

Doc. 300.1.2

Date: 02/10/2019

Higher Education Institution's response

- **Higher education institution:** University of Nicosia
- **Town:** Nicosia
- **Programme of study (Name, ECTS, duration, cycle)**

In Greek: Επιστήμη Δεδομένων (Εξ' Αποστάσεως, 1.5 έτη, Μεταπτυχιακό Δίπλωμα, 90 ECTS,)

In English: Data Science (Distance Learning, 1.5 years, Master of Science, 90 ECTS)

- **Language of instruction:** English
- **Programme's status**
New programme: X
Currently operating:

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 (HEI) based on the External Evaluation Committee’s (EEC’s) evaluation report (Doc.300.1.1) must justify whether actions have been taken in improving the quality of the programme of study in each assessment area.*
- *In particular, under each assessment area, the HEI must respond on, without changing the format of the report:*
 - *the findings, strengths, areas of improvement and recommendations of the EEC*
 - *the deficiencies noted under the quality indicators (criteria)*
 - *the conclusions and final remarks noted by the EEC*
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- *The HEI’s response must follow below the EEC’s comments, which must be copied from the external evaluation report (Doc. 300.1.1).*
- *In case of annexes, those should be attached and sent on a separate document.*

0. Introduction and overall assessment

We refer to the Report of the external evaluation committee for the evaluation-accreditation of the program of study: ‘Master of Science in Data Science - Distance Learning’, which was prepared following a site visit at the University of Nicosia by the members of the External Evaluation Committee (EEC) on July 4, 2019.

We would like to thank the EEC members for their professional and thorough work during the on-site evaluation of the MSc Data Science (Distance Learning) programme and their report. We would also like to express our appreciation for the collegial and constructive approach with which they conducted their evaluation. All full-time faculty teaching in the programme were present during the evaluation. Many of the part-time faculty were also present and the committee had separate meetings with them, as well as with two current students of the Computer Science Department.

The EEC report is extremely positive with very high scores in all Sections and categories. We are looking forward to the accreditation of the programme based on this report.

More specifically we have noted below the scores per category/section, which average to Substantially to Fully Compliant (3 Sections Fully Compliant and 2 Sections Substantially Compliant).

Section 1. “Study programme and study programme’s design and development”, marked as **Substantially Compliant**

From the 31 (applicable) quality indicators:

- 28 were considered fully or substantially compliant.
- 3 were considered partially compliant
- 0 were considered non-compliant

Section 2. “Teaching, learning and student assessment”, marked as **Substantially Compliant**

From the 12 (applicable) quality indicators:

- 11 were considered fully or substantially compliant
- 1 was considered partially compliant
- 0 were considered non-compliant

Section 3. “Teaching Staff” marked as **Fully Compliant**

From the 14 (applicable) quality indicators:

- All 14 were considered as full or substantially compliant
- 0 were considered partially compliant
- 0 were considered as non-compliant

Section 4. “Students”, marked as **Fully Compliant**

From the 7 (applicable) quality indicators:

- All 7 were considered fully or substantially compliant
- 0 were considered partially compliant
- 0 as non-compliant

Section 5. “Resources”, marked as **Fully Compliant**

From the 10 (applicable) quality indicators:

- All 10 were considered as fully or substantially compliant
- 0 were considered as partially compliant
- 0 were considered as non-compliant

Section 6. “Additional for distance learning programmes”, marked as **Fully Compliant**

From the 19 (applicable) quality indicators:

- 18 were considered as full or substantially compliant
- 1 were considered as partially compliant
- 0 were considered as non-compliant

We specifically note the agreement of EEC with our proposed mode of assessment, which provides alternative modes of course assessment in place of written face-to-face final exams (see Point 2B.1).

We do appreciate the committee’s recommendations for improvement, which will enhance the quality of our program and we will be addressing those in the corresponding section of this response.

In the following sections we break down the comments and suggestions of the committee and we provide our comments (if any) and the actions taken in order to address the comments. In order to simplify and make this response report easier to read, we state all positive comments for each section together and then we respond to the constructive feedback of the committee.

1. Study programme and study programme's design and development

(ESG 1.1, 1.2, 1.8, 1.9)

1A. Positive Comments by the EEC

- *“The programme of study focuses on the computer science, mathematics as well as on the domain knowledge components of data science. It is timely and relevant. Its objectives and intended learning outcomes are aligned and compatible with distance learning education.”*
- *“The programme design is sound, informed by research and based on appropriate preparatory work. It was designed by a committee of academics with consultations with industry and international institutions.”*
- *“The programme design is sound, informed by research and based on appropriate preparatory work. It was designed by a committee of academics with consultations with industry and international institutions.”*
- *“The programme supports student progression. There is a balance between computer science, mathematics and domain knowledge. The contribution of each course to the learning outcomes of the programme is clear and distinct.*
- *“The programme builds on the excellent distance learning framework from University of Nicosia in terms of quality assurance, student feedback, pedagogical support for faculty, approval and review process and IT support. There are mechanisms in place to detect plagiarism and processes to addresses fraud cases.”*
- *“The programme is well-designed, relevant, timely. It builds on the existing strengths of the distance learning education at U. Nicosia.”*
- *“The programme management and teaching staff are of high quality.”*
- *“The project in Data Science, taught by industry collaborators is a competitive advantage for the programme.”*

1B. Constructive Feedback by the EEC

- **1B.1** *“The programme duration of 1,5 years with optional thesis is compatible with Cypriot law and in line with the university strategy. “However, this lack of focus on independent study and training in the research process does not compare positively with respect to other programmes in Europe or internationally.”*

Action/Response: We would like to stress that the MSc in Data Science puts particular emphasis in developing the students research skills. Specifically, the compulsory course “COMP-592DL Project in Data Science” in combination with the compulsory “COMP-500DL Research Seminars and Methodology”, are designed to cultivate the research skills of the students of the MSc. It should also be noted that a significant part of the student assessment in COMP-500DL (50% of the course grade) includes a literature survey on a specific topic that is proposed by the student so that it captivates his/her research interests, with the findings written in a form of a scientific paper and presented by each student in a conference-like setting.

Nonetheless, in order to emphasize even more on the development of the students independent study skills, we have increased the number of credits of COMP-592DL by 2 ECTS and reduced the ECTS of “COMP-500DL Research Seminars and Methodology” by 2, removing the section on statistical analysis already covered in COMP-540 Mathematics for Data Science. Edits were made to both course outlines/study guides in order to reflect the above amendments. We would like to emphasize that COMP-592DL is particularly important as students will have the opportunity to work on a large-scale research and domain-dependent project that will require R&D skills as well as domain expertise.

Regarding the thesis, we highlight the EEC comment ‘....**optional thesis is compatible with Cypriot law and in line with the university strategy**’. Indeed this is the case and the practice adopted by Cyprus Universities. We feel that having the thesis obligatory will make the program less flexible especially for those students who will like to focus on more than one specialized subjects of Data Science instead of specializing in a particular subject area. Making the Thesis obligatory, will limit the students to only 1 elective. This 1 elective is significantly restrictive and will limit the opportunity of students to explore advanced courses such a Big Data Processing, Deep Learning, Artificial Intelligence, as well as, extend their knowledge in domain specific topics such as Medicine and Bioinformatics, Mining Social and Web Data, Business Intelligence, and Data Privacy and Ethics. The Programme Development Sub-Committee for the MSc in Data Science of the University of Nicosia, carefully selected these courses in order to cover a wide range of advanced and domain-specific skills in Data Science, after a thorough dialogue process with the industry and academia.

Furthermore, we note that when the program is launched, the programme committee and the faculty advisors will be encouraging students who wish to follow an academic career or work in R&D to opt for the thesis option. On the other hand, students who wish to extend their expertise in crucial industry areas where data science is applied, will be encouraged to choose the non-thesis option.

We therefore feel that this flexibility is a strong feature of the programme and indeed the basic reason why Universities in Cyprus adopt this as one option for their programmes.

Therefore, if the EEC agrees with this justification, we would like to leave the thesis optional.

- **1B.2.** “The optional nature of the thesis is a weak point of the programme.”

Action/Response: Please, see our response in point 1B.1

- **1B.3** *“The programme assumes that students have a good degree of programming and mathematics proficiency. There are no courses, workshops, preparatory sessions or special tutoring allowing students to catch up. There is no focus on learner’s general competencies, which is appropriate in a MSc Distance Learning programme.” “The programme does not provide special support in programming and mathematics for students whose proficiency is not sufficient to effectively follow the programme. A recommendation could be to either (a) introduce tests to screen students before admission and/or to (b) introduce workshops/courses that make it possible for students to build up/refresh their programming and mathematics skills before the start of the programme.”*

Action/Response: As the EEC correctly observed, the MSc in Data Science (Distance Learning) of the University of Nicosia targets students with basic/introductory knowledge to Programming and Mathematics. This is ensured by the admission criteria (see Point 9B.3) where students with no such background will be discouraged to apply. On top of that, the two introductory courses that the students will have to follow in their first semester: 1) COMP-542DL Data Programming and 2) COMP-540DL Mathematics for Data Science, aim at: a) aiding students at revising the basic concepts and fundamentals of programming/mathematics necessary for data science, and b) extending their knowledge and focus on the programming/math topics that will be required in the following courses.

Regarding general competencies, we would like to clarify that the Distance Learning Unit provides tutorial and support where necessary.

- **1B.4.** *“The university is strong in the areas of medicine and pedagogy. The proposed MSc program contains one subject on the application of data science in the context of medicine, but not in the context of pedagogy. Therefore, the EEC believes it would be possible and interesting to add one subject about learning analytics in the program. It may also be a trigger to enhance research interdisciplinarity opportunities with the education area of the university.”*

Action/Response: We have added a subject of learning analytics in the program of study. More specifically, we have included the topic of Learning Analytics in the course “COMP-547DL Social and Web Data Analysis” (see Annex 1 – pages 81 and 85) The reason of integrating this topic to this course is that that the techniques that will be introduced in COMP-547DL (Graph Analysis, Social Data, Sentiment and Text Analysis, etc) are the ones that are widely used in the field of Learning Analytics. In the corresponding chapter, the students will be introduced to the applications of Educational Data Mining and Learning Analytics and the data that can be utilized in an educational setting in order to improve the learning process.

- **1B.5** *“The EEC considers that the discussion about the Big Data era in the curriculum is weak; a suggestion would be that an introductory discussion on Big Data models and architectures is included in COMP-543DL and a deeper presentation appears in COMP-548DL.”*

Action/Response: COMP-543DL and COMP-548DL have been modified as suggested by the EEC. The following amendments have been made: COMP-543DL has been modified to include an introductory discussion of what makes data "big" by featuring a dedicated Section ("The Big Data Era: Models and Architectures") covering the dimensions, basic models and architectures of Big Data. This, along with the Section "Data Visualization at Scale" can be considered a satisfactory introduction to Big Data covered in COMP-543DL. To make room for this new Section, the Sections "Data Quality" and "Data Preprocessing and Cleaning" have been merged with content of the former referring to data transformations added to the Section "Aggregation Techniques for Relational Data Warehouses" which has been renamed to "Data Transformation and Aggregation Techniques for Relational Data Warehouses". With the room left after removing the introduction to Big Data, COMP-548DL has been amended by splitting the Section "Big Data Models" into two Sections "Big Data Advanced Models I and II" to provide a deeper presentation of Big Data models. The amended course syllabi as well as the amended study guides for these courses are both included in Annex 1 (pages 3, 7 and 41, 46, respectively).

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

2A. Positive Comments by the EEC

- *“UNIC is a rather young institution with about 12 years of presence as a HEI in Cyprus. Nevertheless, in this period it has presented a high number of teaching activities, through which it has gained a lot of experience in teaching and learning methodology and processes.”*
- *“Especially for DL, the Department of Comp Sci has limited past experience; this fact however is overcome by UNIC’s extensive experience of years in DL, with its running programmes already accredited by state authorities (ECPU and CYQAA). This is a kind of warranty that everything runs smoothly, considering both tutors and learners of this new programme. For instance, UNIC maintains a dedicated DL unit / helpdesk with a number of ~10 persons devoted to operating and supporting DL programmes.”*
- *“The tutors pass a 36 hours faculty professional development seminar on teaching and learning theory and practice offered by ePSU (e-Learning Pedagogical Support Unit)”*
- *“According to the institution’s quality standards and indicators, courses include general and weekly forum discussions to enhance learning and promote interactivity, exchange of ideas, discussions and active class participation both on a faculty-student and student-to-student levels. The institution’s policy for lecturers requires them to be responsible for updating their material. At the beginning of each semester, lecturers are required to submit /re-submit the course materials to be available on-line. A new course outline – with updated reading materials, textbooks, cases, etc. must be submitted and uploaded, as well as any other course materials, such as lecture notes, case studies, etc. Accuracy is maintained through inspection of the materials.”*
- *“The teaching staff base their teaching and assessment methods on objectives and intended learning outcomes. Innovative teaching methods are used in educational activities and the teaching staff is using new technology (Moodle, WebEx, etc.) in order to make the teaching process more effective. Theory and practice are interconnected in teaching and learning. All the above are ensured through the periodic surveys from learner’s side and the communication with the program coordinator from the teacher’s side.”*
- *“Practical training is non-applicable in this programme, mainly due to its DL nature. On the other hand, there is course COMP-592DL (compulsory, 4 ECTS) through which, students have the opportunity to be actively involved in research performed by teaching staff.”*
- *“The programme is designed according to international standards of teaching and learning with respect to pedagogical methods, modes of delivery, and variety of learning outcomes. The process of teaching and learning takes into consideration the specific students’ needs. Teaching methods, tools and material used in teaching are modern, effective, and support the use of modern educational technologies. The programme presents a balanced mixture of practical and theoretical teaching hours.”*
- *“Assessment is appropriate, transparent, objective and supports the development of the learner. The criteria for and method of assessment, as well as criteria for marking, are published in advance. 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.”*

2B. Constructive Feedback by the EEC

2B.1 *“UNIC should consider changing the final assessment process. Currently, the assessment is made through written exams, which is not the most appropriate manner for a DL programme (it requires students to move to examination centres, etc.). According to the institution representatives, this is due to state legislation, but the EEC feels that it should be underlined as a strong recommendation to both UNIC and CYQAA.”*

Action/Response – We agree with the suggestion of the EEC. This is the reason why we incorporate alternative ways of final assessment (e.g. projects) in the MSc in Data Science. Only for one course (COMP-540DL – Mathematics for Data Science) a final exam is necessary since this is considered the best way to assess the learning outcomes of the course.

Regarding the requirement of CYQAA for the students’ physical presence in the final assessment (i.e. written exam), we would like to clarify that the Distance Learning Unit and the Faculty of the program is ready to operate the final assessment with distance learning methodologies (e-invigilation, etc) if and when this practice is approved by the CYQAA.

2B.2 *“Unfortunately, the final thesis project is left as option to the students (and, according to the feedback received by the faculty, only a small minority of students are expected to take this option), which means that the majority of students will miss the opportunity to be involved in a real-world research task.”*

Action/Response – Please see our response on point 1B.1

2B.3 *“It was not clear how students are encouraged to take an active role in creating the learning process”*

Action/Response – We would like to clarify that students take an active role in all academic decisions including the development of the learning process. This is achieved through the following student participation to a number of academic bodies: a) The Department of Computer Science Council has three elected student representatives who are voting members to all Departmental decisions, including the proposal of new programs, pathway design, course descriptions and learning outcomes etc. Students from the MSc in Data Science will be able to participate in the department council. b) The three Department Council representatives are also chairing the Department’s “Student Wellness Committee” which is responsible of providing feedback regarding the curriculum and liaise with the rest of the students. c) There is one student member in the Internal Team of Reviewers who evaluate the program 2 years after its accreditation, as per the University regulations regarding the Internal Program Evaluation Process (IPEP). Finally, d) Every semester, the coordinator will run a WebEx session where students will participate and suggest methods to improve the programme, discuss their problems, etc.

Moreover, there is a specific guideline in the Distance Learning Faculty Handbook (Section 1, point 5) regarding the students' active role in creating the learning process. As stated in the handbook:

“It is essential that all courses are structured in such a way so as to ensure interactivity between (a) students and faculty, (b) students and course materials, and (c) students and their classmates, and to encourage students' active participation in the learning process.

This can be achieved through the use of various activities, assessments and communication tools, indicated later in this document. The effective use of these enhances students' performance and has a positive impact on the successful delivery of the course.”

- **2B.4** *“A Data Science programme is typically built upon two scientific background pillars, namely Computer Science and Math/Statistics; thus, it is important that students' different abilities on these two topics are considered seriously through some preparatory workshops.”*

☑ **Action/Response** – Please see our response on point 1B.3

- **2B.5** *“The final thesis project is optional, which means that several (perhaps, the vast majority of) students will miss the opportunity to be actively involved in a real-world research task. UNIC should seriously consider changing its status to compulsory.”*

☑ **Action/Response** – Please see our response on point 1B.1

- **2B.6** *“It is not clear whether people outside of UNIC are involved in the assessment of learning outcomes, especially during the defense of the final project thesis. The EEC highly recommends it.”*

☑ **Action/Response** – Regarding the involvement of people outside of UNIC in the assessment of learning outcomes, we would like to clarify that there is an Internal Program Evaluation Process (IPEP) which includes an External Team of Reviewers. The IPEP is initiated 2 years after the accreditation of the programme and the External Team of Reviewers include one faculty member from another University who is an expert in the programme area as well as one industry expert.

Regarding the evaluation of the MSc Thesis, it is already a common practice in the University of Nicosia that professors from other Universities are invited. In the particular case of the MSc in Data Science, this practice will be encouraged even more since this is an interdisciplinary programme where the domain expert will be invited. Given the distance learning nature of the MSc in Data Science this strategy will be straightforward to implement.

- **2B.7** *“The EEC recommends that UNIC explores a more lightweight process for faculty development, focusing more on quality than quantity.”*

Action: We have communicated the above recommendation to the University Management, and more specifically to a) the Office of the Rector, b) the Pedagogical Support Unit c) and the e-Pedagogical Support Unit for their consideration.

3. Teaching Staff

3A. Positive Comments by the EEC

- *“Overall, regarding the teaching staff, the Data Science MSc Programme of the University of Nicosia is fully compliant. The teaching staff includes experienced scientists in the data science domain with qualifications that meet the objectives of the programme, and collaborations with both industry and academia.”*
- *“Teaching is connected with research, and teaching performance is assessed via questionnaires completed by the students. The teaching team includes both genders, both young and senior faculty at different ranks.”*
- *“The teaching staff includes experienced scientists in the data science domain, showing a fair and clear method regarding the recruiting process.”*
- *“The qualifications of the staff clearly meet the objectives of the programme and its planned learning outcomes.”*
- *“The teaching staff has established collaborations with both industry and academia within Cyprus and worldwide.”*
- *“The teaching staff is engaged in professional and teaching-skills training, especially on how to use the distance learning tools.”*
- *“There exist regular development discussions for assessing the teaching and research quality of the teaching and research quality.”*
- *“It is nice to see that teaching is connected with research as this showed by the publications produced in collaboration with students in the programmes the teaching staff participate currently.”*
- *“The teaching performance is assessed via feedback questionnaires completed by the students of the programme. Teaching performance, as well as research performance, affect teachers’ evaluation. Specialized seminars are organized for improving professors’ teaching skills.”*
- *“The teaching team is nicely built: both genders, both young and senior faculty at different ranks. “*
- *“Professors are well-qualified. The teaching team includes visiting teaching staff from other institutions and companies.”*

3B. Constructive Feedback by the EEC

- **3B.1** *“To increase the visibility and internationalization of the programme, recognized visiting professors can be invited for giving lectures of specialized topics.”*

Action/Response - The Department has strong collaboration links with renowned professors in Data Science worldwide and plans to utilize these collaborations for invited lectures on specialized topics, during the Computer Science Seminar Series which the Department runs every Spring and can be broadcasted to the distance learning students. On top of that, due to the distance learning nature of the MSc in Data science, industry experts as well as established researchers will be invited as guest lecturers in the offered courses.

- **3B.2** *“If the new programme is accepted, and given the current workload of the teachers, they should get rid of part of their existing teaching load, so as to have a reasonable amount of teaching hours and available time for research.”*

Action/Response - There have already been two recent hirings of Data Science professors who are currently utilized by the department to teach non-specialized, basic Computer Science courses. When the new program is launched, we plan to remove these general CS courses from the specialized faculty so that they will devote their normal load to Data Science courses. This will also be the case with any other Data Science teaching faculty on the program. New faculty to be hired will undertake the general CS courses. For the MSc in Data Science, new part-time faculty have been recruited with industry experience. These faculty will have no other teaching responsibilities other than the MSc in Data Science.

4. Students

4A. Positive comment by the EEC

- *“The EEC believes that the university provides high level support and services to students. KESY provides the adequate help to students that have special needs or a personal difficulty. Students participate in internal evaluation mechanisms, but they should also have the opportunity to see the effects of their feedback. The EEC is concerned regarding the absence of a requirement regarding the programming skills needed to participate in the program.”*
- *“The teaching staff is easily accessible by the students.”*
- *“All the regulations regarding student progression, recognition and certification are in place.”*
- *“There are adequate welfare mechanisms to support the students through KESY.”*
- *“The students have the opportunity to provide feedback to the university and to participate in the internal evaluation procedures.”*
- *“The adequate support is provided to students with special needs or disabilities.”*

4B. Constructive Feedback by the EEC

- **4B.1.** *“The EEC believes that programming background is necessary to participate in this program. Therefore, the admissions requirements should either discourage students with no programming background to apply for this program or provide extra courses to get the required programmed skills.”*

Action/Response – Please see our response to point 1B.3

5. Resources

5A.1 Positive Comments by the EEC

- *“The EEC generally believes that the environments provided by the university are adequate to support learning and to support the design and implementation of teaching. The classrooms and laboratories are well dimensioned and sized, the technological infrastructure is good, the library provides a good amount of resources, both physically and virtually, and they have appropriate tools that support teaching and learning, including Moodle, Webex, Planet E-stream. The university also provides some rooms where to make recordings and conduct virtual meetings with students, with the support of the distance learning unit.”*
- *“According to students, the university provides necessary assistance through KESY. The welfare services provide the adequate support to students and there are enough learning resources to help them during their studies.”*
- *“According to faculty members, the university provides pedagogical support for designing, implementing and evaluating conventional and online courses, both face-to-face and distance learning by the PSU and ePSU units.”*
- *“The University welfare system for undergraduate and postgraduate students seems to be a very useful and complete service to support students during their learning.”*
- *“The EEC believes that the university has adequate mechanisms to provide the necessary assistance to students with disabilities.”*
- *“The ePSU unit is considered a best practice, due to its structure, its resources, its infrastructures and its services. We believe that they can be a powerful support for guaranteeing and maintaining the quality of the provided teaching.”*
- *“The Distance Learning Faculty Handbook provided for the ePSU is a useful resource that establishes the main characteristics a distance learning course should have. It is a good reference document that guarantees the quality and homogeneity of the distance learning course.”*
- *“The weekly guides used in the courses to determine the work to be done every week for the students is also considered a best practice.”*
- *“As a distance learning program, the learning resources are continuously available to students”*

5B. Constructive Feedback by the EEC

- **5B.1** *“Even though the materials provide a good variety (videos, papers, e-books, etc.) which is good for distance learning, we believe that some considerations should be taken into account to the video materials to be more usable and accessible for students: make them shorter (usually videos in this context should not exceed 7 minutes), include the teacher in the video to provide the non-verbal communication, to add subtitles for accessibility questions.”*

Action/Response – We agree with the recommendations of the EEC. The video material provided were in line with the “Distance Learning Faculty Handbook (DLFH) – Guidelines for the Development and Delivery of Distance Learning Courses” developed by the Distance Learning unit of the University of Nicosia and which provides guidelines and examples of how to set up and

run a distance learning course across all disciplines. We have submitted this booklet along with our initial application (see Annex 4.2 – Distance Learning and Other supporting Documents in our original application, and more specifically the file “a_Distance Learning Faculty Handbook.pdf”). The DLFH is applied on all Distance Learning programs of the University of Nicosia and any amendments have to go through the Senate. We have submitted the suggestions to the Distance Learning Unit of the University. In addition, the Coordinator of the MSc in Data Science will distribute a set of additional guidelines on top of the DLFH to every faculty member of the program. Those guidelines will include the following instructions.

- ▶ “It is advised that the introduction video should be up to 7 minutes.”
- ▶ “When recording the video, it is considered a good practice that the teacher is included in the video to provide non-verbal communication”
- ▶ “Captions should be included in the video.”

- **5B.2** *“Another improvement that would greatly benefit students would be the addition of intelligent tutor systems to support immediate and automatic feedback to students and a testing environment to test their advances.”*

Action/Response – We agree with the comment of the EEC. In the Distance Learning Unit’s “Distance Learning Faculty handbook” there are guidelines, instructions and tutorials that encourage the development of automatic feedback like quizzes and questionnaires. In the courses that we have prepared for demonstration purposes for the evaluation visit, we have already included such quizzes. As for intelligent tutor systems, the University of Nicosia is in constant investigation of such technologies in the education process.

6. Additional for distance learning programmes

6A. Positive comments by the committee

- *“The distance learning methodology is appropriate for the particular program of study. The university assesses its quality by external and voluntary accreditations, such as the ones of QS Stars or EADTU.”*
- *“The university has a unit responsible for providing pedagogical support for designing, creating, implementing and evaluating online courses (ePSU). The unit addresses the requirements for study materials, interactive activities and formative assessment in accordance to international standards.”*
- *“The proposed courses have a complete syllabus plus a weekly study guide that includes relevant information: objectives, learning outcomes expected, material to use, activities to perform, discussions to address and complementary bibliographic references. Each course has a minimum of 9 hours of synchronous communication between teacher and students. The collaboration among students is promoted by some activities. Collaboration among teachers and students (and among students) is conducted through the forums of the subjects and other forums that can be created ad-hoc for facing special needs.”*
- *“During the courses, feedback to students are provided regularly by teachers.”*
- *“Final evaluation may be by a final exam or with a practical activity in some cases”*
- *“The university provides a workshop (and plan to develop new ones in the future) to train teachers in distance learning. In addition, the faculty handbook and the ePSU services provide a good ground to teachers to face distance learning.”*
- *“The ePSU unit is considered a best practice, due to its structure, its resources, its infrastructures and its services. The EEC believes that it can be a powerful support for guaranteeing and maintaining the quality of the provided teaching.”*
- *“Being continually evaluated by non-mandatory external accreditation organizations is a good practice.”*
- *“The Distance Learning Faculty Handbook provided by the ePSU is a useful resource that establishes the main characteristics a distance learning course should have. It is a good reference document that guarantees the quality and homogeneity of the distance learning course.”*
- *“The weekly study guides used in the courses to determine the work to be done every week for the students is also considered a best practice.”*
- *“The fact that real world problems will be faced by students though the use of Expedia data and M-competition is considered a strong point of the program.”*
- *“The policies they have regarding the way the teachers should communicate to students and the time limit (48 hours) before responding. In addition, the provision of nine hours of synchrony between teacher and students for each subject is a good practice that can improve grades and avoid dropout when used efficiently”.*

6B. Constructive feedback by the EEC

- **6B.1** *“According to the videos shown during the visit, the EEC believes that some considerations should be taken into account to the video materials to be more usable and accessible for students. At least, it would be convenient to make them shorter (usually videos in this context should not exceed 7 minutes), include the teacher in the video to promote the non-verbal communication and add subtitles for accessibility questions.”*

Action/Response – Please see our response in Point 5B.1

- **6B.2** *“The use of synchronous mobile messaging systems, such as slack, may be a good asset, since it may greatly facilitate communication between faculty and students.”*

Action/Response – The Distance Learning unit recommends such strategies in the “Distance Learning Handbook” (see page 5, pages 9-17). The use of slack is common practice among the faculty in order to facilitate student-to-teacher and student-to-student communication.

- **6B.3** *“Weekly guides are a great resource and very valuable for students. However, it makes difficult to visualize the dedication time of the assessment activities. It would be great to have more information about the expected dedication time of all the activities, mainly in the graded ones.”*

Action/Response: Overall dedication time *per week* is already included in every study guide of every course of the MSc in Data Science program submitted with our initial application. The guidelines that will be provided to the faculty of the Data Science MSc will amend the Distance Learning Faculty Handbook (see also point 5B.1) at page 17 as follows:

“The weekly effort and time required for the course should be clear and made explicit to students in the course’s Study Guide. In addition to that, the dedication time for the assessment activities (especially the graded ones) should be indicated in the description of each project/activity”.

- **6B.4** *“Another improvement would be the inclusion of intelligent tutoring systems for some activities. That would support immediate and automatic feedback to students and provide a testing environment where they can test their advances.”*

Action/Response: Please see our response on Point 5B.2

- **6B.5** *“One of the concerns about the master is how the university would support new students that are not very proficient in math or programming. In that sense, some tools, like Datacamp, may help the students to improve their programming skills without taking so much workload to faculty.”*

Action/Response: Please see our response in Point 1B.3. In addition, it is common practice that additional resources (like DataCamp) are introduced to students in the Moodle platform.

- **6B.6** *“The use of gamification techniques would be very useful to promote the use of formative assessment activities.”*

Action/Response: Gamification as well as several other tools and methods of authentic assessment were embedded in the Professional Development Training that is offered to all academic staff. As part of this training, academic

staff was informed for the necessity of gamification in the learning procedure especially in DL course. During workshops academic staff had the opportunity to interact with gamification methodology as well as with tools and applications that can use in their courses. Some academic staff that already used gamification shared with the rest their experiences and challenges of their use. Trainees were also presented with data demonstrating the theoretical framework that support the need for implementing gamification within the context of DL delivery. Trainees were also presented with research data indicating the advantages of gamification in the learning procedure and were encouraged to use gamification as a tool for increasing motivation and for implementing formative assessment.

- **6B.7** *“The communities of interest are good resources to promote learning among students in distance learning environments, since they provide a place to share knowledge that goes beyond subjects. The EEC believes the promotion of these communities may be a good lever to promote communication and knowledge sharing among students in the context of the current program.”*

Action/Response: It is a common practice among many professors of the MSc in Data Science that they promote the development of slack-based online communities. This way, communities of interest are developed and exist even after the completion of the course. Such communities can operate with or without the supervision of the instructor.

- **6B.8** *“Student performance is monitored and there are mechanisms to detect and address students with lower grades or with undelivered activities. The monitorization could be greatly improved by using some learning analytics techniques.”*

Action/Response: We would like to note that our Distance Learning Unit in collaboration with the Technology Enhanced Learning Centre is collecting and analysing data (e.g. clickstream analysis) of distance learning courses. Generated reports are delivered to the appropriate units of the university.

- **6B.9** *“The EEC believes that the necessity of making a final written exam to evaluate some subjects may be very limitative in a distance learning environment, in which subjects are geographically dispersed.”*

Action/Response: We would like to clarify that out of the 13 courses of the MSc in Data Science, only one (COMP-540DL Mathematics for Data Science) is obligatory to be examined with a written exam and this is due to the nature of the course and its learning objectives that need to be assessed with a written exam. This was a decision of the sub-committee made after discussion with the relevant faculty.

There are technological means that enable a written exam to be conducted on a connected computer with an e-invigilator. In this case the geographical distribution of the students is not an issue. However, e-invigilation, is a practice

not currently approved by the Cyprus Quality Assurance and Accreditation agency.

7. Additional for doctoral programmes (ALL ESG)

Not Applicable.

8. Additional for joint programmes (ALL ESG)

Not Applicable.

9. Conclusions and final remarks

9A. Positive Comments by the EEC

- *“Overall, the proposed Data Science Master of Science Programme of UNIC is substantially compliant. The programme of study is timely and relevant. Its objectives and intended learning outcomes are aligned and compatible with distance learning education. The programme design is sound, informed by research and based on appropriate preparatory work.”*
- *“The teaching staff includes experienced scientists in the data science domain with qualifications that meet the objectives of the programme, and collaborations with both industry and academia. Teaching is connected with research, and teaching performance is assessed via questionnaires completed by the students. The teaching team includes a good balance of genders and seniority of professors.”*
- *“The university resources are adequate to support learning and the design and implementation of teaching. The classrooms and laboratories are well dimensioned and sized, the technological infrastructure is very good, the library provides a good amount of resources, both physically and virtually, and they have the tools for supporting teaching and learning, e.g., Moodle, Webex, Planet E-stream.”*
- *“The distance learning methodology is appropriate for the particular program of study.”*
- *“The university has a unit responsible for providing pedagogical support for designing, creating, implementing and evaluating online courses. The unit addresses the requirements for study materials, interactive activities and formative assessment in accordance to international standards”*
- *“The university provides high quality support and services to students, with adequate help to students that have personal difficulties (e.g., due to the economic crisis).”*

9B. Constructive Feedback by the EEC

- **9B.1** *“The programme duration is 1,5 years with an optional thesis, leading to a lack of focus on independent study and training in the research process.”*

| **Action/Response:** Please see our response on point 1B.1.

- **9B.2** *“Students participate in internal evaluation mechanisms, but they should also have the opportunity to see the effects of their feedback.”*

| **Action/Response:** Please see our response on point 2B.3.

- **9B.3** *“For the admissions requirements, it seems that there are no rules regarding the programming skills needed to participate in the program”*

| **Action/Response:** Please see our response on point 1B.3. In addition to that, we have added the following text in our admission criteria (see underlined text).

5. Student admission requirements (See Specific Instructions):

General:

Applications for admission to the program will be considered only from candidates that fulfill the minimum entrance criteria as described below:

- A Bachelor Degree in numerate subjects such as, Computer Science, Computer Engineering, Mathematics, Physics, Biology, Economics, Electrical Engineering, from a recognized university (i.e. American, European, or another recognized equivalent qualification) with a CPA of at least 2.5. Applicants with lower CPA will be considered on an individual basis.
- The students should provide proof of knowledge (such as a certificate from a recognized entity or other relevant documentation) of knowledge of basic programming and basic mathematics (probabilities or statistics or linear algebra or calculus) unless this background is evident from the list of courses in their previous studies.
- Proficiency in the English Language: Students satisfy the English requirements if their first degree was taught in English. Otherwise, they would need to present at least a TOEFL score of 550 paper-based or 213 computer-based, or GCSE “O” Level with “C” or IELTS with a score of 6.0 or score placement at the ENGL-100 level of the University of Nicosia Placement Test.

Specific:

- A completed application form;
- A Curriculum Vitae indicating the student’s education, academic and professional experience, any publications, awards, etc.;
- List of Courses undertaken along with the grades received in previous degrees. The applicant should highlight the courses that prove basic knowledge of programming and mathematics. In case there are not such courses, the applicant should submit documentation/certificates from recognized organizations that prove such knowledge
- Letters of Recommendation: Two recommendation letters from academic or professional advisors;
- Personal Statement: A letter highlighting the applicant’s individual competences and strengths and providing his/her reflections regarding the expectations and value of the program as well as to his/her personal advancement and career development.

10. Higher Education Institution academic representatives

<i>Name</i>	<i>Position</i>	<i>Signature</i>
Ioannis Katakis	Associate Professor Programme Coordinator	
Athena Stassopoulou	Professor Head of Computer Science Department	
George Gregoriou	Associate Professor Dean, School of Sciences & Engineering	
Edna Yamasaki Patrikiou	Professor Vice-Rector, Academic Affairs	
Philippos Pouyioutas	Professor Rector	

Date: 02/10/2019