

1. language

Italian.

2. course contents

Coordinator: Prof. SACCONI VALENTINA

Academic Year: 2022/2023

Year Course: 1°

Semester: 1°

UFC: 5

Modules and lecturers:

- APPLIED BIOLOGY (PH000005) - 5 ufc - ssd BIO/13

Prof.ssa Valentina Saccone

3. bibliography

Recommended texts to be chosen from:

Gerald Karp. Biologia Cellulare e Molecolare - Concetti ed Esperimenti- Quinta Edizione – 2015. Editore: EdiSES

Bruce Alberts et al. L'essenziale di biologia molecolare della cellula. Quinta Edizione – 2020. Editore: Zanichelli

David Sadava et al., Principi di Biologia. Quinta Edizione -2020. Editore: Zanichelli

Reference Texts:

ALBERTS et al., Biologia molecolare della cellula, VI edizione - 2016. Editore: Zanichelli

Supplementary teaching materials, in the form of scholarly articles and appropriate telematic sources, will also be provided to supplement, deepen and update the content covered in lectures.

4. learning objectives

The integrated course aims to provide the student with the fundamental information and elements of the scientific/experimental method to understand the basics of cell biology. Upon completion of the integrated course, the student should demonstrate that he/she has acquired the following objectives:

Knowledge and understanding: The integrated course aims to provide the student with the fundamental information and elements of the scientific/experimental method to understand the basics of cell biology.

Applying knowledge and understanding: To demonstrate the ability to adequately interpret and understand the importance of knowledge of the mechanisms underlying the organization and functions of the cell, and the related application implications of biology in

the pharmaceutical field.

Making judgements: to know how to integrate the knowledge and skills learned, to correctly and appropriately evaluate the cellular and molecular mechanisms underlying pharmacological treatments in order to appropriately integrate pharmacological aspects within therapeutic strategies.

Communication skills: to be able to communicate scientific and applied content clearly and unambiguously, using appropriate technical language correctly, explaining their conclusions, as well as the knowledge and rationale behind them, to specialist and non-specialist interlocutors.

Learning skills to Be able to update and expand their knowledge by drawing independently on scientific texts and articles (PubMed).

5. PREREQUISITES

Basic schooling and knowledge of basic science subjects is required: chemistry, physics, and mathematics.

6. teaching methods

The teaching methodology is based on face-to-face lectures delivered by providing both the basic elements of biology and application perspectives in pharmaceutical and biomedical fields. Lectures are based on interactive modes, supplementing standard didactics with activities marked by active learning, such as: "problem-based learning," "self-learning," and "case studies."

The teaching methods used in this course are designed to enable the student to pursue the educational objectives, by virtue of the following characteristics:

Knowledge and understanding: Frontal teaching will systematically cover all topics listed in the program detailed below, dwelling on the most relevant and indispensable aspects, so as to provide students with the complete picture of the integrated topics and the correct study method to strengthen theoretical knowledge.

Applying knowledge and understanding: the use of practical examples, classroom exercises and "case studies" enables students to learn the application potential of the topics covered.

Making judgements: the active learning methods implemented in this course are designed to enable the student the ability to formulate concepts and ideas independently.

Communication skills: the active learning methods and constant interaction with the lecturer during face-to-face lectures will be conducted in such a way as to enable the student to progressively acquire communication skills aimed at exposing applied biology topics with the correct scientific terminology.

Learning skills: the use of supplementary teaching materials, including in the form of articles from the international scientific literature, will enable the student to continue studying mostly self-directed or independently.

In case it is impossible to conduct in presence lectures due to COVID19 emergency, the lecturer plans to use platforms such as BlackBoard and/or Teams for distance learning by following the rules that the university will propose.

7. other informations

The professor will be available throughout the duration of the course, by e-mail appointment, to answer questions and support students throughout their training, including one-on-one meetings.

8. methods for verifying learning and for evaluation

The examination consists of a written test consisting of 50 multiple-choice quizzes and 2 open-ended questions.

The grade for the written test is calculated by scoring 0.5 for each correct quiz, 0 for each wrong or unanswered quiz, and scoring the open-ended answers with scores from 0 to 3.

The minimum score to pass the written test is 18. A student who correctly answers all the questions in the written test will achieve the maximum score (31= grade30/30 cum laude).

Passing the written test will give access to an oral test. The candidate may accept the grade of the written test as the final result or change this according to the outcome of the oral test, which may change the result of the written test within the range of -4/+4 grades. In any case, the student may

achieve the maximum final score

30/30 cum laude only if he/she obtained a grade of 27/30 or higher in the written test.

PLEASE NOTE: In case the emergency related to the COVID-19 pandemic outbreak persist by requiring online education, the assessment arrangements will be officially communicated via notice on Blackboard.

9. program

The scientific method and the basics of the biology course.

Basic properties of cells.

Chemical basis of life and major biological molecules.

Structure of the plasma membrane. Structure and function of membrane proteins.

Regulation of molecules passage across cell membranes. Mechanisms of interaction

Cell-cell and cell-environment.

Mitochondria: structure and function.

Endomembrane system. Smooth and rough endoplasmic reticulum.

Golgi complex, lysosomes, peroxisomes. Endocytic transport and transport by vesicles.

Cytoskeleton and cell mobility. Cytoskeleton and contractility.

Nucleus. Nuclear envelope. Nuclear pore complex. Mechanisms of nuclear import and nuclear export. Structure of chromatin and chromosomes. Nucleoli. Other components of the nucleoplasm.

Concept of gene and genomic structure.

The genetic code. DNA replication and repair. RNA transcription and post-transcriptional modifications.

Types of non-coding RNAs. Regulation of gene expression in prokaryotes and eukaryotes.

Protein synthesis and post-translational modifications.

Cell cycle and cell reproduction. Meiosis and mitosis.

Signal transduction. Messengers and receptors. Mechanisms of signal transduction.

Mechanisms of cell death.

Applications of biology in medicine: stem cells and regenerative medicine.

NB: All the topics indicated in the program can be found in the various chapters of the recommended texts and in the supplementary material provided during the lectures