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<tr><td>Course Title</td><td colspan="5">Biology II</td></tr>
<tr><td>Course Code</td><td colspan="5">MED-109</td></tr>
<tr><td>Course Type</td><td colspan="5">Required</td></tr>
<tr><td>Level</td><td colspan="5">Undergraduate</td></tr>
<tr><td>Year / Semester</td><td colspan="5">Year 1/ Semester 2 (Spring)</td></tr>
<tr><td>Teacher’s Name</td><td colspan="5">Course Lead:
Dr Christiana Charalambous
Contributors:
Dr Constantinos Voskarides
Prof Constantina Constantinou
Dr Ender Volkan</td></tr>
<tr><td>ECTS</td><td>6</td><td>Lectures / week</td><td>3</td><td>Laboratories / week</td><td>2</td></tr>
<tr><td>Course Purpose and Objectives</td><td colspan="5">This course complements Biology I and aims to teach students the complexity of life at the cellular, protein and gene level. The course also aims to provide students with the opportunity to develop further laboratory skills through practice. The main objectives of the course are:
To explain how genetic information is decoded and inherited in multicellular and unicellular organisms
To discuss the principles of Mendelian genetics and the chromosomal basis of inheritance and employ Punnett squares to demonstrate genotypic and phenotypic inheritance.
To explain the main principles of DNA replication, transcription and translation and to discuss the regulation of gene expression.
To introduce students to the different types of prokaryotic and eukaryotic microorganisms and viruses and their role in disease pathogenesis.
To introduce students to Darwin’s theory of natural selection and evolution.</td></tr>
<tr><td>Learning Outcomes</td><td colspan="5">The following list provides the learning objectives that will be covered in the lectures and tutorials of each week:

Week 1
LOBs covered during lectures:
1. Define and describe the concepts of karyotype and pedigree.
2. Outline the basis of Mendelian genetics.
3. Explain the Mendel laws of segregation and independent assortment.</td></tr>
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4. Explain autosomal dominant vs autosomal recessive inheritance.
5. Explain the inheritance of X-linked genetic diseases.
6. Outline the role of genetic testing in identification of human genetic disorders.

LOBs covered during laboratory practical:

7. Distinguish between antigen and antibody.
8. Explain the differences between the different human blood types.
9. Explain the procedure of the haemagglutination inhibition test.
10. Explain blood type choice during transfusions.
11. Explain the pattern of inheritance of the blood type alleles.

Week 2

LOBs covered during lectures:

12. Explain the chromosomal basis of inheritance.
13. Explain the role of gene linkage in inheritance.
14. Describe human disorders that occur due to chromosomal alterations.

LOBs covered during laboratory practical:

7. Distinguish between antigen and antibody.
8. Explain the differences between the different human blood types.
9. Explain the procedure of the haemagglutination inhibition test.
10. Explain blood type choice during transfusions.
11. Explain the pattern of inheritance of the blood type alleles.

LOBs covered during tutorial:

15. Calculate the probability of independent events occurring simultaneously and the probability of either one or the other of two mutually exclusive events occurring.
16. Use binomial expansion to calculate the probability of certain combinations of events happening.

Week 3

LOBs covered during lectures:

17. Describe the structure and functions of DNA.
18. Describe the structure of chromosomes, including the structure and organisation of chromatin.
19. Describe the process of DNA replication including the processes of telomere replication and DNA repair.

Week 4

LOBs covered during lectures:

21. Describe the structure and functions of RNA.

22. Describe the steps and molecules involved in transcription and RNA processing.

23. Describe the steps and molecules involved in translation.

LOBs covered during tutorial:

20. Solve genetic problems involving human pedigree analysis

Week 5

LOBs covered during lectures:

25. Describe the mechanisms involved in the regulation of gene expression in prokaryotes.

26. Describe the mechanisms involved in the regulation of gene expression in eukaryotes.

27. Describe the role of non-coding RNAs in the regulation of gene expression.

28. Describe the role of abnormal gene expression in carcinogenesis.

LOBs covered during tutorial:

24. Calculate simple genotype/phenotype frequencies and recombination frequencies.

Week 6

LOBs covered during lectures:

Midterm revision

MIDTERM EXAM

LOBs covered during tutorial:

29. Describe the connection between genes, proteins and the genetic code

	Week 7 ***LOBs covered during lectures:*** 30. Describe the structure and morphology of prokaryotes. ***LOBs covered during laboratory practical:*** 31. Describe and recognize the different blood cell types in a blood smear preparation and explain the role of each cell type. **Week 8** ***LOBs covered during lectures:*** 32. Identify the role of pathogenic bacteria in human disease. ***LOBs covered during laboratory practical:*** 31. Describe and recognize the different blood cell types in a blood smear preparation and explain the role of each cell type. **Week 9** ***LOBs covered during lectures:*** 33. Describe the different types and categories of protists and their role in human disease. 34. Describe the different types of fungi and their potential role in human disease. ***LOBs covered during laboratory practical:*** 35. Prepare Petri dishes with agar media. 36. Prove the presence of microorganisms in the environment through culturing. 37. Evaluate and describe specific characteristics of colonies formed by different microorganisms. **Week 10** ***LOBs covered during lectures:*** 38. Describe the structure of viruses and phages and their replicative cycles. 39. Describe the role of viruses in human disease pathogenesis (including the mechanisms by which they destroy the host cells) and identify the major viruses that cause human disease. 40.Describe the structure of prions and viroids and their role in disease pathogenesis. ***LOBs covered during laboratory practical:***

	41. Distinguish between sterilization, disinfection, sanitisation and antisepsis. 42. Describe the factors which affect the efficiency of an antimicrobial agent. 43. Describe the different categories of antibiotics based on their mode of action, including antibiotic examples from each category. **Week 11** ***LOBs covered during lectures:*** 44. Explain Darwin's theory of Evolution, Natural selection and adaptation and provide examples of evolution and adaptation in prokaryotes, eukaryotes and humans. **LOBs covered during lab practical:** 45. Evaluate the effectiveness of various antimicrobial agents. **Week 12** **LOBs covered during lectures:** Final exam revision		
Prerequisites	MED-103 Biology I	Required	None
Course Content	**Topics covered in lectures:** • Human Genetics: Mendelian Inheritance, Karyotypes and Pedigrees. • The chromosomal basis of inheritance: linkage and chromosomes. • The Molecular Basis of Inheritance: Watson and Crick Model of DNA, chromosome structure and function, DNA Replication and repair. • Gene expression: the connection between genes and proteins, the genetic code, transcription and translation. • Regulation of gene expression: Regulation of chromatin structure, regulation of transcription, post-transcriptional regulation, post-translational regulation, noncoding RNAs, operons. • Prokaryotes: Bacteria and Archaea. • Eukaryotic microorganisms: Protists and Fungi. • Viruses. • The Darwinian Theory of Evolution, Natural Selection and Adaptation. **Topics covered in lab practicals:**		

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Human blood groups.
Blood cell types (blood smear preparation).
Microbial culture and growth.
Antibiotic resistance selection and microorganism control (evaluation of antimicrobial agents' effectiveness).

<u>Topics covered in tutorials:</u>

Genetics tutorial I: Probabilities in Genetics.
Genetics tutorial II: Pedigree analysis and genetics exercise solving.
Genetics tutorial III: Mendelian Genetics and Genetic Problems.
Gene expression tutorial: DNA and protein synthesis.

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<tr><td>Teaching Methodology</td><td>Lectures, Tutorials, Laboratory Practical Sessions.</td></tr>
<tr><td>Bibliography</td><td>
Required Textbooks/Reading:
<table>
<tr><th>Authors</th><th>Title</th><th>Edition</th><th>Publisher</th><th>Year</th><th>ISBN</th></tr>
<tr><td>N.A. Campbell, L. A. Urry, M.L. Cain, S.A. Wasserman, P.V. Minorsky, J.B. Reece</td><td>Biology: A global approach</td><td>12th Edition</td><td>Pearson</td><td>2020</td><td>9781292341637</td></tr>
<tr><td colspan="6">E-book Permalinks</td></tr>
<tr><td colspan="6">https://ebookcentral.proquest.com/lib/nicosia/detail.action?docID=6191695</td></tr>
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Recommended Textbooks/Reading:
<table>
<tr><th>Authors</th><th>Title</th><th>Edition</th><th>Publisher</th><th>Year</th><th>ISBN</th></tr>
<tr><td>J. D. Watson, A. Berry</td><td>DNA: The Secret of Life</td><td></td><td>Arrow Books</td><td>2004</td><td>9780099451846</td></tr>
<tr><td>Michael A. Palladino</td><td>Understanding the Human Genome Project</td><td>2nd edition</td><td>Pearson Benjamin Cummings</td><td>2006</td><td>9780805348774</td></tr>
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Assessment	Laboratory report (10%), Midterm Exam (30%), and Final Exam (60%). Assessment is by Single Best Answers (SBAs) and Short Answer Questions (SAQs).
Language	English