offering the corresponding mentorship to the students.

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 Accreditation Proposal submitted by the School has demonstrated thoroughly the procedures and practices regarding the student body.

Specifically, most if not all courses are taught with multiple modes of delivery with the principal of those being the standard lecture but also with a considerable percentage of workshops and most important group or individual projects. Furthermore, a significant number of optional courses are offered throughout the curriculum.

Regarding broader skill development, students are required to work on numerous individual and group projects throughout their studies. Additionally, students are encouraged to participate in voluntary activities or groups, those being organized either by the School or the University. Lastly, students participate in European exchange programs, such as Erasmus+.

The students feel included in the teaching process and that faculty understand student needs and possible gaps in knowledge. In recent years, the School dedicated considerable efforts in preparing incoming 1st year students. Furthermore, it was evident that student suggestions are taken carefully into consideration. Course evaluations, in the form of surveys, are conducted regularly and trends are discussed with instructors.

General Assessment criteria are known to all students before the start of the semester and are available in each course's webpage in detail. Any change to course material is discussed with the students well in advance.

A procedure is in place to handle student complaints, first through the assigned professor-counsellor and subsequently by the dean of the school. Additionally, students are encouraged to address their complaints directly to members of the academic staff.

Generally, the School has gone to great lengths to address the students' needs. For example, in order to ensure safe examinations, outdoor areas were converted into examination sites during the Covid-19 pandemic. Teaching practices are adapted to student needs while assessment is based on a multitude of student works, including group projects, homework problems, and exams.

In conclusion, the School has procedures and practices in place to enhance the student experience while continuously adapting and improving best practices. Student morale is very high.

Panel Judgement

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

Panel Recommendations

Although the School has demonstrated its commitment to receive, and act on, student feedback, there is always room for improvement. The panel recommends that the School considers:

- Establishing procedures for formal student input in course scheduling as well as the exam schedule in order to mitigate problems during the exam period as early as possible.
- Possibly organizing a freshman orientation meeting to welcome incoming students and provide information about School procedures, regulations, and events in a bid to not only address their needs but possibly increase their meaningful participation in lectures, surveys, etc.

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 Accreditation Proposal submitted by the CHEMENVENG School provides detailed information relative to compliance to Principle 4. Major actions and outcomes are described below.

Relative to student admission, each year, the CHEMENVENG School and then the TUC recommend to the Ministry of Education the maximum number of new students, typically 70 to 80 students. This is standard procedure for all Greek Universities. However, over the last several years, this number has been ignored by the Ministry of Education which has imposed at least 50% higher student intake.

Both the TUC and the CHEMENVENG School inform the new students on matters relative to matriculation and other campus activities, as well as transportation, living arrangements, via organized visits and handing out pamphlets. The Student Advisor assists students in navigating the course curriculum from the beginning and throughout their studies, along with other professional advice.

The curriculum is compatible with European and international practices; it is structured based on the European Credit Transfer System (ECTS), which facilitates the transfer of credit from studies conducted at other Universities.

The School has a detailed system for following students' progression and recognition of credits, which include grades, duration of studies, percentage of students participating in each examination, percentage of students passing each course examination, and percentage of students engaging in practical training. For practical training, TUC uses the information system ATLAS, which links Universities to Greek Research Centers.

A Diploma Supplement is given to graduates in both Greek and English.

The educational experience of the students is enhanced by research activities throughout their study. They are exposed to research as participants in research projects, in internships, and while conducting their Diploma Thesis.

Participation of students to the Erasmus+ program is encouraged for coursework, Diploma Thesis research, or practical training, and all such activities are managed by an Erasmus+ Committee.

There are several scholarships and awards given to students, either by the School, TUC, or National sources.

In conclusion, relative to Principle 4, the School has and applies a detailed and effective system that benefits the students from admission to graduation. It is noteworthy that the School collects information relative to the quality and preparation of its graduates via an external evaluation conducted with employers and stakeholders.

Panel Judgement

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

Panel Recommendations

- The practical training, typically 2 months and during the summer, should be re-evaluated. There has been concern by some stakeholders that the duration and timing do not lead to effective and meaningful training. Possible courses of action may include making it mandatory, extending it to 4 months, and not carrying it out during the summer months.
- The School is encouraged to enforce rigorous prerequisites to reduce the number of stagnant students or at least implement a numerical % of ECTS completion before progressing through key checkpoints in the undergraduate program.

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 recognise 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 CHEMENVENG faculty members are entirely qualified to fulfil their teaching and advising duties with respect to the undergraduate program, and this is valid for both orientations, Chemical Engineering and Environmental Engineering. Furthermore, they are research active and many of them have reached a very good level of national and international recognition thanks to their high research output as well as their successful translation to industrial practice and service to society.

From the very beginning of its founding, the ENVENG Department has maintained a policy of meritocracy and transparency in the process of hiring new faculty members, while complying with the nationally instituted norms and using the well-established Apella platform. Moreover, the Department (now School) has been enriched progressively with modern areas of specialization in Environmental Engineering (and, to some extent, in Chemical Engineering) that go beyond the mere assurance of covering the teaching subjects (γνωστικά αντικείμενα) of the curriculum. The merit-based hiring and advancement procedures take into account the annual evaluations of the teaching effectiveness, as well as the research productivity of the academic staff and, specifically for new faculty members, teaching evaluations from their previous institutions, are also considered. The questionnaire-based evaluations are also helpful in the periodic adjustments of the curriculum. Nonetheless, commensurate with the non-obligatory attendance of classes in the Greek university system, there is low participation in these evaluations and, generally, reflects the input of the minority of the students who are truly interested and motivated.

Current and past students with whom the Committee discussed were full of praise and expressed their gratitude to the academic staff for their educational impact and their effective advising. Nonetheless, the students did not yet make full use of the recently established Academic Advisor services except in the first semesters and they relied on the advice and guidance of their Diploma Thesis supervisor for questions related to their career.

The introduction of specialized pedagogic training for members of the academic staff (“Training of the Trainers”) is a welcome sign of the seriousness accorded by the faculty to the teaching component of their duties. Ditto regarding the recognition and reward of quality in teaching through an annual teaching award.

Professional development opportunities, like sabbaticals and Erasmus+ faculty mobility programs, are in place but their use by faculty members could be even stronger. Similarly, excellence in research could also be recognized with regularly offered awards (e.g., once every two or three years).

Panel Judgement

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

Panel Recommendations

The panel recommends the following to further strengthen the School’s performance:

- Faculty members are encouraged to communicate further the merits of academic advising to students so that they make full use of this service both in purely academic matters of timely and successful progression through their undergraduate studies as well as in their future career planning.
- The School should also consider providing additional incentives for increased student participation in course evaluations and other processes reflecting student input for attaining and maintaining the push towards excellence.
- A strategy of proactive recruiting efforts for new faculty should continue and be enhanced so that attractive new and complementary specializations are added, and gender diversity is increased.

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 Accreditation Proposal submitted by the CHEMENVENG School jointly with the presentation of the School facilities has provided a detailed account of the School's infrastructure and associated services. As part of TUC, the School enjoys the extended and attractive campus in the Kounoupidiana outskirts of Chania.

For the most part, the facilities of the School have been proven adequate to facilitate the teaching process and although improvements certainly could be made, that is not always up to the School's sole decision given its limitations in national funding. Exceptionally, during the exam period, parking lots were used due to covid protocols, and they continue to be used.

Certainly, the School has rationally distributed the existing facilities, although some facilities are jointly used by other schools and, by extension, their use has scheduling difficulties. A notable example of this practice is the computer lab.

Student support services are widely available to students, usually through the University as a whole instead of the School. For the purpose of informing students about services available to them, the School has issued an informative Study Guide which can be found on the School website.

Generally, the School has demonstrated efforts to support students throughout their studies, while working with its quite limited public budget. Information about services available to students has been given in an organized form and is readily accessible to anyone interested. Lastly, for the financial support of qualifying students, scholarships are provided by the University primarily based on merit and/or financial hardship.

Concluding, the School has made steps to support its students and, more importantly, make all services available and well-known.

Panel Judgement

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

Panel Recommendations

The School has made considerable headway in ensuring adequate infrastructure and services are provided to its students. However other steps could be considered such as:

- Creating common areas where students could study and work on group projects.
- Extending the current working hours of the existing facilities to better accommodate student needs.
- Developing a dedicated computer lab for supporting educational activities.
- The School must ensure building accessibility to special needs 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 analysing information and planning follow-up activities.

Study Programme Compliance

The MODIP of TUC systematically records the quality indicators as prescribed by the Integrated National Quality Information System (OPESP). MODIP disseminates the procedures for the internal and external evaluation of the various Schools, including the undergraduate curricula, and oversees the Quality Assurance of the entire University.

The Electronic Secretariat system appears to work very well with smooth individual access for both students and faculty members. This proved to be particularly valuable during the pandemic and seems to be ready for the challenge of the new undergraduate program with the paths toward two degrees, CHEMENG and ENVENG. The student log (φοιτητολόγιο) provides the possibility for every student at the School to obtain all the information regarding his/her studies, as well as to submit various requests electronically. Instructors also have access to all course information and student grades. Hence, overall, the above information management system is satisfactory for all its constituencies.

Suitable KPIs have been established, and there is clear availability of learning resources (mostly through the infrastructure of MODIP), as well as student support both formal and informal. As an illustration, student progression, success, and stagnation rates are monitored quantitatively and continuously.

On the alumni front, the School should be complimented for maintaining good collaborations with some of its alumni that include joint research projects, field applications, or policy

consultations, and some of these interactions positively, albeit informally, affect educational activities. The career paths of School graduates are not monitored systematically. This is a complex but important task, and a systematic approach should be implemented for the collection and treatment of relevant data (e.g., Alumni Association) for subsequent use in the guidance of programme graduates.

Panel Judgement

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

Panel Recommendations

The panel recommends:

- The good practices pertaining to students and instructors and affecting information management in the educational process should be extended to the program's alumni through the Alumni Association and be used to track their employment realities and future prospects, with a feedback loop for the benefit of current students.

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 Accreditation Proposal submitted by the CHEMENVENG School provides detailed information relative to compliance to Principle 8. Major actions and outcomes are described below.

The School website includes a wide range of publicly available information that includes: A general description; Information (including CVs) of all teaching and administrative staff; a Detailed description of the undergraduate and postgraduate programs, including a study guide; Information regarding the Diploma Thesis project and internship, seminars, latest School news; Description of research laboratories and their activities. Furthermore, the website provides links to the TUC website with information related to campus life, social media, housing, awards and scholarships, Campus Library, TUC eclass, etc.

In conclusion, all information provided is comprehensive, easily accessible and covers in a satisfactory manner most areas of interest to students, faculty, staff, as well as prospective students and visitors.

Panel Judgement

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

Panel Recommendations

The following recommendations are made by the panel:

- A link to Google Scholar profile should be developed for all faculty
- Alumni information should be clearly indicated on the School's 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

It appears that extensive internal reviews are conducted annually to evaluate teaching, research, and service activities. Internal and external reviews help to identify areas of strength and weakness. The School was responsive to earlier external reviews indicating the strong willingness to improve its delivery.

However, it should be noted that the programme does not involve any of the stakeholders in discussions and no external input is solicited in a consistent way.

Panel Judgement

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

Panel Recommendations

To further solidify and enhance adherence to this Principle, the Panel recommends the following additional action:

- As noted above, the programme must proactively solicit input from key stakeholders, including through the formation of an Advisory Board, which will enable implementing innovation and changes that will improve the student experience.
- The School should institute a clearly articulated action plan with timelines and responsibilities for implementation to facilitate quick and results-oriented action.
- The annual action plan should be clearly communicated on the School's website to all stakeholders, that is, students, faculty, staff, students, alumni, industry, and the public.
- The School should engage alumni and industry in discussions for the formulation of all its strategic objectives.

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 only previous external evaluation addressed the ENVENG program of TUC and took place in November 2011. Over the years most of the recommendations of the external evaluation panel were implemented and this is clear when one considers the recent establishment of the new School CHEMENVENG, its corresponding curriculum that leads to two distinct degrees, and its research orientations.

This is a commendable outcome showing the School's team spirit and willingness to adhere to a policy of continuous quality improvement and the aspiration to reach excellence in its educational, research, and service activities.

In summary, as a result of the previous external evaluation, a new culture has taken root in the School that underlies the regular evaluation of the effectiveness of the procedures and actions taken with respect to the quality of the curriculum by the Curriculum Committee, the Internal Evaluation Team OMEA, and the General Assembly of the School.

Panel Judgement

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

Panel Recommendations

The panel recommends more frequent evaluations of the overall activities (every 5 years) to better monitor progress.

PART C: CONCLUSIONS

I. Features of Good Practice

The School of Chemical and Environmental Engineering at the Technical University of Crete is excellent in terms of both teaching and research and is well respected worldwide. The faculty is enthusiastic and dedicated to their mission. The morale in the School is high and the student experience is positive. The enthusiasm of all key stakeholders (the current students, alumni, and employers) was apparent. The graduates pursue successful careers in academia and industry in Greece and abroad.

The programme 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 School has set.

II. Areas of Weakness

The Panel realizes that the Chemical Engineering component is a very new addition (as of 2021). The School articulated an aggressive hiring policy to address the educational requirements that the new discipline would require. Although the panel has confidence in the School's ability to establish a strong Chemical Engineering concentration, in addition to the excellent Environmental Engineering, it is strongly recommended that the School proceeds carefully and develops a well-defined plan with precise goals and measurable outcomes. If the extension is not successful, the School runs the risk of developing a mediocre Chemical Engineering curriculum as well as weakening the Environmental Engineering component.

III. Recommendations for Follow-up Actions

The Panel concludes that the School has implemented several policies that have substantially strengthened the programme. To further improve the educational experience of its graduates, the Panel recommends the following

- The School should establish an External Advisory Board consisting of industry and academic representatives. This does not need to be a formal entity, but rather a process enabling stakeholders to objectively assess the curriculum, provide suggestions, and be actively involved in planning and delivery activities.
- The Panel recommends that systematic and rigorous feedback mechanisms are developed to assess and evaluate teaching effectiveness and identify corrective actions. The current framework appears informal and inconsistent.
- The panel recommends that a committee is established to oversee the deployment of the Chemical Engineering concentration. It is recommended that the independent committee works closely with the faculty to develop directions for the Chemical Engineering concentration to maximize synergies with the already established areas of excellence of the

Environmental Engineering concentration but also identify novel future directions which would be non-overlapping with the existing and well-established Chemical Engineering programmes in Greece.

IV. Summary & Overall Assessment

The Principles where full compliance has been achieved are: **1, 3, 4, 5, 6, 7, 8, and 10.**

The Principles where substantial compliance has been achieved are: **2 and 9.**

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. Professor Emeritus Spiros Agathos**
Université Catholique de Louvain, Belgium
- 3. Mr. Konstantinos Mataras**
University of Patras, Greece
- 4. Professor Emeritus Spyros Pavlostathis**
Georgia Institute of Technology, USA