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Accreditation Report
for the Postgraduate Study Programme of:
Quantum Computing and Quantum Technologies

Department: Electrical and Computer Engineering

Institution: Democritus University of Thrace

Date: July 10, 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 Postgraduate Study Programme **of Quantum Computing and
Quantum Technologies** of the **Democritus University of Thrace** 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 Quantum Computing and Quantum Technologies of the Democritus University of Thrace comprised the following four (4) members, drawn from the HAHE Register, in accordance with Laws 4009/2011 & 4653/2020:

1. Dr. Yani Skarlatos (Chair)
Boğaziçi University, Istanbul, Turkey
2. Dr. George A. Papadopoulos
University of Cyprus, Nicosia, Cyprus
3. Dr. Vasilis Friderikos
King's College, London, U.K.
4. Mr. Christos Bouas
Aristotle University of Thessaloniki, Greece

II. Review Procedure and Documentation

The External Evaluation and Accreditation Panel (EEAP) attended a series of online meetings with the leadership of the Quality Assurance Unit (MODIP), the Internal Evaluation Committee (OMEA) for the Postgraduate Study Programme (PSP) of Quantum Computing and Quantum Technologies of the Democritus University of Thrace (DUTH).

The meetings took place on Tuesday, June 25th and Wednesday, June 26, 2024, as a part of the remote External Evaluation Panel Review for the academic accreditation of the said PSP.

The EEAP was warmly welcomed by the Programme Director, Professor Ioannis Karafyllidis; the head of the Department of Electrical and Computer Engineering, Prof. Georgios Sirakoulis; MODIP President, Prof. Marirena Grigoriou, together with staff members Ms Styliani Gkavaki and Ms Sofia Marsidou. Dr. Georgios Mitrikas from the Steering Committee and Prof. Kyriakos Zoiros from OMEA were also present. At the end of the first day, the EEAP requested several supporting documents and information, which MODIP made available the next day. The EEAP expresses its heartfelt thanks to the MODIP representatives for the speedy response to its request.

On the second day (June 26), the EEAP met with representatives from the PSP. This included faculty members, present and past students, as well as employers and social partners of the PSP. The latter consisted of Dr. Georgios Nounesis, Director of the National Centre for Scientific Research Democritus, Dr. Aggelos Tsikas (Quantum Neural Technologies), Dr. Alexis Askitopoulos (QUBITECH), Dr. Vassilios Katopodis (Kyndryl), and Dr. Christos Papalitsos (Pfizer).

As part of the series of meetings during the second day, the EEAP met with student representatives from the PSP. The discussion was comprehensive, covering most aspects of learning and teaching, student experience, and broader academic life within and outside the department. The students openly expressed their views regarding their studies, challenges, and overall student experience.

Further to meeting with current students, the EEAP had the opportunity to meet a graduate (alumnus). The discussion with the alumnus focused mainly on his opportunities for further studies. As part of the following stakeholder group discussions, the potential employers and social partners discussed their professional activities and interactions with the PSP and the academic team.

At the end of the meeting cycle, the EEAP met with the programme director and the Steering Committee/OMEA members and offered a summary of the preliminary findings.

The report hereafter presents the collective findings of the EEAP based on the two-day meetings, shared documentation provided by the PSP, the private discussions between sessions, and email communications with MODIP.

III. Postgraduate Study Programme Profile

The PSP in Quantum Computing and Quantum Technologies was established in 2021, by Decision 21/81 of the Senate of Democritus University of Thrace published in the Official Gazette of the Hellenic Republic dated Dec. 31, 2022; Second Issue; Folio 7073. It is being operated by the Department of Electrical and Computer Engineering in cooperation with the National Centre for Scientific Research Democritus. The programme aims to train students to be employed and conduct research in the fields of Quantum Computing and Quantum Technologies. It offers a three-semester MSc degree (six in case of part-time attendance) that corresponds to 90 ECTS (European Credit Transfer System) credits. Sixty of those ECTS credits come from courses (4 obligatory and 4 elective courses of 9 and 6 Credit Units each respectively), and the remaining 30 are from completing a thesis, which takes place during the 3rd semester. The program operates fully online, the medium of instruction including the thesis is English, and candidates for the programme must demonstrate adequate language proficiency in addition to the prescribed entry-level qualification criteria.

Tuition received from students is used to cover operational expenses.

The maximum number of students to be admitted to the PSP is set at 50. The first class were admitted in 2022-23; while in 2023-24, there were about 30 students enrolled in the programme, supported by a faculty of eight local and three visiting academic staff members, as well as four researchers from Democritus Research Center. Two students had graduated in that year.

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

I. Findings

A Quality Assurance Policy has been established by the PSP of Quantum Computing and Quantum Technologies. (Doc. A2) The organisation and structure of the study programme align with the teaching objectives of the PSP. The learning objectives, outcomes, and qualifications adhere to the European and National Qualifications Framework for Higher Education at level 7. The program promotes high quality and effective teaching for students. The curriculum is comprehensive, and courses are taught by experienced staff in the respective subjects.

The PSP established its quality assurance policy and published it on the DUTH website. The relevant document, in compliance with the quality policy of the DUTH, affirms the academic unit's commitment to establish, maintain, monitor, and improve quality assurance and clearly defines its implementation through setting goals for continuous improvement with monitoring and evaluation on an annual basis and collecting and analyzing data relevant to quality assurance.

The PSP charges tuition, which is used to cover operating expenses. The Key Performance Indicator (KPI) related to graduation/retention rates in the policy goal setting (στοχοθεσία) is missing.

II. Analysis

The information outlined in the relevant documents and provided by administrators and faculty members indicates that the academic unit is committed to implementing the quality assurance policy. The PSP's goals, as they appear in the quality assurance policy and the policy goal setting, indicate an emphasis on research, teaching, and student-related considerations.

The MODIP monitors and enforces quality assurance. The PSP faculty maintains a positive attitude towards quality assurance evaluation, and interviews with students indicate a high degree of satisfaction with the quality and relevance of the education offered by the academic unit.

Faculty members strive to improve the educational process through promotion of cordial relations with students, encouraging them to participate in research projects and improved evaluation methods.

Current students and a recent graduate are pleased with the program's curriculum and faculty.

A few Key Performance Indicators (KPI) such as the one related to graduation/retention rates in the policy goal setting (στοχοθεσία) is missing.

A service for hearing complaints from students is being offered by the PSP. A system of Academic Advisors has been instituted. However, advising is performed in practice by the entire faculty for each student in an *ad hoc* fashion.

Measurable goals related to teaching methods, student satisfaction, and learning outcomes have been codified. The degree of attainment of the goals should be audited. The last internal auditing took place in January 2023.

III. Conclusions

The PSP has established a quality assurance policy that is monitored and evaluated on a systematic basis. The process provides specific directions for improvement, which is considered necessary for further actions. Several KPIs are included in the policy goal setting, whereas the KPI related to graduation/retention was not found.

Panel Judgement

| Principle 1: Quality assurance policy and quality goal setting for the postgraduate study programmes of the institution and the academic unit | |
|--|----------|
| Fully compliant | X |
| Substantially compliant | |
| Partially compliant | |
| Non-compliant | |

Panel Recommendations

1. The PSP must ensure that student feedback on courses and the program is as thorough as possible by encouraging participation and stressing its importance.
2. The PSP must include KPIs to measure graduation/retention rates.
3. Internal auditing should be performed on an annual basis.

PRINCIPLE 2: DESIGN AND APPROVAL OF 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 POSTGRADUATE STUDY PROGRAMMES. THE OBJECTIVES, THE EXPECTED LEARNING OUTCOMES AND THE EMPLOYMENT PROSPECTS ARE SET OUT IN THE PROGRAMME 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*
- *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

I. Findings

The PSP of Quantum Computing and Quantum Technologies is designed to provide training in modern technologies, conduct research, and advance basic and applied knowledge in the relevant field.

The curriculum, course syllabi, and contents have been developed according to the institution's relevant policies and agree with the ECTS guidelines. All of the above are included in the Study Guide and in the Course Outlines.

The programme aims to continually enhance educational and research activities, and uphold high quality services in accordance with the HAHE guidelines.

There is evidence that students actively participate in curriculum changes and improvements.

II. Analysis

The PSP of Quantum Computing and Quantum Technologies resembles comparable programmes in the EU and the U.S. Its design is based on the needs of the national and international markets in the relevant fields and conforms to the prescriptions of Level 7 of the European and National Qualifications Framework for Higher Education. The programme of study, which requires 90 ECTS for the degree (30 ECTS per semester), allows students to start working on their Thesis in the final third semester.

The PSP programme of studies consists of four compulsory and four elective courses aimed at training students for research. A research based thesis on a specialised subject concludes the program.

The programme has two graduates as yet, one of whom is completing his military service, while the other has been accepted to a Ph.D. programme in a related field.

III. Conclusions

The programme complies with accepted standards and practices at other institutions in this area of study. The thematic areas offered by the programme are adequate to prepare the students for the market. The stakeholders were very enthusiastic about the programme, and offered to participate in a feedback mechanism for its continuous improvement.

Panel Judgement

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

Panel Recommendations

1. The PSP should consider establishing a feedback mechanism involving students, graduates, and stakeholders to continuously improve the material taught in the PSP.

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*
- *Reference to the teaching modes and assessment methods*

Study Programme Compliance

I. Findings

The PSP is offered entirely via live distance learning. Invited lectures offer further opportunities for learning.

Students sharpen their programming as well as their presentation skills through the assignments of certain modules. They can develop their research skills and follow their ideas by working on their Master's thesis.

Student suggestions about the courses are taken seriously with the teaching staff implementing suggestions they deem useful. Furthermore, students can suggest a thesis topic to the teaching staff, other than the professor-suggested ones.

Assessment criteria and methods are published in advance; thus, students know what is required of them to pass a course.

At the end of the semester, students can fill out satisfaction surveys regarding the courses and the teaching, which are then shared with the teaching staff so changes can be made where needed.

Moreover, there is a clear formal appeals procedure, so students can bring to light grievances they may have. Additionally, the PSP applies the function of the academic advisor, a member of the faculty responsible for guiding students and offering necessary support.

II. Analysis

The PSP is accommodating to students all over the world, using live distance learning . The teaching and administrative staff work out lecture hours according to the time zones the students are in. However, since lectures are only offered live, if a student misses a lecture, they can only study the lecture notes for that lecture, akin to lectures that require physical presence. This does not take full advantage of distance learning. Additionally, many students have full-time jobs. This makes it difficult for them to attend lectures. On another note, invited lectures, per tradition of the PSP, are another way students learn, exposing them to more advanced subjects.

Students are encouraged to develop individual skills and can sharpen their technical, research, and presentation skills through coursework as well as working on their thesis.

Findings suggest that students are seen as active partners in the learning process. The student satisfaction surveys are evidently taken into consideration by the teaching staff, with a specific example being a second semester course was moved to the first semester after students suggested it would help them better understand the material. Students can also recommend topics for future invited lectures. Additionally, students can choose to work on a thesis topic other than one of the topics suggested by the faculty.

Furthermore, the assessment criteria for courses are clear and published early. This enables students to plan their studies accordingly.

Student satisfaction surveys are conducted at the end of each semester and taken into account. Satisfaction rates are high, although students expressed their concerns about the

teaching experience of researchers from the National Centre for Scientific Research “Demokritos”. Also, because the PSP is offered in the English language, which the e-forms survey system of the university does not yet support, surveys are currently PDF forms which students fill and then send to a specific student who acts as a representative. This student is responsible for handing in the survey forms they gathered to MODIP. During our meeting, MODIP mentioned that support for the English language will be available soon.

There is a formal procedure for student appeals in place. Students can place their complaint electronically and the Secretariat of the PSP informs the Director of the PSP who attempts to find a solution to the complaint. If no solution is found, the complaint is forwarded to increasingly wider assemblies of the PSP and the university until a solution is found. The process is clear and ensures that complaints will be resolved. The PSP also applies the function of the academic advisor, who is tasked with aiding students along the duration of their studies.

Lastly, The PSP is delivered in a student-centred learning environment that promotes mutual respect. The students mentioned their appreciation for the efforts of the teaching staff and spoke highly of them, while the teaching staff seemed pleased with the accomplishments of the students thus far.

III. Conclusions

All things considered, the PSP promotes a very student-centred approach to learning. Students participate actively in the learning process, furthering their skills in a supportive environment. Overall, the Panel’s judgement is that the PSP fully complies with Principle 3.

Panel Judgement

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

Panel Recommendations

1. The student satisfaction surveys system should be resolved, allowing students to rate courses through the e-forms platform of the university.
2. It is important that the teaching staff belonging to the National Centre for Scientific Research “Demokritos” are clearer and more precise with their teaching.

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

I. Findings

Student admission for the international MSc program in quantum computing and quantum technologies is restricted to a ceiling of 50 students per year. Currently the number of students enrolled is less than 20 and the overall consensus is that this number could potentially increase in the near future. Eligible for admission are graduates from different fields of studies of Engineering schools and faculties of applied sciences such as Physics and Mathematics (or even Biology). It is clearly stated in the available documentation that there no quantum mechanics background is required for applying to this PSP program. This PSP started its function formally in 2021 but the first cohort of students started their studies during the academic year 2022/23. Candidates' number is restricted by a well defined selection procedure. The selection of the applicants is based on their previous academic qualifications, followed by an interview with a defined academic committee. The overall procedures are defined in a clear manner and explained at the portal. A Word file for submitting an application is provided and the timeline of the decisions are described on the website of the PSP program. Applicants are also encouraged to inform the director of the programme about their application.

In terms of other types of regulations for the PSP program it has to be noted that the tuition fees are 4500 Euros.

There are no offered internships and there is no clear future path towards this aim. On the other hand, it is possible that students undertake research as part of their Thesis in

conjunction with a company.

Student mobility (such as for example the Erasmus+ programme) is only briefly mentioned and is not one of the central themes that the program tries to promote.

Information regarding ethics and overall regulations is accessible via the website but there are different locations and documents about these aspects hence finding specific information is troublesome and not convenient.

The specific PSP is a rather demanding one and is a challenge for the students that also have a full-time job due to the fact that it requires full-time effort (in other words all students are registered as full time students irrespectively if they have a full time job or not). In terms of policy and regulations it is encouraged that full time working students enrol as part-time students; this is pedagogically correct (rather than creating a salient part time study for students that cannot cope with the learning load). The teaching takes place only online and it is fully in English (in addition to the Thesis which is also written in English). Furthermore, it has not been clear from the regulations if attendance to the lectures/tutorials participation is mandatory. The duration of the PSP is one and a half year (three semesters consisting of 90 ECTS in total). Students are evaluated continuously in the majority of the modules using coursework assignments. Furthermore, during the last semester of the program students are also obliged to write a dissertation, which in most cases is in line with state of art research in the scope area.

Only two students have completed the course so far and according to the discussions there have been no problems regarding issuing the degree certificate from the University.

An issue of concern is the large number of non-mandatory modules that might lead to modules having a very small number of students. On the other hand, it has to be mentioned that offered modules provide a well-rounded view on their specific scope area and could be deemed as challenging. All PSP module leaders support the students in a proactive manner. However, student experience seems to vary. Having said that, all current enrolled students emphasised that the PSP is rewarding, greatly helping to their development.

II. Analysis

Undoubtedly, the international MSc program in quantum computing and quantum technologies offered by the Department of Electrical and Computer Engineering at the University of Thrace in conjunction with Democritus is a unique offering in the postgraduate landscape of Greek higher education. In that respect, the PSP fulfils an important need for education, training and research in the emerging area of quantum computing which is expected to be relevant for many industries and as such requires expertise at this early stage. The Panel believes that the acquired knowledge is beneficial to the students to propel them in this emerging ecosystem. Having said that, there are some areas of concern. The completion ratio of studies of this PSP is not in generally considered satisfactory from the panel. Very few students manage to graduate on time and this issue needs to be closely monitored. More concerning is the fact that this does not seem to be considered as a major issue by the academics. The Panel understands that a significant number of students are full time working students and/or mature students. To this end, the Erasmus+ program could not be appealing to them. However, this might not be the case as the number of students in

the program increases; hence some more active information about the Erasmus and its benefits should be provided to the students. This is important since these students are not actively part of the academic community of the university per se since they participate only online (therefore information stemming from the program seems to be the main channel for them to acquire knowledge for such issues).

The tuition fees for the PSP program are set at 4500 Euros, which is relatively high for an online-only format (and in comparison with other offered postgraduate courses in the sector). From the available information on the Website it is not clear if Scholarships are available or any other form of waiving the tuition fees for students that fulfil some set of criteria. This information might be important to some applicants, and it should be highlighted in a clear manner in the information available to applicants. The Director of the PSP program justifies this cost by citing the substantial effort required from module leaders; however, this rationale does not appear to be founded on a concrete business model. Nevertheless, it is essential to enhance efforts to publicise scholarships for high-calibre students to promote wider participation.

Regarding the teaching mode for the PSP, the online live teaching is an appropriate delivery method since it allows a wide range of participation. However, it has been emphasised that lectures are not recorded as being something positive. The Panel believes that recorded lectures and/or recorded extra material in terms of tutorials might be beneficial to the students that might want to go back and listen to specific aspects. Hence, the inclusion of selected recorded material is encouraged to all different modules. Furthermore, the program requires by a full-time working student to study approximately 50 hours per week, which is very demanding and not recommended pedagogically. Hence, actions are required on that frontier; this aspect closely correlates with the length of the studies.

III. Conclusions

Overall, this PSP course in the emerging field of quantum computing is both well designed and well organised. However, there is a notable concerns regarding the progression and duration of studies of the students enrolled in the program. Furthermore, according to feedback from students the experience is not homogeneous and module leaders from other collaborative institutions need to get in speed with the quality offered by the academics of the Department of Electrical and Computer Engineering at the University of Thrace. Effort should be placed to ensure that completing the course within three semesters becomes the standard rather than the exception. It is imperative to implement updated policies and actions in the aforementioned areas.

Panel Judgement

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

Panel Recommendations

1. Actively promote the Erasmus+ programme and the potential benefits.
2. Ensure that full time working students enrol as part time students; otherwise monitor progress and re-direct students to being officially part-time rather than continue a full time without any mitigation aspects.
3. Actively promote scholarships to ensure wider participation.

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

I. Findings

The Department currently has a 33 strong faculty, comprising 22 Professors, 5 Associate Professors and 6 Assistant Professors. Eight members of the faculty are directly related to the field of Quantum Computing/Technologies and are involved in the teaching of the program In addition, there are seven more external teaching staff, 4 from NRC Demokritos and 3 more from the University of Patras.

The Faculty is quite active in high-quality research, with journal publications ranging between 40 and more than 200 with thousands of citations for every faculty member. Through the CVs available on the Department's web site, the ability of the faculty to attract external funding for research is evident for most of the Faculty members.

The Faculty have been appointed and promoted through the ranks following the established Greek framework of an appointments committee that includes members from other universities and follows a rigorous evaluation of the research and teaching credentials

of the Faculty under consideration. A number of awards related to excellence in teaching and research have been established, in order to strengthen the incentives of the Faculty to excel.

While interviewing the Faculty, it became evident that they take advantage of the mechanism of mobility of staff via Erasmus+. However, few of them have taken a prolonged leave of absence through sabbatical leaves. The institution supports the participation of Faculty to seminars and conferences for strengthening their teaching and research performance.

The workload of the Faculty involved in the offering of the program in question is, on average, around 7-8 hours per week.

The Department has 17 research labs organised into 5 sectors. Based on the information available on the web site, it is unclear which of these labs, if any at all, are directly related to the graduate program being assessed for accreditation.

The Faculty are evaluated regularly by the students by means of online questionnaires that can be filled and submitted online. As is the case with other institutions, the percentage of students actually participating in this faculty assessment exercise is around 60%.

II. Analysis

The strength of the Faculty is sufficient to offer the graduate programme that is being assessed for accreditation, with the involvement of external teaching collaborators. The level of research quality is similar to that of other institutions nationally and internationally. The level of external funding is not clearly stated in the submitted documentation. Compared to other institutions at a national level, the percentage of faculty members taking sabbatical leaves and, in general, taking advantage of mobility mechanisms is around average. The workload is appropriate for academic staff. The feedback from students is overall positive. The involvement of the Department's labs in the activities of the graduate program that is being assessed for accreditation needs to be strengthened. External funding from national or international sources can be increased.

III. Conclusions

Overall, the Faculty is well qualified to offer the PSP that is being assessed for accreditation.

Panel Judgement

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

Panel Recommendations

1. Provide additional Initiatives to increase the level of student participation in teaching staff assessment.
2. Increase the level of involvement of the Department's relevant lab(s) in the graduate programme's activities, such as offering support for master thesis projects.
3. Further identify methods to increase external funding.

PRINCIPLE 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 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, 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

I. Findings

The university creates a fruitful learning environment by providing the necessary amenities to the PSP, like access to its digital library, access to scientific databases etc. However, there are several concerns about the content of the courses on the eClass platform.

There are a number of support services available to PSP students to help them during their studies.

Students are supported throughout their studies by a competent number of support and administrative staff.

The university has a clear tuition utilisation plan for the first five years of the PSP.

II. Analysis

The PSP is offered exclusively via live distance learning, therefore physical resources such as classrooms, laboratories, etc. cannot be available to students. The PSP does provide the necessary distance learning facilities, like access to the online library of the university, HEAL-Link access to scientific work, an e-secretariat information system, and a collaboration with IBM Quantum enabling students to practise on real quantum computers. The Panel has several concerns regarding the material uploaded to the eClass platform for some of the courses. Many eClass modules lack descriptions, learning objectives, or a detailed syllabus. A few modules include to some extent (even exclusively) learning material in the Greek language, while a few others have handwritten lecture notes. Course contents for some of the courses were uploaded to the eClass platform during the process of accreditation, which is concerning. Two modules are duplicated in eClass. Moreover, the course Python Programming and Applications does not seem to be a Master's level course.

An adequate range of support services, like the academic advisor, the Erasmus program, and psychological support, is available to PSP students. Students seem aware of the services, though they could be mentioned on the website of the PSP for easier access. Despite that, this information exists on the website of the university.

Also, the PSP seems to employ enough supporting staff to aid students with their administrative issues. Students did not mention any complaints.

Finally, spending is regulated through a clear tuition utilisation plan. The plan accounts for teaching and supporting staff salaries, transportation, equipment and facilities, and other spending

III. Conclusions

Overall, some of the necessary learning resources seem to be available to students, while the availability of others remains unclear. Many of the eClass modules are inconsistently organised and the lecture notes for some modules were uploaded late. Also, a specific class is deemed to not be a Master's level course. The supporting staff helps students with their issues. The tuition utilisation plan is clear, but it could be more precise. The judgement of the Panel is that the PSP is partially compliant with Principle 6.

Panel Judgement

| Principle 6: Learning resources and student support | |
|--|----------|
| Fully compliant | |
| Substantially compliant | |
| Partially compliant | X |
| Non-compliant | |

Panel Recommendations

1. The services available to students could be mentioned on the website of the PSP.
2. Although there is a tuition utilisation plan in place, it is not very thorough.
3. All modules in eClass should include a detailed syllabus outlining key topics, learning objectives, and assessment methods. Core reading materials, such as textbooks, scholarly articles, and case studies, should be clearly defined from the outset.
4. The module Computational Biology: (i) does not have a description at the eClass page, (ii) a number of lectures are in Greek, (iii) there is no information regarding assignments, coursework and introduction of what will be covered during the semester.
5. The module Introduction to computational structural biology (i) does not have a description at the eClass page, (ii) a number of lectures are in Greek, (iii) there is no information regarding assignments, coursework and introduction of what will be covered during the semester, (iv) there are only 3 lectures available on the eClass for the students.
6. In the module Linear Algebra for Quantum Mechanics the first reference book used in the module is in Greek, this should be changed to an equivalent English based textbook on that topic. The module leader offers office hours but it is not clear how students that participate online could contact him.
7. In the module Natural and Unconventional Computing there is no description of the module in the eClass page. There are 7 lectures shown in the system, if some of these files contain more than one lecture set for what is covered during one week then the material should be re-organized accordingly.
8. In the module Optical and Quantum Communication there is no description of the module in the eClass portal.
9. The modules Quantum Control and Quantum Optics have hand written notes. This should be avoided at all costs. Module leaders should be encouraged to use digital notes and standardised learning material to allow, inter alia, a better overall student experience and an easy way for the available information to be updated. Also, presenting in an online format hand-written notes is very difficult for students to follow.
10. The module Python Programming and Applications does not seem to be a Master's level course. Perhaps it could be offered as an extra course for students to develop the necessary programming skills, with no ECTS counted towards the degree.
11. Many of the course contents for modules Quantum Solid State Physics, Quantum Devices, Qubit Devices, Measurement and Characterization Methods for Devices and Systems, and Nanoelectronics were uploaded to the eClass platform during the accreditation. This is certainly cause for concern, as the Panel is unable to determine how these modules were taught in absence of critical learning material to the eClass platform.
12. The module Qubit Devices appears two times on eClass and this is confusing. Also, some of the material seems to be uploaded in July '24, i.e., well after the end of the semester.

13. The module Quantum Devices appears two times on eClass and this is highly confusing (it seems that each module leader creates their own entry). The majority of the available contents in the eClass have been uploaded in July '24, i.e., well after the end of the semester.
14. There are few modules that provide the required full range of information for running a high quality module online, such as for example the module entitled Quantum Algorithms and Quantum Information (or the module Quantum Computing and Quantum Technologies). These modules could be used as an example for the other offered modules in the programme.

PRINCIPLE 7: INFORMATION MANAGEMENT

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

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

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

I. Findings

Based on the discussions during the meetings and the available documentation that has been provided it has been evident to the Panel that effort is allocated in monitoring the overall quality of the programme and analysing collected information to make changes and/or amendments to the course (and individual modules) as needed. A number of corrective actions have been presented based on feedback from the students and/or realities from the 'ground', i.e., fully online version of the postgraduate studies hence modules with strong lab components have been omitted. This is definitely a positive sign. Within this framework student questionnaire play a central role in the monitoring of the overall PSP performance. To this end, towards the end of the semesters, students are encouraged to complete a survey regarding their experience of the module. Undoubtedly, student feedback is essential for both individual members of staff and Universities to improve continuously. However, the available form has only 10 questions and might not effectively allow for a more detailed reflection on the teaching methodologies and learning

outcomes of each module. For example, there is no question regarding teaching methods and activities that students enjoyed more (such as for example case studies, small multiple choice questions during tutorials, invited talks, etc.). Students should also be allowed to critique their peers. If for example they feel that their peers have been supportive. Some open-ended questions should also be included. For example, questions like 'What motivated you to study more?' will help unveil good practices as well as aspects of the teaching methods that might require improvement. The preservation of anonymity is somewhat maintained; however, the method for collecting student feedback is a rather unconventional one. Specifically, a designated student from the class is tasked with gathering all the feedback, which may raise concerns regarding the integrity of the anonymity process.

II. Analysis

The cross-departmental postgraduate programme maintains an ongoing process for collecting data as part of its internal quality system. Student feedback is collected for every module taught towards the end of the semesters. The overall return rate of the questionnaires are not clearly mentioned in the available documentation. However, the low number of students (and even lower number of students per module since there is a large number of elective modules) creates an issue of statistical inference from the feedback. To this end, members of staff should consider the collected feedback with a pinch of salt since a very low number of students per module create an issue also with anonymity of the responses (which might not have been an issue if a large pool of students submitted their responses). Despite the above the overall feedback is very positive and students are highly satisfied with the modules and the support they received from module leaders. Student progression could be deemed as rather poor. For example, the 2022/23 cohort constituted of 12 students, however only 2 students (~17%) managed to complete their students on time. This is an issue of major concern and seems that the severeness of the problem is not acknowledged between the teaching members of staff. Clearly, the problems stem from the fact that a large number of students are working full time, and they enrol to a full-time study which means approximately 50 hours per week of lectures/tutorials and personal study. This is a massive load which in essence creates a salient part-time type of studies for the students. There seems to be a substantial gender imbalance in the programme. No specific actions are taken to close this gap; this is an issue that deserves some attention.

It has to be mentioned that even if a full-time working student wants to enrol to the full-time version of the programme it is pedagogically important that those students discuss that matter in detail towards the part-time mode of attendance. In fact, the mode of attendance shouldn't be at the discretion of the students.

Information about plagiarism is limited and it is rather difficult for a student to find it since it is mentioned in many different places and some of the links which are supposed to be in English link to a Greek document. Effort should be allocated to provide a more easily accessible information to those important quality regulation aspects and link this information to the portal of the postgraduate course webpage.

The issue of collusion (which in essence might be more important than plagiarism for this online postgraduate course with no exams at the end of each module) is not mentioned at all. Hence, misconduct policy should be updated.

Student feedback procedures should be revisited. Currently, one student from the cohort is collecting all feedback and then it forwards this information to the director of the program or the admin staff. However, this is an ill-defined method since it relies on a student to send the complete feedback and also the aspect of anonymity is not preserved since all students are enforced to reveal their remarks.

Finally, despite the fact that it has been mentioned repeatedly during the e-meeting that all material is in English the Panel found numerous examples of lectures (after given access to the eClass portal) where presentations are in Greek.

III. Conclusions

Based on the discussions during the e-visit and the available information provided, the Panel is in overall satisfied with the fact that there are some well-established procedures in place to systematically collect and analyse information regarding the day-to-day run of the programme. These processes provide some levels of assertion that relevant data are gathered to evaluate the programme’s quality. Having said that, some major issues of concern such as the heavy load for full-time working students and the extremely low rate of completion of studies seems that it has not been an issue of concern which can be deemed as worrying. Effort is required to adjust enrolment options for students and/or to enforce part-time studies for full-time working students.

Panel Judgement

| Principle 7: Information management | |
|--|----------|
| Fully compliant | |
| Substantially compliant | X |
| Partially compliant | |
| Non-compliant | |

Panel Recommendations

1. Ensure that all documents (for example anti-plagiarism) are also provided in English
2. Organise the documentation on the Website of the postgraduate course so that all information is easily accessible
3. Augment misconduct information to include regulations regarding collusion – especially relevant for this online course with the majority of assessments being assignments.

4. Misconduct procedures with emphasis on issues related to collusion should be explicitly mentioned in the website of the course
5. Create a policy for mitigating circumstances that detail how students should submit mitigating circumstances request giving valid reasons for submitting late work, a team of academics (or a single academic that will have that role) to grant or reject such requests and the associated policy that applies for late submissions.
6. The procedure for receiving student feedback is very concerning and should be changed. For example, an online Microsoft Form could be generated to allow for truly anonymous feedback.
7. Oral assessments should be formalised, and other forms of assessments beyond coursework should be considered.

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

I. Findings

The Department maintains a webpage named, "International M.Sc. Program in Quantum Computing and Quantum Technologies" providing introductory information for the PSP, including:

- General description and contact information.
- How to apply information.
- Key information and curriculum.
- Faculty involved in the program.

Although a number of documents related to the program and the regulations of the institution are available on the web site, there is no complete student handbook and some of the documents are in Greek.

Although the Faculty members involved in the program are listed, detailed information for them is available only through the main Departments website. However, there is no direct link from the program's web site (<https://quantum.ee.duth.gr>) to the main Departmental one (<https://www.ee.duth.gr/en/>).

II. Analysis

The website should be the main source of information about the PSP, providing all the information needed. There is currently a root page within the main website of the Institution / Department, which provides basic information (list of courses, list of Faculty involved in the program, etc.).

There is a presence of the program on social media (LinkedIn). However, so far there is no information on alumni and graduates, as only one person has graduated from the program so far.

Information for prospective external stakeholders, such as social partners, regional organisations, companies, or even professionals, such as previous graduates, is also not provided. The web visitor should search within the Faculty’s material for research details, research activities and projects, etc.

The Departmental office and the PSP’ secretariat staff provide updates and public announcements via relevant electronic platforms, such as personalised emails, and important announcements on PSP in the aforementioned central pages (main website and vertical Greek site).

Some PSP guides and regulations are available in Greek.

III. Conclusions

The PSP website is the main channel of communication for both students and staff, as well as the outside world. It should incorporate information relevant to the interests of different visitor profiles, such as students, graduates, potential students and partners, including external researchers and professors. The website could be enhanced by providing information for incoming ERASMUS+ students, although the PSP does not yet participate in it.

The PSP should be promoted with the distribution of information leaflets, announcements in public media, presentations at events and conferences, etc. However, evidence of such activities is rather limited on its website.

As the PSP has no presence on social media, such links do not appear on the website. There is also no information on alumni and graduates, as no alumni exist for the postgraduate Programme.

The website should provide all QA-related documentation and results, not restricted by GDPR or other reasons.

Panel Judgement

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

Panel Recommendations

1. Develop a formal procedure to update, refine and review the information provided on the website and to students (including links and pdf documentation) to ensure quality and coherency. This mechanism should also document its information dissemination processes, website maintenance tasks/activities, and their allocations/responsibilities for completion.
2. The PSP should support the creation of alumni membership and the provision of related information and services on its website. Alumni members may potentially support PSP's presence in social media.
3. The Information on research topics and labs related to the PSP should be more straightforward on the website and the information on infrastructure used for the delivery of the PSP should be within the PSP webpages.
4. The PSP should enhance the information dissemination for its vision, mission and activities and include such information on its website.

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:

- a) 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*
- b) the changing needs of society*
- c) the students' workload, progression and completion of the postgraduate studies*
- d) the effectiveness of the procedures for the assessment of students*
- e) the students' expectations, needs and satisfaction in relation to the programme*
- f) 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

I. Findings

The program officially started during the academic year 2021/22 however there were no students during that year and hence the first cohort of approximately 12 students started their studies in this program during the 2022/23 academic year. Out of those students only 1 or 2 managed to complete their studies on time (i.e., three semesters).

The program follows a continuous type of improvement that is based on feedback from students', rationalisation of the modules based on realities on the ground and corrective actions are implemented accordingly. Those corrective actions are discussed internally and also propagated to the students in a clear and concise manner (together with the background reasoning of those actions). During our 2-days of discussions it was evident that those actions are also driven by the international tendencies in the field of quantum computing, the consultation with faculty and students and advice from stakeholders. However, it has to be

mentioned that there is no established external advisory committee for this postgraduate programme. Therefore, any such feedback from them could arrive in a rather ad hoc and sporadic manner. In any case, a team of emerging SMEs in the scope area of the programme have been targeted and they are aware of the programme and further engagement is expected in the future.

A clear difficulty in the programme is the relatively diverse academic background of admitted students. Another issue is also the fact that the majority of them are also working full-time. However, such issues are closely monitored, the range of assignments allow early signs of weakness and in general, such issues are well managed in the program. Something that helps towards this direction is the strict entrance criteria to the program and the overall screening that takes place (~50% of the applicants are accepted in the programme). For selected students there is no need for them to have previous knowledge of quantum mechanics. A number of modules are offered by academics and/or researchers from other Universities and Research Institutions; currently those are the University of Patras and the National Centre of Scientific Research - Demokritos (Athens). There are 4 researchers from Democritus involved in a delivery of a module in the programme. The programme does not include any laboratory experiments since all modules are delivered online. On the other hand, participates in both the IBM Quantum Educators Program and the IBM Quantum Researchers Program that allows some exposure to quantum computing experimentation (the IBM quantum systems could also be used by the students for their dissertation research).

II. Analysis

Based on the discussions that we had during the e-visit and the available information it has become evident to the Panel that every effort is made by the Programme Director and the Department as a whole to collect, analyse and discuss information collected within the postgraduate programme. The results from the evaluation questionnaires provide very positive feedback and it has become evident that all points made are carefully considered and if needed corrective actions are made. It might be worthwhile expanding the set of questions for feedback to capture different aspects of student experience. It is not clear what are the key quality indicators for the programme. For example, very few students manage to graduate on time. Unfortunately, this does not seem to be a major issue of concern for the faculty. Other types of KPIs should be defined and regularly monitored. The participation in the teaching duties of staff from the National Centre of Scientific Research – Demokritos should be monitored more closely since a large number of complaints arise during the discussion with the students. The program coordinator should be significantly more proactive to ensure that content on the portal is regularly updated, deadlines could be imposed and private discussions with Demokritos and their line managers is encouraged in order to enforce compliance with the regulations and requirements.

As have been already alluded to the assessment in most of the courses is taking place via numerous assignments (for example 5/6 courseworks with a 2 week submission interval). In that process it is not clear how students are able to defer submission, what is the procedure of not submitting in time, if there is a penalty for late submission and who grants extensions (i.e., accepted mitigating circumstances) so that there is no penalty for late submissions. In general, such rules are missing altogether and should be established as soon as possible.

Accepting situations for mitigating circumstances should not be the role of individual module leaders. Based on information available at eClass it was evident that it was very common for a module leader to issue an extension for the submission of an assignment.

Students are in general highly satisfied with the course as a whole and the overall academic quality of the offered modules. Module leaders are approachable and very responsive to any enquiries and any issues are quick to be ironed out. Students appreciate the fact that courseworks type of assignments are mainly used instead of (closed book) examinations. However, relying solely on coursework may increase the risk of plagiarism or unauthorised collaboration, as students have more time and resources at their disposal. In some cases, there is an oral form of examination towards the end of the semester but there are no marks allocated to such forms of assessment. This can be deemed as a formative assessment and it clearly very useful, but the aim shouldn't be to assess that all previous 5 or 6 summative types of assessments (i.e., courseworks) represent the work of the student. Some other forms of assessment could be integrated into the studies. For example, one such option could be a timed online assessment with a well predefined start of the examination and a window for submission of 3 to 4 hours; in that case, students will not be able to access the assessment after the allotted time has passed. Regarding the individual submitted Thesis it has been evident from the discussion that almost none of the students are able to submit their Thesis on time. This is very concerning and action should be taken so that exactly the situation changes to exactly the opposite, i.e., only very few (none ideally) submit their Thesis beyond the 3rd semester. In fact, any extension should only be given after submission of mitigation circumstances.

The information available on eClass could be improved since a lot of material are hand-written, some presentations are in Greek and it seems that there is a very high number of extensions provided for submitted coursework. More concerning is that for the following modules the Panel didn't had access to eClass: (1) Quantum Devices, (2) Nanoelectronics, (3) Quantum Solid-State Physics, (4) Qubit Devices, (5) Advanced Topics in Quantum Computing and Quantum Technologies

III. Conclusions

The overall monitoring of the programme is well organised and adequately documented. However, effort is required in the actual implementation aspects such as for example in formalising the procedures with external stakeholders, creating sync points during the academic year with external module leaders to enable (or enforce if needed) compliance with Departmental procedures and create a coherent student experience across all different (offered) modules. Effort is also required in the timings of the different coursework deadlines since those should be provided in a rather organised manner to avoid extensive sync between different modules that lead to a very high number of extensions being provided.

Panel Judgement

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

Panel Recommendations

1. The student feedback form could be enriched to shed light on various other aspects of the course
2. Since coursework assignments is one of the main assessment methods in the course it is advised that a heatmap of all expected submission days are created in order to create load balancing for the students
3. Transparency on accessing teaching materials on eClass should be improved

PRINCIPLE 10: REGULAR EXTERNAL EVALUATION OF POSTGRADUATE STUDY PROGRAMMES

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

I. Findings

There has been no external evaluation of the program. However, there has been an external evaluation of the Department in February 2014. Following this evaluation, the Department monitors the satisfaction of the EEAP recommendations.

II. Analysis

The established procedures for internal quality assurance are sufficient for ensuring that the findings and recommendations of this (or future) accreditation panels will be implemented. The relevant Departmental and University stakeholders are well aware of the importance of these accreditation exercises, have been actively engaged in the current accreditation process and are committed to implementing its findings.

III. Conclusions

Many aspects of the Department and its functions confirm good practices. The Department's commitment to the spirit and processes of quality assurance is evident in all principles and aspects. EEAP rates the principle as "fully compliant", based on the above considerations.

Panel Judgement

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

Panel Recommendations

1. The Department is encouraged to continue its internal quality assurance procedures for annual internal assessment and evaluation of academic programs to achieve objectives through monitoring and evaluation.

PART C: CONCLUSIONS

I. Features of Good Practice

1. The PSP is known for its high-quality and scientifically sound academic opportunities that pave the way for its graduates' success.
2. The PSP profoundly impacts the overall experience of students and graduates, fostering a positive environment. The enthusiasm of students, graduates, employers, and other stakeholders was commendable.
3. Several PSP faculty members have international reputations, and all are enthusiastic and dedicated to their mission.
4. Employers and social partners praised the PSP and believe there is a clear need for such graduates.
5. The presence of this PSP promotes the Department of Electrical and Computer Engineering and the DUTh.

II. Areas of Weakness

1. There are serious problems with eClass, listed particularly under Principle 6, which cause confusion and have a detrimental effect on running an otherwise high quality programme online.
2. The PSP KPIs to measure graduation/retention rates are missing.

3. There is no feedback mechanism involving students, graduates, and stakeholders for the continuous improvement of the material taught in the PSP.
4. The English version of the PSP website does not contain the same information as its Greek counterpart and some of its web links point to documents written in Greek.
5. No satisfaction surveys exist for the PSP external stakeholders involved with the programme.

III. Recommendations for Follow-up Actions

1. The PSP must ensure that student feedback on courses and the program is as thorough as possible by encouraging participation and stressing its importance.
2. The PSP must include KPIs to measure graduation/retention rates.
3. Internal auditing should be performed on an annual basis.
4. The PSP should consider establishing a feedback mechanism involving students, graduates, and stakeholders to continuously improve the material taught in the PSP.
5. Actively promote the Erasmus+ programme and the potential benefits.
6. Ensure that full time working students enrol as part time students; otherwise monitor progress and re-direct students to being officially part-time rather than continue a full time without any mitigation aspects.
7. Actively promote scholarships to ensure wider participation.
8. The services available to students could be mentioned on the website of the PSP.
9. Although there is a tuition utilisation plan in place, it is not very thorough.
10. All modules in eClass should include a detailed syllabus outlining key topics, learning objectives, and assessment methods. Core reading materials, such as textbooks, scholarly articles, and case studies, should be clearly defined from the outset.
11. The module Computational Biology: (i) does not have a description at the eClass page, (ii) a number of lectures are in Greek, (iii) there is no information regarding assignments, coursework and introduction of what will be covered during the semester.
12. The module Introduction to computational structural biology (i) does not have a description at the eClass page, (ii) a number of lectures are in Greek, (iii) there is no information regarding assignments, coursework and introduction of what will be covered during the semester, (iv) there are only 3 lectures available on the eClass for the students.
13. In the module Linear Algebra for Quantum Mechanics the first reference book used in the module is in Greek, this should be changed to an equivalent English based textbook on that topic. The module leader offers office hours but it is not clear how students that participate online could contact him.
14. In the module Natural and Unconventional Computing there is no description of the module in the eClass page. There are 7 lectures shown in the system, if some of these files contain more than one lecture set for what is covered during one week then the material should be re-organized accordingly.
15. In the module Optical and Quantum Communication there is no description of the module in the eClass portal.

16. The modules Quantum Control and Quantum Optics have hand written notes. This should be avoided at all costs. Module leaders should be encouraged to use digital notes and standardised learning material to allow, inter alia, a better overall student experience and an easy way for the available information to be updated. Also, presenting in an online format hand written notes is very difficult for students to follow.
17. The module Python Programming and Applications does not seem to be a Master's level course. Perhaps it could be offered as an extra course for students to develop the necessary programming skills, with no ECTS counted towards the degree.
18. Many of the course contents for modules Quantum Solid State Physics, Quantum Devices, Qubit Devices, Measurement and Characterization Methods for Devices and Systems, and Nanoelectronics were uploaded to the eClass platform during the accreditation. This is certainly cause for concern, as the Panel is unable to determine how these modules were taught in absence of critical learning material to the eClass platform.
19. The module Qubit Devices appears two times on eClass and this is confusing. Also, some of the material seems to be uploaded in July '24, i.e., well after the end of the semester.
20. The module Quantum Devices appears two times on eClass and this is highly confusing (it seems that each module leader creates their own entry). The majority of the available contents in the eClass have been uploaded in July '24, i.e., well after the end of the semester.
21. There are few modules that provide the required full range of information for running a high quality module online, such as for example the module entitled Quantum Algorithms and Quantum Information (or the module Quantum Computing and Quantum Technologies). These modules could be used as an example for the other offered modules in the programme.
22. Ensure that all documents (for example anti-plagiarism) are also provided in English
23. Organise the documentation on the Website of the postgraduate course so that all information is easily accessible
24. Augment misconduct information to include regulations regarding collusion – especially relevant for this online course with the majority of assessments being assignment
25. Misconduct procedures with emphasis on issues related to collusion should be explicitly mentioned in the website of the course
26. Create a policy for mitigating circumstances that detail how students should submit mitigating circumstances request giving valid reasons for submitting late work, a team of academics (or a single academic that will have that role) to grant or reject such requests and the associated policy that applies for late submissions.
27. The procedure for receiving student feedback is very concerning and should be changed. For example, an online Microsoft Form could be generated to allow for truly anonymous feedback.
28. Oral assessments should be formalised, and other forms of assessments beyond courseworks should be considered.

29. The student feedback form could be enriched to shed light on various other aspects of the course
30. Since coursework assignments is one of the main assessment methods in the course it is advised that a heatmap of all expected submission days are created in order to create load balancing for the students
31. Transparency on accessing teaching materials on eClass should be improved
32. Provide additional Initiatives to increase the level of student participation in teaching staff assessment.
33. Increase the level of involvement of the Department's relevant lab(s) in the graduate programme's activities, such as offering support for master thesis projects.
34. Further identify methods to increase external funding.
35. Develop a formal procedure to update, refine and review the information provided on the website and to students (including links and pdf documentation) to ensure quality and coherency. This mechanism should also document its information dissemination processes, website maintenance tasks/activities, and their allocations/responsibilities for completion.
36. The PSP should support the creation of alumni membership and the provision of related information and services on its website. Alumni members may potentially support PSP's presence in social media.
37. The Information on research topics and labs related to the PSP should be more straightforward on the website and the information on infrastructure used for the delivery of the PSP should be within the PSP webpages.
38. The PSP should enhance the information dissemination for its vision, mission and activities and include such information on its website.
39. The Department is encouraged to continue its internal quality assurance procedures for annual internal assessment and evaluation of academic programs to achieve objectives through monitoring and evaluation.

IV. Summary & Overall Assessment

The Principles where full compliance has been achieved are: 1, 2, 3, 5, 8, 10

The Principles where substantial compliance has been achieved are: 4, 7, 9

The Principles where partial compliance has been achieved are: 6

The Principles where failure of compliance was identified are: None

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

The members of the External Evaluation & Accreditation Panel

Name and Surname

Signature

1. Yani Skarlatos
2. George A. Papadopoulos
3. Vasilis Friderikos
4. Christos Bouas