

BIOLOGY I (BIO1101 AND BIO1101L) SYLLABUS



NEW YORK CITY COLLEGE
OF TECHNOLOGY
The City University Of New York

School of Arts and Sciences
Department of Biological Sciences

Course Information

Course title:	Biology I (Lecture and Laboratory)
Course code:	BIO1101 and BIO1101L
Credit Hours:	4 credit hours
	3 hours lecture and 3 hours lab per week for 15 weeks
Prerequisite:	CUNY proficiency in reading
Text:	Lecture “BIOLOGY” by S. Mader 10 th Ed., McGraw Hill Publishers
	Lab “General Biology I Laboratory Manual” by Bakewicz Raven, Moore, Vodopich and Enger, 1995. Custom publication for NYCTC by McGraw- Hill Companies. Wm. C. Brown Publishers, 1998
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.

Grading Procedure (see Grading Policies for details)

Lecture: 60%	Lab: 40%
The Lecture component will include <u>at least</u> 4 exams plus other assignments at the discretion of the instructor. The Lab component will include <u>at least</u> 6 quizzes and lab reports, at the discretion of the instructor.	

Course Coordinators

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Learning Outcomes

Upon satisfactory completion of this course, the student will be able to:

- (1) comprehend the principles of biology;
- (2) appreciate the relationship of the other sciences to biology;
- (3) understand the scientific method, its history and importance to society;
- (4) acquire skills in the use of biological equipment and techniques;
- (5) develop expertise in the written and oral expression of biological ideas;
- (6) gain skill in the collection of data and in its mathematical treatment and interpretation;
- (7) acquire the knowledge needed for a thorough understanding of the major bioethical issues in society.

Lecture Schedule

Week 1	<p>Basics</p> <ul style="list-style-type: none"> • Definition, Characteristics and Hierarchy of Life • Ecosystems and Populations • The Scientific Method • Classification and Naming <p>Origin and Evolution of Life</p> <ul style="list-style-type: none"> ▪ Evolution ▪ The Origin of Life ▪ The Geological Time Scale ▪ Cellular History • Kingdoms and Domains
Week 2	<p>Inorganic Chemistry I</p> <ul style="list-style-type: none"> ▪ Definition, Classification and Properties of Matter and Energy ▪ Chemical Reactions: Exergonic and Endergonic Reactions ▪ Activation Energy ▪ Atomic Structure and The Periodic Table ▪ Oxidation and Reduction ▪ Electrons and Energy <p>Inorganic Chemistry II</p> <ul style="list-style-type: none"> ▪ Elements, Compounds, Molecules and Mixtures ▪ Bonds: Weak and Strong
Week 3	<p>Water & pH</p> <ul style="list-style-type: none"> ▪ Importance and Properties of H₂O ▪ Acids, Bases, pH, Buffers <p>Organic Chemistry</p> <ul style="list-style-type: none"> ▪ Importance of Carbon ▪ Organic vs. Inorganic Compounds ▪ The Hydrocarbons ▪ Functional Groups ▪ Isomers
Week 4	<p>Examination I (Lectures 1-6 inclusive)</p> <p>Macromolecules I</p> <ul style="list-style-type: none"> ▪ Monomers and Polymers ▪ Dehydration Synthesis and Hydrolysis ▪ Carbohydrates ▪ Lipids
Week 5	<p>Macromolecules II</p> <ul style="list-style-type: none"> ▪ Proteins ▪ Enzymes and Metabolic Pathways ▪ Nucleic Acids ▪ ATP <p>Cells</p> <ul style="list-style-type: none"> ▪ The Cell Theory ▪ Methods of Studying Cells ▪ Cellular Size Limitations ▪ Cellular Composition ▪ Prokaryotic and Eukaryotic Cells ▪ Cellular Evolution ▪ Viruses, Bacteria and Archaea
Week 6	<p>The Eukaryotic Cell</p> <ul style="list-style-type: none"> ▪ Eukaryotic Cell Structure and Function <p>Membranes and Transport</p> <ul style="list-style-type: none"> ▪ Membrane Structure and Function ▪ Passive Transport Processes ▪ Active Transport Processes ▪ Cell Surface Modifications

Week 7	<p>Examination II (Lectures 8-12 inclusive)</p> <p>Energy</p> <ul style="list-style-type: none"> ▪ Cells and the Flow of Energy ▪ Metabolic Reactions and Energy Transformations ▪ Metabolic Pathways ▪ Organelles and the Flow of Energy
Week 8	<p>Cellular Respiration I</p> <ul style="list-style-type: none"> ▪ Cellular Respiration (Anaerobic) ▪ Outside the Mitochondria: Glycolysis ▪ Fermentation <p>Cellular Respiration II</p> <ul style="list-style-type: none"> ▪ Cellular Respiration (Aerobic) ▪ Citric Acid Cycle ▪ Electron Transport Chain ▪ Metabolic Pool
Week 9	<p>Photosynthesis I</p> <ul style="list-style-type: none"> ▪ Photosynthetic Organisms ▪ The Process of Photosynthesis ▪ Plant as Solar Energy Converters: Light Reactions <p>Photosynthesis II</p> <ul style="list-style-type: none"> ▪ Calvin Cycle Reactions ▪ Other Types of Photosynthesis
Week 10	<p>Asexual Reproduction</p> <ul style="list-style-type: none"> ▪ The Cell Cycle and Its Control ▪ Mitosis and Cytokinesis ▪ The Cell Cycle and Cancer ▪ Prokaryotic Cell Division <p>Sexual Reproduction</p> <ul style="list-style-type: none"> ▪ Halving the Chromosome Number ▪ Genetic Variation ▪ The Phases of Meiosis ▪ Comparison of Meiosis and Mitosis ▪ The Human Life Cycle (Spermatogenesis & Oogenesis) ▪ Life Cycles
Week 11	<p>Examination III (Lectures 14-20 inclusive)</p> <p>Genetics I</p> <ul style="list-style-type: none"> ▪ Gregor Mendel ▪ Mendel's Law ▪ Human Genetics Disorders
Week 12	<p>Genetics II</p> <ul style="list-style-type: none"> ▪ Extending the Range of Mendelian Genetics ▪ Multiple Allelic Traits ▪ Incomplete Dominance ▪ Pleiotropy ▪ Polygenic Inheritance ▪ X-Linked Inheritance <p>Chromosomes</p> <ul style="list-style-type: none"> ▪ Changes in Chromosome Number and Structure
Week 13	<p>DNA</p> <ul style="list-style-type: none"> ▪ The Genetic Material ▪ DNA Structure ▪ DNA Replication ▪ Prokaryotic versus Eukaryotic Replication <p>Gene Function</p> <ul style="list-style-type: none"> ▪ The Genetic Code ▪ Transcription ▪ Translation

	<ul style="list-style-type: none"> ▪ Structure of the Eukaryotic Chromosome
Week 14	<p>Gene Regulation</p> <ul style="list-style-type: none"> ▪ Prokaryotic ▪ Eukaryotic ▪ Regulation Through Mutations <p>Biotechnology and Genomics</p> <ul style="list-style-type: none"> ▪ DNA Cloning ▪ Biotechnology Products ▪ Gene Therapy ▪ Genomics
Week 15	<p>Animal Development</p> <ul style="list-style-type: none"> ▪ Early Developmental Stages ▪ Developmental Processes ▪ Human Embryonic and Fetal Development <p>Examination IV (Lectures 22-29 inclusive)</p>

ACADEMIC INTEGRITY POLICY STATEMENT

Students and all others who work with information, ideas, texts, images, music, inventions, and other intellectual property owe their audience and sources accuracy and honesty in using, crediting, and citing sources. As a community of intellectual and professional workers, the College recognizes its responsibility for providing instruction in information literacy and academic integrity, offering models of good practice, and responding vigilantly and appropriately to infractions of academic integrity. Accordingly, academic dishonesty is prohibited in The City University of New York and at New York City College of Technology and is punishable by penalties, including failing grades, suspension, and expulsion. The complete text of the College policy on Academic Integrity may be found in the catalog.

COLLEGE POLICY ON ABSENCE/LATENESS

A student may be absent without penalty for 10% of the number of scheduled class meetings during the semester as follows:

Class Meets Allowable Absence

1 time/week 2 classes

2 times/week 3 classes

3 times/week 4 classes

Students are responsible for making up any missed work on days that they are absent. If a student's class absences exceed this limit the instructor will alert the student that a grade of WU may be assigned. Unless otherwise indicated by the instructor, two times late is treated as one absence.

Laboratory Schedule

Week 1	The Microscope: Basic skills The Origin of Life (time permitting) <ul style="list-style-type: none"> ▪ Prepare microspheres ▪ Stain Eukaryotic cheek cells
Week 2	pH Determination: Acids, Bases, Buffers and Coacervates
Week 3	Amino Acid Chromatography (theory) Separation of dye molecules Measurements in Science: Metric System
Week 4	Biologically Important Molecules I <ul style="list-style-type: none"> ▪ Carbohydrates ▪ Lipids
Week 5	Biologically Important Molecules II <ul style="list-style-type: none"> ▪ Proteins ▪ Nucleic Acids ▪ Enzymatic Purification of DNA ▪ Dische's Test
Week 6	Quantitative Determination of Proteins Colorimetry
Week 7	Enzyme Kinetics
Week 8	Membranes and Biological Transport <ul style="list-style-type: none"> ▪ Diffusion and Osmosis ▪ Active Transport (theory)
Week 9	Cellular Respiration: Anaerobic and Aerobic
Week 10	Photosynthesis
Week 11	Principles of Electrophoresis Restriction Enzyme digestion (theory) Polymerase Chain Reaction (theory)
Week 12	DNA Fingerprinting
Week 13	Mitosis: Replication of Eukaryotic Cells Meiosis: Reduction Division and Gametogenesis
Week 14	Genetics Problems <ul style="list-style-type: none"> ▪ Human Variations (for reference and practice) ▪ Single Factor Inheritance ▪ Double Factor Inheritance ▪ Human Variations (for reference and practice)

Mendelian Genetics I: Corn
Mendelian Genetics II: Chi-Square**ACADEMIC INTEGRITY POLICY STATEMENT**

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Students are responsible for making up any missed work on days that they are absent. If a student's class absences exceed this limit the instructor will alert the student that a grade of WU may be assigned. Unless otherwise indicated by the instructor, two times late is treated as one absence.

Grading Policies

Students' performance on this course will be evaluated as follows:

Lecture: 60% of final grade (based on 4 exams)

Lab: 40% of final grade, based on 6 quizzes (75% overall) and lab work (25% overall)

ASSIGNMENTS		POINTS	NOTE		
Lab Quizzes	There are 6 quizzes, which will account for 75% of the final lab grade.	Quiz 1	5%	Letter grades will be determined using a standard percentage point evaluation as outlined below: A: 93-100 A-: 90-92.9 B+: 87-89.9 B: 83-86.9 B-: 80-82.9 C+: 77-79.9 C: 70-76.9 D: 60-69.9 F: Below 60	
		Quiz 2	5%		
		Quiz 3	5%		
		Quiz 4	5%		
		Quiz 5	5%		
		Quiz 6	5%		
	Lab report and participation	10%			
Lecture Exam	Exam 1	15%	Percentage Category:		
	Exam 2	15%	Lecture Exams	60%	
	Exam 3	15%	Laboratory Quizzes	30%	
	Exam 4	15%	Lab Report and Participation	10%	
	Total	100%			