UNIVERSITY of NICOSIA

# Course Syllabus

| Course Code | Course Title | ECTS Credits |
|---|---|---|
| BIOL-323 | Molecular Basis to Health and Disease | 8 |
| **Prerequisites** | **Department** | **Semester** |
| BIOL-241<br>BIOL-321 | Life Sciences | Spring |
| **Type of Course** | **Field** | **Language of Instruction** |
| Required | Biochemistry, Medicine | English |
| **Level of Course** | **Lecturer(s)** | **Year of Study** |
| 1st Cycle | Dr Phobie Stavride | 3rd |
| **Mode of Delivery** | **Work Placement** | **Corequisites** |
| Face to face | N/A | None |

**Course Objectives:**

This course aims to help students integrate the biochemical, physiological and molecular knowledge on human health and disease and build the scientific background required for successful progression in the basic biosciences and medical sciences.

The main objectives of this course are to:

- Guide students to acquire, integrate and apply the basic science principles that underlie the biochemical, molecular biology and physiology theory and practice.
- Provide students with the knowledge, skills and opportunities to identify, analyse and predict the molecular basis for the cause and effect of diseases.
- Develop students' awareness of the advances in –omics research and the contributions of such research in studying cell and tissue functions, and in the treatment of disease.
- Encourage individual and interactive life-long learning skills.

**Learning Outcomes:**

After completion of the course students are expected to be able to:

- Discuss and compare the mechanisms of DNA damage and repair in relation to cell death and the development of neoplasia.
- Discuss the molecular basis for the pathogenesis in inflammatory diseases.
- Demonstrate the molecular and biochemical bases of gene and protein function in major human genetic disorders, using specific examples.

- Appraise how controlling gene and protein expression as well as signal transduction pathways aid in the design of therapeutic strategies.
- Identify the experimental approaches in –omics research and systems biology used in the conceptual understanding of molecular mechanisms and cell physiology, and discuss the implications of the human genome project in understanding human diseases.
- Understand how population/medical data and AI technologies can be utilized in biomedical research.

**Course Content:**

Molecular Mechanisms in Disease

1. Cell Cycle and cell death.
2. Signal transduction and cell communication mechanisms
3. Acute and chronic inflammation
4. Mechanisms of infection and host response.
5. Neoplasia and Cancer

Omics implications in understanding human diseases

6. The Human transcriptome and epigenome.
7. The human proteome; Integrative Systems Biology

Molecular and Cellular pathogenesis in Diseases

8. Molecular basis of nervous system diseases
9. Molecular basis of blood diseases.
10. Molecular basis of cardiovascular diseases.
11. Molecular basis of immune system diseases.
12. Molecular basis of diseases of the exocrine and endocrine systems.

**Learning Activities and Teaching Methods:**

Lectures; discussion sessions, assignments on medical/research papers and peer review.

**Assessment Methods:**

Midterm test, assignment, final exam

**Required Textbooks / Readings:**

| Title | Author(s) | Publisher | Year | ISBN |
|---|---|---|---|---|
| Essential Concepts in Molecular Pathology 2nd Edition | William B. Coleman Gregory J. Tsongalis | Elsevier | 2020 | 978-0-12-813257-9 |

**Recommended Textbooks / Readings:**

| Title | Author(s) | Publisher | Year | ISBN |
|---|---|---|---|---|
| Molecular Pathology: The Molecular Basis of Human Disease | illiam B. Coleman Gregory J. Tsongalis | Academic Press | 2017, 2nd Edition | ISBN-10: 0128027614<br>ISBN-13: 978-0128027615 |
| Molecular Basis of Health and Disease | Undurti N. Das | Springer | 2011 | ISBN: 978-94-007-0495-4 |