Accreditation Report

for the Postgraduate Study Programme of:

Electrical and Computer Engineering

Department: School of Electrical and Computer Engineering

Institution: Technical University of Crete

Date: 14 October 2023

Report of the Panel appointed by the HAHE to undertake the review of
the Postgraduate Study Programme of **Electrical and Computer Engineering** of the
Technical University of Crete for the purposes of granting accreditation.

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PART A: BACKGROUND AND CONTEXT OF THE REVIEW

I. The External Evaluation & Accreditation Panel

The Panel responsible for the Accreditation Review of the postgraduate study programme of **Electrical and Computer Engineering** of the **Technical University of Crete** comprised the following five (5) members, drawn from the HAHE Register, in accordance with Laws 4009/2011 & 4653/2020:

1. **Professor Emeritus Nicholas Kyriakopoulos**
   The George Washington University

2. **Professor Ioannis Violaris**
   City Unity College

3. **Professor Nikolas Xiros**
   University of New Orleans

4. **Dr. Dimitris Kabilafkas**
   OTE

5. **Mr. Prodromos Minaoglou**
   University of Western Macedonia

II. Review Procedure and Documentation

The Panel reviewed the material provided by HAHE (Hellenic Authority of Higher Education) in advance of the evaluation week. On Monday morning, 9/10/23, the Panel met remotely via Zoom with the following representatives of the TUC: Prof. Evangelos Grigoroudis, Dean of the PEM School, Prof. Georgios Karystinos, Dean of the Electrical and Computer Engineering School, Professor Ioannis Nikolos, Director of the PEM School, Professor Athanasios Liavas, Director of the MSc Programme of the ECE School, Professor Vassilios Kouikoglou, OMEA, of the PEM School, Professor Konstantinos Tsagarakis, OMEA of the PEM School, Professor Eftychios Koutroulis, OMEA, ECE School, Associate Professor Vassilios Samoladas, OMEA, ECE School. Present were the following members of MODIP: Associate Professor Fotios Kanellos, President of MODIP, Professor Michail Lagoudakis, Professor Doumpos, OMEA member of the PEM School, Ms. Andreani Lyroni, Staff.

Professor Liavas gave a presentation on the establishment, evolution and areas of specialization of the School. Since its establishment in 1993 the School has maintained its focus on research. The focus of the presentation was on the rationale for the development of the Post Graduate Engineering program, the needs it aims to satisfy with emphasis on research. The is a natural outgrowth of the existing undergraduate programs. A major attraction of the program is that the students do not pay any tuition. The majority of the graduate students enrolled in the program get paid from active research programs. One of the admission requirements is good knowledge of English. During the presentations, the panel received detailed briefings about the history of the program that places major emphasis on research. Subsequently, there were virtual visits to the facilities.

Documentation provided by the institution:

A1. Certification Proposal

A2. Quality Policy

A3. Quality Targeting

A4. Decision of the Senate of

A5. Study Guide

A6. Course Outlines

A7. List of Teachers

A8. Internal evaluation results from MODIP

A9. Evaluation by Students

A10. Grievance Management Mechanism Regulation

A11. Academic Advisor

A12. Internal Regulation of Operation

A13. Code of Research Ethics and Conduct

A14. Regulations

A15. Diploma Supplement

A16. Faculty Performance Summary Report

A17. Reports OPESP

A18. Progress Report based on External Evaluation proposals

A19. Other Documentation

III. Postgraduate Study Programme Profile

The Department of Electrical and Computer Engineering in its current form was established in 2016, after a rename from Electronic and Computer Engineering. In 2018, the Department re-established its graduate program. At the same time the Department established a postgraduate program of studies with the title "Post Graduate Research Program in Electrical and Computer Engineering" with two concentrations: a) Telecommunications, Signal Processing and Automatic Control, b) Computer Science and Engineering, with three specializations: Specialization A: Telecommunications, Signal Processing and Automatic Control; Specialization B: Computer Science and Engineering; Specialization C: Electronics, Energy and Quantum Systems.

The duration of matriculation for the program is three academic semesters culminating to the following Post Graduate Degrees: M.Sc. in Telecommunications, Signal Processing and Automatic Control, M.Sc. in Computer Science and Engineering, M.Sc. in Electronics, Energy and Quantum Systems.

The program is research-oriented; it comprises a combination of lectures and research activities including the successful completion of a research project with the report written in English. Enrolment in the program is free; students enrolled in the program do not pay tuition.

The program is financed from the budget of the University, the Ministry of Education, Charitable Foundations, funded research projects, the European Union, and other ad hoc sources.

PART B: COMPLIANCE WITH THE PRINCIPLES

PRINCIPLE 1: QUALITY ASSURANCE POLICY AND QUALITY GOAL SETTING FOR THE POSTGRADUATE STUDY PROGRAMMES OF THE INSTITUTION AND THE ACADEMIC UNIT

INSTITUTIONS SHOULD APPLY A QUALITY ASSURANCE POLICY AS PART OF THEIR STRATEGIC MANAGEMENT. THIS POLICY SHOULD EXPAND AND BE AIMED (WITH THE COLLABORATION OF EXTERNAL STAKEHOLDERS) AT THE POSTGRADUATE STUDY PROGRAMMES OF THE INSTITUTION AND THE ACADEMIC UNIT. THIS POLICY SHOULD BE PUBLISHED AND IMPLEMENTED BY ALL STAKEHOLDERS.

The quality assurance policy of the academic unit should be in line with the quality assurance policy of the Institution 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 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 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 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 the 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 review and audit of the quality assurance system of the PSP through the cooperation of the Internal Evaluation Group (IEG) with the Institution's Quality Assurance Unit (QAU)*

Documentation

☐ *Quality Assurance Policy of the PSP*
☐ *Quality goal setting of the PSP*

Study Programme Compliance

Findings

The Institution has established and published a Quality Assurance Policy that is appropriate for the program. Although it is published, it is not clear how it is communicated to the students.

Continuous improvement is promoted by identifying procedures for monitoring the performance of the program.

There are clearly defined strategic goals, quality targets and the links between them.

The Institution has set as strategic goals a) Improvement of the quality of education and promotion of excellence, b) Outreach, c) Cutting edge research in the global environment, d) cutting edge research related to the operation of the Department and e) Outreach.

Quantitative targets are set for each of the goals as well as actions for improvement are specified.

Analysis

The evidence presented indicated that the Institution has a fairly well-defined quality assurance policy and quality goals as well as a process for measuring compliance and identifying corrective actions.

As an example, an identified weakness is the small number of questionnaires completed and submitted by the students for the academic year 2021-2022 attributed to the use of printed questionnaires. As corrective action, the automation of the process has been recommended.

Conclusions

The Institution has in place a well-defined quality assurance policy and goal setting. Considering that the program in its current form has been in operation only since 2018 any conclusions drawn from the data presented are tentative at best.

Panel Judgement

Principle 1	
Fully compliant	✔
Substantially compliant	
Partially compliant	
Non-compliant	

Panel Recommendations

The course evaluation procedure should be automated and made user-friendly.

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PRINCIPLE 2: DESIGN AND APPROVAL OF POSTGRADUATE STUDYAMMES

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 POSTGRADUATE STUDY PROGRAMMES. THE OBJECTIVES, THE EXPECTED LEARNING OUTCOMES AND THE EMPLOYMENT PROSPECTS ARE SET OUT IN THE PRORAMME DESIGN. DURING THE IMPLEMENTATION OF THE 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, and specialisations 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. For each 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 of 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).

Documentation

☐ *Senate decision for the establishment of the PSP*

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- *PSP curriculum structure: courses, course categories, ECTS awarded, expected learning outcomes according to the EQF, internship, mobility opportunities*
- *Labour market data regarding the employment of graduates, international experience in a relevant scientific field*
- *PSP Student Guide*
- *Course and thesis outlines*
- *Teaching staff (name list including of areas of specialisation, its relation to the courses taught, employment relationship, and teaching assignment in hours as well as other teaching commitments in hours)*

Study Programme Compliance

Findings

The School has established a clearly articulated quality assurance policy with focus on high quality education, encouragement of outreach and high-quality research. They are measured with established Key Performance Indicators.

The structure, duration, number and categorization of the courses are in detail contained, inter alia, in file A1 provided by the Institution.

The School has provided a list of the faculty associated with the program. It includes areas of specialization, teaching loads, other teaching obligations. It also includes the individual websites which contain brief biographies, educational credentials and contact information.

The school has articulated a specific strategy for achieving the strategic goals that comprises continuing monitoring of the undergraduate program, strengthening the ties between education and research, systematic monitoring and standardization of the learning goals and outcomes, annual evaluation, electronic means to support the educational services, support of students through internships and encouragement to participate in the Erasmus program.

Analysis

It is difficult to provide a definitive assessment of the program due to the lack of sufficient data, given that is has been in operation for less than one year. Nevertheless, ignoring the references to the undergraduate program, the procedures described in the submitted documentation pertaining to the design and approval of the program meet the standards of performance.

Conclusions

The information submitted in support of the current request for accreditation frequently makes reference to the undergraduate program as is the case for School quality policy articulated in the website is https://www.ece.tuc.gr/en/school/quality-assurance/quality-policy.

Panel Judgement

Principle 2: Design and approval of postgraduate study programmes	
Fully compliant	✓
Substantially compliant	
Partially compliant	
Non-compliant	

Panel Recommendations

The English version of the website must at all times provide identical information with that of the Greek version. Therefore, the Panel recommends that this is verified and checked at regular intervals.

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PRINCIPLE 3: STUDENT-CENTRED LEARNING, TEACHING, AND ASSESSMENT

INSTITUTIONS SHOULD ENSURE THAT POSTGRADUATE STUDY PROGRAMMES PROVIDE THE NECESSARY CONDITIONS TO ENCOURAGE STUDENTS TO TAKE AN ACTIVE ROLE IN THE LEARNING PROCESS. THE ASSESSMENT METHODS SHOULD REFLECT THIS APPROACH.

Student-centred learning and teaching plays an important role in enhancing students' motivation, their self-evaluation, and their active participation in the learning process. The above entail continuous consideration of the programme's delivery and the assessment of the related outcomes.

The student-centred learning and teaching process

- *respects and attends to the diversity of students and their needs by adopting flexible learning paths*
- *considers and uses different modes of delivery, where appropriate*
- *flexibly uses a variety of pedagogical methods*
- *regularly evaluates and adjusts the modes of delivery and pedagogical methods aiming at improvement*
- *regularly evaluates the quality and effectiveness of teaching, as documented especially through student surveys*
- *strengthens 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 the students' complaints*
- *provides counselling and guidance for the preparation of the thesis*

In addition
- *The academic staff are familiar with the existing examination system and methods and are supported in developing their own skills in this field.*
- *The assessment criteria and methods are published in advance. The assessment allows students to demonstrate the extent to which the intended learning outcomes have been achieved. Students are given feedback, which, if necessary is linked to advice on the learning process.*
- *Student assessment is conducted by more than one examiner, where possible.*
- *Assessment is consistent, fairly applied to all students and conducted in accordance with the stated procedures.*
- *A formal procedure for student appeals is in place.*
- *The function of the academic advisor runs smoothly.*

Documentation
- ☐ *Sample of a fully completed questionnaire for the evaluation of the PSP by the students*
- ☐ *Regulations for dealing with students' complaints and appeals*
- ☐ *Regulation for the function of academic advisor*

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Reference to the teaching modes and assessment methods

Study Programme Compliance

Findings

The programme demonstrates a good standing implementing student-centred learning, teaching, and assessment. The Covid-19 pandemic caused shutdowns and required moving classes online; as a result an increased pace in implementing this principle has been achieved. Even without considering the pandemic's effect, the progress of the Programme is moving in the right direction in implementing the principle's objectives.

Analysis

Student centred learning puts students' individual needs and interests at the forefront of instructors' teaching practices. The term encompasses educational programs, students' learning experiences and academic-support strategies for ensuring students get the most out of their education. Student centred learning gives students more autonomy in their educational experience. These classrooms involve students in the planning, implementation, and assessment phases of an instructional unit. As the term implies, students are placed at the centre of their learning rather than on the outskirts, and are given freedom in voicing how, what and why they are learning certain topics.

Conclusions

The Principle requirements are essentially met; some improvements are suggested to be implemented and monitored, though.

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Panel Judgement

Principle 3: Student-centred learning, teaching, and assessment	
Fully compliant	
Substantially compliant	✔
Partially compliant	
Non-compliant	

Panel Recommendations

Here are some suggestions to further improve with respect to Principle 3; particularly faculty and instructional staff should encourage students to:

- Work in flexible, cooperative groupings to solve problems and analyse literature to demonstrate understanding of a task or concept through multiple perspectives.
- Consistently develop their own reasoning around concepts and ideas and articulate the processes and thinking they engaged in while grappling with a task or idea.
- Take initiative in classroom, present their work, and facilitate groups.
- Take ownership of their technical and management skills and learning to develop, test, and refine their thinking.
- Collaborate and interact with each other as well as with their instructors and exchange different ideas to build upon and apply new learning and approaches to their own understanding of a concept or idea that increase in complexity.

PRINCIPLE 4: 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).

> *All the issues from the beginning to the end of studies should be governed by the internal regulations of the academic units. Indicatively:*
>
> *the student 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*
>
> *All the above must be made public in the context of the Student Guide.*

Documentation
- [ ] *Internal regulation for the operation of the Postgraduate Study Programme*
- [ ] *Research Ethics Regulation*
- [ ] *Regulation of studies, internship, mobility, and student assignments*
- [ ] *Degree certificate template*

Study Programme Compliance

Findings
The program mainly accepts applications from students from related faculties. More specifically, graduates of departments such as ECE, Computer Engineering, Computer Science - Informatics, Electrical - Electronic Engineering, and Telecommunications Engineering are admitted to the postgraduate program. However, students with a first degree in Physics, Mathematics, and Military Schools may also be admitted to the postgraduate program.

Students who wish to attend the postgraduate study program have the opportunity to apply three times a year. A key feature of the program is that the student must, during his application for admission, suggest a supervising professor, a three-member advisory committee and a thesis topic. Some of the criteria for selecting students are the undergraduate degree grade which should be from 7 and above, the analytical score, at least 3 letters of recommendation, the topic and quality of the thesis and a good knowledge of the English language. Master's courses are divided into two main categories, co-taught (with the undergraduate program) and purely postgraduate.

Further encourage the graduate students to attend course lectures. For the evaluation of the students, the teacher instructor takes into account both the participation of the students in the class and their performance in the assignments or in the final exam. In co-taught courses, the assessment of postgraduate students is separated from that of undergraduates. For example, an assignment that is given to undergraduates at group level, at the graduate level the student is asked to individually complete it. In this way, the difficulty for the graduate student increases and the separation is made in relation to the undergraduates as far as evaluation is concerned.

The ECTS system is normally applied to the master's degree program. Each postgraduate course is carrying 7 ECTS credits; the elaboration of a research thesis is carrying 69 ECTS credits, while the elaboration of a non-compulsory publication research thesis is carrying 41 ECTS credits. To graduate from the postgraduate study program, each student is asked to choose one of the two options below.
• Option 1: Attending 3 postgraduate courses and preparing a thesis of research content (3*7) + 69 = 90 ECTS (chosen by the majority of students)
• Option 2: Attending 7 postgraduate courses and writing a thesis which does not necessarily lead to publications (7*7) + 41 = 90 ECTS (chosen by the minority of students)

The postgraduate program offers its interested parties a complete study guide. The study guide contains all the information needed by each candidate, as well as each student attending the program.

Analysis
Through an electronic platform, every interested student can submit all the necessary supporting documents to apply for registration in the postgraduate study program.
A large proportion of students who choose to continue to graduate school come from the same department, so by knowing the professors they can get in touch with the one they want to start the graduate enrolment process. In the event that a student wants to attend the master's degree but comes from a different department, he submits the papers without indicating a supervising professor. At the same time, the professors are informed and after interacting, one of them chooses the external student.

An important feature worth noting is that students from the first day of their admission to the program become members of research groups, which creates a student-centred activity.

The co-taught courses that are held, give students who graduated from the same department the opportunity to attend courses that they may not have chosen during their undergraduate studies. At the same time, students who come from other departments are given the opportunity to obtain knowledge that will help them integrate into the rest of the courses. Purely postgraduate courses are more advanced courses which postgraduate students can take.

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All postgraduate courses (co-taught and purely postgraduate) are divided into three categories. Each category aims at one of the three specializations of the master's degree, which are:
• Specialization A: Telecommunications, Signal Processing and Automatic Control
• Specialization B: Computer Science and Engineering
• Specialization C: Electronics, Energy and Quantum Systems
The postgraduate diploma will indicate a final title corresponding to the chosen specialization of the student.

In the study guide, detailed information on registration and declaration of courses is described. Also, the study guide lists both specializations and available ways of graduating. Finally, the necessary information is given for every student interested in attending the postgraduate program.

Conclusions

The possibility offered to students to be able to start the program three times a year provides the students much more flexibility than other similar master's programs. At the same time, both 3 specializations that students can choose from, as well as the 2 options for completion of studies, complete the student-centred study that the master's level aims at.

Panel Judgement

Principle 4: Student admission, progression, recognition of postgraduate studies and certification	
Fully compliant	✔
Substantially compliant	
Partially compliant	
Non-compliant	

Panel Recommendations

None.

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PRINCIPLE 5: TEACHING STAFF OF 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 of the teaching staff of the academic unit teaching at the PSP, the appropriate staff-student ratio, the appropriate staff categories, the appropriate subject areas, 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 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.*

Documentation
- ☐ *Procedures and criteria for teaching staff recruitment*
- ☐ *Employment regulations or contracts, and obligations of the teaching staff*
- ☐ *Policy for staff support and development*
- ☐ *Individual performance of the teaching staff in scientific-research and teaching work, based on internationally recognised systems of scientific evaluation (e.g. Google Scholar, Scopus, etc.)*
- ☐ *List of teaching staff including subject areas, employment relationship, Institution of origin, Department of origin*

Study Programme Compliance

Findings

The faculty and staff of the Programme is sufficient to cover the subjects of analogue and digital electronics, computing, informatics, and even system theory, cybernetics, signal analysis applied math and engineering physics. Course offerings are more limited in the areas of power systems, electric machinery, power electronics, electromagnetics (even for RF and telecom applications), antennas and propagation etc.

Analysis

Electrical engineering is typically divided into a wide range of different fields, including computer engineering, systems engineering, power engineering, telecommunications, radio-frequency engineering, signal processing, instrumentation, photovoltaic cells, electronics, and optics and photonics. Many of these disciplines overlap with other engineering branches, spanning a huge

number of specializations including hardware engineering, power electronics, electromagnetics and waves, microwave engineering, nanotechnology, electrochemistry, renewable energies, mechatronics/control, and electrical materials science.

Conclusions

The Principle requirements are met but some improvements are suggested to further compliance and enhance potential of the Programme.

Panel Judgement

Principle 5: Teaching staff of postgraduate study programmes	
Fully compliant	✔
Substantially compliant	
Partially compliant	
Non-compliant	

Panel Recommendations

Even though fully compliant, the Programme Faculty is encouraged to consider expanding further into areas of electrical engineering that may have originally been underrepresented given that the programme originally started as an electronics engineering programme.

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PRINICPLE 6: Learning Resources And Student Support

INSTITUTIONS SHOULD HAVE ADEQUATE FUNDING TO COVER THE TEACHING AND LEARNING NEEDS OF THE POSTGRADUATE STUDY PROGRAMME. THEY SHOULD –ON THE ONE HAND- PROVIDE SATISFACTORY INFRASTRUCTURE AND SERVICES FOR LEARING 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, 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 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. 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.

Documentation
- ☐ *Detailed description of the infrastructure and services made available by the Institution to the academic unit for the PSP, to support learning and academic activity (human resources, infrastructure, services, etc.) and the corresponding firm commitment of the Institution to financially cover these infrastructure-services from state or other resources*
- ☐ *Administrative support staff of the PSP (job descriptions, qualifications and responsibilities)*
- ☐ *Informative / promotional material given to students with reference to the available services*
- ☐ *Tuition utilisation plan (if applicable)*

Study Programme Compliance

Findings

Through an electronic platform students have the possibility to receive through the platform useful documents such as certificates, detailed grades of COC. Students also have the possibility to be informed through the platform about news and announcements. Finally advising of students, in addition to that of the supervising professor, is also done by the secretariat and starts from their admission, continues during the registration of the courses and is completed at the graduation stage.

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The laboratory infrastructure of the program consists of a set of laboratories that are used both for the master's courses and available to other interested students who want to participate. More specifically, the Automation Laboratory, the Electronics Laboratory, the Microprocessors and Hardware Laboratory and the Information and Networks Laboratory are some of the laboratories that exist in the master's degree.

The selection of the supervising professor is a basic condition for a student to enrol in the postgraduate study program. In essence, this is the appointment of an academic advisor to the student. The result of this practice is the personal and lasting relationship of each graduate student both with the Supervising Professor and with the faculty members of the School. Each supervising Professor is responsible for monitoring and guiding his/her students in matters such as course selection and conducting research.

Analysis

The material of each lecture and the overall material of the courses is published on the eClass platform. Postgraduate students with a university account can gain access to the courses they choose to attend. Also, through eClass, postgraduate students can receive announcements related to the courses they are attending as well as more general announcements related to the postgraduate program. Finally, in the event that a course requires assignments during its conduct, students can send their individual assignments to the teacher electronically through eClass.

During the meeting of the committee with the students who completed the study program and are now working, it was mentioned that in recent years both the infrastructure and the equipment of the postgraduate program have been developed to a satisfactory level. At the same time, during the periods when the master's degree was forced to operate remotely due to quarantine, the students reported that in the courses that contain laboratory equipment, the teaching method was the best possible from the master's point of view, so that the students were satisfied with the result. Also, all students reported that they were satisfied with the entire postgraduate program.

Conclusions

The paperless, entirely online operation at the level of secretarial assistance and at the level of teaching and monitoring, is a very positive feature of the master's degree. At the same time, the laboratory areas can offer great knowledge and experience to postgraduate students in their professional or academic career. The policy of no tuition fee supplements the student-friendly package offered by the master's degree. In this way, it is possible to enrol= in the program gifted students who may be facing financial difficulties.

Panel Judgement

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

Panel Recommendations

None.

PRINCIPLE 7: INFORMATION MANAGEMENT

INSTITUTIONS BEAR FULL RESPONISBILITY FOR COLLECTING, ANALYSING AND USING INFORMATION, AIMED AT THE EFFICIENT MANAGEMENT OF POSTGRADUATE STUDY PROGRAMMES AND RELATED ACTIVITIES, IN AN INTEGRATED, EFFECTIVE AND EASLILY ACCESSIBLE WAY.

Institutions are expected to establish and operate an information system for the management and monitoring of data concerning students, teaching staff, course structure and organisation, teaching and provision of services to students.

Reliable data is essential for accurate information and decision-making, as well as for identifying areas of smooth operation and areas for improvement. Effective procedures for collecting and analysing information on postgraduate study programmes and other activities feed data into the internal system of quality assurance.

The information collected depends, to some extent, on the type and mission of the Institution. The following are of interest:

key performance indicators
student population profile
student progression, success, and drop-out rates
student satisfaction with their programmes
availability of learning resources and student support

A number of methods may be used to collect information. It is important that students and staff are involved in providing and analysing information and planning follow-up activities.

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

Study Programme Compliance

Findings

In the context of the implementation of the Program's quality policy, the School of ECE collects and analyses various pieces of information, with the aim of monitoring the operation of the Program, as well as the continuous improvement of the services provided, applying various procedures, and using respective tools for collecting, displaying and analysing the information.

• Students Monitoring

The basic system for the collection of information and the monitoring of the course of the study of postgraduate students is the student registry, operated by the Secretariat of the School and used by all Schools of the University.

Students and teachers have distinct access to the student register via the system of the electronic secretariat (https://students.tuc.gr, https://professors.tuc.gr).

The student register collects data yearly on incoming students, total enrolled students and graduating ones. It also collects and stores data on students' elective courses, course grades for each semester, with the purpose of formulating recommendations to the Assembly during its periodic reforms of the study program. Students have access, with their personal credentials, to their grades and course registrations. Teachers have access to all the information that concern the courses they teach, the enrolled students and their grades of these students in their courses.

In addition, these elements are used for the organization of academic work, such as the allocation of rooms for teaching and examinations.

• Performance reports of PMS graduates:

Performance reports are submitted by the Supervisor at the Assembly at the meeting in which the Postgrad degree is awarded and after the successful presentation and examination of the research thesis by the appointed 3-member examination committee. The references contain a brief description of its graduate's research project and a detailed list of publications. Therefore, the School has an accurate picture about his research contributions and publications, and make them available in the Institutional Repository of the Technical University of Crete via https://www.ece.tuc.gr/en/research/student-theses

• Communication with PMS graduates:

The School maintains an open channel of communication with graduates of PMS who work in Greece and abroad, by means of a series of research seminars and summer schools, where distinguished graduates deliver speeches, transferring their experience to the students of PMS.

• Annual Activity Reports of Faculty Members:

Reports are prepared by faculty members, contain detailed information about teaching, research (publications, research projects), the student supervision and administration, and are made public on the School's website (https://www.ece.tuc.gr/en/school/quality-assurance/annual-activity-reports).

• Evaluation of the educational process by student questionnaires:

Data for the evaluations of courses by the students are collected. The questions cover all aspects of the teaching of each course (teachers, lectures, essay, workshop). Students are given the

opportunity to freely submit comments and Suggestions, as the questionnaires are anonymous. The questionnaires are forwarded to the School Secretariat, they are recorded electronically and separately for each course the scores in the questions (both in written and electronic form). Average scores in questions are extracted individually for each course and overall for all courses.

Based on the information gathered, the Dean and the Assembly proceed to corrective interventions to improve the teaching work and the services offered, such as updating course material, introducing new courses, deleting courses which have not been taught for a long time and are not expected to be taught in the foreseeable future, improvements in teaching methods, etc. Additionally, it may have an impact on academic staff evolution.

• Additional Questionnaires

It should be noted that the School expands the data collection mechanism of PMS students and graduates by issuing questionnaires for:

- newly admitted PMS students, with the aim of better understanding "why the students chose to apply to the School's PMS?" and their expectations from PMS,

- recently graduated from PMS, with the aim of the overall assessment of the level of studies in the PMS.

• Quality System Data

At the same time, the Secretariat of the School, in collaboration with OM.E.A. and the Program's Committee, ensure that the data of the student register to feed the census reports of the Ministry of Education and the Integrated National Quality Information System (ICESP) of the ETH.A.A.E. Quantitative performance indicators are extracted to monitor the performance of the quality policy and the achievement of the School's goals, on the basis of the established KPI's.

A MODIP's subsystem was set up 3 years ago and is running for the coordinated, homogenized and for about three years guided writing of course outlines [https://perigrammata.tuc.gr/]. A 173-page document, in Greek, (automatically generated by that system) containing the Course Outlines of the PMS ECE has been made available to our Committee.

Analysis

The course process is monitored by a satisfactory information system and the quality tools of the Internal Quality Assurance System and the Hellenic Authority for Higher Education. Additional effort has been noted to expand the elementary capabilities of the systems, by collecting and utilizing additional data, namely:

• Activity reports of research activities that are a useful tool for School strategy, albeit that many important factors are outside the School's control (e.g., the announcement of Nationals competitive research programs is not done at regular intervals).

• Additional Questionnaires, to freshmen and graduates that provide an opportunity for the School and the Management Bodies to understand the competitive strengths and weaknesses of the program, and to evaluate the performance of the educational process.

• The course outlines, in a central database, in systematic and digital form. The digital form in also allows their statistical processing and export conclusions for various (sub)sets of the registered courses

All these elementary and additional data are analysed for the assessment of possible drawbacks in the program; however it could always be further analysed for the detection of cross-reference factors.

Conclusions

The program is supported by a satisfactory information management system that is further enhanced with additional data collection and analysis capabilities.

Low participation in student questionnaires.

Panel Judgement

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

Panel Recommendations

● Increase participation in students' questionnaires.
● Consider upgrading the information system with further analysis capabilities

PRINCIPLE 8: PUBLIC INFORMATION CONCERNING THE POSTGRADUATE STUDY PROGRAMMES

INSTITUTIONS SHOULD PUBLISH INFORMATION ABOUT THEIR TEACHING AND ACADEMIC ACTIVITIES RELATED TO THE POSTGRADUATE STUDY PROGRAMMES IN A DIRECT AND READILY ACCESSIBLE WAY. THE RELEVANT INFORMATION SHOULD BE UP-TO-DATE, OBJECTIVE AND CLEAR.

> *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 PSP they offer, the intended learning outcomes, the degrees awarded, the teaching, learning and assessment procedures applied, the pass rates, and the learning opportunities available to their students. Information is also provided on the employment perspectives of PSP graduates.*

Documentation
- ☐ *Dedicated segment on the website of the department for the promotion of the PSP*
- ☐ *Bilingual version of the PSP website with complete, clear and objective information*
- ☐ *Provision for website maintenance and updating*

Study Programme Compliance

Findings

• PMS website content

The program utilizes its website, hosted on the School's website, at

- Greek: https://www.ece.tuc.gr/el/spoydes/metaptychiakes-spoydes/metaptychiako-diploma-eidikeysis-ilektrologoy-michanikoy-kai-michanikoy-ypologiston-1

- English: https://www.ece.tuc.gr/en/studies/graduate-studies/msc-in-electrical-and-computer-engineering-1

addressed to its academic community and all potential candidates for postgraduate students of PMS.

The content is listed in Greek and in the English Language (in the great majority of topics) and, through appropriate navigation, anyone interested can be informed about the following:

- Scope and Goals of the Program: the purpose and objective of the PMS are briefly mentioned, as well as the general scientific fields covered by the PMS.

- Specializations: the three specializations of the PMS are mentioned, briefly Telecommunications, Computer Science and Electronics,

- Quality Assurance: The Quality Policy and the Quality Targeting of the PMS are outlined.

- Program Structure and Graduation Requirements: the two graduation options (3 or 7 courses combined with advanced or short thesis respectively), the number and categories of courses in which students are required to succeed, and the requirements regarding journal and conference publications are clearly stated.

- Admission Procedure: the admission process is accurately and clearly described supported

- Courses Catalogue: all PMS courses and the specialization to which they pertain are outlined in detail including the curriculum for each of them. Also, there is information about the courses that are taught in the specific academic year.

- Teaching Research Staff (Faculty): links to the websites of all Faculty members of the School are listed. In this way, candidates can be informed about the biographical details of the School's faculty members, their educational and research interests, have access to publications, etc.

- Program's Committee: the coordination committee of the PMS, that supervises its operation of the PMS and submits proposals to the Dean's Office and the Faculty Assembly.

• Maintenance of the PMS website

By decision of the Assembly, the Extroversion (Outreach / 'εξωστρέφεια')) Committee of the ECE School has been established, which has undertaken the updating and maintenance of the websites of the PMS and the School, as well as the presence of the School on social networking platforms (Facebook, YouTube

• Promotion of PMS

The Research PMS ECE is also publicized through the following channels:

- Guide to Master's and Doctoral Studies Programs of TUC https://www.tuc.gr/el/to-polytechneio/gnorimia-me-to-polytechneio-kritis

With a well-designed guide(odigos-pms-kai-pds-2023) for postgraduate studies in Greek

- Central Website of the Organization Study in Greece of the Ministry of Education https://masters.minedu.gov.gr/Masters/viewMaster

With short but comprehensive information about the Program

The Program and the department are not listed in the Hellenic Academic Research Data Management Initiative. (https://hardmin.heal-link.gr).

Analysis

The School site displays the necessary info for its structure and operations. The English support is almost full, (with the only concern about synchronization inconveniences during navigation), that is especially crucial for a program that hopes to swift into "internationalization".

Detailed information on the taught courses is provided in the Study Guide of the PMS, that should be not publicly and easily available. The candidates can obtain a good image for the teaching and research potential of the Program.

Some issues about the studies that might be considered complicated (options, specializations, admission procedure) are well explained and supported by the site.

The Facebook and YouTube pages of the School contain interesting material that, in part, should also have a place in its site. The main scope for serving as a newsletter, and for on-demand presentations is justified.

The program could further enhance the official presence of students in scientific and professional networks such as the institution has done with the IEEE, with which TUC has established a branch for more than a decade (see: https://ieeesb.tuc.gr/). This presence should be further promoted (i.e. by displaying a link in the web page)

Conclusions

The programme publishes information about its structure and its teaching and academic activities at a satisfactory degree.

Panel Judgement

Principle 8: Public information concerning the postgraduate study programmes	
Fully compliant	✓
Substantially compliant	
Partially compliant	
Non-compliant	

Panel Recommendations

Full use of English, especially the material which is relevant to potential foreign candidates and international collaborations.

PRINCIPLE 9: ON-GOING MONITORING AND PERIODIC INTERNAL EVALUATION OF POSTGRADUATE STUDY PROGRAMMES

INSTITUTIONS AND ACADEMIC UNITS SHOULD HAVE IN PLACE AN INTERNAL QUALITY ASSURANCE SYSTEM FOR THE AUDIT AND ANNUAL INTERNAL REVIEW OF THEIR POSTGRADUATE STUDY PROGRAMMES, SO AS TO ACHIEVE THE OBJECTIVES SET FOR THEM, THROUGH MONITORING AND POSSIBLE AMENDMENTS, WITH A VIEW TO CONTINUOUS IMPROVEMENT. ANY ACTIONS TAKEN IN THE ABOVE CONTEXT SHOULD BE COMMUNICATED TO ALL PARTIES CONCERNED.

> *The regular monitoring, review, and revision of postgraduate 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 PSP is up to date*
> *the changing needs of society*
> *the students' workload, progression and completion of the postgraduate studies*
> *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 PSP in question*
> *Postgraduate study 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.*

Documentation
- *Procedure for the re-evaluation, redefinition and updating of the PSP curriculum*
- *Procedure for mitigating weaknesses and upgrading the structure of the PSP and the learning process*
- *Feedback processes concerning the strategy and quality goal setting of the PSP and relevant decision-making processes (students, external stakeholders)*
- *Results of the annual internal evaluation of the PSP by the Quality Assurance Unit (QAU), and the relevant minutes*

Study Programme Compliance

Findings

The Panel has determined that the university has in place the legally necessary bodies (QAU/MODIP) that are monitoring on an on-going basis the quality of the postgraduate programme.

These quality assurance processes are internally taking place through the necessary personnel that gathers information from the department offering the programme of study.

This is done through a self-assessment procedure and takes place annually as necessitated by the IQAS

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The outcomes of the assessment are properly recorded, yet they need to be more regularly disseminated to the academic and administrative personnel.

As needed, corrective measures are taken through action plans that are drafted following meetings of the Deans, Department Heads and teaching staff.

Analysis

Key performance indicators (KPIs) are set to evaluate the performance at all levels, for instance research achieved, teaching competences, student support, student orientation, guidance to students for further studies and/or employment opportunities.

Advisors are appointed and an open - door policy is in place.

Given the relatively small number of students, lecturers are in constant contact with their students and thus are able to address any issues arising efficiently and effectively.

Conclusions

The Panel believes that this Principle is currently substantially compliant and that in the next few years it can become fully compliant.

Panel Judgement

Principle 9: On-going monitoring and periodic internal evaluation of postgraduate study programmes	
Fully compliant	
Substantially compliant	✓
Partially compliant	
Non-compliant	

Panel Recommendations

The Panel believes that this Principle is currently substantially compliant and that in the next few

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years it can become fully compliant as all involved are determined to achieve further excellence.

PRINCIPLE 10: REGULAR **E**XTERNAL **E**VALUATION **O**F **P**OSTGRADUATE **S**TUDY **P**ROGRAMMES

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

HAHE is responsible for administrating the PSP accreditation process which is realised as an external evaluation procedure, and implemented by panels of independent experts. HAHE grants accreditation of programmes, based on the Reports delivered by the panels of external experts, with a specific term of validity, following to which, revision is required. The quality accreditation of the PSP acts as a means for the determination of the degree of compliance of the programme to 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.

Documentation

☐ *Progress report of the PSP in question, on the results from the utilisation of possible recommendations included in the External Evaluation Report of the Institution, and in the IQAS Accreditation Report, with relation to the postgraduate study programmes*

Study Programme Compliance

Findings

The teaching staff is fully aware of the importance of regular external evaluations; most of them having studied abroad, are aware of the purpose of this procedure and the benefits it brings about in developing an ever-improving programme of study.

The stakeholders related to the programme are also aware of the contribution of this process in improving the programme's quality in a very competitive environment.

Follow-up actions are in place and do take place soon after an external evaluation is communicated to the department.

Analysis

The outcomes of the external evaluation are discussed at the faculty committee level and all suggestions of external evaluators are seriously taken into consideration. Alas some of the suggestions cannot be implemented due to budget constraints.

The PSP under review has not been evaluated by any other Agency, besides the evaluating committees that HAHE is appointing.

Yet, the programme's faculty as well as their research activities are constantly evaluated at European and International conferences at which they are often highly praised.

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Conclusions

Given the above the Panel considers that this Principle is fully compliant.

Panel Judgement

Principle 10: Regular external evaluation of postgraduate study programmes	
Fully compliant	✔
Substantially compliant	
Partially compliant	
Non-compliant	

Panel Recommendations

Given the above the Panel considers that this Principle is fully compliant.

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PART C: CONCLUSIONS

I. Features of Good Practice

- The programme has achieved local and international recognition.
- The faculty is adequately involved in research activity.
- The availability to graduate with either published research or a short thesis, is a good practice.
- Assignment of supervisors/advisors at the time of their admission
- Possibility of admission 3 times in each academic year.

II. Areas of Weakness

- An Advisory Board was established in 2022. A formal mechanism needs to be established for the interaction between the School and the Board.
- The poor participation in Erasmus activities.
- The absence of an active Alumni Association and low awareness of most students of alumni activities organized by the university.

III. Recommendations for Follow-up Actions

It is suggested that the improvements to the programme could be made in the following areas (not necessarily in order of priority):

- Establish an Advisory Board/Stakeholders' Panel. (even an informal one)
- Promote internships, even of short duration.
- Fund students' participation in conferences.
- Increase participation in students' questionnaires; The course evaluation procedure should be automated and made user-friendly.
- Full use of English, especially the material which is relevant to potential foreign candidates and international collaborations.
- Implement actions as suggested or other to enhance student-centred learning, teaching, and
- Assessment.
- Consider expanding further into areas of electrical engineering that may have originally been underrepresented given that the programme originally started as an electronics engineering programme.

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IV. Summary & Overall Assessment

The Principles where full compliance has been achieved are:

1, 2, 4, 5, 6, 7, 8, and 10.

The Principles where substantial compliance has been achieved are:

3 and 9.

The Principles where partial compliance has been achieved are:

None.

The Principles where failure of compliance was identified are:

None.

Overall Judgement	
Fully compliant	✔
Substantially compliant	
Partially compliant	
Non-compliant	

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The members of the External Evaluation & Accreditation Panel

Name and Surname   **Signature**

1. **Professor Emeritus Nicholas Kyriakopoulos**
   The George Washington University

2. **Professor Ioannis Violaris**
   City Unity College

3. **Professor Nikolas Xiros**
   University of New Orleans

4. **Dr. Dimitris Kabilafkas**
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5. **Mr. Prodromos Minaoglou**
   University of Western Macedonia

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