2021-2022

**223.1206 –Cell Biology 1
Semester A**

**Time:** [Wednesday] [10:00-12:00], Room [1007]

**Instructor:** [Prof.] [Estee] [Kurant], **Email:** ekurant@univ.haifa.ac.il]

**Instructor:** [Dr.] [Hagit] [Frenkel-Mullerad], **Email:**  hfrenkel@univ.haifa.ac.il]

**Office Hours:** [Thursday] [14:00-16:00], Room [41], [04-6647982]

**Teaching Assistants & Office Hours:**

no

**Course Level:** BA

**Course Type & Format:** [Mandatory],[Lecture]

**Number of Hours/Credits:** 2 hours / 2points

**Prerequisites:** no

**Course Overview (Short Abstract):**

This course surveys the fundamental principles of biology emphasizing common features to all organisms. It includes basic knowledge and terminology of cell biology, biochemistry and genetics, which prepares students for more advanced courses in biology and allied subjects.

**Learning Outcomes (What are the skills, abilities, or major concepts a student is expected to acquire in this course?) – At the end of the course students will be able to:**

1. Describe the difference between prokaryotic and eukaryotic cells, animal and plant cells.
2. Describe the structure and function of the organelles found in eukaryotic cells appreciating the overall architecture of the cell.
3. Identify the components of biological membranes, including the various types of

membrane proteins.

1. Explain the fluid mosaic model and describe how membranes exhibit selective

permeability including different types of transport.

1. Recall the steps relating to cell life cycle and cell division, understanding what cellular processes happen at each step, and describe the control mechanisms for the process. Explain the multistep model of cancer development including the role of mutations in genes encoding regulators of cell cycle.
2. Compare and contrast the fundamental features of mitosis and meiosis with emphasis on the movement of homologous chromosomes during these cellular reproductive processes.
3. Describe the basic features of the cell differentiation and programmed cell death processes. Identify different types of stem cells including potency and niche requirement.
4. Compare different genetic models and find an appropriate one to resolve a specific research question.
5. Identify the different kinds of molecules that characterize living things
6. Describe the chemical structures and functions of proteins, carbohydrates, lipids, and nucleic acids.
7. State the physical principles underlie biological energy transformations.
8. Describe and demonstrate the role of ATP in biochemical energetics
9. Describe what enzymes are and how do enzymes work
10. Give examples of ATP formation in different metabolic pathways
11. Describe how photosynthesis converts light energy into chemical energy and how this chemical energy is used to synthesize carbohydrates
12. State the structure of DNA and recall how DNA is replicated
13. Show how information flows from genes to proteins
14. Outline how RNA is translated into proteins

**Assessment (Assessment Method and Grade Composition):**

Exam - 100%

**Week-by-Week Content and Assignments:**

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| **Week #** | **Topic** | **Assignment**  |
| 1 | Introduction – Example of Biological research  | Guest lecture |
| 2 | Macro-Molecules - Sugars, Fats, and proteins  | Hagit Frenkel Mullerad |
| 3 | Macro-Molecules - Nucleic Acids  | Hagit Frenkel Mullerad |
| 4 | Cells:The working units of life | Estee Kurant |
| 5 | Cell membranes | Estee Kurant |
| 6 | The cell cycle and cell division | Estee Kurant |
| 7 | Enzymes and metabolic processes | Hagit Frenkel Mullerad |
| 8 | Energy Creation Processes - Breathing, Fermentation and Photosynthesis | Hagit Frenkel Mullerad |
| 9 | The genetic code, protein formation and breakdown | Hagit Frenkel Mullerad |
| 10 | Cell differentiation, morphogenesis and cell death | Estee Kurant |
| 11 | Stem cells, cancer and personalized medicine | Estee Kurant |
| 12 | Genetic models in biological research | Estee Kurant |
| 13 | Overview and questions | Estee Kurant and Hagit Frenkel-Mullerad |

**Website:** [[https://mw11.haifa.ac.il/course/view.php?id=3120]](http://online.haifa.ac.il) moodle link

**Reading List:**

1. Sadava, Hillis, Heller & Berenbaum. 2012. Life - The science of biology.W.H. Freeman (9ed)
2. Krogh. 2011. Biology – A guide to the natural world.
3. Mader & Windelspecht. 2013. Biology.
4. C. Starr & R. Taggart, C. Evers, L. Starr, Biology – The Unity and Diversity of Life, 13th ed. (Wadsworth, 2012‎‎)