

**BROOKLYN COLLEGE**  
**of The City University of New York**  
**Syllabus**

**Biology 1002**

**Departmental Goals and Objectives for Biology 1002:**

*Core Biological Knowledge*

- Demonstrate a working understanding of the Central Dogma
- Describe general details of DNA replication
- Describe the general details of transcription
- Describe the general details of translation
- Compare and contrast eukaryotic and prokaryotic cell architecture
- Describe the biomolecular structure and function of
  - a. proteins
  - b. carbohydrates
  - c. nucleic acids
  - d. lipids
- Describe how the molecules noted above contribute to
  - a. cell structure
  - b. cell metabolism
  - c. enzymes and enzyme activity
- Describe DNA packaging in eukaryotic cells
- Describe the structural organization of eukaryotic chromosomes
- Describe the eukaryotic cell cycle and its regulation
- Describe the molecular regulatory mechanisms in eukaryotic DNA replication
- Describe the molecular regulatory mechanisms in eukaryotic gene expression
- Summarize the processes of cellular and multicellular reproduction
- Compare and contrast the acquisition of new genetic information via mutations

*Practical Competencies*

- Independently investigate biological phenomena using
  - a. scientific method
  - b. proven research tools and methods
- Develop familiarity with laboratory and research procedures by
  - a. formulating hypotheses
  - b. read scientific literature
  - c. design and carry out experiments
  - d. prepare results in tabular and graphical form
- Communicate scientific results in class

*Professional Attitudes and Ethical Responsibilities of Biological Research*

- Adhere to the highest professional standards of the scientific community
- Evaluate important technological advances and discoveries with respect to
  - a. impact on the environment
  - b. impact on society

**Course Requirements and Policies**

**Textbook:** *Brooker et al. Biology, Fifth Edition.* McGraw Hill, Publishers

**Connect:** Online homework Assignments, McGraw-Hill Publishers Directions on Blackboard.

**-Recommended but not required:** *Essential Cell Biology* by Alberts et al. at least 5<sup>th</sup> Edition. Garland Science, Publishers.

To register for my course on Connect the course code is:

**Laboratory:** All information regarding the laboratory part of this course will be given by your lab instructor. There is no lab manual. You will download everything from Blackboard. If you have not accessed Blackboard yet, go to the following website to learn what to do: <http://ait.brooklyn.cuny.edu/blackboard/bb-student-faq.pdf>>

**Homework:** Connect homework comes in 2 parts: Learn Smart and Questions. You must complete and submit both parts for each assignment for credit. There is no partial credit, which means any assignment that is not totally completed by the due date and time gets a 0. It would also be wise to complete the assignment and submit it 2 days before the due date since sometimes there are computer issues. Since you are usually given a week, you have ample time to do the homework and submit. Students who wait until the last minute and are unable to submit the homework get a 0. Finally, please note that 12 PM means noon, not midnight.

**Grading:** Lecture and lab are 50% each of your final grade. Point distribution for lecture is as follows:

Each exam:                      10%                      Exam Dates:

Connect Homework:            10%

### **Lecture evaluation**

Four 1-hour exams will be given. The exams will assess your ability to retain and recall the material covered in lecture as well as your ability to integrate and extrapolate the material covered by solving higher order thinking questions.

***There are no make-up exams. If you miss one exam it will be entered as a 0 and you will have to take a cumulative final which will constitute 20% of your grade. Failure to take 2 exams (or 2 lab quizzes) constitutes an F for the course.***

### **Attendance and Policies**

- It is expected that students will attend every lecture.
- Tardiness is not a socially acceptable practice. You should be in your seat and set up before the instructor begins.
- If you miss a lecture you are responsible for the material covered.
- You are responsible for all announcements made in lecture. If you miss a class or come late, be sure you obtain missed information from a classmate.
- All initial inquiries regarding your grade for the course should be directed to the laboratory instructor.

### ***Academic Integrity***

-The faculty and administration of Brooklyn College support an environment free from cheating and plagiarism. Each student is responsible for being aware of what constitutes cheating and plagiarism and for avoiding both. The complete text of the CUNY Academic Integrity Policy and the Brooklyn College procedure for policy implementation can be found at [www.brooklyn.cuny.edu/bc/policie](http://www.brooklyn.cuny.edu/bc/policie). If a faculty member suspects a violation of academic integrity and, upon investigation, confirms that violation, or if the student admits the violation, the faculty member MUST report the violation.

### ***Disability Accommodations***

-In order to receive disability related academic accommodations students must first be registered with the Center for Student Disability Services. Students who have a documented disability or suspect they may have a disability are invited to set up an appointment with the Director of the Center for Student Disability Services, Ms. Valerie Stewart Lovell at (718) 951-5538. If you have already registered with the Center for Student Disability Services please provide your professor with the course accommodation form and discuss your specific accommodation with him/her.

### **PLEASE NOTE:**

***There are no negotiations for grades.*** Your grade is the sum of the components listed above. There will be **no curving or scaling of grades**. While the Course Coordinator reserves the right to adjust the numerical range for what constitutes a plus (+) or minus (-), as a rule the following is the grade distribution:

97.45-100 = A+  
92.45-97.44 = A  
89.45-92.44 = A-  
87.45-89.44 = B+  
82.45-87.44 = B  
79.45-82.44 = B-  
77.45-79.44 = C+  
72.45-77.44 = C  
64.45-72.44 = C-  
<64.45 = F

***There are no extra credit, make-up or “pity” points. It is expected that you give 100% effort in all your endeavors including this course. Therefore, there are no extra points for “working hard”.***

### **How to succeed in Biology:**

-Attend all lectures and labs.  
- In addition to lecture and lab, plan to spend a minimum of 6-10 hours of

studying each week.

-Read the text **BEFORE** class.

-Review your class notes as soon as possible after lecture and immediately before lecture.

-Study group, study group, study group!!!

**-Know the vocabulary!** The study of biology is like learning a new language. You need to know the vocabulary in order to understand the concepts.

-Get a good night's sleep before the exam.

## **Biology 1002 Course lecture outline with goals and objectives**

***This is a general and flexible outline that will be adjusted as needed during the semester.***

### **Week 1-2 (lecture 1 - 3) Water, the solvent of life**

The biology and biological-chemistry of water

Chapter 2 (The chemical basis of life; atoms molecules and water)

\*You must review chapter 2 as it is assumed you have had at least 1 semester of chemistry. You are responsible for the material but it will not be formally covered in lecture.

Chapter 3 (Organic Molecules)

#### **Goal:**

1. To understand that water is the solvent of life and how molecules interact with water.
2. To understand that diverse life forms use similar carbon containing molecules to build cellular structures and carry out biological processes.

#### **Objectives:**

1. Define, compare and contrast different types of chemical bonds and describe the biological consequences of each.
2. Describe the chemical structure and bonding of water and how it relates to water as a solvent of life.
3. Delineate, compare, and contrast the chemical nature of hydrophobicity and hydrophilicity and describe the biological consequences of each.
4. Define the chemical properties of acids and bases and describe how they affect the function and structure of biological macromolecules.
5. Delineate the chemical composition, structure, properties and functions of carbohydrates
6. Delineate the chemical composition, structure, properties and functions of proteins
7. Delineate the chemical composition, structure, properties and functions of nucleic acids
8. Delineate the chemical composition, structure, properties and functions of lipids

### **Weeks 2 -5 (lectures 4 - 9) Membranes, enzymes and biological energy flow Membrane structure and function**

**Chapter 5:** Membrane structure Synthesis and Transport  
Enzyme function and bioenergetics of enzyme reactions

**Chapter 6:** (An Introduction to Enzymes, Energy and Metabolism)  
Intracellular interconversion of energy and ATP synthesis.

**Chapter 7** (Cellular Respiration, Fermentation and Secondary Metabolism)

The conversion of electromagnetic energy into chemical potential energy

**Chapter 8** (Photosynthesis)

**Goal:** To understand the bioenergetics of biological reactions and to understand the processes by which energy is stored, converted and utilized in biological systems.

**Objectives:**

1. Describe and enumerate the differences between exergonic and endergonic reactions.
2. Delineate the role of enzymes in biological reactions.
3. Enumerate factors that affect enzyme activity and describe how enzyme activity is controlled and coordinated.
4. Describe the bioenergetics of ATP synthesis and delineate the reactions involved.
5. Describe the bioenergetics of photosynthesis and delineate the reactions involved.
6. Describe how plants coordinate photosynthesis with environmental fluctuations.

**Weeks 5 - 7 (lectures 10 - 13) Cell structure and function**

Cell structure and compartmentalization of function

Chapter 4: (General Feature of Cells and Protein Trafficking)

**Goal:** To understand, on a molecular level, the anatomical and functional relationships of subcellular constituents. To understand how cells interact and communicate with the extracellular environment.

**Objectives:**

1. To delineate the structure and function of biological membranes and their components.
2. To delineate the structure of the endomembrane system and describe the functions and interactions of the various components.
3. To enumerate the various processes by which substances get into and out of cells and to describe how these processes are controlled and interact.
4. To enumerate the various components of the cytoskeleton and describe how these components are used to control cell shape, movement of cells (and subcellular structures), and describe how the cytoskeleton is involved in intercellular connections and communication.

**Weeks 7 - 9 (lectures 13 - 19) Gene expression**

Chapter 11 (Nucleic Acid Structure, DNA Replication and Chromosome Structure)

Chapter 15 pages 304-313 (Mutation and DNA Repair)

Chapter 21 pages 452-454 (Transposable Elements)

Chapter 12 (Gene Expression at the Molecular Level)

Chapter 13 (Non-coding RNAs)

Chapter 14 (Regulation of Gene Expression)

**Goal:** To understand the processes by which genetic information is converted into protein and how these processes are controlled.

**Objectives:**

1. Delineate the cellular constituents needed for transcription, describe the process of transcription and describe the mechanisms that regulate transcription.

2. Describe the types and consequences of DNA mutations and transpositions.

3. Describe the nature of the genetic code and explain how it is used in protein synthesis.

4. Describe the process of translation and enumerate and describe the mechanism that control translation.

5. Define differential gene expression and describe how it leads to differentiation.

**Weeks 10-12 (lectures 20 - 24) Molecular basis of selected cellular events**

Chapter 9 (Cell Communication): Signaling pathways.

Chapter 15 pages 314-321 (Cancer)

Apoptosis pages 196-200, 197-99, 295, 215

**Goal:** To understand the molecular basis, and the regulation of, the process by which cells grow, divide and die.

**Objectives:**

1. Delineate the parts of the cell cycle and describe how the cell cycle is controlled.

2. Describe DNA repair mechanisms in the cell and the relationship between DNA mutation and cancer.

3. Discuss the cell cycle, its checkpoints and cell cycle control mechanisms

4. Describe the apoptotic pathways and its importance to tissue integrity

**Week 13 - 14 (lectures 25 - 28) Biotechnology and bioinformatics**

Chapter 20 (Genetic Technology)

Chapter 21 (Genome, Proteomes and Bioinformatics)

**Goal:** To understand the principles, techniques and impact of biotechnology and bioinformatics on current biological thinking and practice.

**Objectives:**

1. To appreciate the potential and impact of biotechnology on society.
2. Describe techniques used in biotechnology explain how the techniques are used in the practice of biotechnology.
3. Delineate the evolutionary framework of bioinformatics
4. Describe the techniques of bioinformatics and explain, by the use of examples, how these techniques are used.