Doc. 300.1.2

Higher Education Institution's Response

Date: 3.11.2025

- **Higher Education Institution:** European University Cyprus, School of Medicine-Frankfurt Branch
- **Town:** Frankfurt, Germany
- **Programme of study Name (Duration, ECTS, Cycle)**

  In Greek:
  "Βιοϊατρικές Επιστήμες, 4 Έτη/240 ECTS, Πτυχίο"

  In English:
  "Biomedical Sciences, 4 Years/240 ECTS, (B.Sc.)"

- **Language(s) of instruction:** English
- **Programme's status:** New
- **Concentrations (if any):**

  In Greek: Concentrations
  In English: Concentrations

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 300.1.1/1 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. The answers' documentation should be brief and accurate and supported by the relevant documentation. Referral to annexes should be made only when necessary.*

- *In particular, under each assessment area and by using the 2nd column of each table, the HEI must respond on the following:*

    - *the areas of improvement and recommendations of the EEC*
    - *the conclusions and final remarks noted by the EEC*

- *The institution should respond to the EEC comments, in the designated area next each comment. The comments of the EEC should be copied from the EEC report **without any interference** in the content.*

- *In case of annexes, those should be attached and sent on separate document(s). Each document should be in *.pdf format and named as annex1, annex2, etc.*

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

Areas of improvement and recommendations **by EEC**	Actions Taken by the Institution	For Official Use ONLY
1.1 While the study programme remains up-to-date and aligned with current developments in both society and scientific research, the committee believes that further enhancements could strengthen its relevance and academic depth. Specifically, the inclusion of emerging topics in biomedicine is recommended. These may include: The Human Microbiome and Its Implications: Exploring the role of microbial communities in health and disease; Big Data and Health: Integrating data science approaches to analyze complex biomedical datasets and improve healthcare outcomes; generative AI in laboratory medicine; single-cell analysis; metabolomics, molecular dynamics and mass spectrometry are other cutting-edge technologies that may benefit from more room in a future-proofed programme.	1.1 We would like to express our sincere appreciation to the External Evaluation Committee (EEC) for their insightful and constructive recommendations regarding the inclusion of emerging topics in biomedicine. We fully share the Committee's view that continuous alignment with current developments in both society and scientific research is essential to maintaining the program's academic excellence and relevance. To illustrate the strong alignment between EEC recommendations and current programme content, we would like to note that the first topic mentioned by the EEC—"The Human Microbiome and its Implications"—is already incorporated in the current curriculum as part of **BMS300 – Human Microbiome and its Implications in Health and Disease**, as presented in Slide 12 of the program presentation. This course introduces students to the significance of microbial communities in human health, metabolism, and disease mechanisms. In addition, the remaining emerging areas suggested by the Committee—namely Big Data and Health, Generative AI in Laboratory Medicine, Single-Cell Analysis, Metabolomics, Molecular Dynamics, and Mass Spectrometry—have been embedded and interwoven throughout the existing curriculum and specifically within existing courses BMS120 (Organic Chemistry), BMS145(Applied Biostatistics), HEA190 (Research Methodology in Health Sciences), BMS210 (Molecular Biology) BMS220	Choose level of compliance:

	(Biochemistry I), BMS230 (Biochemistry II), BMS320 (Bioinformatics), BMS340 (Drugs & Disease), BMS405 (Systems Biomedicine), BMS410 (Clinical Chemistry), BMS440 (Proactive aging & Regenerative Medicine), BMS425 (Undergraduate Thesis II). Thus, students are introduced **to big data and integrating data science** through the courses: BMS145 (Applied Biostatistics), BMS320 (Bioinformatics), HEA190 (Research Methodology in Health Sciences), BMS405 (Systems Biomedicine), while **generative AI in laboratory medicine** is addressed through the courses: BMS410 (Clinical Chemistry), BMS320 (Bioinformatics), and HEA190 (Research Methodology), and BMS425 (Undergraduate Thesis II). Students learn about **single-cell analysis** through BMS210 (Molecular Biology), BMS405 (Systems Biomedicine), and BMS440 (Proactive aging & Regenerative Medicine) while **principles of metabolomics** are taught through BMS220 (Biochemistry I and BMS230 – Biochemistry II), BMS410 (Clinical Chemistry), and BMS405 (Systems Biomedicine). Finally, students are introduced to **molecular dynamics** through the courses: BMS120 (Organic Chemistry) and BMS220/230 (Biochemistry I & II), BMS340 (Drugs & Disease), and BMS405 (Systems Biomedicine) and to **mass spectrometry and other analytical technologies** through courses: BMS230 (Biochemistry II), BMS410 (Clinical Chemistry), BMS220 (Biochemistry I) and BMS405 (Systems Biomedicine). These changes are incorporated in the updated Syllabi. Please see "**Appendix I- Revised Course Syllabi**" where all	

	new additions in syllabi have been highlighted in yellow. A separate list with details and justification of the changes made to address the EEC's recommendations can be found in "**Appendix II- Integration of Emerging topics in courses**". Additionally, these important topics are reinforced through the School's **"Communities of Practice."** These communities serve as a dynamic platform for continuous engagement with current advances, offering students exposure to recent developments through guest lectures, journal clubs, workshops, and collaborative research discussions. To illustrate, the Medical Sciences Insight Lecture Series has featured internationally recognized scholars, including Nobel Laureate Jean-Marie Lehn, Professor Philippe Froguel, and Professor Vijay Tiwari, who have presented on key areas such as molecular dynamics, big data in precision medicine, single-cell transcriptomics, and other state-of-the-art biomedical technologies. These experiences enrich student understanding and ensure that the program remains in close dialogue with evolving scientific and technological landscapes. This integrative approach ensures that students acquire competencies relevant to modern biomedical research and practice without requiring major structural alterations to the accredited curriculum (Appendix II). In line with our strategic commitment to innovation, and as developments in the biomedical field are advancing rapidly, our approach has been to thread these emerging topics throughout existing courses and practical components,	

	complemented by co-curricular activities. This method has proven effective in maintaining the program's contemporaneity while preserving curricular coherence and accreditation integrity. We remain fully committed to incorporating emerging scientific advances and ensuring that our Biomedical Sciences program continues to equip graduates with the most current knowledge and skills in this rapidly evolving field. We reaffirm our proactive approach to curriculum evolution, strategic partnership building, and resource planning	
1.2. The programme currently includes practical placements, which are a valuable component of experiential learning. To further enrich the curriculum, the committee recommends reinforcing these placements by prioritizing laboratories that offer active research opportunities. This would allow students to engage in real-world scientific inquiries and contribute to ongoing biomedical investigations. To secure placements, especially if student numbers increase over time, Memoranda of Understanding (MoUs) or contracts with such laboratories need to be put in place.	1.2. To ensure structured and high-quality experiential learning, the Biomedical Sciences Program operates within the framework of the School of Medicine-Frankfurt Branch, thereby benefiting from the collaborative networks of its faculty. This affiliation inherently provides students with access to a broad spectrum of research and practical learning opportunities. Our strategic faculty recruitment process further strengthens this ecosystem. Projected faculty growth will ensure adequate capacity for expected student cohorts. New faculty appointments are selected not only for their academic excellence, but also for their active engagement in externally funded research projects and established collaborations with national and international institutions. This approach ensures that as student numbers grow, placement opportunities within high-quality research environments will continue to expand. The program currently maintains active collaborations with internationally recognized researchers and	Choose level of compliance:

	institutions, offering students exposure to cutting-edge biomedical research. Notably, the program collaborates with **Prof. Dr. Ilse Hofmann**, Scientific Coordinator of the Major Cancer Biology Programme and Group Leader at the **German Cancer Research Center (DKFZ)**, providing students insight into leading European research in single-cell and spatial omics, molecular profiling, and translational oncology. In addition, Dr. Adonis Yiannakas, Pharmacology, has already established a collaboration with the **University Medical Center Mainz** and the **Institute of Molecular Biology (IMB)** offer valuable collaboration opportunities through **Prof. Aris Weisman's (Director of IMB)**, which investigates neuroimmunological mechanisms of stress resilience using advanced rodent models and molecular techniques (in vitro, in vivo, and ex vivo). Furthermore, **Prof. Panagiotis Politis** has established a growing research network within the Frankfurt and Mainz regions, collaborating with **Professor Benedikt Berninger** (**University Medical Center Mainz**) with projects investigating the role of long non-coding RNAs and transcriptional regulation in adult and embryonic neurogenesis. Prof. Politis also maintains a long-standing collaboration with **Professor Hermann Rohrer** (**Institute of Clinical Neuroanatomy, Goethe University Frankfurt**), focusing on transcriptional mechanisms regulating neural differentiation in the spinal cord and peripheral nervous system. Through these partnerships, students gain direct exposure to internationally competitive	

	biomedical research and benefit from mentorship by distinguished investigators with strong publication records. Beyond research laboratories, the program also offers placement opportunities in clinical and diagnostic settings. Partner hospitals and clinics—such as **St. Elisabethen Hospital**, **Red Cross Hospital**, **Mangau Hospital of Red Cross**, **Center for Kidney and Hypertension Diseases (CfNH)**, **Offenbach IVF Clinic (Kinderwunsch und Endometriose Zeentrum)**, and **Sana Hospital**—provide students with hands-on experience in both diagnostic and clinical research techniques, further bridging theory with real-world biomedical practice. EUC has already established MoUs with these placements. It should be noted that the formalization of collaborations with research laboratories is a continuous, ongoing process. The aim is to further deepen partnerships with laboratories and organizations that offer active research engagement. As the Frankfurt region hosts a high concentration of biotechnology and pharmaceutical companies, as well as prominent research institutions, the program's growing network within this dynamic environment will facilitate student placements, support the exchange of scientific expertise, and enhance access to competitive research opportunities.	
1.3. Moreover, the academic staff is encouraged to leverage future collaborations with both local and international institutions—particularly those based in Frankfurt—to identify	1.3. As part of our faculty and student engagement strategy, the School runs an active Communities of Practice program, providing opportunities to invite **distinguished Visiting Professors** specializing in advanced biomedical sciences, particularly from	Choose level of compliance:

and invite distinguished Visiting Professors specializing in Advanced Biomedical Sciences. Such engagements would not only elevate the academic profile of the programme but also provide students with exposure to cutting-edge research and global perspectives	the Frankfurt region and other leading institutions abroad. Among the upcoming speakers, is **Prof. Aris Weisman, Director of the Institute of Molecular Biology (IMB), University Medical Center Mainz**. These engagements will further enhance the program's academic profile and provide students with valuable insights into global biomedical research trends. (Please see the first response above.)	

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

Areas of improvement and recommendations **by EEC**	Actions Taken by the Institution	For Official Use ONLY
2.1 Process of teaching and learning and student-centred teaching methodology The programme is a direct 1:1 implementation of the Biomedical Sciences B.Sc. programme in Nicosia. It is well designed, and the committee has only a few recommendations. A minor comment is the suggestion to strengthen the inclusion of artificial intelligence (AI) components across various courses.	2.1 As correctly noted by the EEC, the programme is a direct implementation of the Biomedical Sciences B.Sc. programme currently running at the Nicosia main Campus. As outlined in the response #1 under **Study programme and study programme's design and development** we are fully aligned with EEC's recommendation to further strengthen the inclusion of artificial intelligence (AI) componenets across various courses. As previously noted, AI is already integrated within several existing courses including: • BMS410 – Clinical Chemistry: Involves laboratory data interpretation and error analysis using AI-based analytical approaches. • BMS320 – Bioinformatics: Introduces computational tools and algorithms, including elements of machine learning for biological data analysis. • HEA190 – Research Methodology**:** Incorporates machine learning and generative AI algorithms for biomarker discovery and diagnostics. • BMS425 – Undergraduate Thesis II**:** Encourages student projects that apply AI or generative modeling to laboratory or clinical datasets. Please see "**Appendix I- Revised Course Syllabi**" where all new additions in modules have been highlighted in yellow. In addition, targeted co-curricular activities, such as expert seminars, interdisciplinary workshops, and thematic journal clubs – further enhance students' exposure to AI applications in	Choose level of compliance:

	biomedical sciences research and practice.	
2.2 Practical training A key element of the training programme is the placement of the students at external laboratories. However, this relies on the commitment of these external stakeholders to host these interns in their laboratories. Therefore, the EEC strongly recommends establishing binding, long-term agreements with these stakeholders. These agreements should outline the allocation of students, specify the number of students involved, and detail arrangements for training and supervision. A risk is that the number of students that will enrol in the new Biomedical Sciences B.Sc. programme is uncertain. It is aimed for 20 students in the first year. In case of an unexpectedly low or high number of students, the programme needs to be adjusted accordingly, which will pose risks for scheduling and resource allocation, especially for the practical training. Of course, this is a risk with any new educational programme.	2.2 We appreciate the EEC's observation regarding the importance of structured and sustainable partnerships for the placement of students in external laboratories. As noted previously (Response #1.2 under *Study Programme and Study Programme's Design and Development*), we have already established strong and ongoing collaborations with several prominent research centers, including: 1) German Cancer Research Center (DKFZ), Prof Hofmann, 2) Institute of Molecular Biology, Prof Weisman, 3) University of Mainz Medical Center, Prof Berninger and 4) Institute of Clinical Neuroanatomy, Goethe University Frankfurt. Additionally, we have established agreements with four hospitals and two specialty clinics for experience in diagnostic laboratory settings. Please note that for the Nicosia main campus and the current student body of Biomedical Sciences Students (~30 students where placements are integrated in the curriculum), we have placements in two research laboratories, two pharmaceutical companies four diagnostic laboratories, one hospital and one specialty clinic.	Choose level of compliance:
2.3 Student assessment The committee has no specific recommendation concerning student assessment.	We recognize that the precise student intake for the new Biomedical Sciences B.Sc. programme in Frankfurt cannot yet be fully projected. However, based on current capacity and the additional partnerships under development over the next three years – prior to the first cohort's 7th semester placements – we have corresponding numbers of available placement organizations that	Choose level of compliance:

	currently meet student demand and we will be able to adequately cover the placement needs. All inter-institutional agreements define key parameters, including, numerus causa, scope of training and supervision arrangements, thereby ensuring structure, high-quality and sustainable placement experiences for our students.	

3. Teaching staff
(ESG 1.5)

Areas of improvement and recommendations **by EEC**	Actions Taken by the Institution	For Official Use ONLY
3.1 The most important area of clarification is that the School can show CYQAA conclusively what they have not yet been able to convince this EEC, namely that the B.Sc. programme fulfils the requirements about permanently employed teachers. In an excel file received from the Vice Rector via Emily Mouskou as a response to our specific question, it appears as if the number for the existing Department of Medicine is 14 of 25 teachers with permanent full-time positions. This corresponds to 56%. But what's important is the figure for the B.Sc. programme, potentially facilitated after additional recruitments so we are hopeful that this is just a matter of getting the specifics together and showing the CYQAA. where competitive experimental research can be performed, if nothing else to fulfil the School's very ambitious mission statement.	3.1 We thank the EEC for the opportunity to clarify the composition of the permanent, full-time faculty for the B.Sc. in Biomedical Sciences programme. We recognize that this information may not have been fully clear during the previous exchange of correspondence following the site visit. The faculty members who will be teaching in the Biomedical Sciences programme (as listed in the Site Visit Agenda) are the following 12 academic staff, of whom only one (Prof. Politis) is a Visiting Professor: • Karim Dib, Professor, Programme Co-Coordinator, Biomedical Sciences (B.Sc.), School of Medicine–Frankfurt Branch, Immunology/ Microbiology • Irina Ivanova Stoyanova-van der Laan, Professor, Anatomy / Neuroscience • Efterpi Kostareli, Associate Professor, Chairperson, Department of Medicine, School of Medicine–Frankfurt Branch, Member of the Committee of Internal Quality Assurance, School of Medicine–Frankfurt Branch, Biochemistry / Genetics • Katrin Augustin, Associate Professor, Public Health / Ethics • Vasiliki Kalodimou, Assistant Professor, Biology • Ioannis Alatsathianos, Lecturer, Epidemiology / Biostatistics	Choose level of compliance:

	• Adonis Yiannakas, Lecturer, Neuroscience / Research Methods • Stella Voulgaropoulou, Lecturer, Psychology Ethics • Jasmina Isakovic, Lecturer, Physics / Histology • Christina Karantanou, Lecturer, Immunology / Cell Biology • Vasiliki Papadopoulou, Assistant Professor, Physiology, Hematology • Panagiotis Politis, Visiting Professor, Genetics / Biochemistry / Cell Biology Thus, 11 out of 12 faculty members (over 90%) teaching in the programme are permanent, full-time academic staff of the University, meeting CY.Q.A.A. requirements for permanently employed teaching personnel. As correctly noted by the EEC, additional faculty positions are included in our ongoing recruitment process, which will be finalized upon approval and accreditation of the programme by CY.Q.A.A. These forthcoming appointments will further strengthen the teaching and research base of the Biomedical Sciences programme and ensure continued compliance with all accreditation standards. In line with the School's recruitment policy as well as the EEC recommendations, the school has structured recruitment plan to ensure full coverage across all years of the Biomedical Sciences curriculum, aligned with the programme's academic and research vision. The existing faculty team provides strong coverage in key areas: Human Biology, Anatomy, Physiology,	

	Biochemistry, Genetics, Immunology, Pharmacology, Epidemiology / Biostatistics, Histology, Public Health, and Bioethics (existing instructors for the Biomedical Sciences Curriculum are shown in Appendix III). The School's recruitment strategy ensures balanced distribution of teaching responsibilities, reduces dependency on a small number of faculty for critical modules, and supports long-term programme sustainability as student numbers grow, ensuring: • Complete and sustainable course coverage across all four years of the curriculum • Reduced structural dependency on individual faculty for core subjects • Strengthened research capacity in strategic fields aligned with biomedical innovation • Enhanced resilience and flexibility as student numbers increase In parallel, these appointments will pave the way for building leadership capacity in key disciplines, and strengthening research–teaching synergies. This structured staffing approach is fully consistent with CY.Q.A.A. accreditation requirements and ensures that teaching and research activities remain fully resourced and future-proof.	
3.2 When it comes to research synergy for the teachers, they appear to have the time and a good incentives system but not really the on-site research	3.2 We thank the EEC for their constructive recommendation regarding the development of on-site research facilities to support faculty research activities.	Choose level of compliance:

facilities required to perform competitive experimental research. We therefore recommend that the School seriously considers planning for proper and up-to-date research laboratories for a few principal investigators with the right kind of questions, grants and ambitions (e.g. 1-3 labs)	We would like to clarify that the EUC School of Medicine-Frankfurt Branch Campus already includes one dedicated research laboratory for faculty, post-doctoral researchers and Ph.D. candidates. The dedicated research lab operates in addition to the two existing teaching laboratories (Biochemistry/Cell Biology and Pathology/Microbiology). With the completion of the new building, we will gain one additional, dedicated research laboratory, as well as four new teaching laboratories, significantly expanding our experimental and teaching capacity. As a measure of comparison, the Nicosia main campus had one dedicated research lab and four teaching laboratories supporting the School of Medicine, Sciences, Dentistry and Veterinary Medicine. Last year, the main campus opened an additional research laboratory, and 2 more teaching laboratories. This infrastructure has successfully supported the full range of medical, life and health sciences programs, as well as the faculty research efforts, as observed by the publicization record. The research lab currently houses specialized equipment including: Real time PCR system, Thermal Cycler, Nano Drop Spectrophotometer, complete Western Blot Apparatuses, and Fluorescence Microscope. We are also awaiting delivery of a Flow Cytometer (3 lasers) and an HPLC system. The next order includes FTIR spectrometer, bench-top NMR, and cryostat. Thus, by the end of our third year of operation, the Frankfurt Campus will have achieved research infrastructure parity with the Nicosia	

	main campus, ensuring that faculty members have the necessary facilities to pursue competitive experimental research. Furthermore, as practiced at the Nicosia campus, if during new faculty recruitment a faculty member requires specialized research equipment, this need is formally reviewed by the Department and the School Council for possible inclusion in the School's Capital Expenditure (CapEx) budget**.** For example, we recently acquired a Confocal Microscope to support the research of a newly appointed faculty member in Nicosia. This structured approach ensures that research infrastructure evolves in line with faculty expertise, grant activity, and the School's strategic research priorities. This ongoing commitment to research support aligns with the School's mission to foster high-quality, research-driven education and scholarly activity across all campuses and programmes.	

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

Areas of improvement and recommendations **by EEC**	Actions Taken by the Institution	For Official Use ONLY
4.1 Some concerns were raised by the EEC regarding the difficulties to accommodate teaching and research activities, even if the School uses a carousel scheduling system that appears to work well for the M.D. programme. It should be considered that the facilities have to be shared with an increasing number of students from other degree programmes currently or soon to be offered by the School, and also with experimental research performed by the teachers and their staff. It is strongly recommended to be proactive about this situation by preparing an accurate and future-looking plan regarding the availability of additional research laboratories. The EEC thinks that lab experience is vital in a programme like this, although this is not under discussion and it is a key strength of the programme reviewed here, we believe that this point should be emphasized through both graduate and post-graduate studies. Students graduated from the equivalent programme in Nicosia believe that more time in the laboratory is needed to the programme curriculum because it helped them the most in their career.	4.1 We thank the EEC for their observations regarding the challenges of balancing teaching and research activities, particularly in light of shared laboratory use amongst different programs. As noted in Response #2 under Teaching Staff**,** the Schools of Medicine, Sciences, Dentistry, and Veterinary Medicine at the Nicosia main campus have effectively managed shared use of teaching and research laboratories. Historically, this included one dedicated research laboratory and four teaching laboratories, which were recently expanded to two research laboratories and six teaching laboratories to accommodate increasing student numbers and research activity. The School of Medicine-Frankfurt Branch Campus, currently serves a considerably smaller programme portfolio and student body, presently has one dedicated research laboratory and two teaching laboratories. As presented, a phased laboratory expansion plan is in place to align capacity with projected student numbers and research activities. Looking ahead, planned expansions will further enhance capacity: Summer 2026 (old building)**:** Two additional teaching laboratories; and by 2028 (new building): One additional dedicated research laboratory and two additional teaching laboratories	Choose level of compliance:

	Upon completion, the Frankfurt Campus will have two dedicated research laboratories and six teaching laboratories, achieving full parity with the Nicosia main campus, and on a significantly shorter timeline than that originally required in Nicosia and to accommodate a significantly smaller educational portfolio and student/faculty number. We recognize that laboratory experience is vital to the Biomedical Sciences programme. Feedback from Nicosia graduates has been systematically integrated into planning for Frankfurt, ensuring alignment with proven high-impact practice. For instance, extended lab time was among the most valuable components of their training, positively impacting their subsequent careers. The planned expansion at Frankfurt ensures that students will continue to receive high-quality, hands-on laboratory experience, a core strength of the programme, across both graduate and post-graduate levels. This forward-looking approach ensures that teaching and research activities are fully accommodated while maintaining high standards of practical training for all students.	

5. Learning resources and student support
(ESG 1.6)

Areas of improvement and recommendations **by EEC**	Actions Taken by the Institution	For Official Use ONLY
5.1 Teaching and Learning resources An important strength is the ease with which students can contact and interact with the teaching staff. The good accessibility and interaction between students and teaching staff was highlighted in interviews with current and former students of the Medicine programme of the Frankfurt branch and Cancer Biology M.Sc. and Biomedical Sciences B.Sc. programmes of the Nicosia main campus. This should be cherished and maintained when student numbers are increasing. While sufficient teaching resources appear to be available, there is a potential risk due to uncertainty about the number of students expected. This necessitates a high degree of flexibility from both teaching staff and administration, posing potential challenges. If a larger-than-anticipated number of students enrol, there may be constraints in space and an insufficient number of teaching staff. However, the EEC acknowledges that such risks are inherent in launching a new programme. The EUC recognizes this risk and has implemented sufficient flexibility to adjust the programme as needed.	5.1 We remain committed to fostering a culture of personal engagement and mentorship. We thank the EEC for recognizing the strong accessibility and positive interaction between students and teaching staff across both the Frankfurt and Nicosia campuses. In conclusion, we reaffirm our proactive approach to curriculum evolution, strategic partnership building, and resource planning We remain fully committed to maintaining this high level of engagement as student numbers grow, ensuring that every student receives individualized guidance, academic support, and close mentoring throughout their studies. We acknowledge the EEC's observation regarding the potential risks associated with uncertainty in student enrolment numbers, which is inherent in launching a new programme. The EUC has put in place sufficient flexibility in both staffing and facilities to adjust the programme dynamically in response to actual enrolment patterns, thereby minimizing potential challenges in scheduling, space allocation, and resource distribution.	Choose level of compliance:

	As noted in Response #3.2 under Teaching Staff**,** the Schools of Medicine, Sciences, Dentistry, and Veterinary Medicine at the Nicosia main campus have effectively managed the shared use of teaching and research laboratories across programmes. Historically, this included one dedicated research laboratory and four teaching laboratories, which have since been expanded to two research laboratories and six teaching laboratories to support increased student numbers and growing research activity. The School of Medicine-Frankfurt Branch Campus, currently serves a smaller programme portfolio and student body, presently has one dedicated research laboratory and two teaching laboratories. The following expansion plan has been approved to ensure full capacity and future readiness: Summer 2026 (old building)**:** Addition of two new teaching laboratories and by 2028 (new building): Addition of one dedicated research laboratory and two more teaching laboratories. Upon completion, the Frankfurt Campus will have two research laboratories and six teaching laboratories, achieving full parity with the Nicosia main campus—on a significantly shorter development timeline and for a smaller programme portfolio.	

	As noted previously, we also recognize that hands-on laboratory experience is a cornerstone of the Biomedical Sciences curriculum. Feedback from Nicosia graduates consistently highlights that extensive laboratory training was among the most valuable aspects of their education, significantly contributing to their professional success. The planned expansion in Frankfurt will ensure the same standard of high-quality, immersive, and research-informed laboratory learning, across both undergraduate and postgraduate levels. We also appreciate the EEC's emphasis on maintaining structured and sustainable partnerships for student placements. As noted in Response #1.2 under Study Programme and Study Programme's Design and Development and #2.2 under Student – centred learning, teaching and assessment, we have already established collaborations with several prominent research institutions, including: 1- German Cancer Research Center (DKFZ) – Prof. Hofmann; 2. Institute of Molecular Biology – Prof. Weizman, 3. University Medical Center Mainz – Prof. Berninger and 4. Institute of Clinical Neuroanatomy, Goethe University Frankfurt – Prof. Rohrer. Additionally, we have agreements with four	

	hospitals and two specialty clinics providing clinical and diagnostic laboratory placement opportunities. At the Nicosia main campus, the current Biomedical Sciences cohort (~30 students) has access to two research laboratories, two pharmaceutical companies, four diagnostic laboratories, one hospital, and one specialty clinic for placements integrated within the curriculum. While the exact intake for the new Frankfurt Biomedical Sciences B.Sc. cannot yet be projected, the existing and forthcoming partnerships will sufficiently accommodate all placement needs by the time the first cohort reaches the placement stage (7th semester). All inter-institutional agreements clearly define student allocation, training scope, and supervision responsibilities, ensuring structured, high-quality, and sustainable learning experiences. In summary, EUC has in place a robust system of academic accessibility, adaptive resource planning, and strategic partnerships that will ensure: • Continued close interaction between students and faculty • Adequate teaching and research facilities for current and future needs	

	• Strong external collaborations providing comprehensive placement opportunities • A sustainable, high-quality learning environment that supports the School's mission and the Biomedical Sciences programme's growth trajectory.	
5.2 Physical resources The EEC identified two main concerns: Currently, the same laboratories are used both for student education and for staff scientific research. While the existing equipment is sufficient for most B.Sc. and M.Sc. teaching purposes, access to high-end devices is limited, and research activities must be scheduled around teaching, creating planning constraints. The Dean of the School of Medicine has proposed expanding laboratory capacity with the new building. As this building will feature significantly larger laboratories, this can be expected to alleviate part of this issue. The EEC strongly recommends allocating designated laboratories specifically for faculty research, as well as for Ph.D. students and postdoctoral researchers. However, since this solution may take several years to implement, the EEC advises ensuring in the interim that staff retain adequate time and access to laboratory	5.2 We thank the EEC for their constructive recommendation regarding the enhancement of on-site research facilities. As noted previously (please see response #3.2 to Teaching staff above), School of Medicine-Frankfurt Branch currently includes one dedicated research laboratory for faculty, postdoctoral researchers, and Ph.D. candidates, in addition to two teaching laboratories. With the completion of the new building, an additional research laboratory and four more teaching laboratories will be added, significantly increasing research and teaching capacity. This will bring the Frankfurt Campus to full parity with the Nicosia main campus within three years of operation. The laboratories are equipped with advanced instruments (Real-Time PCR, Thermal Cycler, NanoDrop, Western Blot, Fluorescence Microscope), with further equipment—including a Flow Cytometer, HPLC, FTIR, NMR, and cryostat—currently being	

facilities for their research. Maintaining active faculty engagement in scientific research is essential, as it enriches teaching by bringing cutting-edge developments into the classroom, inspiring students, and fostering a culture of inquiry and innovation. The student representative of the EEC agrees that the premises can't support competitive lab work and big experiments because of limited space and lack of equipment regarding newer techniques and analyses. Certain resource-intensive facilities, such as those required for FACS, mass spectrometry, (single cell) sequencing, animal experiments, are not available on campus and must instead be accessed through external organizations. While this arrangement is already well established at the main campus in Nicosia, it has not yet been developed at the Frankfurt campus. The EEC considers it a priority for EUC to build concrete partnerships in the Frankfurt area to ensure access to these facilities. Based on the successful experiences of the Medicine B.Sc. programme, the committee is confident that this can be achieved.	procured. As practiced in Nicosia, specialized equipment needs arising from new faculty recruitment are reviewed by the Department and School Council for inclusion in the Capital Expenditure (CapEx) budget, ensuring that research infrastructure evolves strategically alongside faculty expertise and research priorities. This ongoing investment underscores the School's commitment to supporting high-quality, research-driven education and scholarship across all campuses. While certain specialized facilities (e.g. animal facilities) are not maintained directly on-site at the EUC Frankfurt Campus, the programme has established active collaborations with leading research institutions in the Frankfurt and Mainz regions to ensure full access to these advanced technologies. These partnerships are modeled after the well-established system at the Nicosia main campus, where external collaborations successfully support high-level experimental research and training. Specifically, the programme maintains a close collaboration with Prof. Dr. Ilse Hofmann, Scientific Coordinator of the *Major Cancer Biology Programme* and Group Leader at the German Cancer Research Center (DKFZ). Through this collaboration, students and faculty are	

	exposed to cutting-edge European research in single-cell and spatial omics, molecular profiling, and translational oncology, providing valuable access to advanced experimental methods and equipment. At the University Medical Center Mainz, existing faculty research collaborations with Prof. Aris Weizman, Director of the *Institute of Molecular Biology*, offer access to facilities supporting neuroimmunology research using rodent animal models and in vitro, in vivo, and ex vivo approaches investigating neuroimmune mechanisms of stress resilience. In addition, Prof. Panagiotis Politis has established a growing research network within the Frankfurt region, developing collaborations with leading groups such as:1) *University Medical Center (UMC) Mainz*, where Prof. Politis collaborates on a joint research project exploring the role of long non-coding RNAs and transcriptional regulation mechanisms in adult and embryonic neurogenesis, and 2) *Institute of Clinical Neuroanatomy, Goethe University Frankfurt*, where Dr. Politis maintains a long-standing collaboration focused on transcriptional mechanisms regulating neural differentiation in the spinal	

	cord and peripheral nervous system (PNS). Through these partnerships, EUC Frankfurt faculty and students actively engage in cutting-edge biomedical research, benefiting from mentorship by internationally recognized investigators with strong publication records. These collaborations ensure that EUC students have direct access to advanced experimental resources and research environments, fully addressing the EEC's recommendation and reinforcing the programme's commitment to providing a research-driven, internationally networked educational experience.	
5.3 Human support resources The human support resources seem excellent, and the EEC has no specific recommendations.	We are grateful to the EEC for this comment.	
5.4 Student support The student support seems excellent, and the EEC has no specific recommendations.	We are grateful to the EEC for this comment.	

B. Conclusions and final remarks

Conclusions and final remarks **by EEC**	Actions Taken by the Institution	For Official Use ONLY
1. In general, the EEC conclude that the B.Sc. programme in biomedical sciences appears to be of high quality, fulfilling most, if not all, criteria set up by CYQAA. In the following, recommendations to consider are listed with the aim to further improve the programme, which has already gone through a couple of cycles of improvement in the Nicosia version of the programme running successfully since several years.	1. We thank the EEC for recognizing that the B.Sc. in Biomedical Sciences meets CY.Q.A.A. standards and reflects a high-quality programme. We value the Committee's recommendations and remain committed to continuous improvement, building on the successful model and evolution of the Nicosia programme	Choose level of compliance:
2. The content of the programme is adequate but could be further future-proofed by including more cutting-edge technologies and concepts, including e.g. generative AI components and neural network theory/practice (this e.g. includes Nobel Prize-winning AlphaFold for protein structure and interactions as well as innovative molecular design but may also be much broader than that). Other specifics that can be emphasized more include mass spectrometry, single-cell analysis, microbiome, molecular dynamics, use of super computers etc etc). The programme leadership will also have to work local contacts up that allow visits to labs with access to these technologies.	2. We fully share the EEC's view on the importance of future-proofing the curriculum with emerging topics such as AI, molecular dynamics, single-cell analysis, and mass spectrometry. These topics are already embedded across core and elective courses, supported by co-curricular initiatives (e.g., Medical Sciences Lecture Series), and will be further reviewed during the next Programme Evaluation Review (2027) for potential expansion. Pplease see Response #1.1 under Study programme and study programme's design and development and 2.1 under Student–centred learning, teaching and assessment.	
3. Thus, EEC sees a need to develop local networks and	3. The programme has already established strong	

contacts to build a local Frankfurt environment where students can be placed in multiple types of external laboratories, both commercial diagnostic and academic laboratories. We also recommend that student projects can be placed in such environments. Non-experimental, literature-based B.Sc. thesis work should be considered an exception in a B.Sc. programme of this nature.	collaborations with leading research and clinical institutions, including DKFZ, the Institute of Molecular Biology (Mainz), University Medical Center Mainz, and Goethe University Frankfurt. These partnerships ensure access to advanced research facilities and active, hands-on placements. Binding MoUs and supervision frameworks are in place to guarantee structured, high-quality experiential learning for all students. (Please see Response #1.2 under Study programme and study programme's design and development**)**	
4. Perhaps the most important point remains to emphasize: The School needs to show to CYQAA definitive proof that the teacher staff for the B.Sc. programme meets the criteria regarding 70% permanent staff.	4. We confirm that 11 of the 12 academic staff (over 90%) teaching in the programme are permanent, full-time faculty members, fully meeting CYQAA requirements. Further recruitments is currently underway to strengthen the teaching and research base as the programme grows, pending approval and accreditation of the program by CYQAA. (Please see Response #3.1 under Teaching Staff).	Choose level of compliance:
5. Furthermore, the programme should be safe-guarded against unexpectedly low or high enrolment of students. This includes a dynamic scheduling model and making sure there is enough placement laboratories and supervisors available as alluded to above. This is particularly important in the	5. We acknowledge the EEC's concerns regarding fluctuating student numbers. The programme has built-in flexibility in staffing, scheduling, and laboratory capacity to adapt dynamically to enrolment variations, ensuring sufficient placements, supervision, and high-quality student support. (Please see	Choose level of compliance:

beginning when it is not clear how many students will actually apply and pass the registration requirements.	Response #5.1 under Learning Resources and student support).	
6. EEC recommends the School to plan for higher-end research laboratories that support in-house competitive experimental research by a (initially probably) small number of principal investigators. In this way, the synergy between a lab-intense programme like this and research of even higher quality can be achieved, in line with the School's very ambitious mission statement to become a "leading academic and research hub" in Europe and beyond. Even if it may not be this committee's role, we still feel that it would be better for the credibility of the Frankfurt operations to be a bit more modest and realistic, while still keeping the dream alive by instead striving to be a "competitive academic and research environment" in Europe, that attracts research of high international quality.	6. EUC Frankfurt already operates one dedicated research laboratory and two teaching laboratories, with plans for additional facilities (two teaching and one research lab by 2028). These developments will achieve full parity with the Nicosia main campus. For highly specialized techniques (e.g., animal models, single-cell sequencing, FACS, mass spectrometry), EUC has secured collaborations with DKFZ, IMB Mainz, and Goethe University Frankfurt, ensuring faculty and student access to advanced research infrastructure. (Please see Response 5.2 Physical resources under Learning Resources and student support).	Choose level of compliance:
7. Thanks to a dedicated teacher collegium and experienced programme (co-)coordinators, the EEC expects this programme to have the potential to be as successful as its Nicosia counterpart. By implementing the above recommendations continuously over the next cycle of programme revisions, an even better programme may see the light of day,	7. We appreciate the EEC's positive outlook regarding the programme's future success. With an experienced and dedicated faculty, strong research partnerships, and a robust framework for continuous improvement, EUC is confident that the Frankfurt Biomedical Sciences B.Sc. will mirror—and further enhance—the success of its Nicosia counterpart, preparing	Choose level of compliance:

prepared to produce B.Sc. graduates ready to meet tomorrow's challenges.	graduates to excel in tomorrow's biomedical research and health science environments.	

C. Higher Education Institution academic representatives

Name	*Position*	*Signature*
Prof. Elizabeth Johnson	Dean of the School of Medicine, EUC Main Campus & School of Medicine-Frankfurt Branch	Elizabeth Johnson (Nov 3, 2025 15:44:26 GMT+2)
Dr. Irene Polycarpou	Chairperson, Dept. of Health Sciences, EUC Main Campus & Interim Co-Chairperson of the Department of Life and Health Sciences, School of Medicine-Frankfurt Branch	Irene Polycarpou Irene Polycarpou (Nov 3, 2025 19:37:10 GMT+2)
Dr. Maria-Ioanna Christodoulou	Chairperson, Dept. of Life Sciences, EUC Main Campus & Interim Co-Chairperson of the Department of Life and Health Sciences, School of Medicine-Frankfurt Branch	
Prof. Vasiliki Gkretsi	Programme Coordinator, EUC Main Campus & School of Medicine-Frankfurt Branch	Vasiliki Gkretsi Vasiliki Gkretsi (Nov 3, 2025 16:04:05 GMT+2)
Prof. Karim Dib	Programme Co-Coordinator, School of Medicine-Frankfurt Branch	Prof Karim Dib (Nov 3, 2025 17:11:25 GMT+1)

Date: 3/11/2025

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e-mail: info@dipae.ac.cy

European University Cyprus

Appendix I – Biomedical Sciences Syllabi

Course Title	Introduction to Human Biology				
Course Code	BMS100				
Course Type	Compulsory				
Level	Bachelor (1st Cycle)				
Year / Semester	1st Year / 1st Semester				
Teacher's Name	Vasiliki Kalodimou				
ECTS	6	Lectures / week	2 Hours/14 weeks	Laboratories / week	2 Hours/ 14 weeks
Course Purpose and Objectives	This course is intended to give the student a broad overview of biology with respect to humans. It is designed to acquaint students with the fundamental terms, concepts, and principles of human biology and to serve as a foundation upon which subsequent courses in biomedical sciences will be based.				
Learning Outcomes	Upon successful completion of this course students should be able to: • Describe the normal structure and architecture of eukaryotic cells, as well as the subcellular organelles and their respective role in the cells. • Describe the relationship and mode of communication between neighboring cells and between cells and their extracellular environment. • Recall the structure and role of cell membrane and its role in normal cell function. • Describe the two types of cell division, and the phases of each cell-division cycle. • Describe the general characteristics of the processes of gametogenesis and insemination.				

<table>
<tr><td></td><td colspan="3">Explain the processes of cell division: cleavage, blastulation and gastrulation in the human embryo.
Identify and describe the processes involved in the formation of the ectoderm, mesoderm and endoderm and to establish their relationship with the development of each organ in the human body.
State the process of cell differentiation and its role in the production of numerous and diverse cell types.
Define the fundamental changes in the normal structure and function of cells and their relationships to the appearance of different types of pathological states.
Laboratory skills
Explain the function of each one of the components of an optical microscope
Use the optical microscope to identify the different cell types and their basic cellular component organelles.
Identify and interpret the different phases of mitosis using the optical microscope.
Describe and identify different cell types in basic tissues of the human body</td></tr>
<tr><td>Prerequisites</td><td>None</td><td>Co-requisites</td><td>None</td></tr>
<tr><td>Course Content</td><td colspan="3">Description:
In that regard, students will familiarize themselves with:
The macromolecules found in cells (such as lipids, proteins, polysaccharites) and their basic chemical composition
The structure of eukaryotic and prokaryotic cells
The subcellular organization of each cell type, including description of subcellular organelles
The structure and function of cell membrane
Cell division
Basic description of gametogenesis and gastrulation in the human embryo
Cell differentiation and production of diverse cell types of the human body
The organization of cells in tissues and tissues in organs
Basic description of the cell characteristics in each tissue in the human body (skin, skeletal system, nervous system, muscular system, respiratory system, immune system, digestive system, endocrine system, reproductive system).</td></tr>
</table>

<table>
<tr><td></td><td>

- Fundamental changes in the normal structure and function of cells and their relationships to the appearance of different types of pathological states.

Laboratory exercises:

- Observing cells with light microscopy (i.e. skin, hair, cheek cells)
- Observing organ systems through dissection using animals such as mice
- Observing various body tissues under the microscope using premade slides
- Characteristics of normal blood smear
- Calculations and unit conversions in biomedical sciences
- Identifying bacteria in dental plaque
- Blood pressure measurements: does body position affect blood pressure?
- Testing for neuropathy by two-point discrimination test

</td></tr>
<tr><td>Teaching Methodology</td><td>Face- to- face</td></tr>
<tr><td>Bibliography</td><td>Molecular Biology of the Cell; Alberts, B./ Hopkin, K./Johnson, A; Garland Science.

Molecular Medicine; Trent, R.; Academic Press.</td></tr>
<tr><td>Assessment</td><td>
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<tr><td>Examination</td><td>70%</td></tr>
<tr><td>Assignments/Lab</td><td>20%</td></tr>
<tr><td>Class Participation & Attendance</td><td>10%</td></tr>
<tr><td></td><td>100%</td></tr>
</table>
</td></tr>
<tr><td>Language</td><td>English</td></tr>
</table>

Course Title	Calculus				
Course Code	BMS105				
Course Type	Compulsory				
Level	Bachelor (1st Cycle)				
Year / Semester	1st Year / 1st Semester				
Teacher's Name	Yiannis Alatsathianos				
ECTS	6	Lectures / week	3 Hours/14 weeks	Laboratories / week	N/A
Course Purpose and Objectives	The course offers basic knowledge of the principles of calculus, which is a powerful tool in engineering and science.				
Learning Outcomes	Upon successful completion of the course, students will be able to: • Number the basic algebraic properties of various functions • Calculate the limit for a given function • Calculate the derivative of a function using various techniques • Apply the derivative to solve real problems • Use the derivative to study the characteristics of a function's graph • Recognize the antiderivative as the reverse process of differentiability and apply to various problems • Use the antiderivative (integration) in problem solving containing area calculation				
Prerequisites	None	Co-requisites	None		
Course Content	• Cartesian plane. Distance between two points. Graphs. Circle. Parabola. Slope of the line. Slope line. Parallel and perpendicular lines. Linear equation. Functions. Function symmetry. Composition of functions. Trigonometric functions.				

	• Introduction to differentiation. Calculation of limits. One-sided limits. Limits theorems. Infinite limits and limits that tend to infinity. Tangent line and derivative. Derivative at a point. The derivative as a function. Differentiation in open interval. The derivative as a variance ratio. Instantaneous velocity. Continuous functions. Types of discontinuous functions. Theorem for the upper and lower limit. Intermediate value theorem. Rules on differentiability. The rules for multiplying and dividing. The derivative of complex functions: The chain rule. The power rule. The rule of power functions. Derivative of trigonometric functions. Indirect differentiability. High order derivatives. • Mean value theorem. Functions and graphs I: Increasing and decreasing functions, the first derivative-maxima and minima. Asymptotic behaviour of functions. Functions and graphs II: Concavity and Points of Inflection, finding local extrema using the second derivative. Applications in optimization problems. Undefined forms and L'Hopital's rule. • Antiderivative. Symbolism. Area under a curve. Definite integral. Fundamental theorem of calculus. Integration by substitution. Area between curves. • Recent developments and current issues related to the main objectives of the course.
Teaching Methodology	Face- to- face
Bibliography	Weir, Hass, Giordano., Thomas' Calculus, Pearson-Addison Wesley. Elliott Mendelson, Calculus Schaum's series, McGraw Hill.
Assessment	Examinations 90% Class Participation & Attendance 10% 100%
Language	English

Course Title	General and Inorganic Chemistry				
Course Code	BMS110				
Course Type	Compulsory				
Level	Bachelor (1st Cycle)				
Year / Semester	1st Year / 1st Semester				
Teacher's Name	Panagiotis Politis				
ECTS	6	Lectures / week	2 Hours/14 weeks	Laboratories / week	3 Hours/14 weeks
Course Purpose and Objectives	• This introductory course is taught in the first semester of studies when students of the Biomedical Sciences Program are expected to familiarize themselves with basic concepts and principles of inorganic chemistry such as structure of atoms and molecules, orbitals, chemical bond formation, the electronic effects, the periodic table and periodic properties of elements. • This course aims to provide the students with the required background for further understanding of stereochemistry that leads to the chemistry of complexes, an indispensable tool for the understanding of multiple biological processes, such as enzymatic reactions. • Finally, students will get acquainted with the chemical laboratory, basic chemical techniques, good laboratory practice and safety regulations when performing chemical experiments.				
Learning Outcomes	Upon successful completion of this course the student will be able to: • Recall basic concepts such as: atom, molecule, atomic and molecular orbitals, and chemical bond • Predict basic physicochemical properties of molecules based on their chemical structure • Perform simple chemical calculations and write simple chemical reactions • Recognize, name and classify inorganic compounds • Define molecular geometry • Describe a chemical laboratory as well as basic techniques used for the study of simple molecules				

<table>
<tr><td></td><td colspan="3">• Apply safety rules when performing laboratory exercises in chemistry</td></tr>
<tr><td>Prerequisites</td><td>None</td><td>Co-requisites</td><td>None</td></tr>
<tr><td>Course Content</td><td colspan="3">Theory
• Structure of the atom, hydrogen atom, atomic orbitals, electron configuration, hybridization, periodic table
• Chemical bonds (covalent, non-covalent), structure of molecules, molecular orbitals.
• Solutions, electrolytes, acids, bases, salts, pH, buffers.
• Structure of molecules, Lewis structures, multiple bonds, elementary solid state. Metal Bond, liquid state, gaseous state.
• Thermodynamics: free energy, enthalpy, entropy, equilibrium, stoichiometry, Mole definition, pressure, volume, temperature, concentration, solution, chemical reaction kinetics, activation parameters.
• Chemical reactions: classification, types, chemical equilibrium, chemical kinetics, oxidation-reduction reactions. Theory of acids and bases, chemical reactions, energy, basicity, acidity, nucleophilicity, electrophiles.
• Spectroscopy.
• Stereochemistry, complex chemistry principles, nomenclature of inorganic compounds
Laboratory exercises
• The chemical laboratory, description of basic safety principles.
• Familiarization with basic chemical utensils and devices- Basic Laboratory Techniques
• Assessment of physical constants
• Preparation of solutions, mass and density of solutions
• pH measurement and buffer solutions, salt solubility
• Chemical reactions.
• Molecular weight
• Charles’s Law
• Chromatography
• Titration
• Spectrometrylab
• Laboratory report writing</td></tr>
<tr><td>Teaching Methodology</td><td colspan="3">Face- to- face</td></tr>
</table>

Bibliography	Ebbing D, Gammon S.D, General Chemistry, Brooks Cole.
Assessment	Examinations 60% Assignments 30% Class Participation & Attendance 10% 100%
Language	English

Course Title	Laboratory Calculations in Biomedical Sciences				
Course Code	BMS115				
Course Type	Compulsory				
Level	Bachelor (1st Cycle)				
Year / Semester	1st Year / 1st Semester				
Teacher's Name	Yiannis Alatsathianos				
ECTS	6	Lectures/ week	3 Hours/ 14 weeks	Laboratories /week	N/A
Course Purpose and Objectives	This course aims to help students remember and familiarize themselves with basic calculations used in the laboratory so that their smooth entry into the laboratories is ensured. Students will learn to make calculations and mathematical conversions for making buffers, dilutions, and mixtures. Particular emphasis will be given to the development of their ability to perform calculations for the most frequently confronted problems encountered in the laboratory.				
Learning Outcomes	Upon successful completion of the course, students will be able to: • Explain the procedure of weighing out solids • Explain the procedure of measuring liquids and mixing them • Explain the procedure of measuring the pH of a solution • Convert metric measurements into scientific notation • Calculate the Molarity of a liquid given the formula weight • Explain how to make a dilution from a concentrated stock solution. • Perform basic calculations using Excel software				
Prerequisites	None	Co-requisites	None		
Course Content	**Theory**: Metric System Concentrations (Molarity, Percent solutions) Dilutions Chemical Mixtures, Solutions, and Dilutions (Mixtures and Solutions; Water and Glassware for Solution Making;				

<table>
<tr><td></td><td>Volumes, Amounts, and Concentrations; Formulas for Solutions; Examples: Making Solutions; Making Dilutions; Working with Stock Solutions)
Use excel software in basic calculations (e.g. calculation of mean, standard deviation, standard error, student T-test)</td></tr>
<tr><td>Teaching Methodology</td><td>Face- to- face</td></tr>
<tr><td>Bibliography</td><td>David R. Caprette; Quantitative Methods: Solutions & Dilutions.

F. Stephenson, Academic Press. Calculations for Molecular Biology and Biotechnology: A Guide to Mathematics in the Laboratory.</td></tr>
<tr><td>Assessment</td><td><table><tr><td>Examinations</td><td>70%</td></tr><tr><td>Assignments/Lab</td><td>20%</td></tr><tr><td>Class Participation & Attendance</td><td>10%</td></tr><tr><td></td><td>100%</td></tr></table></td></tr>
<tr><td>Language</td><td>English</td></tr>
</table>

Course Title	Organic Chemistry				
Course Code	BMS120				
Course Type	Compulsory				
Level	Bachelor (1st Cycle)				
Year / Semester	1st Year / 2nd Semester				
Teacher's Name	Panagiotis Politis				
ECTS	6	Lectures / week	2 Hours/14 weeks	Laboratories / week	3 Hours/14 weeks
Course Purpose and Objectives	This course is designed to introduce Biomedical Sciences students to the world of Organic Chemistry and provide general background, both at the theoretical and practical level through laboratory exercises. Completion of this course will qualify students for succeeding in all the lessons of the curriculum that require solid background in organic chemistry. More specifically, students will familiarize themselves with the structure and properties (physical and chemical) of members of the main homologous series of Organic Chemistry, as well as simple mechanisms of organic reactions, the structure and function of organic compounds found in living organisms (biomolecules), and the basic spectroscopic techniques used for the identification of organic compounds structure.				
Learning Outcomes	Upon successful completion of this course students will be able to: • Identify the structure of molecules and basic reactions of organic chemistry • Describe the main spectroscopic techniques • Describe the basic principles and rules of stereochemistry • Distinguish the main classes of organic compounds and biomolecules, name them, and describe their properties as well as the mechanisms of their basic reactions • Combine the application of the main spectroscopic techniques to elucidate the structure of simple molecules • Perform antithetical analysis of simple organic molecules • Propose reaction sequences for synthesis of simple organic molecules by drawing the most efficient chemical reaction				

<table>
<tr><td></td><td colspan="3">sequence
• Classify organic compounds</td></tr>
<tr><td>Prerequisites</td><td>BMS110</td><td>Co-requisites</td><td>None</td></tr>
<tr><td>Course Content</td><td colspan="3">Theory
• Classification and nomenclature of organic compounds. Structure of carbon, hydrogen, oxygen, sulfur and nitrogen.
• Chemical bonds and structure of the molecule. Stereochemistry and spectroscopy. Inductive effect and resonance. Categories of reagents, reactions and mechanisms.
• Hydrocarbons: alkanes, alkenes, alkynes, cycloalkanes, benzene. Alcohols, ethers, phenols. Simple sulphides. Nitro-compounds, amines, diazonium salts. Esters of organic and inorganic acids. Hydrogen bonds in organic compounds. Stereochemistry: enantiomers, diastereomers, geometric isomers. Carbohydrates. Amino acids and proteins. Aromatic compounds. Nucleic acids and nucleotides. Lipids. Stereochemistry and mechanisms of enzymatic reactions.
• Introduction to Molecular dynamics; simulation to study protein-ligand interactions.

Laboratory Exercises
• Techniques: Boiling point.
• Simple and fractional distillation. Steam distillation for isolation of eugenol from cloves
• Qualitative analysis of organic matter
• Methods for separation of organic compounds
• Methods for purification of organic compounds
• High performance liquid chromatography, gas chromatography
• Infrared spectroscopy, mass spectroscopy.
• Purification and separation of liquid substances
• Detection and specific functionalization reactions (detection of double bonds, Carbonyls, sugars, amino-acids, alkyl-halides, alcohols)
• Aldehydes - Ketones - carboxylic acids – hydroxy acids - dicarboxylic acids
Amines – Phenols
• Preparation of acetylsalicylic acid
• Urea-proteins and amino acids</td></tr>
</table>

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Carbohydrates
Benzoic acid and caffeine recrystallizing
Salicylic acid extraction from aqueous solution
Chromatographic Methods (thin layer chromatography-TLC)
Analysis of analgesic drugs

</td></tr>
<tr><td>Teaching Methodology</td><td>Face- to- face</td></tr>
<tr><td>Bibliography</td><td>McMurry J, Organic Chemistry.

McMurry J,. Castellion M.E,. Ballantine D.S, Fundamentals of General, Organic, and Biological Chemistry, Prentice Hall.

Organic Chemistry, by T.W. Solomons and C.B. Fryhle. (Publisher: Wiley).</td></tr>
<tr><td>Assessment</td><td>
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<tr><td>Examinations</td><td>60%</td></tr>
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<tr><td>Language</td><td>English</td></tr>
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Course Title	Anatomy-Physiology I				
Course Code	BMS130				
Course Type	Compulsory				
Level	Bachelor (1st Cycle)				
Year / Semester	1st Year / 2nd Semester				
Teacher's Name	Irina Stoyanova				
ECTS	6	Lectures/ week	2 Hours/ 14 weeks	Laboratories/ week	1 Hour/ 14 weeks
Course Purpose and Objectives	The objective of the course is to familiarize students with: The fundamentals of anatomy and anatomical terminology The principles of Physiology as a basic biological science. The morphology and structure of the musculoskeletal system, and its physiology. The anatomy of Central and Peripheral Nervous system The mechanisms of preservation of the internal environment of the body through homeostasis The importance of the skin as a functional system				
Learning Outcomes	Upon successful completion of this course, students should be able to: • Explain the fundamentals of the methods that support the study of anatomy. • Recall the terminology and use accurately the International Anatomical Nomenclature for naming the various anatomical structures of the human body. • Identify and describe the morphology of the bones, joints, muscles, nervous and vascular components of the musculoskeletal system. • Relate the structural characteristics of the anatomical elements of the musculoskeletal system to their function • Recall the principles of Physiology as a basic biological science. • Discuss the principal functional characteristics of the musculoskeletal system. • Describe the basic characteristics of the nervous system.				

<table>
<tr><td></td><td colspan="3">Describe the fundamentals of the physiology of exercise, the physiology of ageing and the physiology of adaptation to extreme and adverse conditions.
Analyze the organization and the composition of the fluid compartments of the body.
Define the principles of homeostasis of the body fluids.
Enumerate and describe the skin properties and functions and its associated organs.</td></tr>
<tr><td>Prerequisites</td><td>None</td><td>Co-requisites</td><td>None</td></tr>
<tr><td>Course Content</td><td colspan="3">Theory
Fundamentals of Anatomy-Basic principles of topographic anatomy (anatomical terms)-Basic concepts of cytology and histology-International Anatomical Terminology
Fundamentals of Physiology.
Morphological and functional Characteristics of the Musculoskeletal system
Vascular (blood vessels and lymphatic system) and Nervous Tissue Elements of the Musculoskeletal System
Anatomy of the head, neck, spine and limbs
Movement and its relationship to the structure and function of the Musculoskeletal System. The physiology of exercise
Central and peripheral nervous system (neural cells, brain, spinal cord), meninges, spinal cord and function
Brief description of the neuromuscular system function
Autonomic nervous system
Roads of the senses, pyramidal and extrapyramidal system
Homeostasis, fluid balance and acid-base balance. Adaptation to extreme environmental conditions
The growth and development of the human body and the process of ageing
Functions of the Skin and Associated Organs, including the physiology of thermal regulation.

Laboratory exercises:
Using audiovisual means, students will be trained in anatomy and physiology and present projects in relation to the content of the course in order to fully comprehend the material taught. Additionally, students will be able to search for relevant information by accessing libraries and the internet.</td></tr>
<tr><td>Teaching Methodology</td><td colspan="3">Face-to-face</td></tr>
</table>

Bibliography	Gray's Anatomy; Drake, Richard L./Vogl, A. Wayne/Mitchell, Adam W.; Elsevier. Essential Clinical Anatomy; Moore Keith;Lippincott, Williams & Wilkins. Atlas of Human Anatomy: with Student Consult Access (Netter Basic Science); Frank H. Netter; Saunders. Guyton and Hall Textbook of Medical Physiology; John E. Hall; Saunders.
Assessment	Examinations 70% Assignments 20% Class Participation & Attendance 10% 100%
Language	English

Course Title	Cell Biology				
Course Code	BMS135				
Course Type	Compulsory				
Level	Bachelor (1st Cycle)				
Year / Semester	1st Year / 2nd Semester				
Teacher's Name	Vasiliki Kalodimou & Christina Karantanou				
ECTS	6	Lectures / week	2 Hours/14 weeks	Laboratories / week	2 Hours/14 weeks
Course Purpose and Objectives	The objective of the course is to familiarize students with the basic structure and function of prokaryotic and eukaryotic cells, their major components and organelles, the way by which genetic information is organized within the cell and the mechanism used for DNA replication, transcription and translation. Students will also be acquainted with concepts related to normal cell function such as membrane transport, cellular respiration, cell division, and apoptosis.				
Learning Outcomes	Upon successful completion of this course students should be able to: • Compare prokaryotic and eukaryotic cells and be able to recall differences and similarities in terms of morphology and cellular organelles • Describe basic characteristics of viruses and prions • Describe the relationship and mode of communication between neighboring cells and between cells and their extracellular environment. • Recall the structure and role of cell membrane and describe and compare the different transmembrane transport mechanisms and their importance in cellular physiology. • Cellular respiration • Explain the way by which DNA is organized in the cell • Describe the basic principles of DNA replication, transcription and translation • Describe the mechanisms of cellular division, the phases of the cell-division cycle and its regulatory mechanisms.				

<table>
<tr><td></td><td colspan="3">Discuss the effects of aging on the cellular structure and function and to understand the process of apoptosis.
Describe the nature of progenitor stem cells and their principal characteristics.</td></tr>
<tr><td>Prerequisites</td><td>None</td><td>Co-requisites</td><td>None</td></tr>
<tr><td>Course Content</td><td colspan="3">Theory
Normal Structure and Function of Prokaryotic and Eukaryotic Cells.
Relationships between Cells and their Environment.
Transport Mechanisms through Membranes.
Cellular respiration
DNA organization, replication, transcription and translation
Cell Division Mechanisms, the Cell-Division Cycle and Control Mechanisms.
Effects of Ageing and Apoptosis.
Progenitor stem Cells.
Cell Differentiation.
Laboratory Exercises
Optical Microscopy: observation of prokaryotic and eukaryotic cells
Observing bacteria in yogurt
Study of osmosis in plant cells
Study of osmosis in blood cells
Subcellular fractionation and isolation of organelles
Cell division: mitosis-meiosis
Fermentation
Cell culturing techniques, freezing, thawing and subculturing
Cell viability assay
Cytoskeletal and nuclear staining
DNA isolation from cells
Apoptosis assessment</td></tr>
<tr><td>Teaching Methodology</td><td colspan="3">Face- to- face</td></tr>
<tr><td>Bibliography</td><td colspan="3">Molecular Biology of the Cell; Alberts, B./ Hopkin, K./Johnson, A.; Garland Science.

iGenetics: A Molecular Approach; Russel, Peter; Pearson.</td></tr>
</table>

<table>
<tr><td></td><td>The Cell (0); Geoffrey M. Cooper and Robert E. Hausman; Sinauer Associate.

Molecular Medicine; Trent, R.; Academic Press.</td></tr>
<tr><td>Assessment</td><td><table>
<tr><td>Examinations</td><td>70%</td></tr>
<tr><td>Assignments/Lab</td><td>20%</td></tr>
<tr><td>Class Participation & Attendance</td><td>10%</td></tr>
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<tr><td>Language</td><td>English</td></tr>
</table>

Course Title	Academic skills				
Course Code	HLS100				
Course Type	Compulsory				
Level	Bachelor (1st Cycle)				
Year / Semester	1st Year / 2nd Semester				
Teacher's Name	Stella Voulgaropoulou				
ECTS	3	Lectures / week	2 Hours/ 14 weeks	Laboratories / week	N/A
Course Purpose and Objectives	The main aim of the course is the development of certain academic skills that are needed to ensure smooth incorporation of freshmen into the academic environment. Particular emphasis will be given to the development of perception, written and oral skills, as well as the introduction of ways to study, understand and present academic essays, work independently or in teams, and learn to document and support scientific information.				
Learning Outcomes	Upon successful completion of this course, students should be able to: • Recall the academic organization of a university and explain the academic procedures and regulations • Develop simple research skills to support a piece of scientific information • Develop skills for independent and team-based work • Summarize basic concepts, principles and stages of a research project, report or essay • Apply basic use of Excel • Demonstrate written and oral expression skills of good scientific merit • Apply proper ways of citing appropriate literature during report or essay writing • Understand the consequences of plagiarism and be familiarized with ways of proper academic and scientific conduct				
Prerequisites	None	Co-requisites	None		
Course Content	**Theory**				

	• University organization • Academic procedures and regulations, program requirements, organization of studies • Study preparation, time management, study skills, note taking, preparing for and taking exams • Development of the four skills (Listening, Reading, Writing, Speaking) • Proper Structure and writing of a Scientific report/essay • Main types of scientific studies and scientific evidence • Preliminary research concepts and principles: types of research, research protocols, conducting research, ethics in research, writing and presenting original research • References Managing Systems • Basic use of Excel software (calculation of mean, standard deviation, standard error) • Ways and tips on searching literature: Library and Electronic sources (Internet) • Scientific essay/ research paper understanding (abstract, composition, paraphrasing, etc.) • Technical writing, writing and presentation of written work • Oral presentation of individual and group projects using modern technological means • Academic Ethics in essay writing
Teaching Methodology	Face- to- face
Bibliography	Langman, John. *Reading and study skills*. McGraw-Hill. Additional books may be proposed by the instructor(s) of the course.
Assessment	Examinations 70% Assignments 20% Class Participation & Attendance 10% 100%
Language	English

Course Title	Physics for Biomedical Sciences				
Course Code	BMS140				
Course Type	Compulsory				
Level	Bachelor (1st Cycle)				
Year / Semester	1st Year / 2nd Semester				
Teacher's Name	Jasmina Isakovic				
ECTS	3	Lectures / week	2 Hours/14 weeks	Laboratories / week	0 Hours/
Course Purpose and Objectives	The main objective of this course is to introduce students to basic principles, concepts and applications of modern physics that are related and useful to biomedical sciences.				
Learning Outcomes	Upon completion of this course studentσ will be able to: • Recall the basic concepts of waves and acoustics. • Explain the physical principles of ultrasound and the interaction of ultrasound with matter. • Describe the properties of geometrical optics, the function of magnifying lenses, the basic principle of simple optical microscope, as well as the function of the vision sensor. • Recall the origin of LASER radiation and its behavior when passing through matter. • Describe the physical principles of electromagnetic waves and electromagnetic radiation. • Describe the modern physics applications in life sciences and medicine in general.				
Prerequisites	None	Co-requisites	None		
Course Content	• Introduction and Fundamental Physics: Units of measurements, physical quantities, unit conversion, International System of Units, Scientific Notation, position, velocity, acceleration, force, Newton's law, work and energy, gravity, center of mass • Waves and Resonance: Resonance, wave concepts, traveling waves, waves at a boundary, standing waves and resonance.				

	• Acoustics: Sound waves, intensity of the sound wave, producing sound, the human ear: physiology and function, the Doppler Effect in sound. • Ultrasound: Generation and detection of ultrasound, ultrasound propagation mechanisms, ultrasound-tissue interactions, biomedical applications of ultrasounds, protection in diagnostic applications. • Electric Forces and Fields: Electric charge, Coulomb's Law, Conductors and Insulators, Electric Fields, Electric Potential Energy. Electric Current: Electric current and Resistance, Ohm's Law and electrical measurements. • Magnetic Fields: Magnetic Fields and forces, torque and force on a magnetic dipole. • Electromagnetic radiation: Electromagnetic waves, characteristics of electromagnetic radiation, propagation of electromagnetic radiation, electromagnetic spectrum, interactions of electromagnetic waves with biological tissue, risk limits. • Geometric Optics: optical properties of matter, light at an interface, optical fibers, application of optical fibers in medicine • Optical Lenses and Devices: optical lenses, the human eye, optical microscope • LASER Radiation: laser radiation, types of laser devices, laser-tissue interactions, applications of laser in biology and medicine, laser safety
Teaching Methodology	Face- to- face
Bibliography	Physics of the Life Sciences, by J. Newman. University Physics with Modern Physics, by H. Young & R. Freedman. Fundamentals of Physics, by D. Halliday, R. Resnick, and J. Walker. Schaum's Outline of College Physics, by F.J. Bueche, E. Hecht.
Assessment	Examinations 70% Assignments/Lab 20% Class Participation & Attendance 10% 100%

Language	English

Course Title	Applied Biostatistics				
Course Code	BMS145				
Course Type	Compulsory				
Level	Bachelor (1st Cycle)				
Year / Semester	1st Year / 2nd Semester				
Teacher's Name	Yiannis Alatsathianos				
ECTS	6	Lectures / week	3 Hours/14 weeks	Laboratories / week	0 Hours
Course Purpose and Objectives	Applied Biostatistics aims to provide an introduction to selected important topics in biostatistical concepts and reasoning. Students will understand the concept of sampling variation and its critical role in the construction of confidence intervals and hypothesis testing. The statistical methods will be applied to simple medical datasets using the statistical software SPSS and results will be interpreted.				
Learning Outcomes	Upon successful completion of this course students should be able to: • Demonstrate expertise regarding the basic concepts of biostatistics and their application to medical science. • Interpret the findings of the most frequently used statistical methods in medical science. • Critically review the statistical methods and results of clinical trials presented in published articles • Manage a personal computer independently and demonstrate that they can carry out the most common statistical methods and techniques				
Prerequisites	None	Co-requisites	None		
Course Content	• Basic concepts and types of data • Describing data with tables and charts • Describing data with numeric summary values • Probability and Normal distribution • Confidence interval for a population mean • Estimating the difference between two parameters				

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Testing hypotheses about the difference between two population parameters
Testing hypotheses about the ratio of two population parameters and the x2 test
Measuring the association between two numerical variables
Straight line models: linear regression
Curvy models: logistic regression
Power and sample size in study designs
Data analytics module using large-scale biomedical datasets; Application of R / SPSS for predictive modeling.

</td></tr>
<tr><td>Teaching Methodology</td><td>Face- to- face</td></tr>
<tr><td>Bibliography</td><td>Bowers David. Medical Statistics from Scratch: An introduction for Health Professionals. John Wiley & Sons.

Kirkwood Betty, Sterne Jonathan. Essential Medical Statistics. Blackwell Science.

Petrie A, Sabin C. Medical Statistics at a glance, Wiley-Blackwell.</td></tr>
<tr><td>Assessment</td><td>
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<tr><td>Examinations</td><td>70%</td></tr>
<tr><td>Assignments/Lab</td><td>20%</td></tr>
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<tr><td>Language</td><td>English</td></tr>
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Course Title	Anatomy-Physiology II				
Course Code	BMS200				
Course Type	Compulsory				
Level	Bachelor (1st Cycle)				
Year / Semester	2nd Year / 3rd Semester				
Teacher's Name	Irina Stoyanova				
ECTS	6	Lectures / week	2 Hours/ 14 weeks	Laboratories / week	1 Hour/ 14 weeks
Course Purpose and Objectives	The main objective of the course is to familiarize the students with the anatomical structure and function of the human body providing them with the background needed for successful completion of their studies. A systematic presentation of all aspects of human physiology including the description of basic cell function and communication mechanisms involved in normal physiology of the human body will help them to better understand health problems associated with physical function, as well as the notion behind therapeutic target selection for various diseases				
Learning Outcomes	Upon successful completion of this course, students should be able to: • Define the basic anatomical points for each organ of the human body • Describe the structure and function of various organ systems in the human body (cardiovascular, respiratory, immune system) • Analyze the differences between tissues and organs of the human body • Describe normal renal function • Recognize the basic structure and function of the organs in the gastrointestinal tract • Describe how each organ system of the human body is interconnected to the others and how each one affects the harmonic function of the others • Document how a potential malfunction of an organ or organ system of the human body affects the functioning				

<table>
<tr><td></td><td colspan="3">of this system and that of other systems in the human body</td></tr>
<tr><td>Prerequisites</td><td>BMS130</td><td>Co-requisites</td><td>None</td></tr>
<tr><td>Course Content</td><td colspan="3">Theory
Structure and function of:
• Sense organs
• Skin and mammary gland
• Respiratory System
• Circulatory system, heart, blood and lymphatic vessels
• Digestive system -oral cavity, taste, salivary glands- digestive tract.
• Liver and the biliary system
• Urinary System and the kidneys
• Reproductive system
• Endocrine glands
• Exchange of fluid in tissues
• Metabolism, hormones, thermoregulation
• Defense mechanisms of the human body

Laboratory exercises:
Using audiovisual means, students will be trained in anatomy and physiology and present projects in relation to the content of the course in order to fully comprehend the material taught. Additionally, students will be able to search for relevant information by accessing libraries and the internet.</td></tr>
<tr><td>Teaching Methodology</td><td colspan="3">Face- to- face</td></tr>
<tr><td>Bibliography</td><td colspan="3">Gray's Anatomy; Drake, Richard L./Vogl, A. Wayne/Mitchell, Adam W.; Elsevier.

Atlas of Human Anatomy: with Student Consult Access (Netter Basic Science); Frank H. Netter; Saunders.

Guyton and Hall Textbook of Medical Physiology; John E. Hall; Saunders.
Tortora, G.J. Principles of Anatomy and physiology.
Medical Physiology: A Cellular and Molecular Approach; Boron,F.W. / Boulpaep L.E; Saunders.</td></tr>
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Assessment	Examinations 70% Assignments 20% Class Participation & Attendance 10% 100%
Language	English

Course Title	Basic Epidemiology				
Course Code	BMS205				
Course Type	Compulsory				
Level	Bachelor (1st Cycle)				
Year / Semester	2nd Year / 3rd Semester				
Teacher's Name	Yiannis Alatsathianos				
ECTS	6	Lectures / week	3 Hours/14 weeks	Laboratories / week	0 Hours
Course Purpose and Objectives	This course provides an introduction the core principles, concepts and methods used in epidemiologic research, including epidemiologic measures, sources of data, causal inference, confounding and bias, methods for synthesizing secondary data and epidemiological study designs.				
Learning Outcomes	Upon successful completion of this course students should be able to: • Apply the principles and concepts of epidemiology as a scientific discipline to a study relevant to population health • Explain the role and contribution of epidemiology to health • Examine the sources of population and disease information, and the use of secondary data in research • Examine the different epidemiological study designs • Analyse the different type of bias in epidemiologic studies • Calculate, apply, and interpret epidemiological measures • Analyse the criteria for characterizing the causality of associations • Critically interpret the epidemiologic literature and determine their use in evidence-based public health				
Prerequisites	None	Co-requisites	None		
Course Content	**Theory** • Critical evaluation of a public health problem in terms of magnitude, person, time, and place				

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Sources of population and disease information, and secondary data
Calculation and interpretation of measures of disease frequency and association.
Issues related to the evaluation of chance, bias, and confounding
Assessment of association versus causation in the interpretation of study results
Examination of design features and uses of epidemiological study designs (experimental and observational), their strengths and merits
Basic principles and methods of the design, conduct and interpretation of epidemiologic studies
Critically appraise epidemiologic studies and determine their use in research evidence

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<tr><td>Teaching Methodology</td><td>Face- to- face</td></tr>
<tr><td>Bibliography</td><td>Rothman, K.J., Greenland, S. and Lash, T.L. eds
Modern epidemiology. Lippincott Williams & Wilkins.

Webb, P., Bain, C. and Page, A. Essential epidemiology: an introduction for students and health professionals. Cambridge University Press.

Friis RH, Sellers TA. Epidemiology for public health practice. Jones & Bartlett Publishers.</td></tr>
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<tr><td>Examinations</td><td>70%</td></tr>
<tr><td>Assignments</td><td>20%</td></tr>
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<tr><td>Language</td><td>English</td></tr>
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Course Title	Molecular Biology				
Course Code	BMS210				
Course Type	Compulsory				
Level	Bachelor (1st Cycle)				
Year / Semester	2nd Year / 3rd Semester				
Teacher's Name	Vasiliki Kalodimou / Christina Karantanou				
ECTS	6	Lectures / week	3 Hours/ 14 weeks	Laboratories / week	3 Hours/ 14 weeks
Course Purpose and Objectives	The purpose of this course is to familiarize biomedical sciences students with basic molecular biology principles and techniques as well as their applications in basic and applied research in genetics and biotechnology.				
Learning Outcomes	Upon successful completion of this course, students should be able to: • Describe the principles on which basic molecular biology techniques are based • Recall the basic concepts of molecular biology related to the flow of genetic information (central dogma of molecular biology) and the nature and organization of genetic material • Recognize the importance of the using enzymes in Molecular Biology • Describe and apply nucleic acid isolation techniques • Explain and perform polymerase chain reaction (PCR) experiments • Describe the technology for generating transgenic animals • Define the difference between knock-out and conditional knock-out animals • Demonstrate proficiency in laboratory molecular techniques				
Prerequisites	BMS100, BMS135	Co-requisites	None		
Course Content	**Description:** • **<u>Theory</u>**: Introduction to Molecular Biology. Historical perspective.				

	• Nuclear architecture and nuclear organelles The Genetic Material. Chromatin organization. • From DNA to protein: the central dogma of molecular biology. DNA replication, transcription, translation, recombination. • Repair mechanisms. • Gene expression regulation mechanisms • Post-translation modifications of proteins. • Isolation and study of nucleic acids -DNA isolation methods (plasmid, viral, genomic). -RNA isolation methods (total and poly A-RNA). -Methods to study DNA and RNA. -The electrophoresis technique (agarose gels and polyacrylamide). -Southern and Northern blotting -Specialized methods for RNA analysis: RNAse protection, primer extension. • Non-coding RNAs (microRNAs, siRNAs, piRNAs, long ncRNAs). • Polymerase Chain Reaction (PCR): The basic principle, primer selection, cloning of PCR products. Types of PCR. • Applications of Molecular Biology in research, genetic engineering and biotechnology • DNA cloning • **Single-cell omics** scRNA-seq for gene expression heterogeneity • Use of animal models in biomedical research (C. elegans, Drosophila melanogaster, Mus musculus, Zebra danio) • Generation of transgenic, knock-out and conditional knock out animals. Advantages and challenges. **Laboratory Exercises:** • The main equipment in a molecular biology lab- Basic Techniques - Ensure validity of laboratory results - common problems. • Small scale isolation of plasmid DNA using the boiling method (boiling miniprep) and digestion with restriction enzymes. • Genomic DNA isolation and assessment of its concentration. • The polymerase chain reaction (PCR) – Preparation, primer design, amplification. •Total RNA extraction using a solution of guanidine thiocyanate - phenol – chloroform. •cDNA synthesis

<table>
<tr><td></td><td>•Real-Time PCR. Confirmation by agarose gel electrophoresis.
•Protein isolation-Western Blotting
• Commercial Applications of DNA isolation and PCR</td></tr>
<tr><td>Teaching Methodology</td><td>Face- to- face</td></tr>
<tr><td>Bibliography</td><td>Burton E. Tropp, Molecular Biology: Genes to Proteins, Jones &Bartlett Learning.

Jocelyn E. Krebs, Elliot S. Goldstein, and Stephen T. Kilpatrick, Genes Lewin's Essential GENES, Jones &Bartlett Learning.

Basic Laboratory Methods for Biotechnology, by Lisa A Seidman and Cynthia J. Moore (Academic press).</td></tr>
<tr><td>Assessment</td><td><table><tr><td>Examinations</td><td>70%</td></tr><tr><td>Assignments/Lab</td><td>20%</td></tr><tr><td>Class Participation & Attendance</td><td>10%</td></tr><tr><td></td><td>100%</td></tr></table></td></tr>
<tr><td>Language</td><td>English</td></tr>
</table>

Course Title	Biochemistry I				
Course Code	BMS220				
Course Type	Compulsory				
Level	Bachelor (1st Cycle)				
Year / Semester	2nd Year / 3rd Semester				
Teacher's Name	Efterpi Kostareli				
ECTS	6	Lectures / week	2 Hours/1 4 weeks	Laboratories / week	3 Hours/1 4 weeks
Course Purpose and Objectives	The objective of the course is to familiarize students with • The principal biochemical and metabolic processes in the body, their pathways and the role of the cell membrane and the different enzymes • The process of intra- and inter- cellular communication				
Learning Outcomes	Upon successful completion of this course students should be able to: • Identify the principal classes of biomolecules and explain their function or activity with regard to their chemical structure. • Explain the interactions of simple biomolecules giving rise to complex supramacromolecular structures. • Describe the structure and properties of water and understand its macromolecular structure, its properties and biological functions. • Discuss the general principles of enzymology and the importance of enzymes as essential molecules in cellular metabolism. • Analyze the principal metabolic strategies that are used by the human body to obtain and use energy. • Introduce mass spectrometry in enzymology and metabolic pathway analysis along with other metabolomics profiling techniques linking metabolic intermediates to disease biomarkers.				

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<tr><td></td><td colspan="3">Describe the principal biochemical metabolic processes, their interrelationships and their role in maintaining bioenergetic balances in the body.
Describe the role of biological membranes in the processes which generate and use biological energy and also maintain the compartmentalization of the vital processes.
Explain the molecular basis of signal transduction pathways.
Relate the metabolic changes in pathophysiological processes to the most common biochemical analyses, analyse and evaluate the origin of changes and their physiological consequences.</td></tr>
<tr><td>Prerequisites</td><td>None</td><td>Co-requisites</td><td>None</td></tr>
<tr><td>their Course Content</td><td colspan="3"><u>Theory</u>:

• Biomolecules and the interactions of simple biomolecules giving rise to complex supramacromolecular structures
• Introduction to Molecular dynamics; simulation to study protein-ligand interactions and enzyme mechanisms.
• Carbohydrate metabolism: glycolysis and gluconeogenesis
• Citric acid cycle
• Phosphoglyconic acid pathway and pentose phosphate
• Structure and properties of water, its macromolecular structure, its properties and biological functions.
• Enzymology and the roles of enzymes as essential instruments
1. in cellular metabolism,
2. in the principal metabolic strategies to obtain and use energy
• Metabolic processes of the principal types of biomolecules; interrelations and bioenergetic balances.
• Mass spectrometry analysis in enzymology and metabolic pathway analysis
• Metabolomics profiling techniques and the importance of metabolic intermediates as disease biomarkers
• Biological membranes and the processes which generate and use biological energy
• Molecular basis of the signal transduction pathways.
• Mitochondrial diseases.

Laboratory exercises</td></tr>
</table>

	• Safety regulations and good laboratory practice • Buffer preparation, calculations and pipette use • Introduction to basic techniques (measurements, dilutions, UV spectroscopy) • Lipid effusion techniques • Carbohydrate assessment using paper chromatography • Protein isolation from cell cultures • Spectrophotometric measurement of protein concentration • Protein separation by SDS-PAGE electrophoresis • Analysis of alkaline phosphatase enzyme
Teaching Methodology	Face- to- face
Bibliography	Textbook of Biochemistry with Clinical Correlations; Devlin, Thomas M.; John Wiley. Biochemistry: International Edition; Berg, J.M., Tymoczko, J.L.and Stryer. Introduction to Modern Biochemistry, by P. Karlson.
Assessment	Examinations 70% Assignments/Lab 20% Class Participation & Attendance 10% 100%
Language	English

Course Title	Biotechnology				
Course Code	BMS225				
Course Type	Compulsory				
Level	Bachelor (1st Cycle)				
Year / Semester	2nd Year / 3rd Semester				
Teacher's Name	Yiannis Alatsathianos/ Panagiotis Politis				
ECTS	6	Lectures / week	3 Hours/ 14 weeks	Laboratories / week	N/A
Course Purpose and Objectives	The main aim of the course is to familiarize the students with basic principles and important applications of Biotechnology in animals, plants and microorganisms while at the same time giving them the chance to ponder over economic, social and ethical implications that may rise.				
Learning Outcomes	Upon successful completion of the course, students will be able to: • Describe basic principles and applications of both classical and modern Biotechnology. • Explain basic principles and molecular processes involved in the technology of recombinant DNA • Summarize the main applications of Biotechnology in relation to animals, plants and microorganisms • Describe the main applications of Biotechnology in the food, and the environment as well as in medicine • Discuss modern issues of bioethics in terms of Biotechnology applications and their implications in society and economy				
Prerequisites	BMS100	Co-requisites	None		
Course Content	**Description:** -Introduction and historical perspective of the use of Biotechnology since ancient times. Comparison with modern Biotechnology -Fermentation -Enzymes in biotechnology				

	-Genetic Engineering, Recombinant DNA technology, Cloning -Use of microorganisms in Biotechnology -Biotechnology in preparation and processing of food ingredients -Animals and Biotechnology (transgenic and knock-out animals) -Examples of animal models of disease -Biosensors -Pharmaceutical products of biotechnology (drugs and vaccines) -Pharmacogenomics -Biochemistry and Safety. Societal, economical, legal and ethical considerations concerning the increasing use of Biotechnology in everyday life.
Teaching Methodology	Face- to- face
Bibliography	Basic Biotechnology, by Bjorn Kristiansen and Colin Ratledge, Cambridge University Press. Advances in animal Biotechnology, by B.Singh, Gorakh Mal, Sanjeev K.Gautam, Springer.
Assessment	Examinations 70% Assignments/Lab 20% Class Participation & Attendance 10% 100%
Language	English

Course Title	Biochemistry II				
Course Code	BMS230				
Course Type	Compulsory				
Level	Bachelor (1st Cycle)				
Year / Semester	2nd Year / 4th Semester				
Teacher's Name	Efterpi Kostareli				
ECTS	6	Lectures / week	2 Hours/1 4 weeks	Laboratories / week	2 Hours/1 4 weeks
Course Purpose and Objectives	The objective of the course is to familiarize students with the relationship of the biochemical pathways with the pathophysiology of diseases and the application of biochemical diagnostic procedures.				
Learning Outcomes	Upon successful completion of this course students should be able to: • Analyse and evaluate the biochemical processes as the fundamental basis of life and of all vital processes and functions in the human body. • Discuss the biosynthetic pathways and metabolism of amino acids, fatty acids and protein synthesis • Describe the role of hormones and their relationship to disease processes • Explain the metabolism of lipids in health and disease • Describe the fundamentals employed in designing the principal biochemical techniques, especially those most utilized for diagnosis (e.g. electrophoresis, ELISA, etc.).				
Prerequisites	BMS220	Co-requisites	None		
Course Content	**Theory:** • Metabolic changes in pathophysiological processes. • Oxidation and biosynthesis of fatty acids and metabolism of lipids • Biosynthesis of membrane lipids and steroid hormones • Biosynthesis of amino acids, nucleotides and nucleic acids				

	• Protein synthesis • Hormones, hormonal action and the biochemical processes of the hypothalamus, pituitary, thyroid, parathyroids and adrenal glands • Glucose metabolism, insulin resistance and, metabolic syndrome • Metabolism of fats and hyperlipidaemia • Functional biochemistry • Molecular dynamics simulations to explore protein-ligand interactions and enzyme mechanisms. • Laboratory evaluation of liver function, of tumor markers and of muscle fiber-myocardial infarcts. **Laboratory Exercises** • Amino acid composition of a dipeptide by enzymatic proteolysis and paper chromatography • Amino acid properties i.e. detection of tryptophan, detection of the peptide bond (biuret test) • Assessment of the amphoteric properties of proteins • Properties of proteins in solutions (i.e. protein precipitation with concentrated salt solutions-salting out method) • Carbohydrate analysis (Overall reaction to sugars -test with α-naphthol, reducing tests such as Fehling's test and Benedict's test, iodine test in starch • Enzymatic synthesis and hydrolysis of starch • Lipid isolation and analysis • Extraction of lecithin from egg yolk, chemical composition analysis of lecithin (detection of fatty acids, choline, phosphorus) • Detection of fat-soluble vitamins • Hands-on or virtual labs on mass spectrometry, proteomics, and metabolite profiling.
Teaching Methodology	Face- to- face
Bibliography	Textbook of Biochemistry with Clinical Correlations; Devlin, Thomas M; John Wiley. Biochemistry: International Edition; Berg, J.M. , Tymoczko, J.L., Stryer. Introduction to modern biochemistry, by P. Karlson.

<table>
<tr><td></td><td>Lehninger Principles of Biochemistry; David L. Nelson; W. H. Freeman.

Harpers Illustrated Biochemistry; Harper, H./Robert, K. Murray; McGraw-Hill.</td></tr>
<tr><td>Assessment</td><td><table>
<tr><td>Examinations</td><td>70%</td></tr>
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<tr><td>Language</td><td>English</td></tr>
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Course Title	Histology				
Course Code	BMS235				
Course Type	Compulsory				
Level	Bachelor (1st Cycle)				
Year / Semester	2nd Year / 4th Semester				
Teacher's Name	Jasmina Isakovic				
ECTS	6	Lectures / week	2 Hours/14 weeks	Laboratories / week	2 Hours/14 weeks
Course Purpose and Objectives	The objective of the course is to familiarize students with: • The fundamental organization of the different bodily tissues at the molecular and cellular level and the functions involved. • The mechanisms of tissue degeneration, repair and regeneration at the different stages of life				
Learning Outcomes	Upon successful completion of this course students should be able to: • Illustrate, recognize, identify and describe the microstructure and function of tissues and organs under the microscope. • Understand the laboratory procedures required for preparing tissue slides from biopsies for microscopic examination and possible diagnostic purposes through identification of fundamental changes in normal structure consequently affecting tissue function. • Describe the associations of different types of tissues to form organs and systems. • Discuss the normal function and role of cells and tissues in the different stages of life. • Describe the mechanisms used by the body in tissue degeneration, repair and regeneration				
Prerequisites	None	Co-requisites	None		
Course Content	**Description:** • Levels of biological organization and molecular and cellular functions.				

	• Structural and functional organization of the principal tissues in the human body. • Epithelial tissues, supportive tissues and the extracellular matrix. • Contractile tissue (striated muscle tissue, cardiac muscle, smooth muscle, myofibroblasts, pericytes, and myoepithelial cells). • Blood cells. Blood and lymphatic circulatory system, the immune system, • Normal function of cells and tissues in the various stages of life. • Tissue degeneration, repair and regeneration processes.
Teaching Methodology	Face- to- face
Bibliography	Junqueira's Basic Histology: Text & Atlas; Antony L. Mesher, Mc Graw Hill Education. Netter's Essential Histology; William Ovalle,Patrick C. Nahirney, Illustrations by Frank H. Netter; Elsevier Saunders Philadelphia. Human Histology; Stevens, A. / Lowe, J.S. Mosby. Gartner & Hiatt's Atlas and Text of Histology by Leslie P. Gartner and Lisa M.J. Lee, Wolters Kluwer. Color Atlas of Cytology, Histology, and Microscopic Anatomy. Wolfgang Kuehnel, Thieme. Stuttgart.
Assessment	Examinations 70% Assignments/Lab 20% Class Participation & Attendance 10% 100%
Language	English

Course Title	Introduction to Genetics				
Course Code	BMS240				
Course Type	Compulsory				
Level	Bachelor (1st Cycle)				
Year / Semester	2nd Year / 4th Semester				
Teacher's Name	Efterpi Kostareli				
ECTS	6	Lectures / week	2 Hours/ 14 weeks	Laboratories / week	2 Hours/ 14 weeks
Course Purpose and Objectives	The objective of the course is to familiarize students with: • The basic concepts of genetics, Mendel's laws as well as their extension up to molecular genetics • The basic laws that govern inheritance of several inherited human traits				
Learning Outcomes	Upon successful completion of this course, students should be able to: • Recall basic concepts of classic and modern Genetics • Describe the basic principles of Mendelian Genetics • Describe extensions to Mendel's laws • Record family-history in relation to the inheritance of a certain genetic trait (pedigree analysis), and predict inheritance pattern.				
Prerequisites	None	Co-requisites	None		
Course Content	**Theory:** • Introduction to Genetics • Historical perspective of major discoveries in Genetics • The nature and organization of human genome • Gene structure and function • Mitosis-meiosis and gametogenesis • Mendel's laws and Mendelian Genetics • Extensions of Mendel's laws • Chromosomal theory of inheritance • X-linked pattern of inheritance				

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Basic concepts of mutation formation-Genotype and environment.
Cytogenetics
Technology of recombinant DNA, cloning and genetically modified organisms (GMO)
GMOs as animal models of disease

<u>Laboratory exercises:</u>

Monohybrid and dihybrid crosses in corn (Corn Genetics)-Chi square test
Chi-square test in mitosis
Drosophila as a genetic model
Cytogenetics-Karyotype
DNA isolation from plants
Blood typing
Detection of genetically modified organisms using lateral flow strips
Pedigree analysis
Mutation analysis using ARMS (Amplification-Refractory Mutation System) method

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<tr><td>Teaching Methodology</td><td>Face- to- face</td></tr>
<tr><td>Bibliography</td><td>Genetics: from genes to genomes. Hartwell LH, Hood L., Goldberg ML, Reynolds AE., and Silver LM, McGrawHill.

Lewin's Genes; Jocelyn E. Krebs; Jones and Bartlett Publishers, Inc..</td></tr>
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<tr><td>Language</td><td>English</td></tr>
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Course Title	Developmental Biology and Embryology				
Course Code	BMS245				
Course Type	Compulsory				
Level	Bachelor (1st Cycle)				
Year / Semester	2nd Year / 4th Semester				
Teacher's Name	Jasmina Isakovic				
ECTS	6	Lectures / week	3 Hours/14 weeks	Laboratories / week	0 Hours
Course Purpose and Objectives	The aim of the course is the study of patterns and principles of normal embryonic and fetal development of mammals with emphasis on comparison to adult anatomy and medical implications. More specifically, the course addresses the developmental events during all stages of prenatal development emphasizing on human development but with a comparative approach to illustrate key differences in embryological development across animals. Overall, it provides an overview of important developmental issues, questions, and approaches to study.				
Learning Outcomes	Upon successful completion of this course, students will be able to: • Answer questions about the structure of sperm and eggs. • Demonstrate their understanding of the process of fertilization (including recognition, binding, fusion, and the activation of egg metabolism) and the roles of various molecules in that process. • Identify and define key structural and molecular events involved in each stage of human development, the precursors of each structure, and its functional significance.				

	• Recognize, using a comparative approach, the key differences in embryological development across animals. • Describe normal embryological anatomy and identify anomalies and teratological defects in development of various tissues through comparison of normal and abnormal development.		
Prerequisites	BMS100	Co-requisites	None
Course Content	**Theory** • Introduction to Human & Mammalian Embryology. Gametogenesis, Fertilization, Cleavage. • Transport of Gametes & Fertilization. Fertilization and Blastocyst Formation. Blastocyst & Implantation. • Germ layers and Mesenchyme. Gastrulation – Trilaminar disc formation. Stem cells & Mesenchyme. Ectopic Pregnancy. • Axial Skeletal Development. Development of the Bony Skeleton, Neurulation and Cells' migration. Neurulation, extracellular matrix & directed cell migration • Muscular System Development. Sclerotomes, Myotomes & Dermatomes. Muscle System Development, Development of the Limbs. • Pharyngeal Apparatus. Pharyngeal arches, clefts & pouches. Development and Birth Defects of Head & Neck, Face & Palate. Embryology and Birth Defects of Exocrine & Endocrine Glands. Integumentary system & its Derivatives Development and Birth defects • Respiratory System Development. Respiratory Primordium. Development of the Nasal Cavity and Pharynx. Laryngotracheal groove and Laryngotracheal diverticulum, Development of the Larynx, Trachea and Bronchi. Bronchi divisions and Lungs Development. Maturation of Lungs. Respiratory System Birth Defects. • Development and Division of the Embryonic Body cavity. Diaphragm and Pericardial sac development. Peritoneal cavity & Pleuroperitoneal Membranes Development. Diaphragmatic Birth Defects. • Formation of the different chambers of the Heart. Blood vessels development Lymph angiogenesis and Lymphatic System Development. Fetal Circulation and		

<table>
<tr><td></td><td>Hemodynamics. Congenital Heart and Vessels' Birth Defects.
• Development of GI System. Rotation of the Foregut, the Midgut and the Hindgut. Congenital abnormalities of the upper and lower GI System. Development of Liver, Pancreas, Biliary System & Spleen. Congenital malformations of the GI tract's Accessory Glands
• Development of the Kidneys and Related Organs of the Urinary System. Positional changes of the Kidneys during Embryologic Development. Congenital abnormalities of the Urinary System
• Development of the Male & Female gonads, genital ducts and external genitalia. Descent of the Testes and the Ovaries. Congenital abnormalities of the Male Reproductive System. Congenital anomalies of the Female Reproductive System
• Placenta, Umbilical Cord Embryological description
• Anomalies and teratological defects in development of various tissues and their implications
• Teratologic mechanisms, due to drugs and environmental pollution and line differentiation
• Clinical cases in Developmental Defects</td></tr>
<tr><td>Teaching Methodology</td><td>Face- to- face</td></tr>
<tr><td>Bibliography</td><td>Developmental Biology, by Scott Gilbert.

Analysis of Biological Development, by Klaus Kalthoff.

Human Embryology and Developmental Biology, by Bruce M. Carlson.</td></tr>
<tr><td>Assessment</td><td><table><tr><td>Examinations</td><td>70%</td></tr><tr><td>Assignments</td><td>20%</td></tr><tr><td>Class Participation & Attendance</td><td>10%</td></tr><tr><td></td><td>100%</td></tr></table></td></tr>
<tr><td>Language</td><td>English</td></tr>
</table>

Course Title	Bioethics and Scientific Integrity				
Course Code	BMS250				
Course Type	Compulsory				
Level	Bachelor (1st Cycle)				
Year / Semester	2nd Year / 4th Semester				
Teacher's Name	Katrin Augustin				
ECTS	6	Lectures / week	3 Hours/14 weeks	Laboratories / week	0 Hours
Course Purpose and Objectives	The main objective of this course is to introduce students to the concept of Bioethics and acquaint them with major developments in the field of Biomedical Sciences that need to be critically addressed and seen through the filter of Bioethics. The course will also familiarize the students with the current legislation in Cyprus, Europe and worldwide regarding major bioethical issues and debates. Finally, students will be exposed to pertinent case-studies related to scientific integrity, which will enable them to evolve to excellent scientists of high bioethical standards.				
Learning Outcomes	Upon successful completion of this course the students will be able to: • Recall key concepts in Bioethics and describe the main philosophical and ethical issues in modern Biomedical Sciences • Recall the legal framework, both international and national, governing bioethics, and describe the role of the Bioethics Committee in Cyprus • Summarize and describe the major contemporary bioethical considerations				
Prerequisites	None		Co-requisites	None	
Course Content	• Introduction to Bioethics: Life, Ethics, Bioethics • The legal framework (international, European, National • Modern Bioethical Considerations • The ethics behind topics such as:				

	• genetic engineering and genetically modified organisms (GMOs) • reproductive cloning, human cloning • therapeutic cloning • mapping the human genome and gene therapy • new generation of drugs and pharmacogenomics • genetic redesign and children on demand • prenatal and pre-implantation testing and gene editing • embryonic stem cells • in vitro fertilization • euthanasia • use of human subjects in research through clinical trials • use of fetal tissue in research • use of laboratory animals in research (pre-clinical studies) • morality of modern technologies (artificial intelligence, misuse of nuclear energy, risk of particle acceleration experiments in environmental pollution - global warming, biological and chemical warfare) • Integrity in science, which includes the following topics: • Scientific misconduct • Moral reasoning in the conduct of science • Scientific publication and authorship • Peer review • Patents • Copyright • Scientific (and laboratory) record keeping • The issue of informed consent in studies involving human subjects • Conflict of interest in conducting research • Conflict of conscience • Critical thinking and the case study approach
Teaching Methodology	Face- to- face
Bibliography	Mepham B. Bioethics: an introduction for Biosciences. . Singer PA, and Viens AM. The Cambridge Textbook of Bioethics. Beauchamp TL, Childress JF. Principles of Biomedical Ethics. Macrina FL. Scientific Integrity: an introduction text with cases, Americal Society for Microbiology Press.

Assessment	Examinations 70% Assignments/Lab 20% Class Participation & Attendance 10% 100%
Language	English

Course Title	Human Microbiome and its Implications in Health and Disease				
Course Code	BMS300				
Course Type	Compulsory				
Level	Bachelor (1st Cycle)				
Year / Semester	3rd Year / 5th Semester				
Teacher's Name	Karim Dib				
ECTS	6	Lectures / week	3 Hours/1 4 weeks	Laboratories / week	None
Course Purpose and Objectives	The main objective of the 'Human microbiome and its implications in health and disease' course is to provide a comprehensive overview of the role of microbiota in human health and a deeper understanding of the current human microbiome research.				
Learning Outcomes	Upon completion of the course, students will be able to: • Describe the endosymbiotic theory of life; holobionts and their hologenome; holobionts *vs.* superorganisms • Articulate a deeper understanding of the concept of humans as an ecological community consisting of host cells, bacteria, archaea, and viruses, fungi and protists • Explain how human microbial variation has essential roles for human health and physiology including digestion and immunity Explain how dysbiosis of commensal microbiota is associated with the pathogenesis of several diseases • Learn the historical and current state of human microbiome research and the potential of the microbiome to prevent and treat diseases. • Describe the main approaches used in studying the microbiome				
Prerequisites	BMS135	Co-requisites	BMS305		
Course Content	**Description:** • Microbiome definition and overview • Endosymbiotic theory				

<table>
<tr><td></td><td>

Holobionts vs. superorganisms
The Human Microbiome Project
Beginning and maturing of human microbiome: pregnancy, birth, infancy and old age - The hygiene hypothesis
Diversity of the Human Microbiome (oral, gut, skin, lung and urogenital)
The Gut Microbiota in Health and Disease
Microbiota changes associated with diseased states (dysbiosis)
Effects on digestion
Effects on immunity
Techniques used to analyze microbiome data
Manipulating the indigenous microbiota in humans: prebiotics, probiotics and synbiotics
Microbiome research: a tool for new opportunities for diagnosis, prognosis, and treatment of a variety of human diseases.

</td></tr>
<tr><td>Teaching Methodology</td><td>Face- to- face</td></tr>
<tr><td>Bibliography</td><td>The Human Microbiota and Microbiome (Advances in Molecular and Cellular Microbiology), by Julian K. Marchesi. CABI publishing.

Human Microbiome: Clinical Implications and Therapeutic Interventions, by Sabo Thomas. Springer.

The Human Microbiome Handbook Hardcover, by Jason Tetro, Emma Allen-Vercoe, Sydney M. Finegold. DEStech Publications Inc.

Selected scientific articles in pdf format that will be provided in advance by the lecturer.</td></tr>
<tr><td>Assessment</td><td>
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<tr><td>Examinations</td><td>70%</td></tr>
<tr><td>Assignments</td><td>20%</td></tr>
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<tr><td>Language</td><td>English</td></tr>
</table>

Course Title	General Microbiology				
Course Code	BMS305				
Course Type	Compulsory				
Level	Bachelor (1st Cycle)				
Year / Semester	3rd Year / 5th Semester				
Teacher's Name	Karim Dib				
ECTS	6	Lectures / week	2 Hours/14 weeks	Laboratories / week	3 Hours/14 weeks
Course Purpose and Objectives	The objectives of this course are: • to provide students with all the necessary general knowledge in introductory subjects of Microbiology (bacteria, viruses, fungi, and parasites) • to explain how microorganisms can be controlled and their methods of destruction • to introduce students to the basic mechanisms governing function, growth, and testing of microorganisms to familiarize students with the basic laboratory techniques of microbiology so that they acquire a deep understanding of testing methods and the importance of the interaction between microbes and human host.				
Learning Outcomes	Upon completion of the course the student is expected to be able to: • Identify, name and classify Bacteria, Viruses, Fungi, Parasites • Describe various requirements for the growth of microorganisms • Describe the various methods for microorganism destruction (Physical and Chemical) • Recognize the basic techniques used to grow and study microorganisms in the laboratory • Explain the host's defense mechanisms				
Prerequisites	BMS100, BMS135	Co-requisites	None		
Course Content	**Theory**: Microorganisms. The contribution of microorganisms to planet				

<table>
<tr><td></td><td>Earth. Evolution theories of microorganisms and their place in the living world. Historical perspective.
Classification of microorganisms.
Prokaryotic vs eukaryotic cell: Morphological characteristics
Microbial nutrition-nutritional requirements of microorganisms
Microbial culture and microbial growth testing.
Disinfection and sterilization
Microbial genetics.
Biology of Viruses and Plasmids.
Microorganisms and environment: Biogeochemical cycles of elements, symbiotic relationships between microorganisms, Carbon, Nitrogen and Oxygen cycles.
Pathogenic microorganisms vs normal flora. Colonization vs infection
Relationship between microbes and human host.(commensalism, mutualism, parasitism)
<u>Laboratory exercises:</u>
The Microbiological Laboratory - Safety Regulations.
Microbiological nutrient substrates
Aseptic methods - Sterilization.
Staining
Microscopy
Assessment of the microbial population size.
Microbial growth: Microbial Detection / Counting
Effect of natural factors on microbial growth.
Evaluation of antimicrobials-antibiotics effectiveness.</td></tr>
<tr><td>Teaching Methodology</td><td>Face- to- face</td></tr>
<tr><td>Bibliography</td><td>Madigan MT, Martinko JM, Dunlap PV, Clark DP, Brock Biology of Microorganisms, Pearson.

Tortora GJ, Funke BR, Case CL., Microbiology: an Introduction, Benjamin Cummings.

Prescott’s Microbiology, by Joanne Willey, Kathleen Sandman, Dorothy Wood, McGraw-Hill.</td></tr>
<tr><td>Assessment</td><td><table><tr><td>Examinations</td><td>60%</td></tr><tr><td>Assignments/Lab</td><td>30%</td></tr><tr><td>Class Participation & Attendance</td><td>10%</td></tr><tr><td></td><td>100%</td></tr></table></td></tr>
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Language	English

Course Title	Medical Genetics				
Course Code	BMS310				
Course Type	Compulsory				
Level	Bachelor (1st Cycle)				
Year / Semester	3rd Year / 5th Semester				
Teacher's Name	Efterpi Kostareli				
ECTS	6	Lectures / week	2 Hours/14 weeks	Laboratories / week	2 Hours/14 weeks
Course Purpose and Objectives	The objective of the course is to familiarize students with: • The fundamentals of human genetics and their manifestation at the cellular, organ, individual and population levels • Classical as well as modern Genetics and its applications in diagnosis and research • The expression of genetic diseases and their significance for clinical medicine, diagnosis and treatment				
Learning Outcomes	Upon successful completion of this course students should be able to: • Discuss the basic concepts of human genetics. • Describe the relationship between gene structure and function and its implication in the development of genetically-based diseases. • Identify the genetic components of polygenic and multifactorial diseases. • Identify the clinical presentation and etiology of genetic disorders including: single gene disorders, disorders of chromosome abnormalities, inborn errors of metabolism, multifactorial genetic disorders and cancer genetics. • Account for the occurrence, causes, pathophysiology, diagnostic principles, and ethical considerations of the most common genetic disorders (i.e. muscular dystrophies, cystic fibrosis, thalassaemias, hemophillia, genetic deafness, Huntington's disease, color blindness, hereditary cancer).				

<table>
<tr><td></td><td colspan="3">Assess and appraise the importance, usefulness and limitations of genetic tests including: cytogenetic testing, molecular testing, pre-natal testing, genome scanning, new born screen and biochemical genetics testing. Determine which test(s) are most appropriate for a given clinical scenario.
Record family-history in relation to the inheritance of a certain genetic trait (pedigree analysis), and predict inheritance pattern.
Debate the contribution of current advances in molecular genetic research and its implementation in clinical practice.
Explain the importance of the study of population genetics and pharmacogenetics in the study of genetic diseases.</td></tr>
<tr><td>Prerequisites</td><td>BMS240</td><td>Co-requisites</td><td>None</td></tr>
<tr><td>Course Content</td><td colspan="3"><u>Theory</u>:
Fundamentals of human genetics
The chromosome and the molecular basis of monogenic, polygenic and multifactorial diseases.
Genetically-based diseases and Mendel’s laws-
Mutations-DNA repair mechanisms
Positional gene mapping
Clinical cytogenetics
Causes, pathophysiology, and diagnosis of the most common genetic disorders (i.e. muscular dystrophies, cystic fibrosis, thalassaemias, hemophillia, genetic deafness, Huntington’s disease, color blindness, hereditary cancer).
Molecular genetic testing, pre-natal testing and newborn testing. Current advances in molecular genetic research and their implementation in clinical practice.
Extranuclear inheritance and mitochondrial disorders
Pharmacogenetics
Gene therapy
Population genetics
Multifactorial inheritance
Pharmacogenetics and pharmacogenomics.
<u>Laboratory exercises:</u>
Paternity testing
Mitochondrial DNA isolation</td></tr>
</table>

	• Cytogenetics-Karyotype: case studies • Pedigree analysis • Sex identification by PCR • Analysis of DNA sequencing (simulation experiment) • Crime scene investigation • Mitochondrial DNA amplification • Study of monogenic diseases using RFLPs (Restriction Fragment Length Polymorphisms) • Genetic traits and population genetics
Teaching Methodology	Face- to- face
Bibliography	Medical Genetics: An Integrated Approach by G. Bradley Schaefer, James N. Thompson, Jr.; McGraw Hill Medical. Lewin's Genes; Jocelyn E. Krebs; Jones and Bartlett Publishers, Inc. Genetics: From Genes to Genomes, by Hartwell LH., Hood L., Goldberg ML., Reynolds AE., and Silver LM. Essential Medical Genetics; Tobias, ES., Connor, M. Ferguson, M.; Wiley-Blackwell. Thompson & Thompson Genetics and Genomics in Medicine; Ronald Cohn, Stephen Scherer, Ada Hamosh, Elsevier.
Assessment	Examinations 70% Assignments 20% Class Participation & Attendance 10% 100%
Language	English

Course Title	Basic Immunology				
Course Code	BMS315				
Course Type	Compulsory				
Level	Bachelor (1st Cycle)				
Year / Semester	3rd Year / 5th Semester				
Teacher's Name	Karim Dib & Christina Karantanou				
ECTS	6	Lectures / week	2 Hours/ 14 weeks	Laboratories / week	2 Hours/ 14 weeks
Course Purpose and Objectives	The objective of this course is to provide biomedical students with ground knowledge on basic principles of immunology, the compartments and functions of the human immune system. Specific aims include the understanding of innate and adaptive immune mechanisms underlying human defense against microorganisms, tumor cells, autoantigens, allergens as well as transplant rejection. In addition, the development and use of vaccines and antibodies as preventative and/or therapeutic agents in current disease-challenges are discussed.				
Learning Outcomes	Upon successful completion of this course, students should be able to: • Describe the basic components of the immune system and their function • Describe the development of inflammation • Describe the various types of antigens and their recognition by the immune system • Describe the structure and function of antibodies • Discriminate innate and adaptive immune responses, their main players, and involvement in human immune reactions during defense against bacterial or viral infections, autoinflammation, and allergens, anti-tumor responses and transplantation • Describe the main approaches and application of vaccines and antibodies-Define the term of Passive Immunity • Recall common deregulations of the immune system (immunodeficiencies, autoimmunity, hypersensitivity reactions) • Perform basic laboratory techniques related to immunology				

<table>
<tr><td></td><td colspan="3"></td></tr>
<tr><td>Prerequisites</td><td>None</td><td>Co-requisites</td><td>None</td></tr>
<tr><td>Course Content</td><td colspan="3">Description:

Theory
• The immune system and its functions
• Cells, tissues and organs of the immune system
• Innate and adaptive immune responses
• Antigens and their recognition by immune cells. Major histocompatibility complex (MHC)
• Antibodies (structure and function)
• Inflammation
• Immune responses against microorganisms
• Immune responses against tumor cells
• Autoimmune responses
• Immune responses in allergic and asthma conditions
• Immune reactions during transplantation
• Vaccines’ development and therapeutic applications of antibodies
• Deregulations of the immune system (immunodeficiences, autoimmunity, hypersensitivity reactions)

Laboratory exercises
• Epitope mapping
• PBMC isolation
• Monocyte and lymphocyte subsets isolation using antibody-coated magnetic beads
• Culture and stimulation of monocytes and lymphocytes
• Ig isolation
• Immunodiffusion – Counterimmunoelectrophoresis
• Ig electrophoresis
• Ig measurement in human serum by ELISA
• Cytokines measurement in cell-culture supernatants by ELISA
• Immunohistochemistry
• Immuno-phenotyping of human peripheral blood by Flow-Cytometry
• Intracellular staining and analysis of cytokine production by Flow-Cytometry
• Analysis of Flow-Cytometry data</td></tr>
</table>

Teaching Methodology	Face- to- face
Bibliography	AK. Abbas, AH H. Lichtman, S. Pillai. "*Cellular and Molecular Immunology*", Elsevier. J. Punt, S. Stranford, P.Jones, J. Owen. "*Kuby's Immunology*", Macmillan. K, Murray and C. Weaver "*Janeway's Immunobiology*", Garland Science.
Assessment	Examinations 70% Assignments/Lab 20% Class Participation & Attendance 10% 100%
Language	English

Course Title	Bioinformatics				
Course Code	BMS320				
Course Type	Compulsory				
Level	Bachelor (1st Cycle)				
Year / Semester	3rd Year / 6th Semester				
Teacher's Name	Yiannis Alatsathianos				
ECTS	6	Lectures / week	2 Hours/ 14 weeks	Laboratories / week	2 Hours/ 14 weeks
Course Purpose and Objectives	The overall objective of the course is the basic understanding of the field of bioinformatics that will enable students to gather information related to their biological inquiries and use computational analysis and web-based bioinformatics tools and databases, including elements of machine learning to answer a scientific question. Students will also learn programming basics with using Python or R programming language as an implementation tool in order to understand programming essentials, including basic algorithms, data types, elementary control structures.				
Learning Outcomes	Upon successful completion of this course, students should be able to: • Determine the scope of bioinformatics • Access new information and assimilate it into the whole • Examine the structure and function of genes and proteins through the use of computational analysis, statistics, and pattern recognition • Filter, analyze, and display the results of using web-based bioinformatics tools and databases • Write, debug, and run small programs • Understand the concept of an algorithm and a program • Understand a programming language syntax and its definition by example of Python or R language. • Acquire knowledge of basic principles of structural programming.				

<table>
<tr><td></td><td colspan="3">• Introduce computational tools and algorithms, including elements of machine learning for biological data analysis.</td></tr>
<tr><td>Prerequisites</td><td>None</td><td>Co-requisites</td><td>None</td></tr>
<tr><td>Course Content</td><td colspan="3">Description:
This course will explore how computer science and mathematics, supported by information technology, have combined with modern laboratory technologies to solve various problems in the biological sciences. Areas that will be discussed include:

• Novel omics technologies and the new omics era
• Next-generation sequencing
• DNA sequencing and Genomics
• RNA sequencing and Transcriptomics
• Gene-Set Enrichment and Pathway Analysis
• Proteomics and Metabolomics
• Functional Genomics
• Clinical bioinformatics and personalized medicine
• Pharmacogenomics and drug development
• Programming. Languages and platforms. Programming fundamentals. How to define a language syntax? Naming and formatting.
• Basic structural programming language instructions. Conditional statements. Switching. Iterative code. Input/output library basics.
• Computational tools and algorithms, including elements of machine learning for biological data analysis.
• Analysis of datasets using AI-generated predictive models.

Laboratory exercises

• Sequence analysis: alignment and pattern matching
• Introduction to statistics and R
• Introduction to Galaxy platform
• Gene prediction
• Finding SNPs on human chromosome
• Sequence Analysis: Quality Control of NGS data
• Sequence Analysis: Mapping
• Reference-based RNA-Seq data analysis (Data uploading - Mapping - Read counts)
• GSEA and Pathway analysis: DEGs, Venn diagrams, heatmaps, KEGG and GO-enrichment</td></tr>
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Variant analysis
Identification of somatic and germline variants from tumor and normal sample pairs

It should be noted that students will not develop or implement bioinformatics algorithms but rather solve bioinformatics problems with written exercises, and web-based queries.
</td></tr>
<tr><td>Teaching Methodology</td><td>Face- to- face</td></tr>
<tr><td>Bibliography</td><td>
Current Trends in Bioinformatics: An Insight. Editors: G. - Wadhwa, P. Shanmughavel, A.K. Singh, · J.R. Bellare, Springer.

Applied Bioinformatics: An introduction. P.M. Selzer, R.J. Marhöfer, O. Koch, Springer.

Bioinformatics—A Student’s Companion. K.S. Ibrahim, G. G. Zothansanga, R.P. Yadav, N. S. Kumar, S. K. Pandian, P. Borah, S. Mohan, Springer.

G.B. Singh. "Fundamentals on Bioinformatics and Computational Biology-Methods and Exercises in MatLab". Springer.

Introduction to Programming Using Python, Pearson, Y Daniel Liang.
</td></tr>
<tr><td>Assessment</td><td>
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<tr><td>Examinations</td><td>70%</td></tr>
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<tr><td>Language</td><td>English</td></tr>
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Course Title	Clinicall Immunology and Hematology				
Course Code	BMS330				
Course Type	Compulsory				
Level	Bachelor (1st Cycle)				
Year / Semester	3rd Year / 6th Semester				
Teacher's Name	Karim Dib & Vasiliki Papadopoulou				
ECTS	6	Lectures / week	2 Hours/ 14 weeks	Laboratories / week	2 Hours/ 14 weeks
Course Purpose and Objectives	The objective of this course is to provide the ground knowledge of the immune system and its functions as well as the role of cells found in the blood. Comparison will be made between healthy state and states where either the immune system is being compromised (immune deficiencies, autoimmunity, hypersensitivity disease, transplantation) or hematological malfunctions occur.				
Learning Outcomes	Upon successful completion of this course, students should be able to: • define the basic components of the immune system • identify its function in health and disease (immune deficiencies, autoimmunity, hypersensitivity disease, transplantation) • describe the various tests and techniques used to examine its function and their use in clinical diagnostics • outline the principles of vaccinations and the mechanism of protection from infection • distinguish the developmental stages of blood cells • demonstrate and understanding of the components of human blood and characteristics, functions, and abnormalities of each • describe the coagulation mechanism including abnormalities • identify hematological changes in different diseases				

Prerequisites	BMS315	Co-requisites	None
Course Content	**Theory** • Topics that will be covered with regard to clinical immunology include: a) The innate immune system including humoral mechanisms: cytokines & complement; b) the activation and regulation of innate and adaptive immunity including cellular mechanisms & receptors c) an overview of the adaptive immune system including antigen processing & presentation; d) the description of cells and organs of the immune system; e) Cell co-operation and effector mechanisms including immune evasion and principles governing vaccination; f) antibody structure and interaction with antigens; g) the molecular basis of antigen specificity h) self/non-self discrimination and disorders of the immune system; i) Immunisation principles and defense against infectious diseases; j) tumor immunology; k) transplantation immunology; l) Inflammation, Allergies &autoimmunity m) Immune deficiences; n) the use of immunological techniques for testing for the diagnosis and laboratory monitoring of disease in the clinical laboratory. • Topics that will be covered with regard to hematology include: a) Hematopoiesis, b) synthesis of hemoglobin, c) normal hematology, c)leukemia, d)various types of anemia (Fanconi, thalassemia, sickle-cell), e) thrombopoiesis, f) hemostasis **Laboratory exercises** • peripheral blood lymphocyte isolation and culture • monocyte and lymphocyte subsets isolation using antibody-coated magnetic beads • identification of functional subsets of T cells by staining for cytokines • apoptosis measurement • Enzyme Linked ImmunoSorbent Assay (ELISA) test for cytokine identification • phagocytosis evaluation techniques		

<table>
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- **differential white blood cell count**
- **hematocrit measurement (VPRC)**
- **hemoglobin measurement**
- **coagulation time measurement**
- **blood typing**
- **total Blood Cell Counts by hemocytometer**
- flow cytometry and FACS analysis (principle of the method, theory and applications)

</td></tr>
<tr><td>Teaching Methodology</td><td>Face- to- face</td></tr>
<tr><td>Bibliography</td><td>AK. Abbas, AH H. Lichtman, S. Pillai. "Cellular and Molecular Immunology", Elsevier.

J. Punt, S. Stranford, P.Jones, J. Owen. “Kuby’s Immunology”, Macmillan.
K, Murray and C. Weaver “Janeway's Immunobiology”, Garland Science.</td></tr>
<tr><td>Assessment</td><td>

Examinations	70%
Assignments/Lab	20%
Class Participation & Attendance	10%
	100%

</td></tr>
<tr><td>Language</td><td>English</td></tr>
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Course Title	Cancer Biology				
Course Code	BMS335				
Course Type	Compulsory				
Level	Bachelor (1st Cycle)				
Year / Semester	3rd Year / 6th Semester				
Teacher's Name	Efterpi Kostareli & Christina Karantanou				
ECTS	6	Lectures / week	3 Hours/ 14 weeks	Laboratories / week	N/A
Course Purpose and Objectives	The main objective of the Cancer Biology course is to provide a comprehensive overview of the biology and pathology of cancer, as well as methods of diagnosis and treatment approaches.				
Learning Outcomes	Upon successful completion of this course, students should be able to: • Differentiate normal and cancer cells • Describe the hallmarks of cancer • Describe the main characteristics of common cancer types • Explain the types of gene mutations leading to carcinogenesis • Define oncogenes and tumor suppressor genes • Clarify how cancer cells escape cell death • List and describe the steps that lead to metastasis • Outline major therapeutic approaches against cancer • Describe basic research techniques in cancer biology research • Describe animal models used to study tumor growth and metastasis				
Prerequisites	BMS100	Co-requisites	None		
Course Content	• Cancer definition: benign vs malignant tumor • Hallmarks of cancer				

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Main characteristics of the most common types of cancer (breast, prostate, lung, liver, brain, colon)
Mutagens and mutations. Tumor viruses.DNA repair defects and cancer
Oncogenes and tumor suppressor genes, growth factors and their receptors in carcinogenesis
Cell cycle control and the Rb tumor suppressor. Apoptosis and the p53 tumor suppressor
Cellular senescence and telomeres. Cellular immportalization and tumorigenesis. Telomerase as a therapeutic target
Angiogenesis and the tumor microenvironment
Metastasis
Familial cancer syndromes, hereditary cancer (i.e. breast cancer, colon cancer)
Basic techniques in cancer biology research
Use of animal models to study tumor growth and metastasis
Diagnosis of cancer-new genomic and proteomic technologies
Tumor biomarkers Therapeutic approaches: chemotherapy, immunotherapy, targeted therapy

</td></tr>
<tr><td>Teaching Methodology</td><td>Face- to- face</td></tr>
<tr><td>Bibliography</td><td>Molecular Biology of Cancer: Mechanisms, Targets and Therapeutics, by Lauren Pecorino. Oxford Press.

Robbins and Cotran, Pathologic Basis of Disease, Kumar, Abbas, Fausto, Elsevier, Saunders.</td></tr>
<tr><td>Assessment</td><td>
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<tr><td>Examinations</td><td>70%</td></tr>
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<tr><td>Class participation & Attendance</td><td>10%</td></tr>
<tr><td></td><td>100%</td></tr>
</table>
</td></tr>
<tr><td>Language</td><td>English</td></tr>
</table>

Course Title	Drugs and Disease				
Course Code	BMS340				
Course Type	Compulsory				
Level	Bachelor (1st Cycle)				
Year / Semester	3rd Year / 6th Semester				
Teacher's Name	Adonis Yianakkas / Elsanthoury				
ECTS	6	Lectures / week	3 Hours/1 4 weeks	Laboratories / week	None
Course Purpose and Objectives	The main objective of the course is to familiarize students with the pathophysiology of a number of common conditions, including Autonomic and Central nervous diseases and accompanied complications. Specifically diseases to be studied will include heart failure, hypertension, angina, arrhythmias, Parkinson disease, epilepsy, schizophrenia, depression, autoimmune diseases (asthma, rheumatoid arthritis), renal diseases, endocrine diseases, diabetes, osteoporosis etc and understand the basis and pathophysiology of each of these conditions as well as the main therapeutic approaches.				
Learning Outcomes	Upon successful completion of the course, students should be able to: • describe the pathophysiological basis of common disease conditions at the molecular, cellular and organ level • describe the pathophysiology of Autonomic, Central Nervous diseaseas, Autoimmune and endocrine diseases • describe the physiological function of cells and organs, and the main changes that result in disease conditions/states described • recall the pharmacological intervention based on the pathophysiology of the disease • explain and understand the pharmacological basis of therapeutics for common conditions				

<table>
<tr><td></td><td colspan="3">discuss a disease state, critically evaluate the condition and understand the rationale behind a prescribed pharmacotherapy.
Demonstrate drug–receptor interactions using computational molecular dynamics to understand binding affinity.</td></tr>
<tr><td>Prerequisites</td><td>None</td><td>Co-requisites</td><td>None</td></tr>
<tr><td>Course Content</td><td colspan="3">Description:
role of a number of receptors including adrenergic, dopaminergic, or other relevant receptors, ion channels (Ca+, Na+, K+, Cl-) on the normal physiology and homeostasis of organs in each case
appropriate drug therapy will be suggested and considered, and each drug therapy will be discussed from the perspective of altering the pathophysiology to treat or alleviate the symptoms for each disease.
each drug will be examined at the level of modulating receptors or enzymes (inhibiting or activating) that result in therapeutic response.
the rationale behind the proper use of drugs will be examined for each disease, aiming at a better understanding of how each drug modulates the cell-organ physiology to bring about a therapeutic effect.
study of the drug–receptor interactions using computational molecular dynamics to understand binding affinity</td></tr>
<tr><td>Teaching Methodology</td><td colspan="3">Face- to- face</td></tr>
<tr><td>Bibliography</td><td colspan="3">Principles of Pharmacology: The pathophysiological Basis of Drug Therapy. David E. Golan et al.</td></tr>
<tr><td>Assessment</td><td colspan="3"><table><tr><td>Examinations</td><td>70%</td></tr><tr><td>Assignments</td><td>20%</td></tr><tr><td>Class participation & Attendance</td><td>10%</td></tr><tr><td></td><td>100%</td></tr></table></td></tr>
</table>

Language	English

Course Title	Research Methodology in Health Sciences				
Course Code	HEA190				
Course Type	Compulsory				
Level	Bachelor (1st Cycle)				
Year / Semester	3rd Year / 6th Semester				
Teacher's Name	Adonis Yianakkas				
ECTS	6	Lectures / week	3 Hours/ 14 weeks	Laboratories / week	0 Hours
Course Purpose and Objectives	The course aims to: • qualify students in searching scientific information and acquiring knowledge on the basic principles of designing and conducting scientific research in the health sciences • help students develop skills related to the critical reading and evaluation of scientific articles in the field of health sciences • familiarize students with the significance of ethics in conducting research in health sciences • help the students understand the value of research methodology in applying evidence-based practice in the field of health sciences				
Learning Outcomes	Upon completion of the course, students will be able to: • identify and interpret the value of methodological research in applying evidence-based practice in the field of health sciences • set research questions, make hypotheses and design data acquisition • define and explain basic principles both in quantitative and qualitative studies • describe, distinguish and select, one by one, the steps of a research protocol and acquire data both in quantitative and qualitative type of study • demonstrate the ability of critical reading of scientific articles in the field of health sciences				

	• explain the results of systematic reviews in the field of health sciences • utilize the SPSS program as an indispensable research tool in the health sciences		
Prerequisites	BMS205	Co-requisites	None
Course Content	• description of the main concepts and types of scientific research, learning the value of ethics in research, as well as defining the scientific approaches related to problem solving in the field of health sciences • training in searching scientific information using advanced techniques and search strategies in a variety of databases • clarification of the concept of research hypotheses formulation, research protocol design, and pilot studies conduction • learning various sampling procedures as well as the concepts of reliability and validity in research • analysis of problems related to the internal and external validity of an experiment, and provision of ways to address them • means of data collection and management depending on certain variables and scales, data visualization, and reproducible research practices. • critically reading and evaluation of the quality published research work • writing and presenting research results • analysis of research data and presentation in the form of tables and charts using the SPSS statistical program • identification of statistically significant differences • incorporation of machine learning and generative AI algorithms for biomarker discovery and diagnostics.		
Teaching Methodology	Face- to- face		
Bibliography	Cunningham CJL., Weathington BL, Pittenger DJ. *Understanding and conducting Research in the Health Sciences,* Wiley Publishers.		

Assessment	Examinations 60% Assignments 30% Class Participation & Attendance 10% 100%
Language	English

Course Title	Systems Biomedicine				
Course Code	BMS405				
Course Type	Compulsory				
Level	Bachelor (1st Cycle)				
Year / Semester	4th Year / 7th Semester				
Teacher's Name	TBA				
ECTS	6	Lectures / week	3 Hours/14 weeks	Laboratories / week	N/A
Course Purpose and Objectives	As knowledge of genome and gene expression deepens and lists of molecules (proteins, lipids, ions) involved in cellular processes are being developed, the need to understand how these molecules interact with each other to form modules that act as discrete functional systems arises. The main objective of the course is the introduction of students to the fundamentals of systems biomedicine, primarily as a discipline based on the analysis of dynamical interactions among individual members of a biological system aiming to the understanding of the system as a whole, and not merely its individual components. Students will also learn programming essentials using Python or R programming language, including algorithms, data types, control structures, loops and functions used within the framework of structural programming paradigms.				
Learning Outcomes	Upon successful completion of this course, students should be able to: • define the basic terms used in systems biomedicine • describe modern laboratory approaches based on '-omics' methods and their importance in identifying key factors in diseases development • integrate the '-omics' results into a meaningful whole and define the global model of biological processes responsible for disease development: integrate mass spectrometry-based metabolomic data with transcriptomic and proteomic networks to identify disease mechanisms. • describe the use of global '-omics' methods in early diagnostics, prognostics and drug development				

	• acquire the ability to convert a procedure for a problem solving to an algorithm • acquire the ability to write simple programs in Python or R language by using basic control structures (conditional statements, loops, switches, branching, etc.). • understand a function concept and how to deal with function arguments and parameters. • Understand how single-cell data contributes to systems-level modeling of tissues and diseases. • Combine simulation outputs with 'omics' data to model molecular behavior in disease.		
Prerequisites	BMS100, BMS320	Co-requisites	None
Course Content	**Theory**: • Modern experimental approaches in disease research based on simultaneous analysis of thousands of genes/proteins/metabolites and their interactions in a living system • Monitoring of biological system functions in four dimensions (space and time) • The importance of visualization (i.e. 'imaging') in systems biomedicine • Fundamentals of global, comprehensive '-omics' methods (DNA-chips, RT-PCR, proteomics methods) in studying molecular pathological processes • The role of '-omics' methods in early diagnostics, prognostics, disease development, discovery of new molecular targets for treatment as well as in research on drug mechanisms of action and drug safety • Integration of Mass spectrometry-based metabolomic data with transcriptomic and proteomic networks to identify disease mechanisms. • Fundamentals of bioinformatics in systems biomedicine • Single-cell data and systems-level modeling of tissues and diseases. • Essential Programming in Python: Control and loop statements. Data structures and basic algorithms • Functions. Function arguments and function parameters. Functional decomposition: basic knowledge. • Application of systems-level big data analysis, linking multi-omics datasets with disease prediction or drug response.		

Teaching Methodology	Face- to- face
Bibliography	Systems Biomedicine, Concepts and Perspectives by Edison Liu Douglas Lauffenburger, Academic Press. Frontiers Research Topics. Comprehensive Systems Biomedicine. Topic Editors, Enrico Capobianco and Pietro Lio. Introduction to Programming Using Python, Pearson, Y Daniel Liang.
Assessment	Examinations 70% Assignments/Lab 20% Class Participation & Attendance 10% 100%
Language	English

Course Title	Clinical Chemistry				
Course Code	BMS410				
Course Type	Compulsory				
Level	Bachelor (1st Cycle)				
Year / Semester	4th Year / 7th Semester				
Teacher's Name	TBA				
ECTS	6	Lectures / week	2 Hours/ 14 weeks	Laboratories / week	2 Hours/ 14 weeks
Course Purpose and Objectives	The course aims to provide knowledge about the connection between patient, tests and the clinical diagnostic laboratory's importance in the daily activities in healthcare. It also involves laboratory data interpretation and error analysis using AI-based analytical approaches.				
Learning Outcomes	Upon completion of the course the student will be able to: • demonstrate good skills in the relevant laboratory methodology (i.e. perform good quality control measures and proper specimen collection and handling techniques) • carry out blood sampling • explain and evaluate the connection between patient, patient examinations and clinical chemistry diagnostics in different diseases • evaluate analysis results by means of controls and reference ranges • state whether results are within the reference range and explain the correct use of reference intervals while identifying possible factors affecting them • identify and explain various physiological and analytical causes of variability in results on patient laboratory tests. • state sources of error during analysis and methods to minimize or eliminate these errors. • interpret the meaning of laboratory tests and assess their significance in patient disease states				

<table>
<tr><td></td><td colspan="3">• utilize metabolomic assays and interpretation as examples of clinical diagnostics
• evaluate AI tools for automated result interpretation, anomaly detection and laboratory workflow optimization.</td></tr>
<tr><td>Prerequisites</td><td>BMS110, BMS120, BMS220, BMS230</td><td>Co-requisites</td><td>None</td></tr>
<tr><td>Course Content</td><td colspan="3"><u>Theory</u>:

• Clinical chemistry diagnostics of the most common disorders in different organ systems
• The principles of pharmaceutical effects, metabolism in the body and the factors that influence these. Principles of drug analysis and addiction analysis.
• Laws and regulations within healthcare
• Guidelines for specimen collection and processing
• Quality Control and Statistics
• Analytical Techniques and Instrumentation
• Automated Techniques
• Amino Acids and Proteins
• Enzymes
• Blood Gases, pH, and Buffer Systems
• Electrolytes
• Carbohydrates and Alterations in Glucose Metabolism
• Lipids and Lipoproteins
• Thyroid Function analysis
• Pancreatic Function analysis
• Therapeutic drug monitoring
• Review of AI tools for automated result interpretation, anomaly detection and laboratory workflow optimization.

Laboratory

• Basic Principles (weighing and measurements)
• Reagent preparation and use
• Instrumentation (spectrophotometry, electrophoresis, automated analyzer)
• Colourimetric titration
• End point analysis
• Kinetic measurements
• Amino Acids and Proteins
• Total Protein
• Enzymes (i.e. Creatine Kinase, CK-MB, Lactate Dehydrogenase, Aspartate Aminotransferase, Alanine</td></tr>
</table>

<table>
<tr><td></td><td>Aminotransferase, Alkaline Phosphatase, Acid Phosphatase, Gamma-Glutamyltransferase)
• Electrolytes (Sodium, Potassium, Chloride)
• Carbohydrates (Glucose, Glycosylated Hemoglobin)
• Lipids and Lipoproteins (Cholesterol, triglyceride, HDL, VLDL, LDL)
• Urea (uric acid, ammonia)
• Liver Function (Total Bilirubin, Direct Bilirubin)
• Pancreatic Function (Amylase, Lipase)</td></tr>
<tr><td>Teaching Methodology</td><td>Face- to- face</td></tr>
<tr><td>Bibliography</td><td>Tietz Fundamentals of Clinical Chemistry and Molecular Diagnostics, Nadel Rifai.

Clinical Chemistry: Principles, Techniques, Correlations, M.L. Bishop, E.P. Fody, L.E. Schoeff.

Clinical Biochemistry: An Illustrated Colour Text, by Michael Murphy, Rajeev Srivastava, Kevin Deans.

Molecular Diagnostics: Fundamentals, Methods, and Clinical Applications, by Lela Buckingham.

Diagnostic Molecular Pathology: A Guide to Applied Molecular Testing, by William B. Coleman, Gregory J. Tsongalis.</td></tr>
<tr><td>Assessment</td><td><table><tr><td>Examinations</td><td>70%</td></tr><tr><td>Assignments/Lab</td><td>20%</td></tr><tr><td>Class Participation & Attendance</td><td>10%</td></tr><tr><td></td><td>100%</td></tr></table></td></tr>
<tr><td>Language</td><td>English</td></tr>
</table>

Course Title	Placement				
Course Code	BMS420				
Course Type	Compulsory				
Level	Bachelor (1st Cycle)				
Year/Semester	4th Year, 7th Semester				
Teacher's Name	Program Coordinator				
ECTS	6	Lectures/week	150-180 hours	Laboratories/ Web	0 Hours
Course Purpose and Objectives	The placement aims to provide Biomedical Sciences students with the experience and skills required to pursue their profession as Biomedical Scientists. The course will help students to implement in a work environment what they have learned in the academic environment and to develop personal responsibility in relation to the professional dimension of Biomedical Sciences program.				
Learning Outcomes	Upon completion of the course, students will be able to: • Revoke new knowledge relative to the working environment in which they were placed • Describe specialized laboratory or other techniques • Apply the educational (theoretical and laboratory) skills and knowledge they acquired during their studies in the work environment • Record the new trends and methodologies being used in the specific organization • Develop their communication skills further, promote their technical skills and build upon them Apply theory and scientific knowledge gained from their program of study to real situations within organizations Handle effectively, everyday problems encountered in a professional work environment Gain personal responsibility within the working environment through practical applications				
Prerequisites	Be on the 4th year of studies	Required	None		

Course Content	The placement takes place in public or private bodies related to the Biomedical Sciences and the students' subjects and interests such as research laboratories analytical laboratories in the public, clinical laboratories, pharmaceutical companies, schools etc. The placement lasts during the full semester of the studies (total of 150-180 hours). Students are normally integrated into the workplace where they are assigned specific tasks. Students are supervised by the Program's Coordinator from the University side, and a co-supervising Supervisor who will be assigned from the Host body side.
Teaching Methodology	Placement 150-180 Hours
Bibliography	It will be recommended by the supervising Instructor (Program's Coordinator) and the host body who is responsible for the student.
Assessment	Students enrolled in this course should work under the direct supervision of the person responsible/supervisor of the relevant department of the Organization, who completes relevant documents regarding the students' work during that period. After reviewing these documents, the Program coordinator submits a grade of P or F for each student.
Language	English

Course Title	Pathobiology and Precision Medicine				
Course Code	BMS430				
Course Type	Compulsory				
Level	Bachelor (1st Cycle)				
Year / Semester	4th Year / 8th Semester				
Teacher's Name	Vasiliki Papadopoulou				
ECTS	6	Lectures / week	3 Hours/14 weeks	Laboratories / week	None
Course Purpose and Objectives	The Pathobiology and Precision Medicine course aims to: • provide a solid background in the molecular, and cellular basis of disease pathogenesis with emphasis on the ways in which cells, tissues and organs within the human body respond to injury and stress. • introduce the next generation approaches in personalized medicine and healthcare research, based on the individual's genomic/transcriptomic/proteomic profile, which aim to provide significant benefits to patients over traditional therapeutic strategies.				
Learning Outcomes	Upon completion of the course, students will be able to: • explain the way in which cells, tissues and organs within the human body respond to injury that may lead to disease, as well as main repair mechanisms • differentiate between apoptosis and necrosis • describe characteristics of acute and chronic inflammation • recall major characteristics, at the molecular and cellular level, of the pathogenesis of common human diseases such as atherosclerosis, aneurysms, diabetes, environmental and nutritional diseases. • recognize the basic principles for applying data from human genome to medicine • describe the major -omics technologies currently used in personalized medicine				

	• discuss the use of next-generation sequencing for developing personalized anti-cancer therapeutic approaches • describe how genomics (i.e. DNA sequencing, SNP and mutation identification), transcriptomics (i.e bulk, single-cell RNA-sequencing and spatial transcriptomics) and proteomics (i.e. mass spectrometry) can be applied for precision medicine.		
Prerequisites	BMS135	Co-requisites	None
Course Content	**Description:** • Cellular responses to stress and toxic insults: adaptation, injury, and death. • Mechanisms of cell injury (mitochondrial damage, oxidative stress, defects in membrane permeability, damage to DNA and proteins) • Necrosis (ischemic and hypoxic injury, ischemic reperfusion injury, toxic injury) and apoptosis- causes, mechanisms and examples • Acute and chronic inflammation and repair • Cell and tissue regeneration. Role of extracellular matrix in tissue repair-scar formation • Examples of specific disease pathogenesis (atherosclerosis, aneurysms, diabetes, environmental and nutritional diseases) • Principles for applying human genome information to clinical practice, therapy and human health • Basic technologies for developing personalized medicine • Genomics and precision medicine • Transcriptomics and precision medicine • Quantitative proteomics in personalized medicine • Big Data and translational bioinformatics in precision and medicine • Current targeted therapies for major human diseases • Ethical social, regulatory and financial considerations for personalized medicine		
Teaching Methodology	Face- to- face		
Bibliography	Robbins and Cotran, Pathologic Basis of Disease, Kumar, Abbas, Fausto, Elsevier, Saunders.		

	Genomic and Precision Medicine (Foundations, Translation and Implementation), by Geoffrey Ginsburg and Huntington Willard, Elsevier. Textbook of Personalized Medicine, by KK Jain, Springer. The ethics of personalized medicine – critical perspectives, by Jochen Vollmann, Verena Sandow, Jan Schildmann, Routledge.	
Assessment	Examinations Assignments Class participation & Attendance	70% 20% 10% 100%
Language	English	

<table>
<tr><td>Course Title</td><td colspan="5">Medical Microbiology</td></tr>
<tr><td>Course Code</td><td colspan="5">BMS435</td></tr>
<tr><td>Course Type</td><td colspan="5">Compulsory</td></tr>
<tr><td>Level</td><td colspan="5">Bachelor (1st Cycle)</td></tr>
<tr><td>Year / Semester</td><td colspan="5">4th Year / 8th Semester</td></tr>
<tr><td>Teacher’s Name</td><td colspan="5">Karim Dib</td></tr>
<tr><td>ECTS</td><td>6</td><td>Lectures / week</td><td>2 Hours/1 4 weeks</td><td>Laboratories / week</td><td>3 Hours/1 4 weeks</td></tr>
<tr><td>Course Purpose and Objectives</td><td colspan="5">The main purpose of the course of Medical Microbiology is to integrate elements and principles of modern clinical medical microbiology, with emphasis on Medical Bacteriology, guiding the students theoretically and practically through laboratory exercises at all stages of the diagnostic process, from the infectious factor to clinical disease and its diagnosis.</td></tr>
<tr><td>Learning Outcomes</td><td colspan="5">Upon completion of the course the student is expected to be able to:
Describe the chain of infection, the interactions between microorganisms and the human host with reference to the normal flora and distinguish between colonization and infection
Recall the causes and epidemiology of infectious diseases and explain the importance of laboratory identification of microorganisms in epidemiological investigation.
Demonstrate basic theoretical knowledge of Medical Bacteriology, Medicine Virology, Medical Parasitology and Medical Mycology.
Summarize the importance of the Microbiological Laboratory in diagnostics procedure
Implement methods adequately and demonstrate laboratory skills for the collection, transport and processing and identification of biological specimens (body fluid samples and secretions of the human body.)</td></tr>
<tr><td>Prerequisites</td><td colspan="2">BMS245</td><td>Co-requisites</td><td colspan="2">None</td></tr>
</table>

Course Content	**Theory**: • General principles of Medical Microbiology. The Chain of Infection. • The causes of infectious diseases. Epidemiology of Infections with reference to modern western world. • The identification of microorganisms and their importance in epidemiological investigation. • Norma Flora in humans- characterization of host parasite relationships, mutualism and commensalism, the differentiation of normal flora and pathogenicity. Immune responses. • Interaction of Microorganisms with the host. ~~organism.~~ Infection vs Colonization. • Medical Bacteriology: *Staphylococci, Streptococci, Enterococci, Leuconostoc, Pediococci, Neisseria spp, Moraxella, Kinsella, Hemophilus spp, Brucellosis*, various Gram-negative bacteria, Enterobacteriaceae, *Pseudomonas, Acinetobacter, Vibrio, Helicobacter pylori, Legionella pneumophila, Mycobacteria, Nocardia, gram positive Bacilli, Listeria*, anaerobic Gram-Positive, Non sporogenic bacteria, *Borrelia,* unusual Gram negative bacteria, *Mycoplasmas, Chlamydia, Rickettsia, Coxiella, Bartonella.* • Medical Virology. Main Viral Infections. Cold, flu, hepatitis, AIDS, viral gastroenteritis • Medical Mycology. Superficial, subcutaneous and systemic fungal infections. Typical examples. • Medical Parasitology. Protozoa, Helminths, Parasites. • Clinical syndromes. • Mode of action of antimicrobials. Mechanisms of resistance. The importance of the antibiogram in the laboratory report • Infection control. Public health issues • Quality controls. Accreditation standards for clinical laboratories. Issuing of laboratory reports. **Laboratory exercises:** • Instructions for receiving, transporting, processing and examining various biological fluids and secretions of the human body from a microbiological aspect. • Importance of sampling and processing of clinical samples • Direct microscope analysis. • Cultures on nutrient substrates. • Microbial stains.

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Biochemical and serological identifications.
Antibiograms.
Bacterial identification, antibiotic sensitivity testing
Laboratory reports.

</td></tr>
<tr><td>Teaching Methodology</td><td>Face- to- face</td></tr>
<tr><td>Bibliography</td><td>Medical Microbiology and Infection at a glance.
Stephen H. Gillespie Kathleen B. Bamford. Wiley-Blackwell.</td></tr>
<tr><td>Assessmen</td><td>
<table>
<tr><td>Examinations</td><td>70%</td></tr>
<tr><td>Assignments/Lab</td><td>20%</td></tr>
<tr><td>Class Participation & Attendance</td><td>10%</td></tr>
<tr><td></td><td>100%</td></tr>
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<tr><td>Language</td><td>English</td></tr>
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Course Title	Proactive aging and regenerative medicine				
Course Code	BMS440				
Course Type	Compulsory				
Level	Bachelor (1st Cycle)				
Year / Semester	4th Year / 8th Semester				
Teacher's Name	Christina Karantanou				
ECTS	6	Lectures / week	3 Hours/14 weeks	Laboratories / week	None
Course Purpose and Objectives	The main objective of the course is to provide insights into proactive aging as well as an in-depth knowledge of the field of regenerative medicine, from basic biology of stem cells to therapeutic applications giving special emphasis on age-related pathologies.				
Learning Outcomes	Upon successful completion of the course, students will be able to: • define proactive aging and its basic stages • discuss societal challenges related to proactive aging • describe different types of stem cells and their specific characteristics • describe methods of applications to replace damaged or destroyed cells including tissue engineering • account for regenerative medicine applications to human diseases related to aging • evaluate current methods within the research field, their practical execution and application • introduction to single-cell profiling of stem cells differentiation and tissue regeneration				
Prerequisites	BMS135	Co-requisites	None		
Course Content	**Description:** • proactive aging and its basic stages • societal challenges related to proactive aging				

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current knowledge, future potential use and development of regenerative medicine
different kinds of stem cells (pluripotent stem cells, human embryonic stem cells, induced-pluripotent stem cells, neural stem cells, hematopoietic stem cells, mesenchymal stem cells, cord blood hematopoietic stem cells)
tissue engineering and their applications in accelerating the healing process to restore injured or damaged tissues and organs
basic stem cell biology as well as cellular programming and reprogramming
single cell profiling of stem cell differentiation and tissue regeneration
clinical applications of stem cell therapies on age-related diseases, such as e.g. Parkinson's, Alzheimer’s, diabetes and cancer
stem cells gene therapy
biobanking of stem cells
ethical considerations in regenerative medicine

</td></tr>
<tr><td>Teaching Methodology</td><td>Face- to- face</td></tr>
<tr><td>Bibliography</td><td>Essentials of Stem Cell Biology,
Robert Lanza and Anthony Altala.

Principles of Regenerative Medicine,
Anthony Atala, Robert Lanza, James Thomson, and Robert Nerem, Academic Press.</td></tr>
<tr><td>Assessment</td><td>
<table>
<tr><td>Examinations</td><td>70%</td></tr>
<tr><td>Assignments</td><td>20%</td></tr>
<tr><td>Class participation & Attendance</td><td>10%</td></tr>
<tr><td></td><td>100%</td></tr>
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</td></tr>
<tr><td>Language</td><td>English</td></tr>
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Course Title	Undergraduate Thesis I				
Course Code	BMS400				
Course Type	Compulsory				
Level	Bachelor (1st Cycle)				
Year / Semester	4th Year / 7th Semester				
Teacher's Name	TBA				
ECTS	6	Lectures / week	3 Hours/ 5 weeks	Laboratories / week	0 Hours
Course Purpose and Objectives	This course aims to provide students with all the necessary knowledge and training needed for the planning, organization and implementation of a scientific proposal / protocol as well as for the description, analysis, documentation and presentation of its content. The ultimate goal of this course is the successful completion and support of the dissertation research proposal that is to be done in the final semester. This course will also serve as foundation for the proper guidance and supervision of the student's dissertation project.				
Learning Outcomes	Upon successful completion of the Undergraduate Thesis I, students should be able to: • List the sequential steps required to organize references in a literature review and perform experimental work. • Identify and recognize relevant to the area of interest scientific sources via search through electronic scientific databases or through library sources and critically evaluate scientific information. • Describe and explain the structure of scientific articles, summarize their content and consolidate it into a single text. • Evaluate and discuss bioethical issues and research ethics. • Plan, organize, create and implement a descriptive research proposal on a biomedical sciences-relevant topic in accordance with international standards and using reputable bibliographic systems. • Present, discuss and clearly analyze the problem, purpose, methodology of their research proposal. • Organize and carry out the presentation of their research proposal in written and in the form of oral presentation.				

<table>
<tr><td>Prerequisites</td><td>Prior to their registration to this course, students should have acquired a GPA of 2 and have successfully completed the courses HEA190, BMS114 and BMS250.</td><td>Co-requisites</td><td>None</td></tr>
<tr><td>Course Content</td><td colspan="3">Preparation and presentation of research proposal: Students prepare a research proposal on the topic undertaken under the guidance of their supervisor. The research topic is finalized after the successful defense of their research proposal / protocol both in written and through an oral presentation. Courses: The student participates in selected lectures on the subject of the dissertation in which specific issues related to the different types of scientific work, the design and implementation of the surveys and biomedical research are being analyzed. Detailed description of the content and course requirements is listed in the Dissertation Guide</td></tr>
<tr><td>Teaching Methodology</td><td colspan="3">Face- to- face

Training in scientific article search in the University library and in the University’s computer lab facility.</td></tr>
<tr><td>Bibliography</td><td colspan="3">Undergraduate Thesis Guide, EUC Library</td></tr>
<tr><td>Assessment</td><td colspan="3">Written Proposal 60%
Oral Presentation 40%
100%
It should be noted that completion of this course requires successful completion of every one of its evaluation components</td></tr>
<tr><td>Language</td><td colspan="3">English</td></tr>
</table>

Course Title	Undergraduate Thesis II				
Course Code	BMS425				
Course Type	Compulsory				
Level	Bachelor (1st Cycle)				
Year / Semester	4th Year / 8th Semester				
Teacher's Name	Program Coordinator				
ECTS	6	Lectures / week	N/A	Laboratories / week	0 Hours
Course Purpose and Objectives	This course aims to provide students with the required experimental experience and all the necessary skills needed for the planning, organization and implementation of a scientific study as well as for the analysis, documentation and presentation of its content. The ultimate aim of the course is the submission to the advisory committee of a scientific Undergraduate Thesis describing current literature, aim and methods of the research performed as well as main results and conclusions reached. Finally, the student will present his/her work in an oral presentation under the guidance of the advisory committee and the supervisor of the course.				
Learning Outcomes	Upon successful completion of the Undergraduate Thesis II, students should be able to: • List in a logical sequence the steps needed to organize and implement a literature review and experimental work. • Plan, organize, and perform a bibliographic review or an experimental study in the biomedical sciences and describe their results in a written Diploma Thesis using current literature and reputable bibliographic systems. • In the Undergraduate Thesis, students are expected to clearly present the problem, the aim of their study, the methodology used, and the results obtained as well as evaluate the findings and draw conclusions in relation to the current literature. • Evaluate and discuss issues related to research bioethics. • Organize and carry out the presentation of the scientific work via a well-written thesis as well as an oral presentation to a general audience. • Thesis projects may be laboratory based but they may also include AI applications or generative modeling to laboratory or clinical datasets.				

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<tr><td></td><td colspan="3"></td></tr>
<tr><td>Prerequisites</td><td>BMS400</td><td>Co-requisites</td><td>None</td></tr>
<tr><td>Course Content</td><td colspan="3">Theory

Courses: The student participates in selected lectures on the subject of the thesis in which specific issues related to the documentation of scientific information and the presentation of the thesis are being analyzed in accordance with the conditions laid down by Dissertation Guide.
Supervision and guidance: Regular meetings are held between the student and the supervisor in order to provide guidance, organize the activities to be done to complete the project, and obtain feedback on the status of the work progress.

Thesis Presentation: Once the scientific research has been completed by the student, the Diploma Thesis is being written in accordance with the instructions given in the Dissertation Guide. Upon submission of the Diploma thesis to the advisory committee, the student is informed of the date of the oral presentation of his work. Following acceptance and evaluation of the thesis by the advisory committee, the student submits the final version of his/her thesis to the Department secretary in order to obtain a grade. Detailed description of the content and course requirements are listed in the Dissertation Guide.</td></tr>
<tr><td>Teaching Methodology</td><td colspan="3">Face- to- face

Training in scientific article search in the University library.
One to one meetings with the supervisor and the members of the advisory committee.</td></tr>
<tr><td>Bibliography</td><td colspan="3">Undergraduate Thesis, EUC Library.

Cochrane Handbook for Systematic Reviews of Interventions.Higgins JPT, Green S Cochrane. The Cochrane Collaboration.

Marder P. Michael, Research Methods for Science. Cambridge University.</td></tr>
<tr><td>Assessment</td><td colspan="3">Written project 60%
Project presentation 40%
100%</td></tr>
</table>

Language	English

Course Title	English for Health Sciences III				
Course Code	EHL102				
Course Type	Compulsory				
Level	Bachelor (1st Cycle)				
Year / Semester	As appropriate				
Teacher's Name	EUC language center				
ECTS	6	Lectures / week	3 hours/ 14weeks	Laboratories / week	None
Course Purpose and Objectives	This ESP course is geared for students of Health and Life Sciences at the B2 CEFR level. Through a variety of texts that commonly appear in the related fields and exposure to various structures of the language in context, this course aims at helping students broaden their command of English. This entails the practice and development of all four language skills.				
Learning Outcomes	By the end of this course, students are expected to be able to: • Interpret and discuss meaning in texts related to the fields of Health and Life Sciences applying reading strategies • Analyze and interpret statistical data related to Health and Life Sciences • Compose cohesive and coherent texts related to the fields of Health and Life Sciences • Research, organize and present orally a topic in the related fields in a formal setting • Use more complex grammatical structures to express meaning in the related field • Respond to a variety of aural messages in contexts related to healthcare				
Prerequisites	EHL101 or English Placement Test	Co-requisites	None		
Course Content	Students develop their competence in analyzing and reviewing a variety of materials of scientific content related to Health and Life Sciences. Students improve their ability to read texts, understand extended spoken discourse, develop their writing, and participate actively in discussions. Students are also encouraged to develop their study skills. **Reading skills:**				

	Through a variety of reading texts related to the fields of Health and Life Sciences, students develop their comprehension as well as their vocabulary. Skills such as skimming, scanning and inferencing are reinforced. Students also analyze and discuss statistical data such as tables, graphs and pie-charts. **Writing skills:** Students are guided through the various stages of writing after improving their sentence, word selection, and paragraph skills. Students compile a series of individual short assignments such as instructions, emails, letters and reports on selected topics. Students are also introduced to research and documentation related to Health and Life Sciences fields. **Listening skills:** Students develop their listening skills through the use of video and aural material in the related domains. **Speaking Skills:** Speaking skills are also developed through a variety of oral activities related to the fields of Health and Life Sciences including an oral presentation in a formal setting. **Grammar:** Consolidation of grammatical structures may be covered such as tenses, reported speech, conditionals, wish forms, passive structures and linking words.
Teaching Methodology	Face-to-face
Bibliography	• *Career Paths Medical*. Virginia Evans, Jenny Dooley, Trang M. Tran, M.D. Express Publishers. • *Writing for the Health Professions*. Karl Terryberry. Delmar Learning Thomson. *Medical Writing: A Guide for Clinicians, Educators and Researchers*. Robert B. Taylor MD. Springer. Other material given by the instructor
Assessment	Examination(s) 60% Projects/Assignments 30% Class Participation and Attendance 10% 100%

Language	English

European University Cyprus

Appendix II

Integration of Emerging Topics in Biomedical Sciences Education Program

Communities of Practice: Insight Lectures

1. **Jean-Marie Lehn** (Nobel Prize Winner, Chemistry 1987), "From Supramolecular Towards Adaptive Chemistry: Biomedical Aspects" (Molecular dynamics: Modeling adaptive and self-assembling molecular syst3ems; Mass Spectrometry: Characterization of supramolecular complexes and dynamic interactions)
2. **Philippe Froguel** (Prof of Genomic Medicine, Imperial College London), "Precision Diabetes Medicine: Interest of Genomics". (Big Data and Health: Genomic and clinical data integration underpins precision medicine; Metabolomics: Metabolic profiling in classification of diabetes subtypes; Generative AI: AI models in multi-omic diabetes datasets)
3. **Vijay Tiwari** (Professor of Molecular Medicine, University of Southern Denmark), "Deciphering the gene regulatory code of brain development and its disruption in neurodevelopmental disorders" (Single-cell Analysis: Single-cell transcriptomic in neuronal differentiation)
4. **Sotirios Tsiodras** (Professor of Medicine, National & Kapodistrian University of Athens) "Climate Change and Infectious Diseases" (Big Data: Epidemiological modeling of infection spread under climate change)
5. **Kyriacos Kypreos** (Professor of Pharmacology, University of Patras) "Pharmacological Management of Dyslipidemias" (Metabolomics: Lipid metabolism profiling via metabolomics in drug development; Molecular Dynamics / Mass Spectrometry: Simulation of lipid-protein interactions and lipidomic analysis)

Threading of Topics in Current Courses

1. Big Data and Health (Biomedical Data Science)

- **BMS145 – Applied Biostatistics**
  Students already apply statistical methods to medical data.
  Includes a **data analytics module** using large-scale biomedical datasets;
  Applies R / SPSS for predictive modeling.
- **BMS320 – Bioinformatics**
  Focused on computational analysis of genes and proteins.
  Includes **big data approaches**—handling genomic, transcriptomic, and clinical data integration. Students could use public datasets (e.g., TCGA).
- **HEA190 – Research Methodology in Health Sciences**
  Includes data acquisition and use of SPSS.
  Includes instruction on **data management pipelines, data visualization, and reproducible research practices**.
- **BMS405 – Systems Biomedicine**
  Integrates '-omics' results into disease models.
  Applies **systems-level big data analysis**, linking multi-omics datasets with disease prediction or drug response.

2. Generative AI in Laboratory Medicine

- **BMS410 – Clinical Chemistry**
  Involves laboratory data interpretation and error analysis.
  Reviews **AI tools for automated result interpretation**, anomaly detection, and laboratory workflow optimization.
- **BMS320 – Bioinformatics** and **HEA190 – Research Methodology**
  Introduces **machine learning and generative AI algorithms** for biomarker discovery and diagnostics. Students analyze datasets where AI generates predictive models.
- **BMS425 – Undergraduate Thesis II**
  We encourage projects applying **AI or generative modeling** to laboratory or clinical datasets.

3. Single-Cell Analysis

- **BMS210 – Molecular Biology**
  Covers nucleic acid techniques and PCR.
  Integrates **single-cell omics** as an advanced topic—e.g., scRNA-seq for gene expression heterogeneity.
- **BMS405 – Systems Biomedicine**
  Explores how **single-cell data contributes to systems-level modeling** of tissues and diseases
- **BMS440 – Proactive Aging & Regenerative Medicine**
  Discusses stem cells and tissue engineering.
  Includes **single-cell profiling of stem cell differentiation** and tissue regeneration.
- .

4. Metabolomics

- **BMS220 – Biochemistry I** and **BMS230 – Biochemistry II**
  Cover metabolism and biochemical pathways.
  Introduces **metabolomics profiling techniques**, linking metabolic intermediates to disease biomarkers.
- **BMS410 – Clinical Chemistry**
  Uses **metabolomic assays and interpretation** as examples of clinical diagnostics.
- **BMS405 – Systems Biomedicine**
  Integrates metabolomic data with transcriptomic and proteomic networks to identify disease mechanisms.

5. Molecular Dynamics

- **BMS120 – Organic Chemistry** and **BMS220/230 – Biochemistry I & II**
  Introduces **molecular dynamics simulations** to explore protein–ligand interactions or enzyme mechanisms.
- **BMS340 – Drugs & Disease**
  Demonstrates drug–receptor interactions using **computational molecular dynamics** to understand binding affinity.
- **BMS405 – Systems Biomedicine**
  Combines simulation outputs with ‘omics’ data to model molecular behavior in disease.

6. Mass Spectrometry and Other Analytical Technologies

- **BMS230 – Biochemistry II** and **BMS410 – Clinical Chemistry**
  Already involve biochemical and diagnostic techniques.
  Includes **hands-on or virtual labs** on mass spectrometry, proteomics, and metabolite profiling.
- **BMS220 – Biochemistry I**
  Introduces mass spectrometry in enzymology and metabolic pathway analysis.
- **BMS405 – Systems Biomedicine**
  Uses MS-based proteomics and metabolomics datasets to teach integration and systems analysis.

Biomedical Sciences **Appendix III**

Curriculum			Instructor
Compulsory Courses			
	Code	**Course Title**	
1.	BMS100	Introduction to Human Biology	Vasiliki Kalodimou
2.	BMS105	Calculus	Yiannis Alatsathianos
3.	BMS110	General and Inorganic Chemistry	Panagiotis Politis
4.	BMS114	English for Biomedical Sciences	EUC Language Center
5.	BMS115	Laboratory Calculations in Biomedical Sciences	Yiannis Alatsathianos
6.	BMS120	Organic Chemistry	Panagiotis Politis
7.	BMS130	Anatomy-Physiology I	Irina Stoyanova
8.	BMS135	Cell Biology	Vasiliki Kalodimou & Christina Karantanou
9.	HLS100	Academic skills	Stella Voulgaropoulou
10.	BMS140	Physics for biomedical sciences	Jasmina Isakovic
11.	BMS145	Applied Biostatistics	Yiannis Alatsathianos
12.	BMS200	Anatomy-Physiology II	Irina Stoyanova
13.	BMS205	Basic Epidemiology	Yiannis Alatsathianos
14.	BMS210	Molecular Biology	Vasiliki Kalodimou & Christina Karantanou
15.	BMS220	Biochemistry I	Efterpi Kostareli
16.	BMS225	Biotechnology	Yiannis Alatsathianos & Panagiotis Politis
17.	BMS230	Biochemistry II	Efterpi Kostareli
18.	BMS235	Histology	Jasmina Isakovic
19.	BMS240	Introduction to Genetics	Efterpi Kostareli
20.	BMS245	Developmental Biology and Embryology	Jasmina Isakovic
21.	BMS250	Bioethics and Scientific Integrity	Katrin Augustin
22.	BMS300	Human Microbiome and its Implications in Health and Disease	Karim Dib
23.	BMS305	General Microbiology	Karim Dib
24.	BMS310	Medical Genetics	Efterpi Kostareli
25.	BMS315	Basic Immunology	Karim Dib & Christina Karantanou
26.	BMS320	Bioinformatics	Yiannis Alatsathianos
27.	BMS330	Clinical Immunology and Hematology	Karim Dib & Vasiliki Papadopoulou
28.	BMS335	Cancer Biology	Efterpi Kostareli & Christina Karantanou
29.	BMS340	Drugs and Disease	Adonis Yianakkas & Ahmed Elsanthoury
30.	HEA190	Research Methodology in Health Sciences	Adonis Yianakkas

31.	BMS405	Systems Biomedicine	Adonis Yianakkas & Panagiotis Politis
32.	BMS410	Clinical Chemistry	Christina Karantanou
33.	BMS420	Placement of Practical Exercise	Program Coordinator
34.	BMS430	Pathobiology & Precision Medicine	Vasiliki Papadopoulou
35.	BMS435	Medical Microbiology	Karim Dib
36.	BMS440	Proactive Aging and Regenerative Medicine	Christina Karantanou
Elective Courses			
39.	--	Free Elective Course	
Undergraduate Thesis			
40.	BMS400	Undergraduate Thesis I	
41.	BMS425	Undergraduate Thesis II	