

*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 2017**  
**Credits: 5**  
**Schedule: Mondays 5:00-7:45 PM,**  
**Wednesdays 4:00- 7:45 PM**

**Class hours: 4**  
**Laboratory Hours Per Week: 3**  
**Instructor Information**  
**Name: Nanette van Loon**  
**Office: N698K**  
**Email: nvanloon@hotmail.com**

**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**

**Student Learning Outcomes and Assessments**

**After completing this course, students will be able to**

**Assessments**

|   |                                     |
|---|-------------------------------------|
| 1. Prepare buffers and stock solutions  | Practical examination, laboratory   |
| 2. Use and develop assays for testing product presence, concentration, and activity         | Homework assignment                 |
| 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     |
| 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                                | In-class and online 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                          | Research paper, practical examination, written examination |

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|  |   |
|--|---|
| effectively use information technologies   |   |
| Values- Students will make informed choices based on an understanding of personal values, human diversity, multicultural awareness and social responsibility | In-class and online discussion, written examination |

### Required Text & Readings

**Textbook:** *Molecular Biotechnology* 2016, Jones & Bartlett Learning. Author: Carolyn A. Dehlinger

**Laboratory Manual:** *Biotechnology Laboratory Manual* 2<sup>nd</sup> Ed 2017, Paradigm Publishing Inc. Author: Ellyn Daugherty

**Composition Notebook with Sewn Pages to use as Laboratory Notebook**

**Use of Technology (if applicable):** BlackBoard

### Evaluation & Requirements of Students

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

### LECTURE SYLLABUS

| WEEK | TOPICS  | CHAPTER |
|------|---|---------|
| 1    | <b>The Emergence of Molecular Biotechnology</b><br>Definition, History of Biotech, Special Projects   | 1       |
| 2    | <b>The Molecular Biotechnology Industry Today</b><br>Biotechnology in Society, Funding, Publishing, Careers   | 2       |
| 3    | <b>Governmental Regulation of Molecular Biotechnology</b><br>Federal Agencies, NIH Health Guidelines, Regulation of GMOs                              | 3       |
| 4    | <b>Bioinformatics: Genomics, Proteomics, Phenomics</b><br>Databases, Annotation, Comparative Genomics, Proteomics                                     | 4       |
| 5    | <b>Industrial Biotechnology</b><br>Commercial Products and Processes  | 5       |
| 6    | <b>Life Sciences and Health Care (part 1)</b><br>Genetic Counseling, Gene Therapy   | 6       |
| 7    | <b>Life Sciences and Health Care (part 2)</b><br>Pharmaceuticals, Regenerative Medicine   | 6       |
| 8    | <b>Environmental Biotechnology and Conservation</b><br>Pollutants, Bacterial Remediation, Phytoremediation  | 7       |
| 9    | <b>Agriculture and Food Production</b><br>Agriculture Biotechnology, Plant Tissue Culture, Aquaculture  | 8       |
| 10   | <b>Forensics and Biodefense</b><br>Testing Methods, Paternity, Profiling  | 9       |
| 11   | <b>Evo Devo: The Biotechnology of Evolution and Development (part 1)</b><br>Macroevolution, Transitional Organisms, Microevolution, Natural Selection | 10      |
| 12   | <b>Evo Devo: The Biotechnology of Evolution and Development (part 2)</b><br>Mutation, Gene Migration, Stem Cells, Transcription Factors, RNAi         | 10      |
| 13   | <b>The Biotechnology of Anthropology</b><br>Divergence from Other Primates, Hominin Lineage   | 11      |
| 14   | <b>The Future of Biotechnology</b><br>Regulation, Economic Impact, Industry Forecasts, Bioethics, Risk  | 12      |
| 15   | <b>Cumulative Final Exam</b>  | 1-12    |

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### LABORATORY SYLLABUS

| WEEK | TOPICS   | LAB MANUAL CHAPTER                                      |
|------|--|---|
| 1    | Setting Up A Legal Scientific Notebook, Laboratory Safety, Cheese Production   | 1a, 1b, 1c  |
| 2    | Analyzing the Components of an Egg, Using a Compound light Microscope, Making Microscopic Measurements                                 | 2a (I, II, III), 2b (I, III)<br>start 2a at home        |
| 3    | Use of Micropipetters, electronic balance, analytical balance, introduction to spectrophotometer, different concentration measurements | 3b<br>3b, 3c, 3e, 3f                                    |
| 4    | Making solutions of differing molarity, making dilutions<br>setup of sweet potato growing (monitored and photographed each week)       | 3g, 3h<br>10a (only in second edition<br>of lab manual) |
| 5    | Making Solutions for DNA Isolation, Spooling DNA   | lab exercises 4a, 4b, 4e                                |
| 6    | Yeast DNA Extraction, Bacterial Culture Media Prep, Streaking Plates, Agarose Gel Preparation  | 4c, 4e, 4g, 4i  |
| 7    | Bacterial DNA Extraction, Gel Electrophoresis, Gram Stain  | 4h, 4j, 4k  |
| 8    | Enzyme Effect on Apple Juice Production, Assay Development for Protease, Bradford Assay<br>Seed Germination (home project: 1 week)     | 5b, 5c, 5d,<br>10d (1 week home project)                |
| 9    | Polyacrylamide Gel Electrophoresis (PAGE) of Proteins  | 5e, 5f  |
| 10   | Preparing Plant Extracts in Water and Methanol, testing plants for antimicrobial properties  | 12a<br>Monday and Wed                                   |
| 11   | Starch and Sugar Assay, Amylase Activity, Western Blot, ELISA  | 6b, 6c, 6e<br>6e needs advance prep                     |
| 12   | Spectrophotometer, pH meter  | 7b, 7c, 7f, 7g  |
| 13   | Spectrophotometer II, Colorless Proteins, DNA Samples  | 7h, 7i  |
| 14   | Harvesting Amylase from Bacterial Cultures, Protein Dialysis, Ion Exchange Chromatography  | 9a, 9b, 9c  |
| 15   | Identify Amylase Using SDS-PAGE  | 9e, 11e   |

#### **College Attendance Policy**

At BMCC, the maximum number of absences is limited to one more hour than the number of hours a class meets in one week. Using this course as an example, you are enrolled in a six-hour-a week class. You would be allowed 7 hours of absence for the whole semester (not 7 days). In the case of excessive absences, the instructor has the option to lower the grade or assign an F or WU grade.

#### **Academic Adjustments for Students with Disabilities**

Students with disabilities who require reasonable accommodations or academic adjustments for this course must contact the Office of Services for Students with Disabilities. BMCC is committed to providing equal access to all programs and curricula to all students.

#### **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](http://www.bmcc.cuny.edu). For further information on integrity and behavior, please consult the college bulletin (also available online).

**TO PASS THIS CLASS, A STUDENT MUST HAVE A PASSING GRADE OF 60% OR MORE IN LECTURE AND A PASSING GRADE OF 60% OR MORE IN THE LABORATORY PORTION.**