

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
City University of New York

Department of Science

Title of Course: Biotechnology

BTE 201

Semester: Fall 2020

Credits: 5

Schedule: Mondays 5:00-7:45 PM Online

Wednesdays 4:00- 7:45 PM Online

Class hours: 4

Laboratory Hours Per Week: 3

Instructor Information

Name: Nanette van Loon

Office: Online via Zoom

Email: nvanloon@bmcc.cuny.edu

Course Description

This course introduces the student to theory and laboratory practices in molecular biotechnology with emphasis on the impact of biotechnology on daily life, health, ethics and society. The course is designed to impart the skills needed for entry-level jobs or to continue on a career path in biotechnology, by exposing students to a variety of careers, laboratory techniques and social issues in the biotechnology industry.

Basic Skills ENG 095, ESL 095, ACR 095, MAT 051/056 or department approval

Co-requisite: BIO 240 **Pre-requisite:** CHE 201

Student Learning Outcomes and Assessments

After completing this course, students will be able to

Assessments

1. Perform calculations to prepare buffers and stock solutions	Practical examination, laboratory, homework
2. Learn to use the major biological databases. Use bioinformatics software to analyze nucleic acids and proteins.	Homework/ research paper/ written reports
3. Understand the steps of identifying, designing and manufacturing a biotechnology product	Written examination, homework
4. Analyze health, ethical and social issues related to biotechnology	Written examination/ research paper
5. Practice Standard Operating Procedures	Practical examination/ homework/ Labster videos
6. Understand and uphold government regulations of biotechnology practices	Written examination/ research paper

General Education Goals

Assessments

Communication Skills- Students will read, write, listen and speak critically and effectively	Discussion, written examination
Quantitative Reasoning- Students will use quantitative skills and the concepts and methods of mathematics to solve problems	Practical examination, written examination
Scientific Reasoning- Students will understand and apply the concepts and methods of natural sciences	Practical examination, written examination
Information and Technology Literacy- Students will collect, evaluate and interpret information and effectively use information technologies	Research paper, practical examination, written examination
Values- Students will make informed choices based on an understanding of personal values, human diversity,	In-class and online discussion, written examination

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multicultural awareness and social responsibility	
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Required Text & Readings

Textbook: *Introduction to Biotechnology* 4th Edition 2019, Pearson. Authors: William J. Thieman and Michael A. Palladino

Composition Notebook with Sewn Pages to use as Laboratory Notebook

Use of Technology (if applicable): BlackBoard, NCBI Databases, BLAST, Labster simulations, Video lessons on TED Ed, etc.

Evaluation & Requirements of Students

Lecture and laboratory examinations and quizzes, written and oral reports, and practical examinations can be used to evaluate student performance.

LECTURE SYLLABUS

WEEK	TOPICS	CHAPTER
1	The Biotechnology Century and Its Workforce Definition, History of Biotech, Special Projects	1
2	An Introduction to Genes and Genomes (part 1) Biotechnology in Society, Funding, Publishing, Careers	2
3	An Introduction to Genes and Genomes (part 2) Federal Agencies, NIH Health Guidelines, Regulation of GMOs	2
4	Recombinant DNA Technology and Genomics (part 1) Databases, Annotation, Comparative Genomics, Proteomics	3
5	Recombinant DNA Technology and Genomics (part 2) Commercial Products and Processes	3
6	Proteins as Products Genetic Counseling, Gene Therapy	4
7	Microbial Biotechnology Pharmaceuticals, Regenerative Medicine	5
8	Plant Biotechnology, Regulations Pollutants, Bacterial Remediation, Phytoremediation	6, 12
9	Animal Biotechnology, Ethics Agriculture Biotechnology, Plant Tissue Culture, Aquaculture	7, 13
10	DNA Fingerprinting and Forensic Analysis Testing Methods, Paternity, Profiling	8
11	Bioremediation Macroevolution, Transitional Organisms, Microevolution, Natural Selection	9
12	Aquatic Biotechnology Mutation, Gene Migration, Stem Cells, Transcription Factors, RNAi	10
13	Medical Biotechnology (part 1) Divergence from Other Primates, Hominin Lineage	11
14	Medical Biotechnology (part 2) Regulation, Economic Impact, Industry Forecasts, Bioethics, Risk	11
15	Cumulative Final Exam	1-13

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LABORATORY SYLLABUS

WEEK	TOPICS (Topic order and content may be modified)
1	The Laboratory Notebook Laboratory Safety, Safely Using a Bunsen Burner
2	Agarose Gel Electrophoresis Making and Pouring an Agarose Gel Working with Micropipettors
3	Loading an Agarose Gel, Standard Operating Procedures (SOPs) Using an analytical balance Concentration calculations
4	Calibrating and Using a pH meter Use of the Microscope Genetic Databases
5	Making LB Medium and Pouring Plates Using an Autoclave An introduction to the bacterial cell
6	Streaking Plates The Spectrophotometer Bacterial Growth Curves
7	The Gram Stain Bioprocessing Part I: Fermentation Comparing Genetic Sequences Using BLAST
8	Cytogenetics: Array Comparative Genome Hybridization (microarray, Labster)
9	Transformation of <i>Arabidopsis</i> Using <i>Agrobacterium</i> (Floral Dip method) Bioprocessing Part II: Separation/ Recovery
10	Selecting <i>Arabidopsis</i> Transformants High Pressure Liquid Chromatography (HPLC)
11	The Polymerase Chain Reaction (PCR)
12	Enzyme-linked Immuno-Adsorbent Assay ELISA Pasteurization and Sterilization
13	RNA Extraction and Analysis Bioprocessing Part III: Purification
14	Ion Exchange Chromatography Wastewater Treatment
15	

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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 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.

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.

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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).