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| Course Title | **Cell Biology and Genetics** | | | | |
| Course Code | **NURS106** | | | | |
| Course Type | Compulsory | | | | |
| Level | BSc (Level 1) | | | | |
| Year / Semester | 1st / Spring | | | | |
| Instructor's Name | Dr. Maria Pantelidou | | | | |
| ECTS | 5 | Lectures / week | 3 | Laboratories/week | 1 |
| Course Purpose | The aim of this course is to introduce students to the basic concepts and principles of Cell Biology and Genetics in order to familiarize students with the basic cellular and molecular mechanisms of living organisms. The course focuses on understanding concepts such as the chemical composition of the cells, the cell structure and cellular interactions. Additionally, students will gain specific knowledge regarding genetics, the genetic basis of various diseases and heredity. | | | | |
| Learning Outcomes | By the end of this course, the students would be able to:<br>• Describe the basic cell biology principles<br>• Analyse and present the chemical composition of the cell<br>• Present the organelles of the cell<br>• Explain the cytoskeleton and cell movement<br>• Describe the structure and function of DNA and RNA<br>• Elaborate on the genetic basis of various diseases and the impact of Genetics in disease diagnosis, prevention and treatment<br>• Develop the necessary skills for working in groups<br>• Extract conclusions from data | | | | |
| Prerequisites | None | Corequisites | None | | |
| Course Content | **Theory**<br>• **Introduction to the cell:** Types of cells: Eukaryotic and prokaryotic cells. Comparison of different types of cells. Observation of cells under the microscope.<br>• **Chemical composition of cells:** Biological molecules of the cell. Structure and function of different cell organelles.<br>• **Energy production in cells:** Mitochondria and cell respiration (oxidative phosphorylation). Chloroplasts and photosynthesis. | | | | |

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| | • **Cell membrane - Cytoskeleton:** Structure and permeability. Membrane proteins. Intracellular transfer. Cell communication.<br>• **Cell cycle:** Mitosis and meiosis. Cell death.<br>• **The genetic code:** DNA structure and function. DNA replication and repair. Transcription (DNA to RNA) and translation (RNA to protein). Chromosomes, genes and regulation of gene expression. Genetic diseases and chromosomal abnormalities. Cancer and oncogenes. Genetic diversity.<br>• **DNA technology:** DNA analysis. Research in biomedical sciences. Gene therapy. Cloning. Genetic mechanisms<br>**Laboratory:** Students perform exercises in subjects such as:<br>Bacteria. E.coli cell culture. Microscopy. Observation of different types of cells under the microscope. DNA extraction from plant tissue. Exercises for understanding of DNA structure and the processes of DNA replication, transcription and translation. Exercises for understanding heredity of disease. Mitosis and meiosis under the microscope. |
| Teaching Methodology | **Theory**<br>The course is delivered to the students by means of lectures, conducted with the help of computer-based presentations. For the better understanding of the cell biological processes, special images and scientific animations are used/ Detailed notes with PowerPoint are used in the lesson. Image-rich material and short animations are used to gain a better understanding of some molecular biology reactions. Case Studies, Discussion, Questions / Answers are also used depending on the content of the lecture. Lecture notes and presentations are available online for use by students in combination with textbooks. Relevant material published in international scientific journals are also used to follow the latest developments related to the subject of the course.<br>**Laboratory**<br>Before each laboratory experiment/exercise the lab assistant demonstrates procedures and provides students with all relevant information. The evaluation of the laboratory experiments is performed by submitting lab reports, handouts, solving exercises, answering questions related to the material taught. |
| Bibliography | **(a) <u>Textbooks:</u>**<br>B. Alberts, D. Bray, K. Hopkin, A. Johnson, J. Lewis, M. Raff, K. Roberts, P. Walter. (2022). *Molecular Biology of the Cell*, 6th Edition. Garland Science, LLC.<br>B. Alberts, D. Bray, K. Hopkin, A. Johnson, J. Lewis, M. Raff, K. Roberts, P. |

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| | Walter. (2021). *Βασικές Αρχές Κυτταρικής Βιολογίας*, 5η έκδοση. Ιατρικές Εκδόσεις Πασχαλίδης. **(In Greek)**<br><br>**(b) <u>References:</u>**<br><br>Campbell-Reece et al. (2017). *Biology*, 11th Edition, Pearson, Benjamin, Cummings.<br><br>W. S. Klug, M. R. Cummings, C. A. Spencer & M. A. Palladino. (2016). *Concepts of Genetics*. Pearson New International Edition.<br><br>Jane B. Reece, A. Campbell. (2013) *Βιολογία*. Πανεπιστημιακές Εκδόσεις Κρήτης. **(In Greek)**<br><br>W. S. Klug, M. R. Cummings, C. A. Spencer & M. A. Palladino. (2017). *Βασικές Αρχές Γενετικής*. Ακαδημαϊκές Εκδόσεις Ι. Μπάσδρα & ΣΙΑ Ο.Ε. **(In Greek)**<br><br>*Through the services of the university library, access is provided to electronic repositories of scientific journals and articles, indicatively* ***ProQuest, Cambridge University Press*** and ***Science Direct*** *with thousands of scientific journals in the fields of health sciences.* |
| Assessment | The assessment of this course consists of the coursework (midterm exam, laboratory assessment, class participation) and final exam.<br><br>**Mid-Term Exam: 30%.** A written midterm exam will be comprised by multiple choice questions and short answer question.<br><br>**Laboratory evaluation: 10%.** The laboratory assessment includes lab work with lab demonstrations and experiments. It may also involve solving exercises (ie heredity exercises)<br><br>**Student Participation: 10%.** The class participation includes verbal formative assessments with interactive problem-solving questions or discussions.<br><br>**Final Exam: 50%.** A written final exam will be comprised by multiple choice questions, short answer. |
| Language | Greek / English |