



ΕΛΛΗΝΙΚΗ ΔΗΜΟΚΡΑΤΙΑ
HELLENIC REPUBLIC



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Accreditation Report

for the New Postgraduate Study Programme of:

Sustainable Technologies of Energy Resources and Raw Materials

Department: Mineral Resources Engineering

Institution: Technical University of Crete

Date: 3 February 2024



Με τη συγχρηματοδότηση
της Ευρωπαϊκής Ένωσης



Πρόγραμμα
Ανθρώπινο Δυναμικό και
Κοινωνική Συνοχή



Report of the Panel appointed by the HAHE to undertake the review of the New Postgraduate Study Programme of **Sustainable Technologies of Energy Resources and Raw Materials** of the **Technical University of Crete** for the purposes of granting accreditation.

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PART A: BACKGROUND AND CONTEXT OF THE REVIEW

I. The External Evaluation & Accreditation Panel

The Panel (EEAP) responsible for the Accreditation Review of the new postgraduate study programme of **Sustainable Technologies of Energy Resources and Raw Materials** of the **Technical University of Crete** comprised the following four (4) members, drawn from the HAHE Register, in accordance with Laws 4009/2011 & 4653/2020:

- 1. Prof. Georgios Kontogeorgis (Chair)**
Technical University of Denmark, Lyngby, Denmark
- 2. Assoc. Prof. Emeritus Stavros Constantinou**
The Ohio State University, Columbus, Ohio, United States of America
- 3. Prof. Emeritus Yani Skarlatos**
Boğaziçi University, Istanbul, Turkey
- 4. Mr Miltiadis Meliadis, PhD candidate**
School of Spatial Planning and Development
Aristotle University of Thessaloniki, Thessaloniki, 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 School of Mineral Resources Engineering of the Technical University of Crete.

The schedule and agenda of the meetings were as follows:

Monday, January 29, 2024: Preliminary private meeting of the Panel.

Tuesday, January 30, 2024: Consecutive meetings with the following agenda

- a) Welcome and short overview of the new postgraduate programme (PSP) with the vice-Rector/President of MODIP, the Head of the Department and the director of the PSP. A presentation from OMEA was also included.
- b) Discussion with faculty, teaching, and staff members (also on research activities).
- c) On-line tour – discussion about classrooms, lecture halls, laboratories and other facilities.
- d) Discussion with employers and social partners.
- e) Private debriefing (Panel members only).
- f) Discussion with Director of the PSP, head of the department, OMEA and MODIP representatives on points needing clarification.
- g) Informal presentation of the Panel key finding to the vice-Rector, Head of Department, OMEA and MODIP.

Wednesday – Sunday 31.01 – 04.02, 2024: Electronic (e-mail) communication between Panel members and preparation of the report.

Monday, February 05, 2024: Private meeting 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, staff and employers representatives interviewed were eager and helpful in providing all information requested by the Panel. The Panel received all extra information requested during the visit.

III. Postgraduate Study Programme Profile

The School of Mineral Resources Engineering of the Technical University of Crete was established in 1983 and received the first students in 1987. The mission is to educate engineers in the areas of exploration, utilisation, and processing of mineral resources. The duration of the studies is 5 years, and the diploma is recognized as Integrated Master.

The current faculty is comprised of 20 members, who are assisted in their academic and other activities by 19 “EDIP” members (laboratory teaching staff), and additional 4 staff members “ETEP” (technical and administration).

During its 35 years of existence, the school has established and run successfully 4 postgraduate programmes. A total of 338 postgraduate and 50 PhD students have graduated from these programmes.

Some of these PSP have closed and the proposed English-speaking PSP on “Sustainable technologies of energy resources and raw materials” can be considered to be a further development and modernization of some of the previous, now closed, PSP. The topic chosen for new PSP is very important, both nationally and internationally, as part of modern developments in circular economy and green transition. It is expected that a successful completion of the programme will enable its graduates to address a diverse array of global challenges.

The new PSP will have access to modern facilities offered by the school and the university and overall, the new PSP will be administrated by the School of Mineral Resources Engineering. A total of 1,500 € in tuition fees for the entire program is paid only for students outside of EU. All students pay a subscription fee of 500 €.

Holders of a degree in a wide range of natural science and engineering degrees from Greece or abroad can be accepted to the programme, after a carefully designed selection process which can include an interview with potential candidates.

The new programme has a duration of eighteen months, i.e., of three academic semesters or in total 90 ECTS. There are two specializations: Sustainable technologies for exploitation of energy resources-environment and Sustainable technologies of exploration and exploitation of raw materials – recycling. Each specialization has 6 mandatory courses from which the students should choose 4, as well as two elective courses which the students can choose from 15 courses. There is also some limited flexibility to choose courses different from the ones mentioned. For both specializations, the third semester is the postgraduate diploma thesis (30 ECTS) which is expected to be related to a relevant research topic and/or be carried out in collaboration with industry/external partners.

PART B: COMPLIANCE WITH THE PRINCIPLES

Principle 1: Strategy, Quality Assurance Policy and Quality Goal Setting for the New Postgraduate Study Programmes

INSTITUTIONS SHOULD INCLUDE IN THEIR STRATEGIC MANAGEMENT THE DEVELOPMENT, ORGANISATION, AND IMPLEMENTATION OF NEW POSTGRADUATE STUDY PROGRAMMES (PSP) IN SPECIFIC SCIENTIFIC FIELDS AFTER INVESTIGATING THEIR FEASIBILITY AND SUSTAINABILITY.

INSTITUTIONS SHOULD APPLY A QUALITY ASSURANCE POLICY FOR THE NEW POSTGRADUATE STUDY PROGRAMMES AS PART OF THEIR STRATEGIC MANAGEMENT.

THIS POLICY SHOULD EXPAND AND BE AIMED (WITH THE COLLABORATION OF EXTERNAL STAKEHOLDERS) AT THE PSP OF THE INSTITUTION AND THE ACADEMIC UNIT. THIS POLICY SHOULD BE PUBLISHED AND IMPLEMENTED BY ALL INTERESTED PARTIES.

By decision/s of the Institutional Senate, the Institutions should adapt their strategy to allow for the provision of postgraduate study programmes, in addition to attending to the profile, vision, mission and strategic objectives of the Institution. In this strategy, the Institutions should anticipate the potential benefits, difficulties or risks from the implementation of new postgraduate study programmes and plan all the necessary actions to achieve their goals. The Institution's strategic choices should be documented through specific feasibility and sustainability studies, especially for new postgraduate study programmes.

In the case of PSP delivered by distance methods, the Institution prepares and applies an e-learning strategy. The Institution's e-learning strategy is integrated into its overall strategy and identifies educational goals while keeping up to the rapid technological changes and to the developments in pedagogical models. The Institution should include in its strategy the justification and feasibility as to why e-learning has been selected as the appropriate learning strategy for the particular programmes of study where it is applied.

In the context of e-learning, innovation strategies, the possibility of programme revision, the linking between learning and research (requiring knowledge of the latest innovations in order to select the most appropriate means to achieve the learning outcomes) should be taken into account.

The quality assurance policy of the academic unit for postgraduate study programmes should be in line with the Institution's strategy and must be formulated in the form of a public statement, which is implemented by all stakeholders. It focuses on the achievement of special goals related to the quality assurance of the postgraduate study programmes offered by the academic unit. Indicatively, the quality policy statement of the academic unit includes its commitment to implement a quality policy that will promote the academic profile and orientation of the postgraduate study programme (PSP), its purpose and field of study; it will realise the programme's goals and it will determine the means and ways for attaining them; it will implement appropriate quality procedures, aiming at the programme's continuous improvement.

In particular, in order to implement this policy, the academic unit commits itself to put into practice quality procedures that will demonstrate:

- a. the suitability of the structure and organisation of postgraduate study programmes*
- b. the pursuit of learning outcomes and qualifications in accordance with the European and National Qualifications Framework for Higher Education - level 7*
- c. the promotion of the quality and effectiveness of teaching at the PSP*

- d. the appropriateness of the qualifications and the availability of the teaching staff for the PSP*
- e. the drafting, implementation, and review of specific annual quality goals for the improvement of the PSP*
- f. the level of demand for the graduates' qualifications in the labour market*
- g. the quality of support services, such as administrative services, the libraries, and the student welfare office for the PSP*
- h. the efficient utilisation of the financial resources of the PSP that may be drawn from tuition fees*
- i. the conduct of an annual internal review and audit of the quality assurance system for the PSP through the cooperation of the Internal Evaluation Group (IEG) with the Institution's Quality Assurance Unit (QAU)*

Study Programme Compliance

I. Findings

The structure and organization of the study programme appears to be suitable to the teaching programme objectives of the new PSP. The learning objectives, outcomes and qualifications are in accordance with the European and the National Qualifications Framework for Higher Education – level 7. Efforts are being made to promote high quality and effectiveness of teaching, with the ultimate goal of equipping graduates with skills allowing them to be successful in their careers in the thematic areas of the PSP. The curriculum includes many interesting courses, whereas some areas like CO₂ capture and storage (CCS) are not covered in depth and the curriculum could be more dynamic e.g. allowing for special research-oriented courses. Most courses are given by the school's staff who have expertise with the subjects taught, but some courses may need external teachers. However, the PSP is new and many of these elements can be improved.

The general principles of the study programme have been designed based on international standards and there is some input from external stakeholders. This input can be more extensive and especially more formalized e.g. via formation of an external advisory board (EAB).

The school will also make use in the new PSP of questionnaires (which will be electronic) for evaluating the satisfaction of the students on their courses and will use this information for improving the courses. Procedures for this have been established. Courses' evaluation percentages are low for the undergraduate programmes, and it is recommended that the school establishes a way to improve such response percentages for the new PSP.

Postgraduates of the programme may have different backgrounds, and the school wishes to have the new PSP open to a very wide range of candidates, but the school has established selection criteria including supplementary courses for those candidates who may not have the appropriate background. These criteria need to be formalized.

Methods of evaluation of student performance depend on the course and include a variety of forms (written exams, projects, multiple choice, etc.).

Teaching faculty show good involvement in externally funded research programmes, which can be improved, but the hard competition and other difficulties are recognized. Teaching and research appear to be effectively linked in the new PSP especially via the final thesis, but more possibilities can be considered e.g. the establishments of special courses.

II. Analysis

Our findings are based on the extensive material received and the detailed discussions with members of faculty, the representatives of MODIP and OMEA as well as a few representatives from the external stakeholders. All the discussions were excellent and informative. The PSP is new and there are no graduates or current students.

The Panel found that the PSP adheres to the Institution's Quality Assurance Policy as part of the broader strategy of the school, accompanied by regular quality assurance targets for the continuous development and improvement of the academic unit and teaching programme.

The teaching faculty indicated consistent efforts to promote quality and effectiveness of teaching. Teaching faculty and administrators appear enthusiastic and strongly committed to ensuring high quality student support services. Some courses included a project-based approach that encouraged students to work in groups and analyse recent peer-reviewed publications in the field, then present their analysis via presentations to the class. This enhances student critical thinking and communication skills.

Further development of the curriculum appears to be on an ad hoc basis and informal discussions. The same can be said for advising students but the relatively low number of admitted students in the new PSP will permit close student-faculty collaboration and interaction. There are some established procedures to address student welfare issues.

The programme accepts graduates from different fields that may lack the background necessary for following the programme.

III. Conclusions

Through its OMEA and MODIP, the programme is committed to the continuous improvement of a quality policy that supports the academic profile and orientation of the curriculum and supports the students and the participating teaching staff. Quality targets are realistic and will be built on the progress – experiences obtained by running the PSP.

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, considering national and regional economic factors as well as recent advances in the broader field of the new PSP.

Panel Judgement

Principle 1: Strategy, Quality Assurance Policy and Quality Goal Setting for the New Postgraduate Study Programmes	
Fully compliant	
Substantially compliant	X
Partially compliant	
Non-compliant	

Panel Recommendations

- The school should prepare a thorough, complete, and detailed plan for the advertisement and promotion of the new PSP
- The Panel recommends the adoption of formal quantifiable means and criteria that guide future curriculum updates. These should reflect the mission statement of the school and be aligned with clearly defined long-term goals and educational objectives.
- Implementation of the academic advisor
- Creation of channels with legal staff for complaints on unpleasant situations
- Introduction of project-based approaches (PBL) in more courses
- Introduction of a series of seminars and workshops open to all teaching faculty with the purpose of assisting faculty with adoption of novel teaching technologies and principles.
- Establishment of introductory courses and other procedures for facilitating students without the appropriate background to follow the programme
- Employers – previous graduates of the school are very active and eager to support the programme. These interactions should be continued and enhanced. The alumni's views could be considered on several topics, and the establishment of an External Advisory Board (EAB) is recommended. In general, it is recommended to increase substantially the collaboration with local and regional industry and other stakeholders also by involving some of them in an External Advisory Board. The Department's Alumni should also be actively involved in the Department's development and be consulted. It is furthermore important to include in the EAB also employers and social partners directly related to field of the proposed PSP.
- Recent international trends in the field of the new PSP should be continuously pursued and e.g. a separate course on CCS is strongly recommended. There are some efforts on entrepreneurship which need to be introduced in all courses where this suitable.
- 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. Inviting distinguished professors from abroad and other initiatives that increase the visibility of the school should be considered.

Principle 2: Design and Approval of New Postgraduate Study Programmes

INSTITUTIONS SHOULD DEVELOP THEIR POSTGRADUATE STUDY PROGRAMMES FOLLOWING A DEFINED WRITTEN PROCESS WHICH WILL INVOLVE THE PARTICIPANTS, INFORMATION SOURCES AND THE APPROVAL COMMITTEES FOR THE NEW POSTGRADUATE STUDY PROGRAMMES. THE OBJECTIVES, THE SPECIFIC SCIENTIFIC SUBJECT AND THE STREAMS OR SPECIALISATIONS, THE EXPECTED LEARNING OUTCOMES AND THE EMPLOYMENT PROSPECTS ARE SET OUT IN THE PROGRAMME DESIGN. DURING THE IMPLEMENTATION OF THE NEW POSTGRADUATE STUDY PROGRAMMES, THE DEGREE OF ACHIEVEMENT OF THE LEARNING OUTCOMES SHOULD BE ASSESSED. THE ABOVE DETAILS, AS WELL AS INFORMATION ON THE PROGRAMME'S STRUCTURE ARE PUBLISHED IN THE STUDENT GUIDE.

The academic units develop their postgraduate study programmes following a well-defined procedure. The academic profile and orientation of the programme, the research character, the scientific objectives, the specific subject areas, the specialisations, the expected learning outcomes, the structure, the courses, the teaching and assessment modes, the teaching staff and the necessary resources are described at this stage.

The structure, content and organisation of courses and teaching methods should be oriented towards deepening knowledge and acquiring the corresponding skills to apply the said knowledge (e.g. course on research methodology, participation in research projects, thesis with a research component).

The expected learning outcomes must be determined based on the European and National Qualifications Framework (EQF, NQF), and the Dublin Descriptors for level 7. During the implementation of the programme, the degree of achievement of the expected learning outcomes and the feedback of the learning process must be assessed with the appropriate tools. In particular, for each expected learning outcome that is designed and made public, it is necessary that its evaluation criteria are also designed and made public.

In addition, the design of PSP must consider:

- *the Institutional strategy*
- *the active involvement of students*
- *the experience of external stakeholders from the labour market*
- *the anticipated student workload according to the European Credit Transfer and Accumulation System (ECTS) for level 7*
- *the option of providing work experience to students*
- *the linking of teaching and research*
- *the relevant regulatory framework and the official procedure for the approval of the PSP by the Institution*

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

Study Programme Compliance

I. Findings

The PSP on “Sustainable Technologies of Energy Resources and Raw Materials” aims to train engineering and science graduates in the exploration, exploitation, and processing of energy resources and other mining materials. The programme further aims to conduct research and advance the level of knowledge in the relevant field. (A5)

Two specialization areas are foreseen: Sustainable Technologies for Exploitation of Energy Resources-Environment, and Sustainable Technologies of Exploration and Exploitation of Raw Materials-Recycling.

The curriculum, syllabus, and course contents have been developed by the School of Mineral Resources Engineering in accordance with the relevant policies of the institution and European recommendations. They have been revised, and they are included in the study guide. (A8)

The programme of study aims at continuous improvement of educational and research activities as well as at high quality of services provided under the guidelines of the National Administration of Quality Assurance in Higher Education (HAHE). The institution’s quality assurance unit (MODIP) oversees the process of internal and external evaluations of the programme.

II. Analysis

The study programme with its two specialization areas is unique in Greece, while it resembles comparable programmes in U.S. and European universities. The design of the programme has been based on the needs of the national and international markets in the field of sustainable exploitation of underground resources and conforms to the prescriptions of Level 7 of the European and National Qualifications Framework for Higher Education. (Docs. A5, A6, A7)

The programme of studies consists of core courses providing the basics in the field, followed by specialized courses leading to the front lines of the relevant subjects, and aiming at preparing students for research. A research-oriented thesis on a specialized subject concludes the course of studies.

All necessary documentation describing the programme, including the senate decision for its establishment, curriculum, list of teaching staff, study guide, and course and thesis descriptions have been provided. Criteria for success have been set. (Docs. 4, 5, 6, 7, 14)

Internal audits of the programme’s operations are to be performed in cooperation with MODIP. Data on course structure and organization collected from the Integrated National Quality Data System (OPESP), the Hellenic Authority of Higher Education (HAHE), and departmental systems will be analysed in order to evaluate and improve the educational process.

Periodic revisions of the curriculum in consultation with internal and external experts, students, graduates, and other stakeholders are stipulated in the rules of procedures of the PSP approved by the Senate of the University. (Doc. A14)

III. Conclusions

The programme has been designed and approved in compliance with HAHE requirements.

Panel Judgement

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

Panel Recommendations

- Prepare Greek and English versions of the new post graduate programme in the university website. The currently offered programmes are presented only in Greek.
- Although the relevance of the subject matter of the PSP is undisputable, there is no record of consultations with potential public or private sector partners pertaining to the planning of the curriculum and focus of the programme. It might help to carry out such consultations and make any adjustments that may be found useful; or, in case this has been done already, mention it in the programme's introduction.

Principle 3: Regulations for Student Admission, Progression, Recognition of Postgraduate Studies, and certification

INSTITUTIONS SHOULD DEVELOP AND APPLY PUBLISHED REGULATIONS COVERING ALL ASPECTS AND PHASES OF STUDIES (ADMISSION, PROGRESSION, THESIS DRAFTING, RECOGNITION AND CERTIFICATION).

The Institution should develop and publish the internal regulations prescribed by law which, among other things, should regulate all issues of postgraduate studies from the beginning to the end of the studies.

Indicatively:

- *The students' admission procedures and the required supporting documents*
- *Student rights and obligations, and monitoring of student progression*
- *Internship issues, if applicable, and granting of scholarships*
- *The procedures and terms for the drafting of assignments and the thesis*
- *The procedure of award and recognition of degrees, the duration of studies, the conditions for progression and for the assurance of the progress of students in their studies*
- *The terms and conditions for enhancing student mobility*

In case that the PSP is offered through distance learning methods, the Institution should have in place a regulation for e-learning, including in particular the following issues:

- *Services of the Institution to support e-learning*
- *Methodology for the development and implementation of courses*
- *Ways of providing teaching and variety of teaching and assessment modes*
- *General standard of course structure*
- *Student support system*
- *Support of faculty/teachers with mandatory e-learning training for new staff members*
- *Technological infrastructures made available by the Institution*
- *Student identity confirmation system (student identity check, assignment and exam writing process, security and certification issues).*
- ❖ *The Institution should establish rules for the provision of appropriate access and for the assurance of the participation of students affected by disability, illness, and other special circumstances.*
- ❖ *Ethical issues, such as those concerning data protection, intellectual property rights and rules for protection against fraud are governed by the e-learning regulation.*

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

Study Programme Compliance

I. Findings

Student admission for this specific PSP is restricted to maximum 30 students per year. Eligible for admission are graduates from various fields of studies, especially from Polytechnic Schools.

This PSP has not started yet. It will offer the degree in “Sustainable Technologies of Energy Resources and Raw Materials”. Acceptance to the programme is restricted based on a well-defined selection process. The selection of the applicants is based on their undergraduate performance scores, recommendation letters, followed by candidates’ interviews by an established academic committee. These procedures are clearly described in the required supporting documents, which also contain information for the student rights and obligations, and ways allowing to monitor their progression. Some improvements in this procedure could be made, especially for students with degrees quite different from the area offered by the PSP.

Research ethics regulations, regulations of studies, internship, mobility, and student assignments are also provided. A hybrid method of teaching exists, live and remote, which is helpful but not for laboratories.

The duration of the PSP is one and a half year (three semesters, 90 ETCS in total). Students are evaluated at the end of each semester. Students are also required to write a thesis, which is typically research based. The PSP diploma allows students to get a job in the public or private sector (research institutes, private companies etc) with specific requirements, or to further develop their skills by acquiring a Ph.D. diploma. The programme provides both theoretical courses and some practical training in labs.

II. Analysis

This PSP provides an important and interesting basis for further studies in the fields of Energy Resources and Raw Materials.

The meeting of the Panel with employers and social partners of the PSP provided a positive impression of the quality of this PSP. All participants were enthusiastic and positive concerning their experience and knowledge of the school and the teaching staff. Several employers, former students at the school, have important positions in private companies, which indicates the importance of this PSP which is expected to upgrade the knowledge of the students.

This PSP will be given in English and international literature (books, articles) is already planned to be available for the courses. EU students do not pay tuition fees, except for 500€ as an entrance fee. Non-EU students should pay 1500€, (500€ each semester) as fees for the specific PSP.

Via the Erasmus+ and Eureca-Pro programmes students are given various opportunities for mobility.

The degree certificate template is provided electronically to the students upon completion of PSP in the English language.

The Panel considers that the length of studies, as well as the help from the school to the future students of this PSP are, in general terms, satisfactory.

III. Conclusions

Despite the fact the PSP has not started yet to receive students, it is a well-organized and designed PSP in the fields of Energy Resources and Raw Materials. The different modules as well the laboratories provide a significant help and boost to the students training and they are considered, as well as the length of the studies for graduation, to be satisfactory.

Panel Judgement

Principle 3: Regulations for Student Admission, Progression, Recognition of Postgraduate Studies, and certification	
Fully compliant	X
Substantially compliant	
Partially compliant	
Non-compliant	

Panel Recommendations

- The school should make more efforts towards the recruitment in the PSP of additional students outside the EU highlighting the benefits of completing the programme. A well-designed English website can help in this direction.
- The school should proceed with the organization of an information day, where various stakeholders could present possibilities of mobility, job opportunities.
- The school should also consider inviting external lecturers, world leaders in the field of the PSP, from Greece and from abroad.

Principle 4: Teaching Staff of New Postgraduate Study Programmes

INSTITUTIONS SHOULD ASSURE THEMSELVES OF THE LEVEL OF KNOWLEDGE AND SKILLS OF THEIR TEACHING STAFF, AND APPLY FAIR AND TRANSPARENT PROCESSES FOR THEIR RECRUITMENT, TRAINING, AND FURTHER DEVELOPMENT.

The Institution should attend to the adequacy and scientific competence of the teaching staff at the PSP, the appropriate staff-student ratio, the proper staff categories, the appropriate subject areas, the fair and objective recruitment process, the high research performance, the training, 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 for the PSP 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 (with respect to attendance requirements, performance, self-assessment, training, etc.); develop policies to attract highly qualified academic staff.

Study Programme Compliance

I. Findings

According to the Graduate Studies Regulations of the School of Mineral Resources Engineering (Official Gazette 7121 t.B/31.12.2022), the PSP will employ faculty members of the School of Mineral Resources Engineering (MICHOP) or other Schools of the Technical University of Crete and other University Departments of the country and foreign universities as well as different categories of teachers, per the provisions of article 83 of Law 4957/2022.

The School of Mineral Resources Engineering (MICHOP) organizes and follows clear, transparent, and merit-based criteria and procedures for selecting staff for the newly established PSP with the appropriate qualifications and providing employment conditions concerning the importance of teaching and research. Furthermore, the school applies all policies required by law to recruit and hire highly qualified individuals. It provides opportunities for the professional development of its faculty and strengthens the ties between research and teaching.

The School of Mineral Resources Engineering (MICHOP) faculty and other qualified staff will provide the instruction in the new PSP. There are 20 faculty members (DEP), another 26 qualified persons (EDIP), and two administrative staff members (ETEP) to support the programme.

The research and publication records of faculty, as compiled from the Scopus citation database, indicate a productivity rate above the average of the faculty members of Greek universities (A17). This metric is a significant indicator of the success of the new PSP. In

addition, the faculty teaching in the new PSP will not interfere with their teaching responsibilities in their undergraduate studies.

The new PSP aims to train engineers who will contribute to sustainable resource management, energy efficiency, and environmental stewardship. These are particularly important research areas; the graduates will work mainly in the relevant industry and private sector, although some might follow an academic career. Future scholars can generate innovative, interdisciplinary scientific insights that strengthen the bonds between research and industrial applications.

II. Analysis

The Postgraduate Study Programme (PSP) in Sustainable Technologies of Energy Resources and Raw Materials” under the School of Mineral Resources Engineering at the Technical University of Crete has been created following the university's established procedures consistent with the government and EU policies. The programme's goals are clear and meet a societal need for engineers who will work in the industry, and broadly in the private and public sectors. The criteria for recruiting and hiring quality faculty and other staff are well articulated and transparent. The teaching load and research productivity of faculty and other qualified staff are appropriate to support the new PSP. The programme's curriculum meets the requirements of the ECTS for level 7 and provides a complete and balanced educational experience. The curriculum structure is well-stated, and students will be able to finish their degrees on time.

III. Conclusions

The programme is fully compliant with the Principle.

Panel Judgement

Principle 4: Teaching Staff of New Postgraduate Study Programmes	
Fully compliant	X
Substantially compliant	
Partially compliant	
Non-compliant	

Panel Recommendations

There is a discrepancy between these figures and those cited in the Accreditation Proposal dated May 2023. There is a need for consistent and up-to-date figures cited in different documents, especially on the PSP website.

The citation of the research publications of faculty who will teach in the new PSP includes metrics from Scopus. Additional sources for such comparisons include the Web of Science and Google Scholar. The latter data will be helpful, mainly since the HAHE uses those metrics.

Creating an External Advisory Board as a consulting body for the PSP would benefit the programme. The membership of this board could include members from the private sector, local city government, and academics from European and American universities who can provide their expertise for cutting-edge technologies and research, help with the re-evaluation of the learning goals and course work, and further develop strategies for the employment of its graduates.

Principle 5: Learning Resources and Student Support

INSTITUTIONS SHOULD HAVE ADEQUATE FUNDING TO COVER THE TEACHING AND LEARNING NEEDS OF THE POSTGRADUATE STUDY PROGRAMMES. 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, CAREER AND SOCIAL POLICY SERVICES ETC.).

Institutions and their academic units must have sufficient resources and means, on a planned and long-term basis, to support learning and academic activity in general, so as to offer PSP students the best possible level of studies. The above means include facilities such as the necessary general and more specialised libraries and possibilities for access to electronic databases, study rooms, educational and scientific equipment, IT 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 and foreign students, students with disabilities), in addition to the shift towards student-centered learning and the adoption of flexible modes of learning and teaching. Support activities and facilities may be organised in various ways, depending on the Institutional context. However, the internal quality assurance proves -on the one hand- the quantity and quality of the available facilities and services, and -on the other hand- that students are aware of 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.

Study Programme Compliance

I. Findings

The handling of the students' support is provided by the university in general and the School of Mineral Resources Engineering. The school occupies five large building complexes with five classrooms, two amphitheatric lecture halls, and one meeting room fully equipped for teleconferencing and distance teaching. There is a 15-slot computer room, 13 teaching and research labs, and offices. The university library provides archival, electronic search, and consulting services to students and faculty.

The PSP offers a number of support services, such as boarding, career counselling, innovation and entrepreneurship unit, medical care, student advocate, unit for the support of students from vulnerable groups, as well as complaint management procedures. All support available constitute well-established services, already offered by the host university for many years, so they are functional while most of them are electronically accessed by the students. Lastly, there is a tuition utilisation plan described in A1 as well as in A19.

II. Analysis

Virtually all the facilities available to students have been established and they are functioning already for the existing students at the university. Newcomers to the programme will undoubtedly find out about them as well as all academic matters through contacts and electronic means.

III. Conclusions

As implementation of the programme has not started yet, it all looks fine on paper; however, the chance of unforeseen complications/omissions should be minimized by regular internal audits even before the start of the programme. In this manner, any omissions or problems will be identified, and corrective actions will take place on time.

Panel Judgement

Principle 5: Learning Resources and Student Support	
Fully compliant	X
Substantially compliant	
Partially compliant	
Non-compliant	

Panel Recommendations

- All available services will be presented to the students in the first week of their studies. However, it should be carefully monitored how all these support services will be delivered and communicated to the specific PSP's students.
- The administrative staff to be hired or allocated must be vigilant in ensuring the smooth operation of the support services.
- Internal audits should be carried out by OMEA and MODIP well before the start of the programme.

Principle 6: Initial Internal and External Evaluation and Monitoring of New Postgraduate Study Programmes

INSTITUTIONS AND ACADEMIC UNITS SHOULD HAVE IN PLACE AN INTERNAL QUALITY ASSURANCE SYSTEM, FOR THE AUDIT, INTERNAL AND EXTERNAL EVALUATION OF THE NEW POSTGRADUATE PROGRAMMES, THUS ENSURING COMPLIANCE WITH THE PRINCIPLES OF THE PRESENT STANDARDS. ANY ACTIONS TAKEN IN THE ABOVE CONTEXT SHOULD BE COMMUNICATED TO ALL PARTIES CONCERNED.

The internal evaluation of the new PSP includes the assessment of the accreditation proposal, as well as the documentation in accordance with the Principles of the present Standards and the quality procedures of the Institution's Internal Quality Assurance System (IQAS). The internal evaluation of new postgraduate study programmes also aims at maintaining the level of educational provision and creating a supportive and effective learning environment for students. The Institution, through its Quality Assurance Unit (QAU) and the corresponding academic units, organise and support the external evaluation procedures of the new PSP, according to the specific guidelines and directions provided by HAHE.

The above comprise the assessment of:

- *the objectives, content, and structure of the curriculum, the knowledge offered and the level of science and technology in the given discipline, thus ensuring that the PSP is up to date, according to the relevant documentation listed in the decisions of the pertinent bodies*
- *the entailed students' workload for the progression and completion of postgraduate studies*
- *the satisfaction of the students' expectations and needs in relation to the programme*
- *the learning environment, support services, and their fitness for purpose for the PSP in question*

Postgraduate study programmes are designed and established in accordance with the provisions of the Institution's internal regulations, involving students and other stakeholders.

Study Programme Compliance

I. Findings

The Postgraduate Study Programme (PSP) in Sustainable Technologies of Energy Resources and Raw Materials was created by the unanimous vote of the Faculty Assembly of the Technical University of Crete on December 15, 2022. The new PSP is organized by the School of Mineral Resources Engineering, and the language of instruction is English. Using English makes the Programme attractive to EU citizens and students from other countries. Since almost all faculty members have doctorates from English-speaking countries, using English to deliver the new PSP should not be a problem.

The new PSP leads to the awarding of a postgraduate degree in the following two areas of specialization:

(1) Sustainable Technologies for the Utilization of Energy Resources-Environment.

This track focuses on sustainable and economically efficient technologies for utilizing energy resources. Significant themes include carbon capture, sequestration, storage, energy transition technologies, biofuel production, and energy-efficient plant design.

(2) Sustainable Technologies for the Exploration and Exploitation of Raw Materials-Recycling.

This track emphasizes economically viable and energy-efficient technologies for exploring and exploiting raw materials. In addition, it underscores the importance of recycling and the use of by-products and waste according to the principles of circular economy.

The goals of the PSP, through the adoption of a broad interdisciplinary approach, are to provide a high level of knowledge, know-how, and expertise, as well as to promote research to qualified engineers and scientists in specific fields and specializations in the context of sustainable development (Official Gazette 7121 vol. B/ 31.12.2022).

This review is the first external evaluation of the new Postgraduate Study Programme (PSP) titled "Sustainable Technologies of Energy Resources and Raw Materials" of the School of Mineral Resources Engineering at the Technical University of Crete, as mandated by HAHE. This evaluation is being conducted by the External Evaluation and Accreditation Review Panel (EEAP). The external evaluation and accreditation process follows the guidelines set by the "Quality Standard for the Accreditation of Postgraduate Programmes," issued by HAHE in 2022, and the Principles and Guidelines for Quality Assurance in the European Higher Education Area.

The Quality Assurance Unit (MODIP) and the Unit of Internal Evaluation (OMEA) of the School of Mineral Resources Engineering at the Technical University of Crete were fully committed to the external evaluation and participated actively throughout the process. They were eager to learn from the EEAP evaluators and to incorporate recommendations for improvements within the programme e.g. on improving student participation rates in the student evaluation of instruction (as these numbers could be small based on the experience of the undergraduate programme).

The EEAP evaluators had access to many sources, including the OMEA and MODIP members of the School of Mineral Resources Engineering at the Technical University of Crete. They provided a wealth of information to the EEAP about its activities, including the Postgraduate Study Programme (PSP), the expected learning outcomes, the teaching and evaluation procedures, and the degree awarded. In addition, employers and social partners who are graduates of the School of Mineral Resources Engineering undergraduate programme were available for interview sessions and were very complimentary of their experiences.

II. Analysis

During the present External Evaluation and Accreditation review process, the teaching staff was fully aware of the significance of the external review process and the importance of follow-up recommendations.

Stakeholders of the academic unit were actively engaged in the process, as evidenced by their participation during the review process.

There is a procedure in place to distribute the findings of this external evaluation at all levels of the university evaluation structure, which will set the stage for implementing the recommendations of this External Review Panel. The participants were fully aware that the present evaluation would form the basis for future assessments of the PSP.

Because this is the first external review of the Postgraduate Programme (PSP), no prior recommendations exist for comparison purposes. The faculty participated actively in the external review process and were highly responsive and forthcoming during the programme discussions. They were open for discussing their programme's strengths and weaknesses and understood the review process's value and importance. Furthermore, they showed a positive attitude toward implementing possible suggestions for programme improvements, and they recognized the substantive review by the Panel and expressed their gratitude. The Panel believes that the statements of the Director of the PSP, the Department Head, and the Head of the MODIP constitute the strongest guarantee for the implementation of possible Panel suggestions.

III. Conclusions

The PSP is fully compliant with the Principle.

Panel Judgement

Principle 6: Initial Internal and External Evaluation and Monitoring of New Postgraduate Study Programmes	
Fully compliant	X
Substantially compliant	
Partially compliant	
Non-compliant	

Panel Recommendations

No recommendations on this principle, but the Panel encourages the school and the responsible of the PSP to consider carefully the recommendations stated in the other 5 principles.

PART C: CONCLUSIONS

I. Features of Good Practice

- Well-structured programme in an important field (sustainability, green transition)
- Unique programme in Greece
- Several new and well-selected and organized courses
- Dedicated staff, experienced in teaching and research
- Employers, previous graduates of the undergraduate programme, show keen interest to help in the further development of the new PSP

II. Areas of Weakness

- The role of external stakeholders is not entirely clear, how they have been consulted in the development of the PSP
- The procedures for admitting and further instructing students having a degree not close to the programme are not fully documented
- Relatively little flexibility and freedom in selecting courses which may pose also mobility restrictions
- The criteria for the selection of the specific courses and specializations could have been better presented

III. Recommendations for Follow-up Actions

- Design and execute a detailed plan for the advertisement and promotion of the new PSP in Greece and beyond which should include an easily accessible and attractive website in English and the organization of an information day with presence of external stakeholders
- Establish an external advisory board with selected employers-social partners and possibly external academics, which should help both in the promotion of the PSP and its future development including identification of new focus areas
- Consider in the future a variety of teaching approaches e.g. more courses in PBL format as well as more courses of actual relevance to the current programme e.g. Carbon Capture and Storage (CCS)
- Introduction of a series of seminars and workshops open to all teaching faculty with the purpose of assisting faculty with adoption of novel teaching technologies and principles
- Introduce courses and establish procedures for facilitating students without the appropriate background to follow the programme
- Increase the collaborations with other Universities, using more actively the opportunities provided by the Erasmus programme and actively advertise these to the students
- Establish from the beginning procedures that will ensure high student participation in the evaluation of their courses

- Adoption of formal quantifiable means and criteria that guide future curriculum updates which should reflect the mission statement of the school and be aligned with clearly defined long-term goals and educational objectives

IV. Summary & Overall Assessment

The Principles where full compliance has been achieved are: **2,3,4,5,6**

The Principles where substantial compliance has been achieved are: **1**

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

- 1. Prof. Georgios Kontogeorgis (Chair)**
- 2. Assoc. Prof. Emeritus Stavros Constantinou**
- 3. Prof. Emeritus Yani Skarlatos**
- 4. Mr Miltiadis Meliadis**