Doc. 300.1.2

# Higher Education Institution's Response

Date: 20/09/2022

- **Higher Education Institution:**
  **Cyprus Institute of Neurology and Genetics**
- **Town: Nicosia**
- **Programme of study**
  **Name (Duration, ECTS, Cycle)**

  **In Greek:**

  Μάστερ στη Βιοτεχνολογία (13 μήνες Πλήρης Φοίτηση, 2 χρόνια Μερική Φοίτηση, 2ος κύκλος σπουδών.

  **In English:**

  Master in Biotechnology (13 months Full-Time, 2 years Part-Time, 2nd cycle)
- **Language(s) of instruction: English**
- **Programme's status:** New
- **Concentrations (if any):**

  **In Greek: N/A**
  **In English: N/A**

**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 to 2021 [L.136(I)/2015 – L.132(I)/2021].**

## 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 or 300.1.1/2 or 300.1.1/3 or 300.1.1/4) 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 conclusions and final remarks noted by the EEC*

- *The HEI's response must follow below the EEC's comments, which must be copied from the external evaluation report (Doc.300.1.1 or 300.1.1/2 or 300.1.1/3 or 300.1.1/4).*

- *In case of annexes, those should be attached and sent on a separate document.*

## ***General Remarks by The Cyprus Institute of Neurology and Genetics***

We would like to thank the External Evaluation Committee (EEC) for their thoughtful evaluation and constructive comments regarding the proposed MSc program in "Biotechnology". We believe this process has strengthened our MSc program and we are very pleased to submit a revised version of the syllabus that we feel incorporates, where possible, the majority of the suggestions raised. All of the amendments proposed had to be in line with the guidelines of the Cyprus Agency of Quality Assurance and Accreditation in Higher Education, as well as the rules and regulations of The Cyprus Institute of Neurology and Genetics, ensuring the coherence of all the programs/courses.

A summary of the amendments that have been made can be seen below:

- The syllabi of the mandatory courses "Fundamentals of Biotechnology" and "Microbial Biochemistry" have been updated, following the recommendations by the ECC
- The course in "Molecular Virology and Immunology" is retained as mandatory and has been updated to include key lectures, following the recommendations by the ECC.
- Dr. Panagiotis Dalias (Agricultural Research Institute; ARI) has agreed to teach key lectures proposed by the EEC.
- The course in "Bioinformatics" is included as an elective course.

Overall, we are confident that the proposed MSc program in "Biotechnology" would provide candidates with all the specialized knowledge required to be immediately employed in the job market or progress further with their studies. It is our strong belief that such a program is currently lacking in Cyprus.

We would like to bring to the attention of the committee, that further to approvals received from the relevant authorities, as of September 2022, the Cyprus School of Molecular Medicine (CSMM), changes its name to "The Cyprus Institute of Neurology and Genetics". All degrees from September 2022 onwards, will be issued by "The Cyprus Institute of Neurology & Genetics". The relevant letter from the Ministry of Education, Culture, Youth and Sports is provided in Appendix A1.

## 1. Study programme and study programme's design and development
*(ESG 1.1, 1.2, 1.7, 1.8, 1.9)*

### *Findings*
The Cyprus School of Molecular Medicine is the postgraduate school of the Cyprus Institute of Neurology & Genetics. It is a private foundation that also receives governmental support and about half of the board members are appointed by the government. It functions as an international centre of Excellence in basic and applied research in biomedical and clinical sciences and as a regional reference centre. To accomplish this, the institute combines three pillars: services, research, and education. For the latter the institute has experience of 10 years of postgraduate teaching, next to training of scientists and doctors. Annual research is supported by local and international funding resulting in 34 research programs and an average of 81 peer-reviewed publications/year. Concerning service, the institute has accreditation for many quality controls and participates in several European Reference Networks. It provides many specialized services (>500) and has a high turnover (66.000 services or tests offered and treatment of 6000 patients in 2020). Overall, the External Evaluation committee (EEC) had an excellent impression of the institute and was pleasantly surprised by the professionalism, high scientific quality and scientific output, dedication and motivation of the personnel, and the general positive atmosphere.
The EEC wishes to thank the many people that provided it with lots of useful information. It appreciates the willingness of the staff and students resulting in a sense of cooperativity during the on-site visitation.

### *Strengths*
The institute has a very good reputation nation-wide and internationally and collaborates with several other institutes, including the university of Cyprus. Many of the scientific staff members have had education in often prestigious institutes and universities abroad. As a result, many international collaborations have been set up and incoming and outgoing students are frequently exchanged with European (e.g. via Erasmus programs) and non-European countries. There are at the moment several MSc and PhD programs running in the institute, so next to the scientific excellence at the CING, the Biotechnology program can make use of a large expertise in student administration, teaching, student assistance and quality assessment that is already in house.
There is a very good ratio student-teacher, which results in interaction with each student on a regular and individual basis. This also results in good support for the students and close monitoring of student's progression, satisfaction, etc. The system for collecting feedback for the students is well established, and suggestions by the students are readily taken up and implemented, as appropriate.

### *Areas of improvement and recommendations*
Teaching at the institute is obviously focussed on medical applications. These cover only a part of the biotechnological applications that exist today. Although the attraction of scientists outside the institute has been initiated already, in order to develop a full biotechnology program, the team will have to include more non-medical scientists from other institutes and/or universities. The EEC learnt that new CING regulations allow course organizers to teach less than 50% of the course, thus such a strategy may now become feasible. The EEC acknowledges that due to administrative and organizational reasons it might be difficult to implement these changes immediately in the program. An alternative could therefore be an adaption of the title of the program, e.g. to "Medical Biotechnology" which is an appropriate title for the current program (see also below). This adaption could be kept for one or more years until the team has found new ways for extending the course towards more and other biotechnological items as outlined in our recommendations below. The EEC understood from the discussion with the academic staff that it was indeed the intention to further develop and/or extend the program over the coming years into a full program that prepares graduates for work both in academia, in research centres but also in an industrial setting in Cyprus and around the world.

***Response of The Cyprus Institute of Neurology and Genetics***

The proposed MSc program in "Biotechnology" has been carefully designed to highlight the important role of biotechnology not only in the pharmaceutical industry (delivered by CING, University of Cyprus, University of Nicosia), but also the beverage/food industry (delivered by Zambartas Wineries Ltd and Charalambides Christis Ltd), agricultural industry (delivered by the Agricultural Research Institute; ARI), and waste-water management (delivered by the WTE Wasstertechnik GmbH,Germany-Cyprus Branch). Therefore, implementation of an MSc in "Medical Biotechnology", even temporary, would still require extensive modifications to exclude all the lectures conducted by professionals working in the aforementioned local industries, making it thereby attractive to potential applicants with a specific interest in "Medical Biotechnology". Equally important, implementation of temporary MSc in "Medical Biotechnology" would create unnecessary competition with the existing programmes offered by the CING, all of which are heavily medically-oriented.

The ultimate goal is to create an MSc program in "Biotechnology" that is currently unavailable in Cyprus, bringing together all the local experts from academia and industry. Our understanding is that biotechnology is a vast and complex field that relies on a broad range of skill sets and key areas of expertise, thereby a BSc degree would probably be needed in order to cover in depth all the different "colors" of biotechnology. Instead, our intention is the creation of a postgraduate programme in biotechnology that within a year, students will have the opportunity to gain specialized knowledge and experience in specific sectors of biotechnology (ie medical, agriculture, food/beverage, waste-water management). Following the recommendations by the ECC, not all fields would receive the same focus, nevertheless, students would have the opportunity to gain knowledge on "White", "Grey", "Yellow", "Green", and "Red" biotechnology. We are confident that the amended syllabus for this new MSc Programme would enable graduates to acquire all the necessary biotechnology skills and education to work in academia, in research centers, but most importantly in an industrial setting initially locally, but also abroad. For the above reasons we relied on the recruitment of all relevant experts from the academia and industry locally situated in Cyprus.

The new CING regulations allow course coordinators to teach less than 50% of the course, which indeed, in theory at least, allows for the recruitment of non-medical scientists to participate in the proposed programme. Of course, any invited guest speakers could not teach more than 30% of the lectures/tutorials, as per regulations set by the Cyprus Agency of Quality Assurance and Accreditation in Higher Education. So far, the MSc in "Biotechnology" syllabus has been prepared in such a way to ensure that collectively the invited, non-medical scientists teach up to 30% of the lecture/tutorials. Of equal importance, following the recommendation of the EEC, we have tried to include more non-medical scientists to teach in one of the Program's mandatory courses. Specifically, Dr. Panagiotis Dalias from the Agricultural Research Institute (ARI) has agreed to participate with a series of lectures and tutorials, covering biotechnology-related areas that were highlighted by the EEC (see section 2. Teaching staff) as important for the MSc in "Biotechnology" syllabus. The CV of Dr. Panagiotis Dalias can be seen in Appendix B1.

In addition, taking always in consideration that amongst our priorities is to establish and deliver this pioneering program through the years, our intention is to primarily rely on recruiting experts from academia and industry that are currently situated in Cyprus. This would undoubtedly minimize the risks associated with the recruitment of colleagues from abroad.

## 2. Student – centred learning, teaching and assessment
*(ESG 1.3)*

### *Findings*
The Cyprus School of Molecular Medicine has a 10-year experience in medical and biomedical postgraduate studies. The ECC committee was overwhelmed by the high standards that the school has according to student-centred learning, teaching and student assessment. This conclusion was taken after a meeting with the education office manager, the academic staff, the students and after the on-site visits of the different CING labs.

### *Strengths*
As noted before, the ratio teacher/student is very high (near 1/1) which ensures a high-quality assistance for the students. The EEC also learnt from discussion with the teachers that new teaching methods are being implemented in the lessons and that workshops and sessions are organized for them (especially for starting teachers) in order to improve their teaching skills. As a result, modern student-centered education strategies and technologies are used, as well as different assessment methods, thereby facilitating the achievement of the planned learning outcomes. Overall, this is reflected in the positive student's comments, demonstrating a positive learner-student relationship and flexible learning paths that promote the autonomy of the students.

### *Areas of improvement and recommendations*
The EEC acknowledges that the tutorials are an added value to the courses (see also 3). However, so far, the tutorials may be occupied by other items like questions from the students or journal clubs, which makes students have not many opportunities to develop their practical skills during the first two semesters. As a result, they may end up starting their master thesis by first learning the different operations that are required to perform basic biochemical/genetic work, which may slow down the progress of their master thesis. The first advice of the EEC is therefore to include more practical sessions into the program since practical and theoretical studies must be highly interconnected. However, as the EEC understood it was difficult to realize this, it is very important that students are selected who clearly have acquired the necessary practical skills during their Bachelor program (see 4.).

### ***Response by The Cyprus Institute of Neurology and Genetics***

We agree with the comments of the EEC regarding the importance of introducing practical sessions to provide students with the opportunity to develop their practical skills during the first two semesters. During the Autumn Semester and part of the Spring Semester, students are mainly focused on completing the taught courses which are needed for the Programme of study. However, at least 40% of the programme is focused on the thesis project under which the students are gaining practical knowledge and hands on experience. Apart from the taught courses, during the period: January – August, students are placed in the lab.

In addition, most of the courses combine practical (in the form of workshops) and theoretical sessions. More specific:

**Microbial Biochemistry (Mandatory):**

- Laboratory methods used for bacterial cultures
- Basic experiments of cloning, bacterial transformation
- Expression and purification of proteins in bacteria
- Bacteriophage growth
- Visit of food industry facilities

**Molecular Virology and Immunology (Mandatory):**

- Plaque assay
- Cell culture
- RT-PCR
- ELISA
- Immunofluorescence

**Fundamentals of Biotechnology (Mandatory)**:

- Laboratory methods used for viral vector production, purification and titration
- Applications of digital droplet PCR
- Principles of peptide synthesis
- Visit of sewage plant
- Visit of ARI facilities

**Methodologies and Technologies Applied in Medical Genetics (Elective):**

- Fragment analysis
- DNA sequencing
- Blotting techniques
- Statistical genetics

**Cellular and Molecular Neuroscience (Elective):**

- Neuroscience Lab and methods-I - Experimental neurophysiology
- Neuroscience Laboratory and methods-II: Histology, microscopy, tissue culture
- Neuroscience Laboratory and methods-III: DNA recombination, tissue culture and transgenic technologies

**Molecular Basis of Monogenic Diseases (Elective):**

- Polymerase chain reaction (PCR) based on genomic DNA templates
    - Including principles of primer design and annealing temperature calculations
    - Including steps for PCR optimisation
- Agarose gel preparation and electrophoresis
- PCR cleanup
- Cycle sequencing
- Sequencing cleanup
- Sample preparation and loading for Sanger sequencing (on ABI Genetic Analysers)
- DNA sequence analysis
- Evaluation of sequence output (including detection and reporting of mutations

**Gene and Cell Therapy (Elective):**

- Workshop Viral Vectors: Production and amplification of viral vectors. Describe the protocol, observe cells under microscope and the equipment needed.
- Experimental animals: Observe common techniques used in the labs like injections, anaesthesia, dissection, tissues isolation.

**Biochemical Basis of Genetic Diseases (Elective):**

- Determination of blood lactate concentration
- Measurement of lysosomal enzyme activity in plasma
- Acylcarnitine profiling using tandem mass spectrometry

**Bioinformatics (Elective):**

- Tools for sequence and structural analysis
- Modelling and simulation tools
- Drug repurposing tools
- Tutorial on bioinformatics for precision medicine

In regards to the recruitment of students, we do agree with the EEC to focus and give priority to the recruitment of students who clearly have the practical skills to successfully complete this MSc programme. At CING we follow a strict selection process as all candidates who fulfil the minimum entry requirements are invited to an interview for admission. During the interview, among other, candidates are evaluated for the following Criteria: Academic Qualifications, Recommendation Letters, Scientific knowledge, Problem solving and critical thinking, Motivation, Level of English Language, Interpersonal skills, teamwork and lab experience.

## 3. Teaching staff

*(ESG 1.5)*

### *Findings*

Teaching staff is highly qualified and performs high level experiments in the area of biomedical research. For the present application, the responsible team has initiated collaborations with other research centers in Nicosia, such as the University of Cyprus and the Agricultural Research Institute, where highly qualified researchers will contribute to the teaching with their expertise. However, for a full program in Biotechnology that covers a broad range of topics relevant to biotechnology, additional expertise will be required. The organising institution is excellently qualified to cover the topic of medical biotechnology and research, and there are collaborators that are competent in agricultural biotechnology and environmental biotechnology, however, many other fields of biotechnological research are missing. These include large scale production of proteins both for therapeutical applications and other purposes such as enzymes, production of chemicals by microbial organisms including biofuels and fine chemicals as well as newer applications such as synthetic biology and all –omics applications. These topics should definitely be covered at least in the theoretical courses of the program. While hiring new staff may be difficult, these experts could be pulled in for a hybrid course where they provide their expertise via online tools.

### *Strengths*

The lecturers so far selected are all of the highest level of competence in their respective field. The CING has an established procedure and ongoing resources dedicated to improving the teaching skills of their staff. The applicants have also invested both time and effort in generating new courses specifically for this program.
The existing scheme of course structures that consist of lectures and associated tutorials is excellent and provides the students with detailed instructions, enabling rapid resolution of any unclear topics and providing relevant answers to questions that may have remained open. The ability for teachers to introduce some hands on or practical exposure to relevant methods along with the theory in these tutorials should be exploited to a maximum because of the high need for developing practical skills before starting the master thesis (see also 2.).

### *Areas of improvement and recommendations*

As outlined above, to fully cover the field of Biotechnology, additional expertise needs to be pulled in some areas. For instance, the topics of white biotechnology including production of fine chemicals along with the required genetic and pathway engineering of cells is hardly touched on, nor is the topic of biofuels, an important tool in achieving goals of sustainability in the future. As another example, while 'Plant breeding applications for improved nutrition' are not core Biotechnology, there is an expert on microbial ecology, bioremediation, agricultural microbiology and biotechnology at ARI (Michalis Omirou), among several other ARI researchers involved in core-biotech fields, who is currently not involved in the teaching. This comes to contrast with the fact that adequacy in microbiological foundations is an important objective for students of this course, according to course coordinators. Additionally, in Red Biotechnology, while the medical and clinical parts are well covered, the area of actual production of such therapeutics is not, including cell line development, large scale bioprocessing, downstream purification and quality attributes important for

biological entities. Additional lectures need to be found that cover these topics. With the recent pandemics, it should now be possible to find such lecturers across Europe or even the world who are willing to present their expertise online, so that hybrid courses are set up. We also noted there is only minor collaboration between CING researchers and external participants in the program, except for noted synergies in bioinformatics research between CING and ARI. Hence teaching/research synergy is largely missing for the other biotechnological disciplines. Lastly, the EEC was surprised that the course for Bioinformatics was not taken up in the program, although it is present at the CING. We consider incorporation of Bioinformatics into the program at least as an elective course as an absolute must, preferentially as an elective course out of only two from which the student can choose. We have provided more detailed suggestions at the end of this document.

## ***Response by The Cyprus Institute of Neurology and Genetics***

We agree with the recommendations by the EEC to enrich the courses of the proposed MSc programme with specific topics related to biotechnology. In our quest to implement the recommendations of the EEC, as highlighted above, we have invited Dr. Panagiotis Dalias (ARI) to contribute with a series of specific lectures/tutorials. In particular, Dr Dalias will provide lectures on (1) Basic ecological principles: energy flow in ecosystems, biochemical cycles with an emphasis on carbon, nitrogen, and phosphorus cycles, soil microbial ecology ("Fundamentals of Biotechnology"; Lecture 17; Appendix A2), (2) Agricultural microbiology and biotechnology; Principles of agricultural sustainability and biotechnological strategies to achieve sustainability; Bioremediation; Biofules ("Fundamentals of Biotechnology"; Lecture 18; Appendix A2), (3) Agricultural biotechnology in relation to biodiversity and bioethics ("Fundamentals of Biotechnology"; Lecture 19; Appendix A2). Specific reference was made for Dr. Michalis Omirou (Agricultural Research Institute; ARI) that could contribute with lectures on the topics of microbial ecology, bioremediation, agricultural microbiology and biotechnology. Although we have invited Dr. Omirou to actively contribute with the delivery of lectures he politely informed us that he is very busy with other commitments and therefore would not be able to participate at all in this MSc programme, as pointed out in a letter from the Director of ARI, Dr. Dora Chimonidou (Appendix A3).

Following the recommendations of the Committee the Red biotechnology section is enriched with the lectures on cell line development ("Molecular Virology and Immunology"; Lectures 18; Appendix A4), large scale bioprocessing ("Fundamentals of Biotechnology"; Lecture 10, Appendix A2) ("Molecular Virology and Immunology; Lectures 19/21; Appendix A4), downstream purification and quality attributes important for biological entities ("Fundamentals of Biotechnology"; Lectures 3/6/7; Appendix A2).

The proposed programmed is designed based on in-person learning. The COVID-19 pandemic has indeed highlighted the usefulness and convenience of online teaching and we can selectively use the hybrid option to enrich further our courses by inviting guest lecturers/experts from abroad to present specific lectures in our courses. This is a practice that we are already implementing in our courses. So far, we had invited speakers from Greece, Germany, Australia and USA. Of equal importance, our current application for

approval by the Cyprus Agency of Quality Assurance and Accreditation in Higher Education was for face-to-face courses. Therefore, the introduction of a hybrid course would require the submission of a different application to the Cyprus Agency of Quality Assurance and Accreditation in Higher Education. In addition, taking always in consideration that amongst our priorities is to establish and deliver this pioneering programme through the years, our intention is to primarily rely on recruiting experts from academia and industry that are currently situated in Cyprus. This would undoubtedly minimize the risks associated with the recruitment of colleagues from abroad. It is our strong believe, however, that the aforementioned amendments can be successfully implemented by local experts/scientists/non-medical scientists. Of equal importance, this would ensure the continuity of the programme through the years.

The proposed MSc in "Biotechnology" is expected to act as the springboard for establishing new collaborations between our external collaborators and different departments within the CING. Our intention is to create a local, scientific conference, which will run on yearly basis, where external collaborators as well as colleagues from different CING departments would be able to present their work in the quest to find common ground for future collaborations.

We agree with the recommendation of the EEC to include the "Bioinformatics" course as an elective course for the MSc "Biotechnology" programme. Course Syllabus is provided in Appendix A5. The CV of Professor George Spyrou (course co-ordinator of the course "Bioinformatics") can be seen in Appendix B2.

## 4. Student admission, progression, recognition and certification *(ESG 1.4)*

### *Findings*

To be admitted a student must hold a bachelor's degree from a recognized accredited institution in a related field, and although the institution is more medical oriented, students from other fields such as physics and computer science have been admitted in other MSc programs of the institute. In general, the EEC committee was satisfied by the procedures and policies that are being followed by the institute regarding already established MSc Programmes and that are going to be incorporated in the study programme under evaluation.

### *Strengths*

The institute has prepared a very intensive and well organized preparatory course, mandatory for students without a biological background, and also available for students who wish to strengthen their knowledge. This appears to be much appreciated by the students. An exam following this introductory course ensures that the students have met the expected criteria. In addition, students are interviewed for their knowledge, background and motivation, ensuring a good selection of a small group of highly motivated, well-prepared students.

### *Areas of improvement and recommendations*

In light of the changes we suggest for the Biotechnology program, the institute may have to (slightly) adapt the preparatory course towards non-medical subjects. The institute must assure that students are selected who have a good background in the exact sciences (mathematics, physics, biology, chemistry) and also have acquired practical skills. The latter is important since besides the tutorials (which are more like "demonstrations") the only practical work the students will do is during their thesis.

***Response by The Cyprus Institute of Neurology and Genetics***

This preparatory course precedes the main CING postgraduate course programme and provides necessary background information for the main courses, for both medical and non-medical subjects. It is organized as 9 lecture sessions with associated tutorials, covering the fundamentals of cell and molecular biology, biochemistry, immunity, medical genetics, disease mechanisms and methods in molecular biosciences. For students from non-biomedical backgrounds and where this was indicated by conditional acceptance to the main courses, attendance and successful completion of a written course exam are mandatory for participation in the CING main course programme. The course is also highly recommended as a vocabulary primer for participants originating from non-English-speaking institutions and as an update for participants who graduated a number of years ago. Moreover, attendance may benefit anyone registered for the main CING postgraduate programmes.

Following an agreement with the co-ordinator of the preparatory course Dr. Carsten Lederer, the syllabus would be updated to include an introductory Lecture in Biotechnology ("Introduction to Molecular Biomedical Sciences"; Lecture 9, Appendix A6), providing relevant background information to students registered for the Biotechnology programme but also to those that would be interested to choose one of the mandatory courses as an elective.

In regards to the recruitment of students, as mentioned above, priority will be given to the recruitment of students who clearly have the practical skills to successfully complete this MSc program. At CING we follow a strict selection process as all candidates who fulfil the minimum entry requirements are invited to an interview for admission. During the interview, among other, candidates are evaluated on the following Criteria: Academic Qualifications, Recommendation Letters, Scientific knowledge, Problem solving and critical thinking, Motivation, Level of English Language, Interpersonal skills, teamwork and lab experience.

In order to ensure that all students admitted to the CING's programmes will have proper guidance throughout their studies, each student is assigned to an Academic Advisor and to Research Advisor(s) as well as to lab mentors (where necessary). All students are highly encouraged to be present in the lab from the beginning of Spring Semester to make sure that they will have adequate time to acquire hands on experience on techniques and get familiar with the research culture of CING.

## 5. Learning resources and student support
*(ESG 1.6)*

### *Findings*
Much useful information was obtained from the administrative staff and from the education office manager such as admission and support of students (finances and scholarships, housing, assistance in learning and other activities outside the program).

According to the student feedback, the Cyprus School of Molecular Medicine provides the students with adequate resources to achieve their thesis objective and overall completing their study program. The support they receive from the teaching staff and the institute is excellent and much appreciated by all the students. An on-site visit of the laboratories showed the environments wherein students can follow experimental procedures during the tutorial sessions and where they can perform their master thesis. These were all found to be of the latest state of the art, equipped with excellent infrastructure.

### *Strengths*
Overall, the students were very positive about the CING education programs. Every MSc student receives a budget for consumables. The laboratories in the institute are well organized and provide the necessary equipment and services to conduct high quality research mainly in medical applications. The collaboration with the Agricultural Research Institute (ARI) is a step in the right direction to expand into areas beyond medical biotechnology, providing the necessary infrastructure and highly qualified research personnel for applications in disciplines such as plant improvement, animal production, plant protection and rural development.

Students have not only their thesis supervisor but also an academic supervisor. A student representative is also involved to gather feedback from the students and provide suggestions for positive improvements. Changes to the program based on student's suggestions are later communicated to the students so they know that students in the coming years will not experience the same problems. The entire scope of services that is available to the students is a very strong point of the program. Together with the scientific programs it makes the CING programs very attractive, which is reflected in the high number of applications coming from more than 40 countries.

All information is easily accessible via the institutions website for students that are applying or are registered.
The organizers currently plan to accommodate between 5 and 10 students for the program. There is a new building planned which could provide more space in case the program grows and more students are attracted.

### *Areas of improvement and recommendations*
The EEC has no further suggestions concerning this subject and encourages the institute to continue this way.

## ***Response by The Cyprus Institute of Neurology and Genetics***

The CING would like to thank the EEC for its comments. We would like to assure the committee that the CING will continue offering to its students the proper support before, during and after their studies.

6. **Additional for doctoral programmes**
*(ALL ESG)*

**N/A**

## 7. Eligibility (Joint programme)

*(ALL ESG)*

**N/A**

## B. Conclusions and final remarks

The EEC was highly impressed with the quality of education found at CING; in particular, with the outstanding level of personal interaction and high-quality training that students receive. The quality of the courses, both with respect to their content and delivery, is of the highest standard. However, the EEC wishes to remark the following:

Biotechnology is the discipline that describes the implementation of technology to create new products: molecular, cellular, organismal. Implemented in the environment, it aims to offer solutions in organismal community dynamics, energy conservation, recycling and bioremediation. In the food and feed industry, it focuses on the development of new crops, animal feedstocks and consumable products with desirable traits using biotechnological tools such as recombinant DNA technology or cell/pathway engineering. In the pharmaceutical industry, it addresses the design and manufacturing of new medicines, vaccines and novel therapeutic regimes. In the chemical, biomolecular and biofuel industries, it tends to the production of new economically important compounds using methods that are sustainable and require lower energy input than in the traditional chemical industry.

As the program now stands it is a program in "Medical Biotechnology" that does not cover quite a wide range of topics that are accepted and acknowledged parts of biotechnology by the current state of the art. As such it could remain largely unchanged if it were indeed called a program in "Medical Biotechnology". However, the presented aim is the generation of graduates who "have acquired the necessary skills... to meet the requirements for working in an industrial setting" and have a "broad knowledge of the use of microorganisms in pharmaceutical industry, agricultural industry, beverage/wine industry and industrial wastewater management" (copied from slide 16 from Prof. Christodoulou´s presentation). While the program currently covers a wide range of topics from medical research and some red biotechnology, it only touches on a few of the above topics and does not present many others that are of high importance now and will be even more so in the future.

***Response by The Cyprus Institute of Neurology and Genetics***

As highlighted earlier our intention is to create an MSc program in "Biotechnology", rather than a temporary MSc program in "Medical Biotechnology". Furthermore, creation of a program in "Medical Biotechnology" is not within the scope of the CING. This would create unnecessary competition with the existing MSc programs of the CING, all of which have been very successful so far. Taking into consideration the suggestions of the EEC, the updated syllabus of the proposed program in "Biotechnology" is covering most of the colours in biotechnology. It is our strong belief that all of the proposed amendments would contribute towards successful completion of this goal. More details of these amendments can be seen below.

In view of this, the EEC is of the opinion that, if the program remains to be one on Biotechnology and aims to prepare students for work in applied areas of biotechnology and the industry, then a number of changes in the curriculum should be implemented to equip students with the necessary skills, including a detailed understanding of the methods used in biotechnological research today, as well as a good knowledge base for (most) relevant topics in biotechnology. Skills to be familiar with include the principles of molecular biotechnology (ie, recombinant DNA technology, genetic and genomic engineering, enzyme technology and engineering, molecular recognition, gene and genome editing, synthetic biology and omics technologies), an understanding of the role of microbes in biotechnology as the core toolbox that is exploited for the production of important compounds, for use as bioremediation and bioleaching vehicles, for their exploitation as cell-factories or in food/feed production per se (single cell protein, probiotics), and as vectors in novel therapies against human disease.

***Response by The Cyprus Institute of Neurology and Genetics***

We would like to thank the EEC for the comments and guidance related to the field of biotechnology. The syllabus has been updated accordingly to accommodate the majority of recommendations. We are confident that the syllabus for each of the mandatory courses ("Microbial Biochemistry", "Molecular Virology and Immunology", "Fundamentals of Biotechnology") has been enriched to equip students with the necessary skills, including a detailed understanding of the methods used in biotechnological research today, as well as good knowledge base for (most) relevant topics in biotechnology.

With respect to the main areas of biotechnology that should at least be mentioned in the respective courses, we refer to the UNESCO definition of the Colours in Biotechnology (The Colours of Biotechnology: Science, Development and Humankind | DaSilva | Electronic Journal of Biotechnology (ejbiotechnology.info), according to Edgar J. DaSilva, Former Director, Division of Life Sciences, UNESCO, Paris, France (further supplemented in the text herein):

Red - Health, Medical, Diagnostics: centers on the production of therapeutic biological molecules such as antibodies and vaccines - including their development, purification and quality assurance - as well as cellular and tissue engineering procedures, CAR-T cell development technologies and all methodologies in general contributing to regenerative medicine, gene therapy and cell therapy.

Yellow - Food Biotechnology and Nutrition Science: overlooks the production of fermented or modified food, feed and drinks, in manners relevant to the food industry, to winemaking and brewing establishments, as well as processes addressing insect and pesticide control in the fields. Transgenic plant technology is a major contributor to this field.

Blue - Aquaculture, Coastal and Marine Biotechnology: seeks to explore and use marine biodiversity as a source of new products, bioprospect the environment and implement the fundamentals of molecular biology and microbial ecology in marine organisms to obtain beneficial advances for humanity.

Green - Agricultural and Environmental Biotechnology, Biofuels, Biofertilizers, Bioremediation, Geomicrobiology: seeks to reduce the dependence of agriculture on mechanical and chemical innovations by using less aggressive practices to the environment and contribute to the emergence of better food, increased productivity and reduced production costs. Biofuels are also an object of grey biotechnology.

White - Gene-based Bioindustries: a major part of biotechnology that focuses on the production and processing of chemicals, materials and energy using living cells, such as yeast, fungi, bacteria, plants and enzymes for the industrial scale synthesis of products.

Gold - Bioinformatics and Nanobiotechnology: addresses the handling and processing of big data pertaining biological systems, the storing, accessing and exploitation of high-throughput analyses, and the implementation of bioinformatics and nanotechnology in developing the new fields of nano informatics, nano sciences and nanoengineering

Grey - Classical Fermentation and Bioprocess Technology: involved in balancing the environment by the removal of contaminants and the disposal of substances using microorganisms and plants. It includes the major field of waste management, which is conventionally carried out with the use of microorganisms.

Brown - Arid Zone and Desert Biotechnology: focuses on management of arid lands and deserts; highly relevant to soil science and water cycle management.

Purple - Patents, Publications, Inventions, IPRs.

The EEC therefore suggests the following changes to the curriculum. These may not be implementable within the first year(s) of the course; however, they should definitely be addressed and resolved over the next years to turn this into a program that indeed covers the full scope of Biotechnology and prepares students for both academic research in the field and industrial careers.

The mandatory course on Microbial Biochemistry starts with an excellent overview over microorganisms, their metabolism and function, but also contains a number of lectures that would better fit into the Lecture on Biotechnology. We suggest further strengthening the biochemical part of this by adding several lectures on the metabolic pathways important in microorganisms, including mammalian cells as important cell factories. The required expertise is available and is currently presented in the course on "Biochemical Basis of Genetic Diseases", where the main focus is on human disease. However, some of the lectures, such as Overview of Carbohydrate metabolism, Overview of amino acid metabolism, Overview of mitochondrial function, Nucleotide metabolism, Mitochondrial fatty acid oxidation (all with a reduced part on the related disorders) would be highly beneficial to provide students with a solid basis to appreciate the diverse use of microorganisms in biotechnology and their diverse capacities.

***Response by The Cyprus Institute of Neurology and Genetics***

The course on "Microbial Biochemistry" has been amended according to the suggestions of the EEC. Two lectures concentrating on metabolic pathways in microorganisms were added to the course, emphasizing on carbohydrate, amino acid and nucleotide metabolism, as well as mitochondrial function and fatty acid oxidation. These 2 new lectures (Lecture 7: Carbohydrate, amino acid, and nucleotide metabolism; Lecture 8: Mitochondrial electron transport chain and fatty acid oxidation) (Appendix A7) will replace one lecture of "Microbes in human disease" (original two lectures on the topic will be concentrated into one) and a lecture on "Detection of microorganisms" will be omitted, since the topic covered in the course of "Molecular Virology and Immunology" (Lecture 6, Diagnosis and monitoring of viral infections) (Appendix A4). These 2 new lectures will be delivered by Dr. Petros Petrou (Course co-ordinator of the course "Biochemical Basis of Genetic Diseases"). Additionally, certain lectures have been modified to be related to the biotechnology field (Lecture 1: The microbial world: use of microbes in biotechnology; Lecture 5: Proteins: Basic concepts, functions, and use in biotechnology; Lecture 6: Enzymes: Catalysts of the cells and use in biotechnology). Of equal importance, a series of lectures delivered by our industry collaborators are retained, providing knowledge to the industrially most relevant fields, such as White, Yellow, and Red biotechnology (Lecture 13-24) (Appendix A7)

All the Lectures covered in the "Microbial Biochemistry" course, together with the lecturer, learning outcomes and employment objectives, as well as area covered, can be seen below. Newly added lectures are ***italicised***.

The updated analytical syllabus of the "Microbial Biochemistry" course can be seen in Appendix A7.

| TYPE OF PRESENTATION | Description | Lecturer | LO | EO | AREA |
|---|---|---|---|---|---|
| Lecture 1 | The microbial world: use of microbes in biotechnology | Dana Koptides | LO1* | EO1* | - |
| Lecture 2 | Microbial cell structure | Christina Christodoulou | LO1* | EO1* | - |
| Tutorial | | Dana Koptides | | | |
| Lecture 3 | Microbial cell growth | Christina Christodoulou | LO1* | EO1* | - |
| Lecture 4 | Microbial metabolism: Fueling cell growth | Dana Koptides | LO2* | EO2* | - |
| Tutorial | | Dana Koptides | | | |
| Lecture 5 | Proteins: Basic concepts, functions, and use in biotechnology | Dana Koptides | LO3* | EO2* | - |
| Lecture 6 | Enzymes: Catalysts of the cell and use in biotechnology | Dana Koptides | LO3* | EO2* | - |
| Tutorial | | Dana Koptides | | | |
| ***Lecture 7*** | ***Carbohydrate, Amino acid, and Nucleotide metabolism*** | ***Petros Petrou*** | ***LO3**** | ***EO2**** | - |
| ***Lecture 8*** | ***Mitochondrial electron transport chain and fatty acid oxidation*** | ***Petros Petrou*** | ***LO3**** | ***EO2**** | - |
| Tutorial | | Dana Koptides | | | |
| Lecture 9 | Bacterial genetics | Dana Koptides | LO4* | EO2* | - |
| Lecture 10 | The diversity of microbial metabolism | Dana Koptides | LO5* | EO1* EO2* | - |
| Tutorial | | Dana Koptides | | | |
| Lecture 11 | Yeast, fungi and other; viruses of bacteria | Dana Koptides | LO6* | EO1* EO4* | - |
| Lecture 12 | **Assessment - Mid-term test** | Dana Koptides | | | |
| Tutorial | | Dana Koptides | | | |
| Lecture 13 | Tools of genetic engineering, Recombinant DNA | Stavros Bashiardes | LO7* | EO4* | WHITE |
| Lecture 14 | Microbial epidemiology | Stavros Bashiardes | LO8* | EO3* | RED |
| Tutorial | | Stavros Bashiardes | | | |
| Lecture 15 | Antimicrobial drugs | George Krashias | LO8* | EO3* | RED |
| Lecture 16 | Microbes in human diseases | Dana Koptides | LO9* | EO3* | RED |
| Tutorial | | George Krashias Dana Koptides | | | |
| Lecture 17 | Microbiome I | Stavros Bashiardes | LO10* | EO1* EO4* | RED |

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|---|---|---|---|---|---|
| Lecture 18 | Microbiome II | Stavros Bashiardes | LO10* | EO1* E04* | RED |
| Tutorial | | Stavros Bashiardes | | | |
| Lecture 19 | Biotechnology in Food Production – Case Study: Bread | Pascale Bouzon | LO11* | EO5* | YELLOW |
| Lecture 20 | Food Quality and Safety in food production | Pascale Bouzon | LO11* | EO5* | YELLOW |
| Tutorial | | PascaleBouzon | | | |
| Lecture 21 | Microorganisms in Dairy industry | Kleopatra Rousouli | LO11* | EO5* | YELLOW |
| Lecture 22 | Enzymes in Dairy industry | Kleopatra Rousouli | LO11*, | EO5* | YELLOW |
| Tutorial | | Kleopatra Rousouli | | | |
| Lecture 23 | Microorganisms in Wine industry | Marcos Zambartas | LO11*, | EO5* | YELLOW |
| Lecture 24 | Fermentation in Winemaking | Marcos Zambartas | LO11* | EO5* | YELLOW |
| Tutorial | | Marcos Zambartas | | | |
| Lecture 25 | Presentations of research papers followed by questions | Dana Koptides | LO12* | EO6* | - |
| Lecture 26 | Presentations of research papers followed by questions | Dana Koptides | LO12* | EO6* | - |
| Tutorial | | Dana Koptides | | | |
| | **Final Exam** | **Dana Koptides** | | | |

*: Full description can be found in the syllabus (Appendix A7)

2) The mandatory course "Fundamentals in Biotechnology" aims to provide an overview of biotechnology, but given the importance of the topic for this syllabus, we consider the current length of 10 ECTS too short. This course should therefore be supplemented with a second mandatory course, i.e., "Advanced Biotechnology". Both courses together should be structured in a logical way to provide a) an introduction to biotechnology (from the current course this would include e.g. the lectures on Introduction to Biotechnology, Recombinant DNA/RNA technologies, Recombinant protein expression, Protein engineering, Nonbacterial expression systems, Non-viral delivery systems, Modern Techniques in Peptide Synthesis, Bioprocessing, Bioethics in biotechnology) and b) cover the different fields in Biotechnology as outlined above. Not all fields need to receive the same focus, however, students should at least receive an overview over most of these topics, and particular attendance to the industrially most relevant fields, such as White, Grey, Yellow, Green and Red biotechnology should be given. In view of the fact that Cyprus is an Island, blue biotechnology may also be of interest. Red Biotechnology currently misses important topics such as bioprocessing of therapeutic proteins, vaccine production on an industrial scale, down-stream processing and quality attributes for 26 therapeutic entities. This part should also contain lectures on the immune system, how it functions, how antibody therapies and vaccines interact with the immune system and how CAR-T cells work, as the basis for many of the biopharmaceutical therapies.

***Response by The Cyprus Institute of Neurology and Genetics***

Following thorough consideration of the recommendation by the EEC, creating an additional new course entitled "Advanced Biotechnology" would not be feasible, given that such a course would rely mostly on external collaborators. This would be in stark contrast with the regulation of the Cyprus Agency of Quality Assurance and Accreditation in Higher Education (i.e. only 30% of lectures allowed to be delivered by external collaborators). Nevertheless, following the recommendations of the ECC we have decided to keep the course

in "Molecular Virology and Immunology" as mandatory, incorporating key lectures, as recommended by the EEC. As changes have been applied to the courses "Molecular Virology and Immunology" and "Microbial Biochemistry", incorporating key lectures relating to biotechnology, we believe the need for a supplementary second course has been rendered unnecessary. Most importantly, all three mandatory courses have been carefully redesigned so that different aspects of biotechnology are covered. Thereby, the overall number of ECTS that are related to biotechnology have now increased to be more than 10.

The course "Molecular Virology and Immunology" was carefully re-designed and adapted to retain the requested lectures on the immune system and its functions (Lectures 3-6), whereas at the same time enriched with new lectures related to immune technologies in biotechnology, cell and tissue engineering, bioreactors, vaccine production at an industrial scale, interaction of antibody therapies and vaccines with the immune system antibody therapies and vaccines (Lectures 17-22) (Appendix A4).

All the Lectures covered in the "Molecular Virology and Immunology" course, together with the lecturer, learning outcomes and employment objectives, as well as area covered, can be seen below. Newly added lectures are ***italicised***.

The updated analytical syllabus of the "Molecular Virology and Immunology" course can be seen in Appendix A4.

| TYPE OF PRESENTATION | Description | Lecturer | LO | EO | Area |
|---|---|---|---|---|---|
| Lecture 1 | Introductory basic concepts of virology/Taxonomy of viruses | George Krashias | LO1*/LO2* | EO1* | - |
| Lecture 2 | Multiplication of viruses: An overview | George Krashias | LO3* | EO1* | - |
| Tutorial 1 | | George Krashias | | | |
| Lecture 3 | Introductory basic concepts of immunology/Innate immunity | George Krashias | LO4*/LO5* | EO2* | - |
| Lecture 4 | Adaptive immunity: $CD8^+$ T cell responses and humoral immune responses | George Krashias | LO5* | EO2* | - |
| Tutorial 2 | | George Krashias | | | |
| Lecture 5 | Antigen recognition by B-cell and T-cell receptors Antigen presentation to T lymphocytes | George Krashias | LO6* | EO2* | - |
| Lecture 6 | Diagnosis and monitoring of viral infections | Jan Richter | LO7* | EO3*, EO4* | - |
| Tutorial 3 | | George Krashias | | | |
| Lecture 7 | Orthomyxoviruses family: Influenza/Respiratory viruses/Vaccines | Jan Richter | LO8* | EO1* | Red/ White |
| Lecture 8 | Picornaviruses family/Vaccines | Christina Tryfonos | LO8* | EO1* | Red/ White |
| Tutorial 4 | | Jan Richter | | | |
| Lecture 9 | Vector-borne diseases: Arboviruses/Vaccines | Jan Richter | LO8* | EO1* | Red/ White |
| Lecture 10 | Herpes viruses family/Vaccines | Dana Koptides | LO8* | EO1* | Red/ White |
| Tutorial 5 | | Jan Richter | | | |
| Lecture 11 | Papovaviruses family/Vaccines | Dana Koptides | LO8* | EO1* | Red/ White |
| Lecture 12 | Hepatitis viruses family/Vaccines | Dana Koptides | LO8* | EO1* | Red/ White |

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|---|---|---|---|---|---|
| Tutorial 6 | | Christina Christodoulou | | | |
| Lecture 13 | Oncogenic viruses/Transmissible Spongiform encephalopathies | Jan Richter | LO9*, LO10* | EO1* | - |
| Lecture 14 | Retroviruses family: HIV | George Krashias | LO8* | EO1* | - |
| Tutorial 7 | | Christina Christodoulou | | | |
| Lecture 15 | Pathology and Pathogenesis of viral infections | George Krashias | LO11* | EO5* | - |
| Lecture 16 | **Mid-term test** | George Krashias | | | - |
| Tutorial 8 | | Christina Christodoulou | | | |
| ***Lecture 17*** | ***Immune technologies in biotechnology*** | ***Nancy Lambrianides*** | ***LO12**** | ***EO6**** | ***Red*** |
| ***Lecture 18*** | ***Cell and tissue engineering*** | ***George Krashias*** | ***LO13**** | ***EO7**** | ***Red/ White*** |
| Tutorial 9 | | Christina Christodoulou | | | |
| ***Lecture 19*** | ***Bioreactors*** | ***Maria Loizidou#*** | ***LO14**** | ***EO8**** | ***Red*** |
| Lecture 20 | Vaccines and antiviral agents | George Krashias | LO15*, LO16* | EO6* | Red |
| Tutorial 10 | | George Krashias | | | |
| ***Lecture 21*** | ***Vaccine production on an industrial scale*** | ***George Krashias*** | ***LO17**** | ***EO9**** | ***Red*** |
| ***Lecture 22*** | ***Interaction of antibody therapies and vaccines with the immune system*** | ***George Krashias*** | ***LO18**** | ***EO10**** | ***Red*** |
| Tutorial 11 | | George Krashias | | | |
| Lecture 23 | The immune system in health and disease-Manipulating the immune response | Nancy Lambrianides | LO19*, LO20* | EO2* | - |
| Lecture 24 | Autoimmunity and tolerance | Nancy Lambrianides | LO21* | EO2* | - |
| Tutorial 12 | | Marios Pantzaris | | | |
| Lecture 25 | Presentations of research papers followed by questions | George Krashias | LO22* | EO11* | - |
| Lecture 26 | Presentations of research papers followed by questions | George Krashias | LO22* | EO11* | - |
| Tutorial 13 | | George Krashias | | | |
| | **Final Exam** | **George Krashias** | | | - |

*: Full description can be found in the syllabus (Appendix A4).#: The CV of Dr. Maria Loizidou can be seen in Appendix B3.

The course "Fundamentals of Biotechnology" has been enriched by including a further expert for the Agricultural Research institute (Dr. Panagiotis Dalias) teaching three lectures and two tutorials covering subjects such as biofuels, ecology and bioremediation (Lecture 17: Basic ecological principles; Lecture 18: Principles of agricultural sustainability and biotechnological strategies to achieve sustainability, bioremediation, biofuels; Lecture 19: Agricultural biotechnology in relation to biodiversity and bioethics) (Appendix A2). A lecture about CAR-T cell therapy has been already part of the biotechnology course and is retained (Lecture 4) (Appendix A2). Bioprocessing was already in Lectures 9 and 10 by Dr. Tsipa (Lecturer of Environmental Biotechnology at the University of Cyprus). Newly additions are the subject of bio-based fine chemical production and synthetic bioengineering that will be covered by Dr. Sariyiannis, University of Nicosia (Lecture 8) and the subject related to molecular bioprocessing for renewable energy systems (Lecture 23). In addition, all the lectures highlighted by the ECC (ie Introduction to Biotechnology, Recombinant DNA/RNA technologies, Recombinant protein expression, Protein engineering, Nonbacterial expression systems, Non-viral delivery systems, Modern Techniques in Peptide Synthesis, Bioprocessing, Bioethics in

biotechnology) have been retained in the mandatory courses "Microbial Biochemistry" and "Fundamentals in Biotechnology".

Overall, the updated syllabus of the "Fundamentals of Biotechnology" course covers knowledge related to Red, White, Grey, and Green biotechnology, as requested by the EEC. We do agree with the recommendation of the EEC to provide information related to Blue biotechnology. This will be briefly covered during the introductory lecture, nevertheless, our intention is to enrich (in the first 2 years) the existing syllabus with at least one additional lecture that will provide additional information on Blue biotechnology.

All the Lectures covered in the "Fundamentals in Biotechnology" course, together with the lecturer, learning outcomes and employment objectives, as well as area covered, can be seen below. Newly added lectures are ***italicised***.

The updated analytical syllabus of the "Fundamentals of Biotechnology" course can be seen in Appendix A2.

| LECTURE | LECTURER | TOPIC | TYPE OF PRESENTATION | LO | EO | Area |
|---|---|---|---|---|---|---|
| 1 | Jan Richter | Introduction to Biotechnology | Lecture | LO1* | EO2* | **RED** |
| 2 | Jan Richter | Viral vectors for Gene therapy I | Lecture | LO2* | EO1* | **RED** |
| | Jan Richter | | Tutorial | LO2* | EO3* | |
| 3 | Jan Richter | Viral vectors for Gene therapy II | Lecture | LO2* | EO1* | **WHITE** |
| 4 | Jan Richter | CAR-T-cell therapies | Lecture | LO3* | EO1* | **RED** |
| | Jan Richter | | Tutorial | LO3* | EO3* | |
| 5 | Jan Richter | Non-viral delivery systems | Lecture | LO3* | EO1* | **RED** |
| 6 | Yiannis Sariyiannis | Pharmaceutical Biotechnology: Concepts & Applications | Lecture | LO4* | EO1* | **RED** |
| | Yiannis Sariyiannis | | Tutorial | LO4* | EO3* | |
| 7 | Yiannis Sariyiannis | Nanobiotechnology in Drug Discovery | Lecture | LO5* | EO1* | **RED** |
| ***8*** | ***Yiannis Sariyiannis*** | ***Bio-based fine chemical production and synthetic bioengineering*** | ***Lecture*** | ***LO5**** | ***EO5**** | ***WHITE*** |
| | Yiannis Sariyiannis | | Tutorial | LO5* | EO3* | |
| 9 | Argyro Tsipa | Environmental Biotechnology: Enzyme and Microbial Growth Kinetics | Lecture | LO6* | EO5* | **GREY** |
| 10 | Argyro Tsipa | Bioprocessing | Lecture | LO7* | EO5* | **GREY** |
| | Argyro Tsipa | | Tutorial | LO7* | EO3* | |
| 11 | Jan Richter | RNA-based technologies | Lecture | LO7* | EO1* | **RED** |

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|---|---|---|---|---|---|---|
| 12 | Jan Richter | **Mid-Term test** | **Assessment** | | | |
| | Jan Richter | | Tutorial | | | |
| 13 | Dionysia Fasoula | Plant genomic pathways and functional foods | Lecture | LO9* | EO1* | GREEN |
| 14 | Dionysia Fasoula | Plant breeding applications for improved nutrition | Lecture | LO9* | EO5* | GREEN |
| | Dionysia Fasoula | | Tutorial | LO9* | EO3* | |
| 15 | Georgia Hadjipavlou | Biotechnology and farm animals: from research to industry | Lecture | LO10* | EO1* | GREEN |
| 16 | Georgia Hadjipavlou | Genetic and genomic applications in animal breeding | Lecture | LO10* | EO5* | GREEN |
| | Georgia Hadjipavlou | | Tutorial | LO10* | EO3* | |
| ***17*** | ***Panayiotis Dalias#*** | ***Basic ecological principles*** | ***Lecture*** | ***LO11**** | ***EO6**** | ***GREEN*** |
| ***18*** | ***Panayiotis Dalias*** | ***Principles of agricultural sustainability and biotechnological strategies to achieve sustainability, Bioremediation***<br>***Biofuels*** | ***Lecture*** | ***LO11**** | ***EO1**** | ***WHITE*** |
| | ***Panayiotis Dalias*** | | ***Tutorial*** | ***LO11**** | ***EO3**** | |
| ***19*** | ***Panayiotis Dalias*** | ***Agricultural biotechnology in relation to biodiversity and bioethics*** | ***Lecture*** | ***LO11**** | ***EO5**** | ***GREEN*** |
| 20 | C. Christodoulou | Bioethics in biotechnology | Lecture | LO12* | EO6* | WHITE |
| | Panayiotis Dalias | | Tutorial | LO12* | EO3* | |
| 21 | Marek Reiss | General principles of modern waste water treatment | Lecture | LO13* | EO1* | GREY |
| 22 | Marek Reiss | General principles of biological reactors for waste water treatment plants | Lecture | LO13* | EO5* | GREY |
| | Marek Reiss | | Tutorial | LO13* | EO3* | |
| ***23*** | ***Stavros Bashiardes*** | ***Molecular bioprocessing for renewable energy systems*** | ***Lecture*** | ***LO14**** | ***EO1**** | ***WHITE*** |
| 24 | Stavros Bashiardes | Biomining/bioleeching | Lecture | LO15* | EO5* | WHITE |
| | Stavros Bashiardes | | Tutorial | LO15* | EO3* | |
| 25 | Jan Richter | Selected papers | Presentation | LO16* | EO4* | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | Jan Richter | Selected papers | Presentation | LO16* | EO4* | |
| | Jan Richter | | Tutorial | | | |
| | Jan Richter | **Final Exam** | | | | |

*: Full description can be found in the syllabus (Appendix A2). #: The CV of Dr. Panagiotis Dalias can be seen in Appendix B1.

3) To make room for this second biotechnology course, we suggest that the Molecular Virology and Immunology course be one of the Elective courses. Nevertheless, as explained above, some aspects covered in this course, such as basic innate and adaptive immunological processes, basic virology and the viral mechanisms to circumvent these immune processes could be integrated into the Red biotechnology chapter in the main Biotechnology course(s).

***Response by The Cyprus Institute of Neurology and Genetics***

As highlighted above we have decided to keep the course in "Molecular Virology and Immunology" as mandatory. This would serve a dual purpose. Firstly, the lectures highlighted by the EEC would be integrated into the Red biotechnology (basic innate and adaptive immunological processes, basic virology and viral mechanisms to circumvent these immune process), and thereby mandatory. Secondly, the syllabus had been updated further to include the recommendations of the EEC, as highlighted in the section above.

4) Amongst the elective courses, there is one that appears to us to contain the fundamental tools and handycraft of a biotechnologist, namely the course on "Methodologies and Technologies in Applied Genetics" (renaming 'Medical Genetics' would be crucial). Further, a course in Bioinformatics is of immense importance to provide graduates with the skills and crafts required for their trade and therefore is a must to be amongst the elective courses for this curriculum. We even suggest that these two are elective courses where students have to choose at least one, whatever their second choice is. It should also be possible for students to select both of them. For those that pick only one, the second elective course can then be taken from the remaining suggested courses.

***Response by The Cyprus Institute of Neurology and Genetics***

The course on "Methodologies and Technologies in Applied Genetics" is currently mandatory for the MSc and PhD programs in Medical Genetics, and elective for the rest of the ongoing MSc and PhD programs of the CING, already accredited by the Cyprus Agency of Quality Assurance and Accreditation in Higher Education. Therefore, renaming the course to "Medical Genetics" is not possible, since this would affect the current structure of all of our ongoing programmes in the CING. In addition, the Cyprus Agency of Quality Assurance and Accreditation in Higher Education advises that such changes take place at the end of the accreditation period when the programs will be re-evaluated. Irrespective of the name of the course, enrolled students would have the opportunity to choose it as an elective, and thereby acquire knowledge on the cutting edge methodologies and technologies used in applied genetics. We agree with the EEC to include the course in "Bioinformatics" as an elective course. According to the rules and regulations of the CING, students can choose any of the elective courses form a predefined pool of courses in the programme of study. The syllabus of the "Bioinformatics" course can be seen in Appendix A5. The CV of Professor George Spyrou (course co-ordinator of the "Bioinformatics" course) can be seen in Appendix B2.

Overall, as already outlined above, we consider the current curriculum to be excellent for the topic of Medical Biotechnology. However, if the aim of providing graduates that are "industry ready" is to be pursued - to adopt the course directors' phrase - the above suggestions need to be adapted and implemented.

***Response by The Cyprus Institute of Neurology and Genetics***

**Once more we would like to thank the EEC for providing us the opportunity to present this MSc program in "Biotechnology". All of the feedback/recommendations made by the EEC were carefully evaluated and addressed, always trying to remain within the guidelines of the Cyprus Institute of Neurology and Genetics and the Cyprus Agency of Quality Assurance and Accreditation in Higher Education. All of us (CING and collaborators) are excited and eager to embark in this new journey.**

## C. Higher Education Institution academic representatives

| *Name* | *Position* | *Signature* |
|---|---|---|
| **Prof Leonidas A. Phylactou** | Provost | |
| **Prof Kyproula Christodoulou** | Dean | |
| **Prof Christina Christodoulou** | Program Coordinator | |
| **Mr Marios Flouros** | Finance and Administrative Director | |
| **Ms Maria Lagou** | Education Office Manager | |

**Date:** 20/09/2022

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