**Doc. 300.1.2**

Date: 3rd June 2019

# Higher Education Institution's response

- **Higher education institution:**

  University of Cyprus

- **Town:** Nicosia

- **Program of study (Name, ECTS, duration, cycle)**

  **In Greek:** Προπτυχιακό πρόγραμμα στην Πληροφορική, 240, 4 χρόνια

  **In English:** Undergraduate programme in Computer Science, 240, 4 years

- **Language of instruction:** Greek with some modules in English
- **Program's status**
  **New program:** No
  **Currently operating:** Yes

**The present document has been prepared within the framework of the authority and competencies of the Cyprus Agency of Quality Assurance and Accreditation in Higher Education, according to the provisions of the "Quality Assurance and Accreditation of Higher Education and the Establishment and Operation of an Agency on Related Matters Laws of 2015 and 2016" [N. 136 (I)/2015 and N. 47(I)/2016].**

## A. Guidelines on content and structure of the report

- *The Higher Education Institution based on the External Evaluation Committee's evaluation report (Doc.300.1.1) must justify whether actions have been taken in improving the quality of the program of study in each assessment area.*

  The Council of the Department of Computer Science held an extraordinary meeting on June 3rd 2019 during which it examined the evaluation report of the EEC and decided how to act upon the various recommendations voiced by the EEC.

## 1. Study program and study program's design and development (*ESG 1.1, 1.2, 1.8, 1.9*)

Regarding the EEC's comment that the programme is not fully compatible with the Bologna framework, we would like to clarify that the legislation of the University of Cyprus, in accordance with other relevant national legislation, stipulates that first cycle programmes are four years in duration (240 ECTS credits). This applies to all first cycle degree programmes offered by HEIs and colleges of tertiary education in Cyprus.

**Recommendations of the EEC and Departmental decisions/actions:**

- *Consider teaching a larger number of courses in English:* The Senate decision regarding the teaching of undergraduate courses in English refers to up to five such courses. This constraint is imposed by the relevant clause in the Law of the University that stipulates the following:

  "The University can, through a Senate decision, offer in undergraduate programmes of study up to five courses per programme, mandatory or not, in a language other than the official languages of the Republic, without having to offer them at the same time in one of the official languages of the Republic."

  Given the above legal constraint it is not possible to offer, exclusively in English, more than five courses in the undergraduate curriculum of the Department. However, the given five courses could be more coherently selected to constitute an integral whole. At present all courses taught in English are optional and the particular courses are indeed selected on an ad-hoc basis entirely at the discretion of individual teaching staff. The Departmental Council has decided to forward the matter to its Undergraduate Programme Committee to make a suggestion without necessarily constraining the courses to be taught in English to optional courses, as it is currently the case, and to take into consideration the fact that a number of core courses are taught on both semesters (indeed this may give an outlet for increasing the number of courses to more than five, without violating the Law of the University, if for example the same course will be taught in English during one semester and in Greek during the other semester of the academic year).

- *Explore the establishment of additional teaching-related links with other European institutions of higher learning (exchanges, joint degrees):* Establishing additional teaching-related links with other European institutes is already one of the strategic objectives of the Department, focusing in the first instance on structured mobility, joint doctoral programmes and further student and staff exchanges.

- *Carefully consider the choice of the first programming language and select a language based on the pedagogical needs of the degree programme:* The choice of the first programming language (predominantly on pedagogical grounds) was a matter of active consideration and discussions within the Department from the very beginning, having in mind that the CS131 Programming Principles course is the root course of the problem solving cluster of the curriculum, and presently it constitutes the starting node of no less than eight chains of thirteen mandatory courses. The overall aim of the course on Programming Principles is for students to grasp the fundamental principles of abstraction, information hiding, decomposition, synthesis, modularity, extensibility and reusability, with the purpose of designing and building structured, sound and maintainable algorithmic solutions to problems. The latest version of the course uses the Java programming language, however this has always been a problem-solving, and not a computer coding, course,

exploiting in its current version a synergistic integration of process-based (procedural) and concept-based (object oriented) thinking. Since its initial inception back in 1992, the CS131 course has evolved through three phases regarding the programming paradigms deployed for teaching and learning principled programming, program abstraction (process modelling) and data abstraction (concept modelling). For its first eight years (1992-99), the course deployed the functional paradigm and used Miranda as the programming language. For its next eleven years (2000-10) the course deployed the procedural paradigm and used C as the programming language. Since 2011, the course deploys Java as the programming language. The content of the course, and its teaching and learning approach have been continuously revised and modernized taking into consideration academic developments as well as national developments like the new informatics module at secondary level and its now mandatory status for entrance to CS-UCY. It is already evident that the new cohorts of students have a (more than ever) uniform, basic knowledge of computer programming, exclusively based though, on imperative aspects of C++, without any reference to objects. The students now appear ready to take up the challenge of object-oriented thinking from the start of their university studies. Certainly the choice of "Java" (as a mean and not as an end on its own, although students are expected to acquire adequate competence in the given language and in fact using a "real" language gives them an additional incentive to do so) as the history of the course shows is not cast in stone, and a new language could replace it in the future. The choice of a replacement language should take into consideration the dependencies with other courses in the problem-solving cluster. At present the choice of Java provides a smooth integration between these courses. The functional paradigm, as our previous experience showed, has many pluses, particularly regarding abstraction mechanisms, but at the same time it has some serious minuses, not least the prominent use of recursion that does create learning difficulties to a fair number of students.

- *The large optional teaching offer, through "restricted electives", has not been fully justified and there are concerns that it cannot be sustained in the future due to the aging and upcoming retirement of a substantial part (40%) of the teaching faculty:* It is true that the Department has been quite liberal so far in its restricted electives as any member of academic staff had the freedom to propose any new restricted elective on the basis of his/her scientific expertise and research interests. The loosely-applied "specialisations" in the current version of the curriculum resulted, naturally, through some clustering of the existing set of restricted electives. Thus the set of restricted electives is very much a "live component" of the curriculum that can evolve in a dynamic way, on the understanding that the Department has the obligation to provide adequate choice for its students given the number of such restricted electives that they are required to do. As a matter of fact the number of restricted electives offered each semester is decided on the basis of the given constraints (number of students, number of restricted electives they need to take, and the maximum number of places on these courses).

  For our Department, it is of paramount importance for the University to exert the necessary leadership regarding the timely staging of the processes for the recruitment of new academic staff so that the new occupant of an academic position is ready to take it up immediately after the current occupant of the position retires. This way, there will be no academic gaps. It is fair to say that the main concern of the Department, in pushing for a timely replacement of outgoing academic blood with new incoming academic blood, rests with the core component of its undergraduate curriculum (mandatory courses if possible should not be taught by external part-time teachers) and less with its restricted electives. Provided that there will be no academic gaps, the Department is confident that it can sustain its large optional teaching offer, but if the need arises, this offer can be reduced to some extent without affecting the quality of its undergraduate curriculum.

## 2. Teaching, learning and student assessment (*ESG 1.3*)

**Recommendations of the EEC and Departmental decisions/actions:**

- *Examination papers should be checked internally by another member of the teaching staff as this will help to ensure comparable standards across all examination papers in the degree programme:* The Departmental Council has forwarded this recommendation to its Undergraduate Programme Committee for consideration and submission of a relevant proposal, having in mind that in the context of continuous student evaluation, final examinations in the Department rarely count for more than 50% of the total score for a course. Also, it should be noted that we have final exams every semester and not only on a yearly basis, and in addition the standard practice with laboratory assignments (that count towards a course assessment) is that these are jointly discussed and decided between the faculty members and the special teaching staff in charge of the laboratories.

- *In particular, the Operating Systems (OS) course lacks a practical laboratory component. As done successfully in other computer science departments, it is possible to balance the workload imposed by an OS laboratory exercise by assigning students to small groups:* The Department welcomes this comment, as it was an issue that has been discussed in the past in a number of occasions. Following this recommendation, CS222 (Operating Systems) will be revised to include a lab component. We will make use of a typical educational operating system (such as OS361 or MINIX) or a concurrency package such as BACI. These tools will be used in order for students to program in a real environment, typical process synchronisation scenarios, scheduling algorithms and virtual memory support. The overall grade of CS222 will be split as follows: Mid Term: 20%, Final: 50%, Homework: 15%, Projects: 15%.

## 3. Teaching Staff (*ESG 1.5*)

**Recommendations of the EEC and Departmental decisions/actions:**

- *Some of the faculty members are approaching retirement, and there is a need to ensure that faculty positions are made available to replace the retiring faculty members in a timely fashion. The availability of the faculty posts should be confirmed in advance to ensure that there is no drop in teaching quality.* As mentioned above, the Department endorses fully and strongly this recommendation as it considers its implementation vital for the Department's sustainability. As this implementation would require authority at University level, the Department urges the Rectorate, the Senate and the Council to proceed without any further delay in stipulating the relevant procedures and processes. In addition, the Department is of the strong opinion that academic positions vacated due to retirements, resignations or other unexpected reasons should continue to belong to the Department and not to be transferred to a central pool and the Department to be required to make a case for reclaiming them. (The central pool should hold truly developmental positions since vacated positions by definition, or at least by default, were very much actively operational and their immediate reuse would be absolutely necessary for the sake of operational continuity.)

- *The department rarely has visiting professors; university funding for such positions would be necessary to attract quality visitors. This would benefit both the students, who would get exposure to international expertise, and the faculty, who would be able to extend their research collaboration network.* The Department agrees fully with this recommendation. In fact, the Law of the University stipulates that 10% of the academic positions should be utilized for this purpose. For a number of years, before the economic crisis, that was very much so and the experience was positive as the institution of a visiting professor was mutually beneficial and with important multiplier effects. Since the economic crisis, the 2-3 academic positions that were left vacant by the Department and utilized for inviting visiting professors were returned to the central University pool and the relevant funds were also frozen. Again the Rectorate, the Senate and the Council should consider reinstating the previous state of affairs.

- *Recent research suggests that student evaluations may be biased. It is therefore not advisable to base promotion decisions on the scores in student questionnaires. The department should explore the possibility of teaching evaluation by peer observation. In addition, student feedback should be processed by support staff so that non-constructive or offensive comments are filtered and not passed to the teaching staff.* The Department appreciates the value and validity of teaching evaluation (or teaching mentoring) by peer observation, especially during the start of one's academic career. This suggestion as well as the Committee's expressed reservation regarding the use of the scores in student questionnaires for staff promotion decisions, given the fact that recent research suggests that student evaluations may be biased, will be forwarded to KEDIMA, the University's Centre for Teaching and Learning, for its consideration. In fact, it is our understanding that KEDIMA is already considering the implementation of peer evaluation amongst other measures concerning the quality of teaching. Finally, regarding the processing of student feedback in order to remove non-constructive or offensive comments, the Department is in full agreement and again it will request KEDIMA, that oversees the application of the student evaluation questionnaire, to implement this recommendation.

## 4. Students (*ESG 1.4, 1.6, 1.7*)

**Recommendations of the EEC and Departmental decisions/actions:**

- *An overwhelming majority of the students in the programme are male. The department should explore new approaches to reaching out to pre-university female students to encourage them to apply to the programme. It may be helpful to establish a women-in-CS organisation to improve both the experience of female students and the image of the department as a welcoming place for female students.* The Department will act upon all these recommendations as they collectively constitute one of its strategic objectives. In addition, it is necessary to objectively understand the key reasons of the observed drop in interest of female students over the past 4-5 years. In its efforts to avert this situation, the Department will utilize its strong links with the Cyprus Computer Society, and the relevant sector of the Ministry of Education and Culture. As a matter of fact, the Ministry is aware of this and they are already taking some actions in this respect.

- *The department would benefit from more robust conflict resolution procedures, so that if a student feels that they are not treated fairly, they can get impartial advice and help. Such help would also be best provided at the university level, e.g. by appointing an independent ombudsman.* This recommendation will be forwarded to the Senate Committee for Undergraduate Studies (that is chaired by the Vice-Rector for Academic Affairs) for consideration. At the same time the Department will try and streamline its own procedures, so that all students are equally and fairly treated, particularly in matters concerning their studies and learning performance. Likewise, the students should make better use of their academic advisors who are there to provide first level advice and help to the students and in a sense to act as their personal "ombudsmen".

- *The department should explore mechanisms that ensure that students who may not be comfortable in revealing learning difficulties or other hidden disabilities get the necessary help without having to discuss the nature of their disability with individual faculty members.* The Department will explore this recommendation and also seek advice from the competent office of the Student Welfare Services of the University.

## 5. Resources (*ESG 1.6*)

**Recommendations of the EEC and Departmental decisions/actions:**

- *The department and the university should ensure that laboratory facilities are sufficiently resourced and supported in the future, by having a clear plan to support laboratory facilities with future investment in order to refresh the software and hardware lifecycles.* It is fair to say that the Department has a clear (rotating) plan to support its laboratory facilities with future investment in order to refresh the software and hardware lifecycles, but unfortunately over the last few years in particular, the Department's plans do not have at University level the reception that they deserve. Hopefully the recommendation of the EEC will help to alleviate this situation and the relevant University authorities will come to appreciate/accept that central facilities cannot cater for specialized computing needs.

- *In addition, laboratory facilities should explore the use of public cloud computing resources to complement on-premise hardware purchases.* The Department agrees fully with this recommendation. Specifically, a number of undergraduate courses are already using public or in-house cloud and HPC resources in the labs, and we shall aim to utilize further public cloud resources through the Cyprus Research and Academic Network, which is a member of GEANT and it has been chaired by a member of faculty of the Department (A. Pitsillides previously and V. Vassiliou currently). Moreover, the Department has a strong research infrastructure comprising high-performance clusters and cloud computing facilities. In addition, a proposal has been recently approved by the Senate regarding the establishment of a university-wide High-Performance Computing (HPC) Data Center that will be housed in the new Library building, and a budget of 1 million Euro has been allocated for the hardware purchases. The envisioned Data Center will invest in GPU, cluster and Cloud computing resources. Two faculty members of the Department are members of the HPC Data Center committee.

- *The department must also ensure that appropriate software offerings are available to students for their work.* The Department, within its own authority and financial means, has always tried to apply this recommendation in the best possible way, giving emphasis to open source tools.

6. **Additional for distance learning programs** *(ALL ESG)*

7. **Additional for doctoral programs** *(ALL ESG)*

8. **Additional for joint programs** *(ALL ESG)*

## B. Conclusions and final remarks

The Department of Computer Science expresses its sincere thanks to the members of the External Evaluation Committee for their thorough and insightful evaluation of the undergraduate programme of studies of the Department. The Department notes with ample satisfaction that the Committee's recommendations are closely aligned with strategic objectives of the Department and in this respect the opinion of external, independent peers is of great value to the Department, that looks forward to discussing further and implementing the Committee's recommendations, with the support of the University as the case may be. Moreover, the Department would be very happy and willing to share in due course with the members of the Committee, the experiences that will accrue from these developments and in particular the means and mechanisms that will be deployed in pushing forwards with the given recommendations.

The Department also thanks the Cyprus Agency of Quality Assurance and Accreditation in Higher Education, as well as the two members of staff of the Agency who accompanied the Committee during its site visit, for the amicable organization of the entire external evaluation process.

## C. Higher Education Institution academic representatives

| *Name* | *Position* | *Signature* |
|---|---|---|
| **Irene-Anna Diakidou** | Vice-Rector for Academic Affairs | |
| **Elpida Keravnou-Papailiou** | Chair of Department of Computer Science | |
| **Anna Philippou** | Coordinator of the Undergraduate Studies Committee of the Department of Computer Science | |

Date: 3rd June 2019