

GENERAL BIOLOGY I

Course Syllabus for Biology 1101

Coordinators: Profs. D.M. Bakewicz, J. Seto and A. Zameer

Textbook: [BIOLOGY](#) by OpenStax, ISBN-13 978-1-938168-09-3

Laboratory Manual: Biology Laboratory Manual for General Biology I, Edited by Bakewicz, Seto, Zameer, McGraw-Hill 2013 ISBN-13: 978-1-121-81854-5

Course Description: The fundamental principles of biology focus on topics including taxonomy, structure, nutrition, reproduction, heredity, development and evolution. The concepts of molecular biology and DNA fingerprinting using representative plants and animals are introduced. The course also includes the use and care of the microscope.

Lecture Schedule

WEEK	LECTURES	TOPIC
I	1.	BASICS Introduction to the Course Definition, Characteristics and Hierarchy of Life Scope of Ecology: habitat, Population, Community, Ecosystem The Scientific Method Evolution and Classification Systematics, taxonomy, phylogeny
	2.	THE ORIGIN & EVOLUTION OF LIFE Darwin & Evolution The Origin of Life The Geological Time Scale Cellular History Kingdoms and Domains
II	3.	INORGANIC CHEMISTRY I Definition, Classification and Properties of Matter Atomic Structure The periodic Table Isotopes Electrons and Energy Energy Chemical Reactions: Exergonic and endergonic Activation Energy Oxidation and Reduction
	4.	INORGANIC CHEMISTRY II Elements, Compounds, Molecules and Mixtures Bonds: Weak and Strong
III	5.	WATER & pH Importance and Properties of H ₂ O Acids, Bases, pH, Buffers

6. [ORGANIC CHEMISTRY](#)
Importance of Carbon
Organic vs. Inorganic Compounds
The Hydrocarbons
Functional Groups
Isomers
- IV 7. **Examination I** (Lectures 1-6 inclusive)
8. [MACROMOLECULES I](#)
Monomers and Polymers
Dehydration Synthesis and Hydrolysis
Carbohydrates
Lipids
- V 9. [MACROMOLECULES II](#)
Proteins
Nucleic Acids
ATP
Enzymes and Metabolic Pathways
10. [CELLS](#)
The Cell Theory
Methods of Studying Cells
Cellular Size Limitations
Cell Composition
Prokaryotic and Eukaryotic Cells
Cellular Evolution
Anaerobic and Aerobic Cells; Endosymbiosis; Multicellularity; Viruses, Bacteria
and Archaea
- VI 11. [THE EUKARYOTIC CELL](#)
Eukaryotic Cell Structure and Function
12. [MEMBRANES & TRANSPORT](#)
Membrane Structure and Function
Passive Transport Processes
Active Transport Processes
Cell Surface Modifications
- VII 13. **Examination II** (Lectures 8-12 inclusive)

14. [ENERGY](#)
Cells and the Flow of Energy
Metabolic Reactions and Energy Transformations
Metabolic Pathways
Oxidation and Reduction
- VIII 15. [CELLULAR RESPIRATION I](#)
Cellular Respiration (Anaerobic)
Outside the Mitochondria: Glycolysis
Fermentation
16. [CELLULAR RESPIRATION II](#)
Cellular Respiration (Aerobic)
Inside the Mitochondria:
 The Preparatory Reaction (Hub)
 Citric Acid Cycle (TCA)
 Electron Transport Chain (ETC)
Metabolic Pool
- IX 17. [PHOTOSYNTHESIS I](#)
Photosynthetic Organisms
The Process of Photosynthesis
Plant as Solar Energy Converters: Light Reactions
18. [PHOTOSYNTHESIS II](#)
Dark Reactions: Calvin Cycle Reactions (Carbon Fixation)
Other Types of Photosynthesis
- X 19. [ASEXUAL REPRODUCTION](#)
The Cell Cycle and Its Control
Mitosis and Cytokinesis
The Cell Cycle and Cancer
Prokaryotic Cell Division
20. [SEXUAL REPRODUCTION](#)
Halving the Chromosome Number
Genetic Variation
The Phases of Meiosis
Comparison of Meiosis and Mitosis
The Human Life Cycle (Spermatogenesis & Oogenesis)
- XI 21. [CHROMOSOMES](#)
Changes in Chromosome Number and Structure
22. **Examination III** (Lectures 14-21 inclusive)
- XII 23. [GENETICS I](#)
Gregor Mendel
Mendel's Law
Human Genetics Disorders

24. [GENETICS II](#)
Extending the Range of Mendelian Genetics
Multiple Allelic Traits
Incomplete Dominance
Pleiotropy
Polygenic Inheritance
X-Linked Inheritance
Environmental Influences
- XIII 25. [DNA](#)
The Genetic Material
DNA Structure
DNA Replication
Prokaryotic versus Eukaryotic Replication
26. [GENE FUNCTION](#)
The Genetic Code
Transcription
Translation
Structure of the Eukaryotic Chromosome
- XIV 27. [GENETIC REGULATION](#)
Prokaryotic
Eukaryotic
Regulation Through Mutations
28. [BIOTECHNOLOGY & GENOMICS](#)
DNA Cloning
Biotechnology Products
Gene Therapy
Genomics
- XV 29. [ANIMAL DEVELOPMENT](#)
Early Developmental Stages
Developmental Processes
Human Embryonic and Fetal Development
30. **Examination IV** (Lectures 23-29 inclusive)