

This syllabus is provided as a general informational guide. Some of the information may vary depending on the specific course section and instructor. Different sections of the same course may require different textbooks. Verify the section specific textbook information in the CUNY's Academic Course Schedule Web Page. Modifications of the grading system presented here will be communicated by the instructors of the sections when they meet the class.

BOROUGH OF MANHATTAN COMMUNITY COLLEGE
The City University of New York
Department of Science

CELL BIOLOGY – BIO 260

Class Hours: 6

Lecture Hours per Week: 3

Laboratory Hours per Week: 3

Semester: Spring 2020

Instructor Information (Phone#, Office#, email)

Credits: 4

BIO260 is not yet an elective science course

Course Description: The goal of this course is to provide students with a basic understanding of the molecular mechanisms underlying cellular processes – the structure, function and specializations of the cell. This will be accomplished through a combination of lecture and laboratory sessions providing both theory and application. The course will include study of subcellular structure and function such as protein structure and activity, nucleotide structure, gene expression, regulation of gene expression, cellular organelles, cell respiration and photosynthesis, cellular trafficking, cell-to-cell communication, cell division and cancer.

Basic Skills: ENG 095 or ESL 095, ACR 095, MAT 056

Prerequisites: BIO 220 and CHE 201

Corequisites: CHE 230 (optional)

Course Student Learning Outcomes. Students will be able to	Measurements
1. Understand the cell as the basic unit of life by being able to describe the structure and function of the cellular organelles. Students will be able to explain the molecular mechanisms of cellular function	Quizzes, examinations, case studies and homework assignments.
2. Demonstrate understanding of DNA as the genetic material of cell and will be able to explain DNA replication, cell division, protein synthesis, mutation and inheritance.	Quizzes, examinations, case studies and homework assignments
3. Explain cell signaling pathways and intracellular trafficking.	Quizzes, examinations, case studies and homework assignments
4. Understand the process of cell division and relate it	

This syllabus is provided as a general informational guide. Some of the information may vary depending on the specific course section and instructor. Different sections of the same course may require different textbooks. Verify the section specific textbook information in the CUNY's Academic Course Schedule Web Page. Modifications of the grading system presented here will be communicated by the instructors of the sections when they meet the class.

to cancer.	
5. Explain biological energy related processes like Cell respiration, photosynthesis and the role of enzymes in these processes.	
4. Perform common laboratory techniques used in the study of cells, such as (but not limited to) microscopy, immunohistochemistry, cell culture and cell transfection.	Laboratory research project. Students will search literature to identify a question they can investigate and conduct research. A written report on their work will be submitted and students will also present their work to their class

Below are the college's general education learning outcomes, the outcomes that are checked in the left-hand column indicate goals that will be covered and assessed in this course. (Check at least one.)

	General Education Learning Outcomes	Measurements
X	Scientific Reasoning- Students will be able to apply the concepts and methods of the natural sciences.	Lab experiments, written reports, reading peer reviewed papers
X	Communication Skills- Students will be able to write, read, listen and speak critically and effectively.	Working on projects, submitting written reports and presenting their work orally
X	Quantitative Reasoning- Students will be able to use quantitative skills and the concepts and methods of mathematics to solve problems.	Homework assignments and case studies

Required Text & Readings

Essential Cell Biology (4rd Ed)–
 An Introduction to the Molecular Biology of the Cell.
 By Alberts, B; Bray, D; Hopkins, K; Johnson, S; Lewis, J;
 Raff, M; Roberts, K; Walter, P. Garland Science, 2014
 ISBN 978-0-8153-4454-4(hard cover)
 978-0-8153-4455-1 (soft cover)
 978-0-8153-4525-1 (Loose leaf)

Required Laboratory Manual Handouts

Other Resources:

- iBioseminars from Howard Hughes Medical Institute
- CourseSource.org
- CBI website

This syllabus is provided as a general informational guide. Some of the information may vary depending on the specific course section and instructor. Different sections of the same course may require different textbooks. Verify the section specific textbook information in the CUNY's Academic Course Schedule Web Page. Modifications of the grading system presented here will be communicated by the instructors of the sections when they meet the class.

Use of Technology (If Applicable)-Blackboard

Evaluation and Requirements of Students

Lecture Examinations: 30%

In class assignments 30%

Laboratory project 30%

Other Assignments: 20%^{[[[]]]}_{SEP}

Final Examination (Included in the 60% Lecture Examination)

TO PASS THIS CLASS, A STUDENT MUST HAVE AN OVERALL PASSING GRADE OF 60% OR MORE.

BMCC is committed to the health and well-being of all students. It is common for everyone to seek assistance at some point in their life, and there are free and confidential services on campus that can help.

Single Stop www.bmcc.cuny.edu/singlestop, room S230, 212-220-8195. If you are having problems with food or housing insecurity, finances, health insurance or anything else that might get in the way of your studies at BMCC, come by the Single Stop Office for advice and assistance. Assistance is also available through the Office of Student Affairs, S350, 212-220-8130.

Counseling Center www.bmcc.cuny.edu/counseling, room S343, 212-220-8140. Counselors assist students in addressing psychological and adjustment issues (i.e., depression, anxiety, and relationships) and can help with stress, time management and more. Counselors are available for walk-in visits.

Office of Compliance and Diversity www.bmcc.cuny.edu/aac, room S701, 212-220-1236. BMCC is committed to promoting a diverse and inclusive learning environment free of unlawful discrimination/harassment, including sexual harassment, where all students are treated fairly. For information about BMCC's policies and resources, or to request additional assistance in this area, please visit or call the office, or email olevy@bmcc.cuny.edu, or twade@bmcc.cuny.edu. If you need immediate assistance, please contact BMCC Public safety at 212-220-8080.

Office of Accessibility www.bmcc.cuny.edu/accessibility, room N360 (accessible entrance: 77 Harrison Street), 212-220-8180. This office collaborates with students who have documented disabilities, to coordinate support services, reasonable accommodations, and programs that enable equal access to education and college life. To request an accommodation due to a documented disability, please visit or call the office.

Class Participation

Participation in the academic activity of each course is a significant component of the learning process and plays a major role in determining overall student academic achievement. Academic activities may include, but are not limited to, attending class, submitting assignments, engaging

This syllabus is provided as a general informational guide. Some of the information may vary depending on the specific course section and instructor. Different sections of the same course may require different textbooks. Verify the section specific textbook information in the CUNY's Academic Course Schedule Web Page. Modifications of the grading system presented here will be communicated by the instructors of the sections when they meet the class.

in in-class or online activities, taking exams, and/or participating in group work. Each instructor has the right to establish their own class participation policy, and it is each student's responsibility to be familiar with and follow the participation policies for each course.

At BMCC, class participation is very important and it is suggested that students limit their absences to one more hour than the number of hours a class meets in one week. For example, you may be enrolled in a three-hour class. In that class, to be successful you might want to restrict your absences for **4 hours (not 4 days) per semester**. Lab participation is equally important as you might not get an opportunity to repeat a lab and this could also adversely affect your grades. In Cell biology, Lab is a very important component and each lab counts to 7 points towards your grade.

BMCC Policy on Plagiarism and Academic Integrity Statement

Plagiarism is the presentation of someone else's ideas, words or artistic, scientific, or technical work as one's own creation. Using the idea or work of another is permissible only when the original author is identified. Paraphrasing and summarizing, as well as direct quotations, require citations to the original source. Plagiarism may be intentional or unintentional. Lack of dishonest intent does not necessarily absolve a student of responsibility for plagiarism. Students who are unsure how and when to provide documentation are advised to consult with their instructors. The library has guides designed to help students to appropriately identify a cited work. The full policy can be found on BMCC's Web site, www.bmcc.cuny.edu. For further information on integrity and behavior, please consult the college bulletin (also available online).

LECTURE SYLLABUS

WEEK	TOPICS	CHAPTER
1	Lecture: Introduction to the cell The Eukaryote cell – structure and organelles nucleus, mitochondria, chloroplasts, internal membranes, cytosol, cytoskeleton Unity and diversity of cells Chemical components of cells	1, 2
2	Lecture: Proteins - Folding and function Shape and structure of proteins How proteins work – enzymes, motor proteins	4
3	Lecture: DNA structure and function Structure and function of DNA DNA replication DNA repair	5,6
4.	Lecture: Gene expression DNA to RNA RNA to protein RNA and the origins of life	7,8
5.	Lecture: Regulation of gene expression and evolution of genomes Structure of eukaryotic chromosomes Gene regulation Genetic variation	8,9
6	Lecture: Plasma membrane – structure and function	11,12

This syllabus is provided as a general informational guide. Some of the information may vary depending on the specific course section and instructor. Different sections of the same course may require different textbooks. Verify the section specific textbook information in the CUNY's Academic Course Schedule Web Page. Modifications of the grading system presented here will be communicated by the instructors of the sections when they meet the class.

	<p>The lipid bilayer Membrane proteins Carrier proteins and their functions Ion channels and the membrane Ion channels and signaling in nerve cells Intercellular junctions</p>	
7, 8,	<p>Lecture: Enzymes and Biosynthesis Catalysis and the use of energy by cells Lecture Cell Respiration and Photosynthesis Break down of sugars and fats Electron transport and proton pumping Regulation of metabolism Photosynthesis</p>	3, 13,14
9	<p>Lecture: Intracellular trafficking Membrane-bound organelles Protein sorting Vesicular transport Secretory pathways Endocytic pathways</p>	15
10	<p>Lecture: Cytoskeleton Intermediate filaments Microtubules Actin filaments</p>	17
11	<p>Lecture: Signal transduction pathways and cell communication General principles of cell signaling G-protein-linked receptors Enzyme-linked receptors</p>	16
12	<p>Lecture: Cell cycle, mitosis, meiosis Overview of cell cycle Mitosis and cytokinesis Meiosis</p>	18
13	<p>Lecture: Control of cell cycle and apoptosis Cell-cycle control system Control of cell numbers in multicellular organisms.</p>	19
14	<p>Lecture: Cancer biology Tissue maintenance and renewal Tissue disruption by cancer</p>	20
15	Cumulative Final Exam	

This syllabus is provided as a general informational guide. Some of the information may vary depending on the specific course section and instructor. Different sections of the same course may require different textbooks. Verify the section specific textbook information in the CUNY's Academic Course Schedule Web Page. Modifications of the grading system presented here will be communicated by the instructors of the sections when they meet the class.

LABORATORY SYLLABUS

WEEK	Lab topic
1	Microscopy I Review of the light microscope Viewing prepared slides Making wet mounts Oil immersion
2	Making solutions, determining pH, and dilutions Basic tissue culture techniques, serial dilutions Determining cell density by spectrophotometry and by hemocytometer direct counting
3.	Microscopy II – light and electron microscopy Students view cells and tissues using light microscope Students examine cell structure and organelles using electron micrographs (provided by Dr. E. Robbins) Use of electron microscope
4	Immunofluorescence Staining of cells (prokaryote and eukaryote) using fluorescent dyes
4	Immunofluorescence Staining of cells (prokaryote and eukaryote) using fluorescent labeled antibodies
5	Protein concentration and standard curve Measuring protein concentrations using the BCA assay Generation of a protein standard curve Determining concentration of unknown proteins
6	Protein expression and purification Extraction of protein from a source
7	Protein expression purification SDS-PAGE gel electrophoresis and chromatography
8	Protein expression and purification Western blotting
9.	Cell Viability assay Mitochondrial viability (MTT) assay
10	Cell culture Setting up cell cultures Establishing growth curve assays
11	Enzyme assay
12	Restriction digestion and mapping Pgl0 plasmid restriction mapping
13	rRNA isolation from bacteria Qiagen kit
14	Final project
15	Final exam