ΕΛΛΗΝΙΚΗ ΔΗΜΟΚΡΑΤΙΑ
HELLENIC REPUBLIC

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Accreditation Report for the New Undergraduate Study Programme in operation of:

Chemical Engineering

Institution: University of Western Macedonia

Date: 19 February 2023

Ευρωπαϊκή Ένωση
Ευρωπαϊκό Κοινωνικό Ταμείο

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

ΕΣΠΑ 2014-2020

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Report of the Panel appointed by the HAHE to undertake the review of the New Undergraduate Study Programme in operation of **Chemical Engineering** of the **University of Western Macedonia** 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 new undergraduate study programme in operation of **Chemical Engineering** of the **University of Western Macedonia** comprised the following five (5) members, drawn from the HAHE Register, in accordance with Laws 4009/2011 & 4653/2020:

1. **Prof. Georgios Kontogeorgis** (Chair)
   Technical University of Denmark (DTU), Denmark

2. **Prof. Peter Englezos**
   University of British Columbia, Canada

3. **Prof. Emeritus Spyros Pavlostathis**
   Georgia Institute of Technology, United States of America

4. **Mr. Pantelis Pantelaras**
   Member of the Technical Chamber of Greece, Greece

5. **Ms. Eleni Papadopoulou**
   Student in the Department of Environmental Engineering, International Hellenic University, Greece

II. Review Procedure and Documentation

The review was conducted via teleconference (Zoom). It was organized and coordinated by HAHE with the help of the Department of Chemical Engineering (University of Western Macedonia). The schedule and agenda of the meetings were as follows:

Monday, February 13, 2023: Preliminary private meeting of the Panel.

Tuesday, February 14, 2023: Consecutive meetings with the following agenda

a) Welcome and short overview of the undergraduate programme (UP) with the vice-Rector/President of MODIP and the Head of the Department
b) Discussion of degree compliance of the UP to the quality standards for accreditation with OMEA members and staff and MODIP representatives.
c) Private debriefing (Panel members only).
d) Discussion with faculty, teaching, and staff members (also on research activities)
e) Discussion with current undergraduate students.
f) Private debriefing (Panel members only)

Wednesday, February 15, 2023: Consecutive meetings with the following agenda

a) On-line tour – presentation of the Department's laboratories.
b) Discussion with employers and social partners.
c) Private debriefing (Panel members only).
d) Discussion with OMEA and MODIP representatives on points needing clarification.
e) Informal presentation of the Panel key finding to the vice-Rector, Head of Department, OMEA and MODIP.

Thursday, February 16, 2023: Private meeting of the Panel to coordinate report writing.

Friday and Saturday, February 17 & 18, 2023: Electronic (e-mail) communication between Panel members and preparation of the report.

Sunday February 19 and Monday 20, 2023: Private meetings of the Panel for report writing and for finalizing the report.

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. The Panel received all extra information requested during the visit including samples of reports and Diploma Theses.

III. New Undergraduate Study Programme in operation Profile

The Department of Chemical Engineering of the University of Western Macedonia was established in 2019. The Department of Environmental Engineering of the same University and the Antipollution Department (part of TEI) were combined in the recently established Department.

The stated mission of the current programme is to educate chemical engineers able to apply basic mathematical, physical, chemical, and biological principles to the design, development and optimization of processes, systems and products in a wide range of domains, including materials, energy and environment. There is particular emphasis in the areas of environment and energy.

The programme aims at providing its students with a broad, yet solid foundation of basic chemical engineering principles, enabling its graduates to address a diverse array of global challenges. We have considered these statements as also standing for the programme *educational objectives*. The task of the Panel was to evaluate the undergraduate educational programme, therefore this report will heavily focus on the undergraduate programme, although some comments related to graduate education and research will also be included below, as appropriate.

The Department has now access to modern facilities in the new campus of the University of Western Macedonia in Kozani and it has access to 5 lecturing rooms, two auditoria and very good laboratories with a wide variety of equipment a significant part of which is used for teaching purposes.

The current faculty is comprised of 15 faculty members where this number includes the faculty whose employment is imminent. There is educational and technical support of 6 members. The educational activities are further supported by additional guest faculty who are employed for a shorter period. 55 courses are provided by the permanent faculty of the Department, 10 courses are given by other Departments of the University and finally 32 courses are taught by guest/non-permanent faculty.

Currently, 226 undergraduate students are registered in the Department (54% women) and 14 have graduated from the newly established Department (previously registered at the Department of Environmental Engineering). The ratio student/faculty is about 17.

The duration of the undergraduate studies is 5 years (10 semesters). Students are expected to complete successfully a total of 45 mandatory, 11 elective courses chosen from 5 groups (one general and 4 specializations), 2 courses on English language and terminology as well as a Diploma Thesis. The three-month industrial internship/practical training is not mandatory. This totals to 300 ECTS.

The Department faculty have an active research portfolio and there are 5 established by law research Laboratories, one in collaboration with the Department of Mechanical Engineering.

PART B: COMPLIANCE WITH THE PRINCIPLES

Principle 1: Strategic Planning, Feasibility and Sustainability of the Academic Unit

Institutions must have developed an appropriate strategy for the establishment and operation of new academic units and the provision of new undergraduate study programmes. This strategy should be documented by specific feasibility and sustainability studies.

By decision of the institutional Senate, the Institutions should address in their strategy issues related to their academic structure in academic units and study programmes, which support the profile, the vision, the mission, and the strategic goal setting of the Institution, within a specific time frame. The strategy of the Institution should articulate the potential benefits, weaknesses, opportunities or risks from the operation of new academic units and study programmes, and plan all the necessary actions towards the achievement of their goals.

The strategy of their academic structure should be documented by specific feasibility and sustainability studies, especially for new academic units and new study programmes.

More specifically, the feasibility study of the new undergraduate study programmes should be accompanied by a four-year business plan to meet specific needs in infrastructure, services, human resources, procedures, financial resources, and management systems.

During the evaluation of the Institutions and their individual academic units in terms of meeting the criteria for the organisation of undergraduate study programmes, particular attention must be place upon:

a. The academic profile and the mission of the academic unit
The profile and mission of the department should be specified. The scientific field of the department should be included in the internationally established scientific fields of Higher Education, as they are designated by the international categorisation of scientific fields in education, by UNESCO (ISCED 2013).

b. The strategy of the Institution for its academic development
The academic development strategy for the operation of the department and the new study programme should be set out. This strategy should result from the investigation of the factors that influence the studies and the research in the scientific field, the investigation of the institutional, economic, developmental, and social parameters that apply in the external environment of the Institution, as well as the possibilities and capabilities that exist within the internal environment (as reflected in a SWOT Analysis: strengths, weaknesses, opportunities, and threats). This specific analysis should demonstrate the reason for selecting the scientific field of the new department.

c. The documentation of the feasibility of the operation of the department and the study programme
The feasibility of the operation of the new department should be justified based on:

- *the needs of the national and regional economy (economic sectors, employment, supply-demand, expected academic and professional qualifications)*
- *comparison with other national and international study programmes of the same scientific field*
- *the state-of-the-art developments*

- *the existing academic map; the differentiation of the proposed department from the already existing ones needs to be analysed, in addition to the implications of the current image of the academic map in the specific scientific field.*

d. The documentation of the sustainability of the new department

Mention must be made to the infrastructure, human resources, funding perspective, services, and all other available resources in terms of:

- *educational and research facilities (buildings, rooms, laboratories, equipment, etc.)*
- *staff (existing and new, by category, specialty, rank and laboratory). A distinct five-year plan is required, documenting the commitment of the School and of the Institution for filling in the necessary faculty positions to cover at least the entire pre-defined core curriculum*
- *funding (funding possibility from public or non-public sources)*
- *services (central, departmental / student support, digital, administrative, etc.)*

e. The structure of studies

The structure of the studies should be briefly presented, namely:

- ***The organisation of studies:*** *The courses and the categories to which they belong; the distribution of the courses into semesters; the alignment of the courses with the European Credit Transfer System (ECTS).*
- ***Learning process:*** *Documentation must be provided as to how the student-centered approach is ensured (modes of teaching and evaluation of students beyond the traditional methods).*
- ***Learning outcomes:*** *Knowledge, skills and competences acquired by graduates, as well as the professional rights awarded must be mentioned.*

f. The number of admitted students

- *The proposed number of admitted students over a five-year period should be specified.*
- *Any similar departments in other HEIs with the possibility of student transfers from / to the proposed department should be mentioned.*

g. Postgraduate studies and research

- *It is necessary to indicate research priorities in the scientific field, the opportunities for interdisciplinary research, the challenges towards new knowledge, possible research collaborations, etc.*
- *In addition, the postgraduate and doctoral programmes offered by the academic unit, the research projects performed, and the research performance of the faculty members should be mentioned.*

Relevant documentation

- *Introductory Report by the Quality Assurance Unit (QAU) addressing the above points with the necessary documentation*
- *Updated Strategic Plan of the Institution that will include its proposed academic reconstruction, in view of the planned operation of new department(s) (incl. updated SWOT analysis at institutional level)*
- *Feasibility and sustainability studies for the establishment and operation of the new academic unit and the new study programme*
- *Four-year business plan*

Study Programme Compliance

Findings

Chemical Engineering is a central and established field within the engineering disciplines. It has existed for over 100 years and will continue to exist, adjusting to emphasize new directions of importance in the 21st century. One of these is the "green transition", also of special attention in the area of Western Macedonia. The scientific field of the Department is included in the internationally established scientific fields of Higher Education designated by UNESCO (International Standard Classification of Education – Fields of Education and Training 2013; ISCED 2013).

The Department has clear mission and profile with strong environmental elements. The Department has presented a strategy of the academic development, both with respect to graduate and postgraduate studies. The strategies of the operation of the Department as well the development of the study programme are fully harmonized with the strategy of the Institution. The study programme is well-designed and the collaboration with the local and regional industry to offer joint Diploma Theses and practical training will further increase the quality of the programme. The Department is well-aware of challenges and opportunities and has presented a well-thought SWOT analysis.

The development and operation of the Department is consistent with and supportive of the Western Macedonia Region development vision. Relative to other similar programmes, the new Department is differentiated by its unique focus on energy transition, environment and food chemistry/technology, areas in which the faculty have long experience.

The structure of the five-year undergraduate program of study of the new Department is based on a total of three hundred (300) European Credit Transfer System (ECTS) credits. Although traditional areas of Chemical Engineering as well as newer areas, for example green energy transition, are covered by the study program, the number of electives compared to the mandatory courses is relatively small. In addition, the students' research experience is mainly based on the Diploma Thesis and to some degree on the practical training which is optional.

The number of students is not very high as 55-60% of admitted students are afterwards enrolled in other departments, typically in other universities. While the student/faculty ratio is very favourable, the sustainability of this new Department will, in the long run, largely depend on increasing the number of students who remain and complete their studies. The Department is aware of this and actively motivates the existing students and actively attracting new. These efforts should continue and intensify. Such efforts are crucial for the sustainability of the Department.

Analysis of judgement

Our findings are based on the extensive and well-prepared material received and the very detailed discussions with members of faculty, the representatives of MODIP and OMEA as well as current students and representatives from the external stakeholders. All the discussions were excellent and informative. We requested some additional material which was received in a timely manner. The Panel did not meet with any of the few graduates that the Department has had so far. The Panel found that the new Department adheres to the Institution's Quality

Assurance Policy as part of its broader strategy, accompanied by annual quality assurance targets for the continuous development and improvement of the academic unit and teaching programme.

Conclusions

We have concluded that the special "environmental" profile of the Department, also considering its location, should be further enhanced, and solidified. The structure of the studies should facilitate further link between research and courses as well as enhanced interaction with external stakeholders especially companies in private and public sectors. The panel acknowledges that the University and the Department take into account national and regional economic factors as well as recent advances in chemical engineering science to advance the Department of chemical engineering. In addition to Panel recommendations for each individual Principle, some overarching recommendations are included for Principle 1, below.

The Panel finds that the Department is, on average, fully compliant with Principle 1.

Panel Judgement

Principle 1: Strategic planning, feasibility and sustainability of the academic unit	
a. The academic profile and the mission of the academic unit	
Fully compliant	**X**
Substantially compliant	
Partially compliant	
Non-compliant	
b. The strategy of the Institution for its academic development	
Fully compliant	**X**
Substantially compliant	
Partially compliant	
Non-compliant	
c. The documentation of the feasibility of the operation of the department and the study programme	
Fully compliant	**X**
Substantially compliant	
Partially compliant	
Non-compliant	
d. The documentation of the sustainability of the new department	
Fully compliant	
Substantially compliant	**X**
Partially compliant	
Non-compliant	
e. The structure of studies	
Fully compliant	
Substantially compliant	**X**
Partially compliant	
Non-compliant	
f. The number of admitted students	
Fully compliant	**X**
Substantially compliant	
Partially compliant	
Non-compliant	

g. Postgraduate studies	
Fully compliant	**X**
Substantially compliant	
Partially compliant	
Non-compliant	

Principle 1: Strategic planning, feasibility and sustainability of the academic unit (overall)	
Fully compliant	**X**
Substantially compliant	
Partially compliant	
Non-compliant	

Panel Recommendations

To enhance adherence to Principle 1, the Panel recommends the following:

- The Department should prepare a thorough, complete, and detailed plan for the advertisement and promotion of the Chemical Engineering programme. This includes but should not be limited to i) actively promoting the excellent and modern facilities, ii) be in close contact with high schools in the area of Western Macedonia/Northwest Greece, iii) emphasize the role of industry and job opportunities.
- The active engagement of the enrolled students in their studies should be very closely monitored at all levels and continuously (including but not limited to class attendance, evaluation of courses, performance in exams, interest in diverse activities and initiatives, etc.)
- Re-structure the curriculum to reflect better the green transition, possibly renaming laboratories and groups and include modern areas of chemical engineering in the curriculum (as explained in detail in other Principles).
- Increase substantially the collaboration with local and regional industry and other stakeholders also by involving the External Advisory Board that the Department has recently established. The Department's Alumni should also be actively involved in the Department's development and be consulted.
- Increase the collaborations with other Universities, using more actively the opportunities provided by the Erasmus programme. These should be more actively advertised to the students. Invitations of distinguished professors from abroad and other initiatives that increase the visibility of the Department should be considered.

Principle 2: Quality Assurance Policy of the Institution and the Academic Unit

The Institution should have in place an accredited Internal Quality Assurance System, and should formulate and apply a Quality Assurance Policy, which is part of its strategy, specialises in the operation of the new academic units and the new study programmes, and is accompanied by annual quality assurance goals for the continuous development and improvement of the academic units and the study programmes.

The quality assurance policy of the Institution must be formulated in the form of a published statement, which is implemented by all stakeholders. It focuses on the achievement of special annual quality goals related to the quality assurance of the new study programme offered by the academic unit. In order to implement this policy, the Institution, among others, commits itself to put into practice quality procedures that will demonstrate: the adequacy and quality of the academic unit's resources; the suitability of the structure and organisation of the curriculum; the appropriateness of the qualifications of the teaching staff; the quality of support services of the academic unit and its staffing with appropriate administrative personnel. The Institution also commits itself to conduct an annual internal evaluation of the new undergraduate programme (UGP), realised by the Internal Evaluation Group (IEG) in collaboration with the Quality Assurance Unit (QAU) of the Institution.

The quality assurance policy of the academic unit includes its commitment to implement quality procedures that will demonstrate: a) the adequacy of the structure and organisation of the curriculum, b) the pursuit of learning outcomes and qualifications in accordance with the European and National Qualifications Framework for Higher Education, c) the promotion of the quality and effectiveness of the teaching work, d) the adequacy of the qualifications of the teaching staff, e) the promotion of the quality and quantity of the research work of the members of the academic unit, f) the ways of linking teaching with research, g) the level of demand for graduates' qualifications in the labour market, h) the quality of support services, such as administration, libraries and student care, i) the implementation of an annual review and audit of the quality assurance system of the UGP through the cooperation of the Internal Evaluation Group (IEG) with the Quality Assurance Unit (QAU) of the Institution.

Relevant documentation

- *Revised Quality Assurance Policy of the Institution*
- *Quality Assurance Policy of the academic unit*
- *Quality target setting of the Institution and the academic unit (utilising the S.M.A.R.T. methodology)*

Study Programme Compliance

The Department's mission is reflected in the structure and in its strategy and the expected outcomes of the undergraduate programme of studies.

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 reviewed and updated.

Measurable and achievable goals are set, which are monitored against well-specified key performance indicators (KPIs) and disseminated to stakeholders and the wider society. The Department has good collaborations and provides also service to industry. There is outreach

to society and career days provided as well. The Department should be praised for having already established an External Advisory Board consisting of key stakeholders.

Teaching effectiveness is assessed by regularly monitoring student progress and student satisfaction. The Panel confirms that faculty are motivated and care deeply about the student experience at the Department.

There are some links between education and research, mostly at the Diploma Thesis stage. Similarly, there is a link between education and workplace through -to some extent- Diploma Thesis and practical training. Opportunities also exist for students to be involved in industry-initiated Diploma Theses, thus further enhancing student exposure to industry needs.

The level of teaching and administrative support available to the students is deemed highly satisfactory. The Department has very good laboratories and excellent new modern facilities.

The Panel finds that the Department has established a quality assurance policy that is fully compliant with Principle 2.

Panel Judgement

Principle 2: Quality assurance policy of the Institution and the academic unit	
Fully compliant	**X**
Substantially compliant	
Partially compliant	
Non-compliant	

Panel Recommendations

To enhance adherence to Principle 2, the Panel recommends the following:

- The practical training should either be made mandatory or be offered to all students who wish to participate in the experience.
- The interactions with alumni should be exploited as a potential means of informing the decision-making process as regards future direction. A few of Department's Alumni can

be included in the Department's Advisory Board. The alumni's views could be considered on several topics.

- There are many collaborations with several universities and companies, but the number should be increased, and more use of the Erasmus and other similar programs should be made.
- The Panel recommends the adoption of formal and quantifiable means for selecting the criteria that guide curriculum updates and course updates. These should reflect the mission statement of the Department and be aligned with clearly defined long-term goals and educational objectives towards its continuous development.
- Recent international trends in chemical engineering, such as digitalization, big data, emphasis on entrepreneurship, product design etc., should be followed more closely and considered in future updates of the study programme. The Panel believes that the curriculum must reflect and meet the current requirements and future trends of the workplace, that will help prepare graduates who will be able to address the many grand challenges that continuously emerge today, from sustainability to health to security and to well-being.

Principle 3: Design, Approval and Monitoring of the Quality of the New Undergraduate Programmes

Institutions should design the new 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.

The Institutions develop their new undergraduate study programmes, following a well-defined procedure. The academic profile, the identity 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 European and National Qualifications Framework for Higher Education are described at this stage. An important new element in the structure of the programmes is the introduction of courses for the acquisition of digital skills. The above components should be taken into consideration and constitute the subject of the programme design, which, among other things, should include: elements of the Institution's strategy, labour market data and employment prospects of graduates, smooth progression of students throughout the stages of the programme, the anticipated student workload according to the European Credit Transfer and Accumulation System (ECTS), the option of providing work experience to the students, the linking of teaching and research, the international experience in study programmes of similar disciplines, the relevant regulatory framework, and the official procedure for the approval of the programme by the Institution.

The procedure of approval or revision of the programmes provides for the verification of compliance with the basic requirements of the Standards by the Quality Assurance Unit (QAU).

Relevant documentation

- *Senate decision for the establishment of the UGP*
- *Curriculum structure: courses, course categories (including courses for the acquisition of digital skills), ECTS awarded, expected learning outcomes according to the EQF, internship, mobility opportunities.*
- *Labour market data regarding the employment of graduates, international experience in a related scientific field.*
- *Student Guide*
- *Course outlines*
- *Teaching staff (list of areas of specialisation, its relation to the courses taught, employment relationship)*
- *QAU minutes for the internal evaluation of the new study programme and its compliance with the Standards*

Study Programme Compliance

The Department has developed internal procedures for continuously assessing the effectiveness of the curriculum and teaching. The curriculum compares well with

internationally accepted standards, including regulations of the European Federation of Chemical Engineering (EFCE) regarding chemical engineering education.
Overall, the Department prepares well its graduates, and it provides them with good opportunities for gaining work and research experience.

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, could be solicited routinely and more systematically. The Panel is of the opinion that as a result the curriculum would be enriched and be up to date with the latest developments in the field. Moreover, the exposure of students to active research work is typically limited to Diploma Thesis. The collaboration with industry can be significantly enhanced to involve more joint Diploma Theses, practical training, visits to and by industry in the Department's courses and more.

The Panel finds that the programme is substantially compliant with Principle 3.

Panel Judgement

Principle 3: Design, approval and monitoring of the quality of the new undergraduate programmes	
Fully compliant	
Substantially compliant	**X**
Partially compliant	
Non-compliant	

Panel Recommendations

To further improve adherence to Principle 3, the Panel recommends the following:

- Critical stakeholders (alumni, companies, graduate schools, and other organizations employing or further training graduates) 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. The Panel noticed that all stakeholder representatives

met, expressed strong support and enthusiasm for furthering their interactions with the Department.

- The already recently established external advisory board (EAB) should be organized with the clear objective to provide useful guidance on teaching, research, and other impact activities, while also serving as champions and external advocates of the Department. The EAB should meet once or twice a year and one meeting is suggested to be in person so that interaction with students takes place. Ad hoc meeting with EAB can also be arranged.
- The students' exposure to the English language, via selected courses, seminars by guest researchers and other initiatives should be enhanced. This will also enhance the Department's participation in student exchange initiatives (which is rather limited), and further open the possibility of offering online degrees to a wider international audience, if such decision is eventually made.
- The practical training should be made mandatory and/or be offered to all who wish it. The Panel strongly recommends that the programme identifies new ways for increasing the length of this experience to increase its value and impact. A restructuring of the curriculum may be needed to allow willing students to spend more time during the practical training, thus gaining additional and meaningful experience. This is a standard practice in many institutions around the world.
- An "Independent Research" elective course could be created preparing students for specific diploma thesis projects by enriching their research thinking.
- The programme should seek a higher industry participation in the educational enterprise, for example by participating in design projects, providing visitors for lectures, and perhaps also participating in helping select Diploma Thesis topics and offering corresponding mentorship to the students. The EAB can assist in this direction. It is recommended that a greater fraction of the Diploma Thesis be conducted in collaboration with and mentorship by the industry.
- It is recommended that restructuring of the study programme is guided by both trends in chemical engineering education and by local societal and labour needs. Examples are renewable energy/decarbonization, climate change, product design, water scarcity, digitalization, entrepreneurship, and big data 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.

Principle 4: Student-centred Approach in Learning, Teaching and Assessment of Students

The academic unit should ensure that the new 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.

In the implementation of student-centered learning and teaching, the academic unit:

- ✓ *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 application of 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*

Relevant documentation

- *Questionnaires for assessment by the students*
- *Regulation for dealing with students' complaints and appeals*
- *Regulation for the function of the academic advisor*
- *Reference to the planned teaching modes and assessment methods*

Study Programme Compliance

The study programme has managed to support the incoming students and to create a welcoming and engaging environment. The students are seen as active partners both in the laboratories and in the classrooms. The programme requirements and other information are available on the Department's web page. There are basic monitoring tools, e.g., student satisfaction surveys and follow-ups from student appeals. Contact with students is very close at all levels. The students interviewed by the Panel are very satisfied with their studies. However, the participation of students in course evaluations is very low and efforts must be made to increase student participation in the course evaluation process, as this will contribute to the continual improvement of courses and teaching.

There are some student learning paths via a limited number of elective courses, as well as a non-mandatory practical training and internships. The study programme is rather dense with few opportunities to follow flexible learning paths, due to the many mandatory and few elective courses. We applaud the recent legislation put forth by the Ministry of Education, as yet not implemented, which specifies that up to 10% of elective courses can be taken from other Departments of the University.

The Panel also finds that there is no programme in place for the teaching faculty to be exposed to modern pedagogical methods, more suitable for current and future generations of students.

Student mobility by means of the Erasmus+ programme is promoted and information, related to it, is available on the Department's web page and via contact with the appointed contact person of the program.

Similarly, Practical Training Internship should become available for all students who apply (ideally made mandatory), by coordinating with more stakeholders from both the private and public sectors. The External Advisory Board can help in this direction.

Faculty members should further encourage their students to participate in national and international talent competitions to enhance their confidence and global outlook.

The academic unit encourages students to develop individual skills and to participate in various projects and presentations, in which they also have an active role. The concept of the "academic advisor" is useful in helping guide students through the programme. The Panel determined that the students are aware and take advantage of all the information and possibilities that the Department and University provide.

In general, the Panel agrees that the programme is delivered in a student-centered learning environment, that promotes mutual respect, and is substantial compliant with Principle 4.

Panel Judgement

Principle 4: Student-centred approach in learning, teaching and assessment of students	
Fully compliant	
Substantially compliant	**X**
Partially compliant	
Non-compliant	

Panel Recommendations

To enhance adherence to this Principle, the Panel recommends the following:

- While appreciating the fact that students can now take courses also from other Departments, the Panel does not find it sufficient to cover the rapidly changing pace in science, technology and engineering that is certain to impact the students' careers. These diverse needs must be addressed with more flexible learning paths, including the following:

  i. Students should be able to take courses from other programmes outside the confines of the Department, which will formally count towards the ECTS needed to fulfil the programme (restrictions on courses to be decided by the curriculum committee).
  ii. Create an "Independent Research" elective course, for purposes of preparing students for their diploma thesis projects, enriching their research experience and/or enabling students to develop a deeper understanding of topics of interest. Such course should also earn students ECTS towards their degree.

- The curriculum must be enhanced to encourage entrepreneurship among the graduate population.
- One-day workshops could be organized, in the Department or in the University, which could allow students to learn about new advances in their areas of study; journal clubs may be deployed for the same purpose.
- Incentives and support must be given to faculty members to deploy new pedagogical approaches and methodologies aiming at improving the students' learning experience. Such courses could be made mandatory for all junior faculty. In parallel, it should also be explored whether such pedagogy courses can be taken from other Departments of the University as well or whether they can be established at the University level.
- The faculty should implement a variety of assessment tools / examination methods for the courses, including open-book exams, projects in large and small groups, oral presentations, etc. An additional benefit of such a change would be incentivizing more active student's participation in the class.
- A special day dedicated to information on Erasmus should be considered.
- The exams schedule should be published a month prior to exams start, so that the students are aware of the exact exams schedule in advance and be able to plan their preparation and other obligations.
- Some courses should consider changing their mode of delivery so that active students' participation is increased.
- Practical training can ideally be made mandatory.
- The faculty should consider to gradually implement in the classroom proven pedagogical approaches such as active learning, problem-based learning, and a rethinking of the laboratories to progressively move from well prescribed to more open-ended experiments in the senior years.

Principle 5: Student Admission, Progression, Recognition of Academic Qualifications and Award of Degrees and Certificates of Competence of the New Study Programmes

Academic units should develop and apply published regulations addressing all aspects and phases of studies of the programme (admission, progression, recognition and degree award).

All the issues from the beginning to the end of studies should be governed by the internal regulations of the academic units. Indicatively:

- ✓ *the registration procedure of the admitted students and the necessary documents - according to the law - and the support of the newly admitted students*
- ✓ *student rights and obligations, and monitoring of student progression*
- ✓ *internship issues, granting of scholarships*
- ✓ *the procedures and terms for writing the thesis (diploma or degree)*
- ✓ *the procedure of award and recognition of degrees, the duration of studies, the conditions for progression and assurance of the progress of students in their studies*

as well as

- ✓ *the terms and conditions for enhancing student mobility*

Appropriate recognition procedures rely on relevant academic practice for recognition of credits among various European academic departments and Institutions in line with the principles of the Lisbon Convention on the Recognition of Qualifications concerning Higher Education in the European Region. 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).

All the above must be made public within the context of the Student Guide.

Relevant documentation

- *Internal regulation for the operation of the new study programme*
- *Regulation of studies, internship, mobility and student assignments*
- *Printed Diploma Supplement*

Certificate from the President of the academic unit that the diploma supplement is awarded to all graduates without exception together with the degree or the certificate of completion of studies

Study Programme Compliance

The Department of Chemical Engineering publishes a detailed study guide in Greek which is available in the website. The 2022-23 student guide is 261-page comprehensive document which describes the Program of Study (entrance criteria, academic regulations, advising, chemical engineering practice, diploma thesis, curriculum and course description) as well as useful information about the University, the Department, and its laboratory facilities, office, library, and other support facilities. The documentation provided in the quality assurance

folder included the 2020-21 study guide. It was informative to see the updated guide and better appreciate the progress the Department has made for example with the addition of new qualified faculty who enriched its research and teaching capacity in core areas of chemical engineering. Based on the posted information and discussions with faculty and students we note the following:

- Students enter the program primarily according to National entrance examinations. They admit about 100 students per year but about 55-60 % transfer to other chemical engineering schools in the country. The remaining class size of about 40 students creates an intimate learning environment which is beneficial to all. On the other hand, if this trend continues and less and less students decide to stay in the program this may inevitably put the sustainability of the program into question.
- The Department organizes welcome and orientation sessions to incoming students. Students have the opportunity to learn about the discipline of chemical engineering, the curriculum, academic regulations governing grading policy, examinations, important dates in the academic calendar, and student support resources offered by the University. The Department brings in representatives from the Technical Chamber of Greece and thus students have the opportunity to hear about professional engineering practice.

The Department oversees student progression through the Student Advisor and more locally through the course instructor. This enables the identification of learning gaps and areas that need attention to improve teaching practices.

The Department offers the opportunity for student mobility through ERASMUS + and in this regard the University has established criteria and procedures for selection and participation in the program. In addition, the Department has established the terms under which a student may carry out their diploma thesis abroad. Relevant information is available through the website and the University's International and European affairs office.

All courses list the ECTS. In addition, the program states clearly its expectation for graduation (300 ECTS).

The Department issues a Diploma Supplement. Samples in Greek and in English were provided in the documentation for viewing. The documents are detailed and include links to the University and the Department, European Union, Ministry of Education, and Information about Greece's higher education system. In this regard they are quite informative.

Students carry out a diploma thesis under the supervision of a faculty member and evaluated by another two faculty members. Students select the research and the supervisor after completion of the 9th semester. In this regard the Department posts diploma thesis topics and a brief description in the Department website. The thesis topics and the three-member committees for each student thesis must be approved by the Department. The Department provides the information about the academic requirements and regulations about the diploma thesis in the detailed program of study. We requested and received three samples of recent diploma theses which we found of very high quality.

Practical training is valued by the Department and receives considerable attention. In this regards the Department has stated expected learning outcomes (mostly skills and attitudes)

for the students and also the potential benefits to the local communities and receiving organizations. It is noteworthy that the Department has established an external Industry advisory board (council) that consists of individuals with a tremendous reservoir of good will to support the department in its efforts including practical training. The Department also makes use of funding through “antapodotikes-ypotrofies”. Students, faculty and member of the advisory board are all supportive of this aspect of the program as it helps students develop job relevant skills and secure good jobs after graduation. In addition, the companies have a steady pipeline of talented and motivated students who evolve into highly qualified personnel.

The Panel finds that the programme is substantially compliant with Principle 5.

Panel Judgement

Principle 5: Student admission, progression, recognition of academic qualifications, and award of degrees and certificates of competence of the new study programmes	
Fully compliant	
Substantially compliant	**X**
Partially compliant	
Non-compliant	

Panel Recommendations

To further improve adherence to Principle 5, the Panel recommends the following:

- Student retention is a key issue which, although driven by externalities, should be given priority. A systematic effort needs to be devoted to understanding the main drivers and then create incentives, student support programs, such as more student work opportunities, stronger connection with research in the Department and in industry,

enhance mobility as well as housing and food security will likely create strong drivers for retention.

- There is a need to devote effort to increase student engagement and set targets for class attendance and student response rate to the evaluation of teaching. For a small department and one that promotes an intimate learning environment one would expect that the response rates would be above 50 %.
- Given the importance of the department and the faculty of engineering to the country's efforts on decarbonization and energy transition, it is worthwhile that the Department and the School of Engineering in collaboration with the local and central government institutes and creates an "undergraduate student research opportunities" (USRA) program with a focus on Decarbonization and Renewables. Such opportunities would provide financial support to a number of students during the semester that the students carry out their diploma thesis.
- The Department should take advantage of social media, for example by creating an alumnus LinkedIn group for all graduates, in order to progressively build an extensive stakeholder database.
- Mechanisms of co-supervision of Diploma Thesis research projects by faculty members from other Departments or Institutions and/or from Industry and other external organizations should be established in order to encourage multidisciplinary study.
- 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 some exams should become a priority.
- For several 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.

Principle 6: Ensuring the Competence and High Quality of the Teaching Staff of the New Undergraduate Study Programmes

Institutions should assure themselves of the competence, the level of knowledge and skills of the teaching staff of the academic units, and apply fair and transparent processes for their recruitment, training and further development.

The Institution should attend to the adequacy of the teaching staff of the academic unit, the appropriate staff-student ratio, the suitable categories of staff, the appropriate subject areas and specialisations, the fair and objective recruitment process, the high research performance, the training – development, the staff development policy (including participation in mobility schemes, conferences and educational leaves- as mandated by law).

More specifically, 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.

Relevant documentation

- *Procedures and criteria for teaching staff recruitment*
- *Regulations or employment contracts, and obligations of the teaching staff*
- *Policy for staff recruitment, support and development*
- *Performance of the teaching staff in scientific-research and teaching work, also based on internationally recognised systems of scientific evaluation (e.g., Google Scholar, Scopus, etc.)*

Study Programme Compliance

The Department operates within the state regulations and legal framework and has adopted a series of well-defined procedures as imposed by state law to recruit and hire qualified teaching staff. Given this context the Department has transparent procedures for the advertisement and recruitment of teaching staff at various ranks and employment groups e.g., permanent, and temporary staff. The Department currently has five full professors, three associate and four assistant professors which is a balanced mix. Moreover, four of the 13 faculty are female which is a good ratio but still below the gender balance in the class which we understand to be 50 % female, which is significant and noteworthy.

The Department rewards excellence in teaching through merit-based awards based on student evaluations. On the other hand, it is not clear if there are opportunities for professional development. This is an area where the faculty of engineering may want to invest in a way that benefits all engineering departments. Moreover, while the Department rewards excellence in teaching they could also institute a merit-based research excellence award. We recognize of

course that research excellence brings indirect recognition to the researchers which perhaps explains the current lack of such an award.

Mobility opportunities are available through Erasmus+ and regarding sabbatical leaves the state legal framework governs the process. The Department contributes additional financial support for mobility as well as participation in international conferences.

Newly hired assistant professors have reduced administrative load. On the other hand, the Department assigns full load to all staff irrespective of rank. We gather that this equitable approach is valued by the faculty members. Teaching two courses per semester is the teaching load for faculty members ("DEP") whereas those on contract teach one course per semester. In general, the workload is reasonable given the number of students and offers an intimate learning environment. There may be merit, however, to offer some relief to newly hired assistant professors during their first year so that they can develop their courses and research program more effectively.

There are certain links between research and teaching, and we were provided examples. We believe that such interactions are extremely valuable as they expose the students' modern experimental and computing facilities. Therefore, the Department and the faculty can make a more systematic effort to offer additional exposure of the undergraduate students to research. The pool of motivated and talented students is expected to further enhance research productivity.

The students are given the opportunity to conduct teaching evaluations. This is a centrally planned activity through "MODIP". We gather that the response rate is about 15 % which given the small number of students remaining in the program (about 35-40) results in a very small sample which may not be representative. This poses a challenge and needs to be analysed to identify contributing factors and remedies. The teaching staff appear to make efforts to encourage the students' participation in course evaluation.

The procedure to analyse and create actionable items arising from the teaching are taken into account for the evaluation of faculty although it is not clear how this is exactly done. In addition, a discussion between the instructor and chair of the Department may take place in case the evaluation raises issues and concerns. Again, this is a good starting point and clearly an area for improvement.

The Department has focused research areas such as energy and environment, materials-nanotechnology, chemical processing, and food/biotechnology. These appear to be generic and do not help the branding of the Department. The Department needs to make an effort to distinguish from other similar Departments as far as its research emphasis. A Research vision consistent with the mission of the University and the values of the Department as well as the tremendous opportunity for regional development based on the decarbonization, renewable energy, environmental protection, as well as advanced materials related to energy and energy storage, e.g. batteries, offer tremendous opportunities.

The Panel finds that the programme is fully compliant with Principle 6.

Panel Judgement

Principle 6: Ensuring the competence and high quality of the teaching staff of the new undergraduate study programmes	
Fully compliant	**X**
Substantially compliant	
Partially compliant	
Non-compliant	

Panel Recommendations

To enhance adherence to Principle 6, the Panel recommends the following:

- To maintain the robustness of the programme, additional hires need to be secured. New hires should ideally be qualified individuals with a variety of pedigrees to enrich exposure to new ideas, philosophies, and approaches to teaching (and research and organization). New faculty hires should be evaluated for their teaching ability separately from their research ability.
- The Department in collaboration with the faculty can establish research excellence merit awards especially for early and mid-career faculty. In addition, they may consider lifetime achievement awards for teaching, service, and research.
- The faculty of engineering can establish a centre for instructional support and support for teaching and learning in general. This would help faculty get support in curriculum changes, new course syllabi development, course revisions, teaching methodologies such as active learning, grading policies, etc.
- The students should be mobilized and be more engaged in the affairs of the Department for example with stronger participation in relevant committees such as the learning and teaching committee, laboratory facilities, etc.
- Students need to have mentorship and support to form student clubs / teams and offered support to participate in national and international competitions such as chem E car, etc.
- Teaching evaluations should be systematically communicated to individual instructors in an organized and systematic way. Metrics to compare individual instructor performance to the average evaluations of the Department and the University for all key performance questions should be developed. The Department should inform widely the students that teaching evaluations are used to improve course delivery, instruction methods, and the curriculum, and that they are taken seriously, in order to help increase student participation.

- The Department can engage student to submit nominations to select “teacher of the year” awards winners.
- The Department should engage the advisory board as well as regional and national government to develop a research strategic plan followed by a detailed implementation plan. We see opportunities in advanced materials for energy conversion and storage, decarbonization technologies, environmental biotechnology, nanotechnology and advanced manufacturing, as well as artificial intelligence.
- Opportunities for enhanced and more organized collaboration with the Department of Products and Systems Engineering on product design could be pursued in a more organized and systematic basis to expand teaching and also the translation of research to practice.
- The Department and the School of Engineering could also invest in the area of entrepreneurship and innovation to engage students in the culture of translation of research to products and services through start-ups, etc.
- It would benefit the Department to establish the concept of joint faculty appointments or sabbatical stays, either within the University of Western Macedonia or with other Greek or even foreign universities. Such appointments bring an outside perspective that enriches the Department, contribute to improved teaching practices and generate joint research opportunities.
- Given the modest record in research output by some faculty members, the Panel recommends the establishment of a small group of external scientists, prominent in relevant fields of Chemical Engineering, to serve as members of an external research advisory board and help the Department excel in its research mission. Such a board can mentor faculty members as well as graduate students and post-doctoral fellows, facilitate workshops on proposals for grant development, etc.

Principle 7: Learning Resources and Student Support of the New Undergraduate Programmes

Institutions should have adequate funding to meet the needs for the operation of the academic unit and the new study programme as well as the means to cover all their 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 resources, on a planned and long-term basis, to support learning and academic activity in general, in order to offer students the best possible level of studies. The above means include facilities such as, the necessary general and specific libraries and possibilities for access to electronic databases, study rooms, educational and scientific equipment, information and communication services, support and 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 students, students with disabilities), in addition to 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. Students should be informed about all available services. In delivering support services, the role of support and administration staff is crucial and therefore this segment of staff needs to be qualified and have opportunities to develop its competences.

Relevant documentation

- *Detailed description of the infrastructure and services made available by the Institution to the academic unit to support learning and academic activity (human resources, infrastructure, services, etc.) and the corresponding specific commitment of the Institution to financially cover these infrastructure-services from state or other resources*
- *Administrative support staff of the new undergraduate programme (job descriptions, qualifications and responsibilities)*
- *Informative / promotional material given to students with reference to the available services*

Study Programme Compliance

In terms of physical infrastructure, the Department has two 20-seat classrooms, three 60-seat classrooms, two 201-seat amphitheatres (shared use), as well as the necessary secretariat, faculty, and staff offices. There are five established by law, well-equipped and functional laboratories: Environmental Technologies, Alternative Fuels and Environmental Catalysis, Environmental Chemistry and Water & Wastewater Treatment, Chemistry and Food Technology, and Air & Waste Management (jointly between the Departments of Chemical Engineering and Mechanical Engineering). The above laboratories are used to support specific courses of the curriculum, to carry research, as well as to provide specialized services to industry and other sectors. It is noteworthy that there is a large number of pilot systems used either in the laboratory for instruction and research or deployed in the field. Detailed information relative to laboratory and equipment safety and good practice procedures is made

available to the students in introductory laboratory sessions and are posted in every laboratory.

The Department has a study room for the students equipped with PCs, printers, etc. The students have access to the University Central Library, which in addition to books, reports, journals, etc., has a digital library (https://dspace.uowm.gr). Furthermore, the University Central Library participates in the Association of Greek Academic Libraries (https://www.heal-link.gr). In addition, the Department maintains a library with a large number of technical and educational books, scientific journals, and diploma and doctoral theses. An IT Laboratory is maintained by the Department which houses 18 PCs with a large number of commercial and free software used in support of teaching as well as tools for scientific analysis and technical calculations.

The University maintains an electronic course management system (http://eclass.uowm.gr) which supports Asynchronous Distance Learning and is also used by the students relative to their coursework, such as postings of lectures, laboratory exercises; the students can also communicate directly with the teaching staff using the electronic system. The academic progress and overall welfare of each student from entrance to graduation is monitored by the Academic Advisor, who is a faculty member assigned by the Department at the beginning of the student's first semester of study, but the student can ask for another faculty member in subsequent semesters.

The Department, in addition to the departmental secretariat office, uses University support services, such as: liaison office for students and graduates; office of practical training; innovation and entrepreneurship unit; ERASMUS office, as well as a large number of holistic/social care support (e.g., athletics, music, students' radio, students' associations, etc.). The students enjoy a wide range of support services such as dormitories, students club and cafeteria, career counselling, welfare office, medical clinic and sport/recreational facilities. It is noteworthy that many of the above services are entirely free or heavily subsidized. The students are informed about the above services during their freshman, welcome orientation event while all pertinent information is readily available in the Department's website. The Department coordinates the student support services through their secretarial office, which employs two administration staff members. Detailed information relative to all students' support services is posted on the University and Department websites.

Overall, the Department's infrastructure and learning resources, as well as the students' support services are excellent. Future expansion of the new College of Engineering Campus will lead to further improvement of the Department's existing resources and infrastructure.

The Panel finds that the Department is fully compliant with Principle 7.

Panel Judgement

Principle 7: Learning resources and student support of the new undergraduate programmes	
Fully compliant	**X**
Substantially compliant	
Partially compliant	
Non-compliant	

Panel Recommendations

To enhance adherence to Principle 7, the Panel recommends the following:

- Consider hiring an additional secretariat staff member as the number of faculty increases overtime.
- Consider the employment of a permanent well-trained research staff member to assist with the development, instrument maintenance, and operation of the laboratories.
- The Department, perhaps through the University, should pursue the creation of a "Maker Space" (http://www.makerspaceforeducation.com/makerspace.html) providing students with a significant hands-on venue for exploring their creativity.

Principle 8: Collection, Analysis and Use of Information for the Organisation and Operation of New Undergraduate Programmes

The Institutions and their academic units 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.

Effective procedures for collecting and analysing information on the operation of Institutions, academic units and study programmes feed data into the internal quality assurance system. The following data is of interest: key performance indicators for the student body profile, student progression, success and drop-out rates, student satisfaction with the programme, availability of learning resources and student support. The completion of the fields of National Information System for Quality Assurance in Higher Education (NISQA) should be correct and complete with the exception of the fields that concern graduates in which a null value is registered.

Relevant documentation

- *Report from the National Information System for Quality Assurance in Higher Education (NISQA) at the level of the Institution, the department and the new UGP*
- *Operation of an information management system for the collection of administrative data for the implementation of the programme (Students' Record)*
- *Other tools and procedures designed to collect data on the academic and administrative functions of the academic unit and the study programme*

Study Programme Compliance

The Department has developed a satisfactory information management system for its current students, following the rules and suggestions of NISQA. Suitable key performance indicators have been established. The Department has the necessary learning resources and students are supported both formally and informally.

Student progression, success and drop-out rates are closely monitored. As far as student satisfaction with the program, curriculum and teaching staff, the Department utilizes detailed questionnaires with 25 questions at the end of each semester and actions/follow-ups are taken when this is considered necessary. The percentage of students who evaluate their courses is very low.

As the Department is new, the career paths of graduates are not yet monitored systematically. The existence of the External Advisory Board is expected to help on this direction.

The Panel finds that overall, the programme fully complies with Principle 8.

Panel Judgement

Principle 8: Collection, analysis and use of information for the organisation and operation of new undergraduate programmes	
Fully compliant	**X**
Substantially compliant	
Partially compliant	
Non-compliant	

Panel Recommendations

To enhance adherence to Principle 8, the Panel recommends the following:

- The Panel recommends that the student evaluations be considered formally by the
- "Undergraduate Programme or Study 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 recommends that the evaluation be extended also to all support staff in charge of in-class or laboratory teaching.
- The Department must establish a transparent way by which the student evaluations (once they are at an acceptably high percentage) are included in the annual faculty assessment, e.g., *via* the existing Education/Study Programme Committee. The data should be readily available to relevant faculty peer committees and other stakeholders.
- The career paths of graduates are not, as yet, monitored systematically. A dedicated alumni portal may be developed to promote post-graduation interactions. This community may contribute to the Department's financial support and could facilitate important networking interactions among graduates.

Principle 9: Public Information Concerning the New Undergraduate Programmes

Institutions and academic units should publish information about their teaching and academic activities in a direct and readily accessible way. The relevant information should be up-to-date, clear and objective.

Information on the Institutions' activities is useful for prospective and current students, graduates, other stakeholders and the public. Therefore, Institutions and their academic units must provide information about their activities, including the new undergraduate programmes they offer, the intended learning outcomes, the degrees awarded, the teaching, learning and assessment procedures used, the pass rates and the learning opportunities available to their students. Information is also provided, to the extent possible, on graduate employment perspectives.

Relevant documentation

- *Dedicated segment on the website of the department for the promotion of the new study programme*
- *Bilingual version of the website of the academic unit with complete, clear and objective information*
- *Provision for website maintenance and updating*

Study Programme Compliance

The Department has developed a complete website (available in Greek and English) and maintains active YouTube , Facebook, Instagram and Twitter accounts, all of which are regularly updated with news and activities. The website includes all kind of information (course outlines, accommodation, public transport, etc.) and its access is easy. The Departmental policy on quality assurance is published online and relies on the MODIP website.

The Department has contact with many external stakeholders, and many are already actively involved in its activities. All the stakeholders the Panel met are eager to get engaged and help the Department achieve its goals. Some, but not all, are fully informed of the Department's affairs.

The Panel notes the extra-curriculum activities and student engagement in competitions, events, and other opportunities to disseminate practices and innovation in chemical engineering related topics.

The Panel finds that overall, the programme fully complies with Principle 9.

Panel Judgement

Principle 9: Public information concerning the new undergraduate programmes	
Fully compliant	**X**
Substantially compliant	
Partially compliant	
Non-compliant	

Panel Recommendations

To enhance adherence to Principle 9, the Panel recommends the following:

- The Department's introduction video (in the Home Page) should be also available in English.
- The website is not easy to change in the English version when accessed via mobile phone.
- The Department should consider a more active communication strategy with its constituencies and stakeholders, for example by issuing and emailing periodic newsletters describing Department's news, initiatives, awards, success stories, etc. These should also include prestigious competitive awards and distinctions received by its individual faculty, as well as individual students (namely, beyond distinctions earned by student groups).
- A site for alumni must be developed that includes information that targets the specific group. Relevant information could be on the Department's strategic initiatives, Department's success stories in general, including opportunities for visits and engagement.
- Services provided to industry should be broadly publicised. This may be a source of additional Department income to support student initiatives, equipment renewal, student mobility and industry placements, etc.

Principle 10: Periodic Internal Review of the New Study Programmes

Institutions and academic units should have in place an internal quality assurance system, for the audit and annual internal review of their new 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 the new study programmes aim at maintaining the level of educational provision and creating 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.

Relevant documentation

- *Procedure for the re-evaluation, redefinition and updating of the curriculum*
- *Procedure for mitigating weaknesses and upgrading the structure of the UGP and the learning process*
- *Feedback processes on strategy implementation and quality targeting of the new UGP and relevant decision-making processes (students, external stakeholders)*
- *Results of the annual internal evaluation of the study programme by the QAU and the relevant minutes*

Study Programme Compliance

Internal evaluations have been performed annually following the existing process and methodology. A SWOT analysis is also undertaken. Teaching, research, and service activities are conducted, and the outcomes of self-assessment and all findings are submitted to MODIP. These reviews are thoroughly analysed, and they help identifying areas of strength and weakness and result in specific corrective actions. At this stage, it is not evident, how or whether the curriculum changes are made on the basis of regular input from students and external stakeholders. Still, the Panel believes that the presence and actions of the External Advisory Board, together with students' questionnaire evaluation will propose curriculum changes and new directions for the programme.

The Panel finds that overall, the programme fully complies with Principle 10.

Panel Judgement

Principle 10: Periodic internal review of the new study programmes	
Fully compliant	**X**
Substantially compliant	
Partially compliant	
Non-compliant	

Panel Recommendations

To enhance adherence to Principle 10, the Panel recommends the following:

- The Panel recommends engaging the External Advisory Board in the process of programme review and curriculum change. Also, to formalize structured external input and feedback to the Department. This can enable implementation of approaches and changes that will improve student experience.
- The Department should create an organized alumni site when enough graduates are available. The alumni should be engaged together with industry and public sector in discussions for the formulation of the strategic objectives. The Panel recommends that, in addition to industry and Alumni, students are also encouraged to participate in the process – discussions related to the formulation of the strategic objectives. The students the Panel met had several interesting and constructive ideas.
- The annual action plan should be clearly and broadly communicated in the Department's website so that it is readily accessible to all stakeholders (students, faculty, alumni, industry, public). The Panel recommends that the Department communicates via its website about the continuous improvement process and about any measures taken that led to actionable items and implementations to improve the study plans and curriculum. All these actions will contribute to the even greater Department's exposure to the society.

Principle 11: Regular External Evaluation and Accreditation of the New Undergraduate Programmes

The new undergraduate study programmes should regularly undergo evaluation by panels of external experts set by HAHE, aiming at accreditation. The results of the external evaluation and accreditation are used for the continuous improvement of the Institutions, academic units and study programmes. 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 panel of independent experts. HAHE grants accreditation of programmes, based on the Reports submitted by the panels, 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 Standards, and as a catalyst for improvement, while opening new perspectives towards the international standing of the awarded degrees. Both academic units and institutions must consistently consider the conclusions and the recommendations submitted by the panels of experts for the continuous improvement of the programme.

Relevant documentation

- *Progress report on the results from the utilisation of the recommendations of the external evaluation of the Institution and of the IQAS Accreditation Report.*

Study Programme Compliance

Given that the Department of Chemical Engineering, as part of the University of Western Macedonia restructuring (Public Law 4610/2019), was established in 2019 and the programme is in its fourth academic year, there have not been any previous external evaluation reports. Thus, there are no Departmental progress reports relative to programme compliance in response to previous evaluation reports submitted by a panel of external, independent experts.

Based on the accreditation proposal submitted by the programme, as well as the discussions of the Panel during the external evaluation, the Institution and Department administration, as well the faculty and staff are fully aware of the legal requirement as well as the value and positive impact of external evaluation towards not only achieving compliance to standards set forth by the HAHE, but also achieving continuous improvement of the programme towards a higher quality and academic standing. The OMEA and MODIP representatives provided a thorough description of the mechanisms in place to follow the progress of the programme relative to the various performance indicators being assessed, showing that the whole process is taken seriously and with professionalism by the administration, faculty and staff involved.

The Panel finds that the Department is fully compliant with the Principle 11.

Panel Judgement

Principle 11: Regular external evaluation and accreditation of the new undergraduate programmes	
Fully compliant	**X**
Substantially compliant	
Partially compliant	
Non-compliant	

Panel Recommendations

To further solidify and enhance adherence to Principle 11, the Panel recommends the following:

- The Panel hopes that this external accreditation will continue into the future. Given that this is a process uniformly applied to all Chemical Engineering programmes in Greece, we also strongly recommend that all related programmes engage in an open and active coordination of their activities with the goal of improving the Chemical Engineering education across the country, further solidifying Greece's position in the field. It would also be useful for programmes to be asked to provide a list of peer institutions against which their performance would be compared.
- The potential benefit for student exchange programs between Greek Universities, as well synergies in teaching could be explored. For example, a specialized course offered by one institution could be made available online to all chemical engineering departments.
- It is recommended that an accreditation session is organised as part of the Annual Chemical Engineering meeting.
- Experience-sharing with Chemical Engineering Departments in Europe, so that best practices can eventually be developed is also strongly recommended.
- Through consultation with industry and alumni the undergraduate curriculum should embrace new technologies and standards such as those presented previously under other Principles recommendations.

Principle 12: Monitoring the Transition from Previous Undergraduate Study Programmes to the New Ones

Institutions and academic units apply procedures for the transition from previously existing undergraduate study programmes to new ones, in order to ensure compliance with the requirements of the Standards.

Applies in cases where the department implements, in addition to the new UGPs, any pre-existing UGPs from departments of former Technological Educational Institutions (TEI) or from departments that were merged / renamed / abolished.

Institutions should implement procedures for the transition from former UGPs to new ones, in order to ensure their compliance with the requirements of the Standards. More specifically, the institution and the academic unit must have a) the necessary learning resources, b) appropriate teaching staff, c) structured curriculum (courses, ECTS, learning outcomes), d) study regulations, award of diploma and diploma supplement, and e) system of data collection and use, with particular reference to the data of the graduates of the pre-existing UGP. In this context, the Institutions and the academic units prepare a plan for the foreseen transition period of the existing UGP until its completion, the costs caused to the Institution by its operation as well as possible measures and proposals for its smooth delivery and termination. This planning includes data on the transition and subsequent progression of students in the respective new UGP of the academic unit, as well as the specific graduation forecast for students enrolled under the previous status.

Relevant documentation

- *The planning of the Institution for the foreseen transition period, the operating costs and the specific measures or proposals for the smooth implementation and completion of the programme*
- *The study regulations, template for the degree and the diploma supplement*
- *Name list of teaching staff, status, subject and the course they teach / examine*
- *Report of Quality Assurance Unit (QAU) on the progress of the transition and the degree of completion of the programme. In the case of UGP of a former Technological Educational Institution (TEI), the report must include a specific reference to how the internship was implemented*

Study Programme Compliance

The Department had developed a detailed plan to support the transition from the previous undergraduate programme of Environmental Engineering/University of Western Macedonia to Chemical Engineering and the support of the undergraduate programme of Anti-Pollution Engineering/TEI of Western Macedonia due to its termination. The plan clearly and comprehensively defined the period during which the Department continued to support the previous two undergraduate programmes, the methods by which this was accomplished, the transition process and requirements for students who wished to enrol in the new Chemical Engineering undergraduate programme, as well as the estimated time the students were/are expected to graduate. As faculty and teaching staff from the former two undergraduate programmes were transferred to the new Chemical Engineering Department, there was/is sufficiently qualified staff to support the former programmes up to their completion date. The mandatory practical training of the old TEI undergraduate programme was/is adequately

supported by a three-member faculty committee. It is commendable that the new Chemical Engineering study programme maintains students' practical training as an option.

Regarding the students of the old undergraduate programme, who wished to graduate with the Chemical Engineering Diploma, the Department had drawn up a clear procedure regarding the obligations that students needed to fulfil in order to join the new program, alongside the recognition of past credits, additional courses and remaining duration of studies when they joined the new undergraduate programme.

Overall, the Department had/has taken adequate steps to ensure a smooth transition period ending with the successful graduation of the students, as well as to follow procedures to ensure compliance of the new undergraduate programme to all quality requirements and standards.

The panel finds that the Department is fully compliant with Principle 12.

Panel Judgement

Principle 12: Monitoring the transition from previous undergraduate study programmes to the new ones	
Fully compliant	**X**
Substantially compliant	
Partially compliant	
Non-compliant	

Panel Recommendations

The Panel has no specific recommendations on Principle 12.

PART C: CONCLUSIONS

I. Features of Good Practice

The Department of Chemical Engineering of the University of Western Macedonia is a recently founded Department, combining Departments with different cultures, history, and objectives. The Department is strong in terms of teaching and with a moderate level of research output.

The teaching facilities, including the laboratories, are excellent. We praise in particular the new modern campus, which the Panel hopes it can be used to attract even more students.

The faculty is enthusiastic and dedicated to their mission. The morale in the Department is high and the student experience positive. The enthusiasm of the current students and employers was evident in our meetings. The Department does not have many graduates yet, but their careers will be followed by the Department and their advice will be considered in the future development of the curriculum. This is absolutely crucial for the Department's future development.

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.

The Panel acknowledges the enormous amount of work that went into collecting the material, preparing a substantial volume of documents, and organizing the visit. This clearly indicates that the Department of Chemical Engineering of the University of Western Macedonia takes the process seriously, is open to suggestions and constructive criticism and is committed to striving for excellence.

The Panel has appreciated that the Vice-Rector for Academic Affairs is very engaged in the process of MODIP and the strategic development of the School of Engineering. Moreover, the Panel also noted the high quality of the recently recruited faculty of the Department. Finally, the Panel also wishes to praise the University of Western Macedonia administration for its willingness to help the Department in many of activities and plans.

II. Areas of Weakness

The Panel identified some areas that require special attention:

- The programme needs to engage its stakeholders (current students, alumni, employers, and social partners) more systematically. The Panel recognizes that the Department and its faculty are working towards continuously improving the curriculum, but the efforts appear to be primarily driven by the faculty without significant input and feedback from the various stakeholders, especially the non-Departmental ones. It is the impression of the Panel that the Department's stakeholders are more than willing to participate in such a process, which should and can be a win-win situation for all involved. Moreover, the

sustainability of this young Department will be highly dependent on the active and enthusiastic involvement of all its stakeholders, so this point cannot be stressed strong enough.

- The process to analyse and translate the findings of assessments into curriculum improvements should be transparent and systematic and engage not only faculty but also the students. Increased student participation in the evaluation of the courses is integral to the long-term success of the Department.
- The programme needs to address an apparent lack of flexibility in curriculum. There are far too many mandatory courses, only few elective courses, short and non-mandatory training practice, limited exposure of students to research, and limited use of new pedagogies. Moreover, there could be more courses on recent important areas of Chemical Engineering and skills needed in engineering practice. Finally, we understand that the lack of opportunity to take courses from other Departments will be mitigated with the policy change to be able to take a number of courses outside the department.

The Panel recognizes that certain actions may be beyond the control of the Department, but several steps are within its means and could be implemented at no financial cost. The Panel acknowledges the several changes the Department has implemented and these should be taken as evidence of the willingness to embrace a culture of change towards progressive and continuous improvements.

III. Recommendations for Follow-up Actions

The Panel applauds the Department for having implemented several policies aiming at improving the programme delivery. During our discussions it became evident that the Department needs to operate within limitations imposed by forces above and beyond its control and that its degrees of freedom and ability to implement innovative solutions is sometimes limited. Recognizing these constraints, the Panel limits its recommendations to steps that could be implemented with the means currently available.

Curriculum, Teaching and Learning

- The Panel recommends that the programme further implements steps aiming at increasing flexibility in the curriculum. Suggestions include but are not limited to:
    i. Introducing a “research for credit special course” in which students participate in organized research.
    ii. Existing courses enriching their content either by introducing targeted cross-disciplinary themes (with the help from faculty from other programmes) or by engaging alumni/employers as guest lecturers.
    iii. Open up the possibility to take elective courses from other Departments (to a limited degree).

iv. Consider implementing new and emerging topics in Chemical Engineering (as exemplified in the recommendations for various Principles, including innovation and entrepreneurship).

- The panel recommends that recent pedagogical approaches aimed at active learning, better use of the laboratories as well as process and product design be seriously considered for progressive adoption in the undergraduate program.
- The panel also recommends that the input from students and the External Advisory Board be more formally considered to improve teaching and learning as well as the analysis of the evaluation of teaching data.

Faculty development and Research Strategy

- The Panel recommends that the Department establishes annual "retreats". These need not be formal events but should be of short duration (one or two days), informal, honest, open discussions, facilitated by an independent/external leader focusing on deliverables, strategic planning, goals and means for achieving these goals. During these retreats, the faculty should have the opportunity to objectively assess data related to the teaching and research activities, identify a small number of actions and pursue them as well as developing a research strategic plan for the Department (see Principle 6).
- The Panel recommends that the University of Western Macedonia (or School of Engineering) establishes a centre for instructional support and support for teaching and learning in general. This would help the faculty get support in curriculum changes, new course syllabi development, course revisions, teaching methodologies such as active learning, grading policies etc.

Contact with stakeholders (internal and external)

- The Panel recommends that a work framework (agenda of meetings, assignment of a chairperson, objectives, expectations) is outlined for the recently established External Advisory Board (EAB). The Panel recommends that such an EAB meets at least annually and that the process of soliciting the input from EAB is implemented as soon as possible.
- The Panel recommends that the Department takes immediate actions and attention to increase student engagement and set targets for class attendance and increased student response rate to the evaluation of teaching.
- The Panel recommends that the Department designs and executes a thorough, complete, and detailed plan for the advertisement of the Chemical Engineering programme. This includes but should not be limited to i) actively promoting the excellent and modern facilities, ii) be in close contact with high schools in the area of Western Macedonia and neighbouring areas, iii) emphasize the role of industry and job opportunities.
- It is strongly recommended that the Department intensifies efforts towards increasing its revenues. Given the severe budgetary constraints within which the Department operates, innovative approaches must be developed to augment and diversify revenue streams. These include, but are not limited to exploring its human resources and equipment to perform contract work, as already done to some degree.

IV. Summary & Overall Assessment

The Principles where full compliance has been achieved are: **1, 2, 6, 7, 8, 9, 10, 11, and 12.**

The Principles where substantial compliance has been achieved are: **3, 4, 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 members of the External Evaluation & Accreditation Panel

Name and Surname **Signature**

1. **Prof. Georgios Kontogeorgis** (Chair)
   Technical University of Denmark (DTU), Denmark

2. **Prof. Peter Englezos**
   University of British Columbia, Canada

3. **Prof. Emeritus Spyros Pavlostathis**
   Georgia Institute of Technology, United States of America

4. **Mr. Pantelis Pantelaras**
   Member of the Technical Chamber of Greece, Greece

5. **Ms. Eleni Papadopoulou**
   Student in the Department of Environmental Engineering, International Hellenic University, Greece