
COURSE (TITLE): Cellular Biochemistry

LECTURER:

YEAR and SEMESTER: I year/I semester

CREDITS (CFU): 6 CFU

SECTOR (SSD): Biochemistry (BIO/10)

ACADEMIC YEAR:

ASSESSMENT: Oral exam

LOCATION: Department of Environmental, Biological and Pharmaceutical Science and Technologies, Via Vivaldi 43, 8100, Caserta, Italy.

COURSE OBJECTIVES/OUTCOMES:

The course is rooted in an understanding of the molecules within cells and of the interactions between cells that allow development of multicellular organisms. Key concepts in cellular biochemistry and their experimental underpinnings will be presented. Medically relevant examples will be described where appropriate to help illustrate the connections between cellular biochemistry and health and human disease. A hallmark of the course is the use of experiments to engage students in the history of cell biology and the research that has contributed to the field.

SYLLABUS (overview)

Cells in culture and techniques for their study; Cell cycle and control of cell growth in eukaryotes; Development of multicellular organisms: integrating cells into tissues; Signal Transduction pathways; Cancer.

SYLLABUS (Detailed description):

Part I: Cells, the Fundamental Units of Life

- Course Introduction
- Chemical Components of Cells, Cells, and Model Organisms
- Ways of working with cells: Culturing cells, Cell culture Media, Reagents, Cell lines, Cell cultures, Primary Cell cultures; Visualizing cells and their components; Identifying and Analysing molecules inside the cells and Studying their Interactions.
- Model Organisms and Transgenesis

Part II: The Cell-Division Cycle and Cell growth

- The Eukaryotic Cell Cycle and its regulation

Part III: Integrating Cells Into Tissues

- Stem Cells and Pluripotency, Cell Asymmetry.
 - Transcriptional Control of Gene Expression during Development of multicellular organisms; Cell
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Differentiation: Myogenesis, the muscle formation during embryonic development; The Formation of the Primary Body Axis, the anterior–posterior axis, during embryonic development

- Cell Signaling: Signal Transduction and G Protein–Coupled Receptors, human G protein-coupled receptors of pharmaceutical importance; Signal Transduction and Receptor Tyrosine Kinase (RTK); Signaling Pathways that control Gene Expression; Signaling by Sensory Receptors.
- Cell Death

Part IV. Cancer

- The characteristics of cancer cells and how they differ from normal cells

TEXTBOOKS:

- *Molecular Biology of the Cell*, sixth edition, (2014), *Bruce Alberts, Alexander D. Johnson, Julian Lewis, David Morgan, Martin Raff, Keith Roberts, Peter Walter*. W.W. Norton & Company
- *Molecular Cell Biology*, Eighth Edition (2016), *Harvey Lodish, Arnold Berk, Chris A. Kaiser, Monty Krieger, Anthony Bretscher, Hidde Ploegh, Angelika Amon, Kelsey C. Martin*. Macmillan Learning.
- *Essential Cell Biology*, Fourth edition, *Bruce Alberts, Dennis Bray, Karen Hopkin, Alexander D. Johnson, Julian Lewis, Martin Raff, Keith Roberts, Peter Walter*. W.W. Norton & Company

ADDITIONAL READING:

Scientific research articles provided by the lecturer

Curriculum Vitae