

Course Unit	Biology	Field of study	Biology and Biochemistry
Bachelor in	Environmental Engineering	School	School of Agriculture
Academic Year	2022/2023	Year of study	1
Type	Semestral	Semester	1
Level	1-1	ECTS credits	5.5
Code	9099-309-1101-00-22		
Workload (hours)	148,5	Contact hours	T 30 TP - PL 30 TC - S - E - OT 20 O -

T - Lectures; TP - Lectures and problem-solving; PL - Problem-solving, project or laboratory; TC - Fieldwork; S - Seminar; E - Placement; OT - Tutorial; O - Other

Name(s) of lecturer(s) Ana Maria Pinto Carvalho, Maria João Almeida Coelho Sousa

Learning outcomes and competences

At the end of the course unit the learner is expected to be able to:
To detail structural and functional aspects of cellular biology. To acquire basic abilities of optic microscopy and cytochemistry. To justify concepts based on the recommended bibliography.

Prerequisites

Before the course unit the learner is expected to be able to:
basic knowledge of chemistry and biology

Course contents

Cell theory, concept of Live. Virus. Cellular organization and classification. Prokaryotic and eukaryotic cell. Eukaryotic cells, chemical composition, structure and function of cellular structures: Cell wall, plasma membrane, and Hialoplasma Mitochondria, Plastids, Peroxysomes. Morphofunctional relations between endoplasmic reticulum, Golgi complex and lysosomes. Nucleus: interphasic, mitotic and meiotic. Mitosis and meiosis.

Course contents (extended version)

- Theory and Cellular concept of Live. The case of the virus.
 - The cellular organization and classification of living beings. Prokaryotes and eukaryotes.
 - Introduction to microscopy: Types of microscopy. Manipulation of optical microscope.
 - Microscopic observation of prokaryotic and eukaryotic cells.
 - Structural and morphological differentiation of cells of different taxonomic groups.
- Organization of eukaryotic cells.
 - Chemical composition, structure and functions of key cellular structures.
 - Observation of phenomena of transport through the cell membrane in plant/animal after cell staining.
- Cell wall of different taxonomic groups. Plasma membrane and the unitary membrane theory.
 - Cytochemical staining of lignified and non lignified cell walls.
 - Observation of phenomena of transport through the cell membrane in plant/animal after cell staining.
- Hyaloplasm and the energetic metabolism of the cell: Glycolysis, and Pentose phosphate way.
 - Mitochondria and energetic metabolism of the cell. Cell location and cellular mechanisms.
 - Oxidative Decarboxylation of pyruvic acid, the Tricarboxylic Acid Cycle and the respiratory chain.
- Plastids: Main types of plastids; reserve plastids and plastids with color. Chloroplasts
 - Photosynthesis in plants C3, C4 and CAM; Cell location and cellular mechanisms.
 - Observation of Plastids: Reserve plastids and plastids with color.
 - Observation of Plastids: amiloplasts and oleoplasts chromoplasts and chloroplasts.
 - Extraction, separation and quantification of photosynthetic pigments.
- Peroxisomes: glyoxylate cycle and Photorespiration.
- Morphofunctional relations between: endoplasmic reticulum, Golgi complex and lysosomes.
- Nucleus: interphasic, mitotic and meiotic. Mitosis and meiosis.
 - Visualization of mitosis and meiosis phenomena in plant cells.

Recommended reading

- Alberts, B. , Johnson, A. , Lewis, J. , Raff, M. , Roberts, K. , and Walker, P. (2002). Molecular Biology of the Cell, Garland Publishing, New York.
- Becker, W. , Kleinsmith, L. e Hardin, J. (2000). The world of the cell, 4th Ed. . The Benjamin/Cummings Publishing Company. San Francisco.
- Purves, W. , Orians, G. , Heller, H. e Sadava, D. (1998). Life – The science of biology. 5th Ed. Sinauer Associates, Inc. ; W. H. Freeman. Estados Unidos da América.
- Azevedo, C. & C. E. Sunkel (2012). Biologia molecular e celular. 5ª edição. Lidel, Lisboa.
- Ruzin, S. E. (1999). Plant microtechnique and microscopy. Oxford University Press. New York.

Teaching and learning methods

One hour theoretical lessons twice a week. Expositive methodology, using the media resources. Provision of study materials via e-learning. Two hour practical lessons once a week. Practical laboratory work using educational and scientific laboratory equipment. Tutorials to work on literacy skills. Performances assessed by both coursework and examinations.

Assessment methods

- Coursework Assessment - (Regular) (Final)
 - Laboratory Work - 5% (Assiduity, participation in practical classes and practical reports)
 - Intermediate Written Test - 40% (Practical contents examination. Minimum 9, 5/20)
 - Final Written Exam - 55% (Final examination with theoretical and theoretical-practical contents. Minimum 9, 5/out of 20)
- Diligent regimen of evaluation - (Student Worker) (Final)
 - Final Written Exam - 45% (Test that includes practical contents.)
 - Final Written Exam - 55% (Final examination with theoretical and theoretical-practical contents.)
- Final examination - (Regular, Student Worker) (Supplementary, Special)
 - Final Written Exam - 45% (Test that includes practical contents. (2, 5 ECTS))
 - Final Written Exam - 55% (Final examination with theoretical and theoretical-practical contents. (3 ECTS))

Language of instruction

Portuguese

Electronic validation

Ana Maria Pinto Carvalho, Maria João Almeida Coelho Sousa	Maria José Miranda Arabolaza	Artur Jorge de Jesus Gonçalves	Paula Cristina Azevedo Rodrigues
07-12-2022	16-12-2022	17-12-2022	18-12-2022