

BIOL 202 (002-104): Foundations in Biology: Cellular & Molecular LAB

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OFFICE HOURS: By Appointment Only (Email)	COURSE WEBSITE: https://canvas.njit.edu/
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	LOCATION: CKB: 328

DESCRIPTION:

Cell chemical components, structure and methods of study; thermodynamics and metabolism; membrane biology, energy utilization and transfer; protein and nucleic acid structure and function; transcription, translation, and genetic regulation. This laboratory complements the lecture course 120:201 Foundations of Biology: Cell and Molecular Biology. Both courses 120:201 and 120:202 must be taken concurrently, although they are separate courses with different grades.

PREREQUISITES:

21:120:200 Concepts in Biology, and 21:160:115 General Chemistry.

TEXT AND COURSE WEB PAGE:

A Laboratory Manual is provided to all registered students as a PDF, downloadable from Canvas. Students are required to wear a laboratory coat and will keep notebooks electronically to minimize contact between individuals. We will use [Canvas](#) in this course. To use Canvas students must have an NJIT UCID. If you are matriculated at NJIT you should already have a UCID. If you are a Rutgers student you can request one here <https://newacct.njit.edu/~accts/cgi-bin/new> or call the NJIT helpdesk for assistance (973-596-2900).

LAB PREPARATION:

For each lab, a lab handout and a lab worksheet will be posted on the course website. Please read through both of these files thoroughly before coming to lab, and be sure to bring a print-out of BOTH files to each lab. Note that for some labs, you will need to bring handouts and worksheets for two labs. Please **obtain a 3-ring binder** to keep your lab handouts and worksheets organized into a lab notebook. Good laboratory notebook keeping is not only part of the skills that you must acquire in this experimental laboratory course. It is also the way to document your activities, results, and thoughts related to your experiments; and, when you eventually work in the laboratory, the clinic, or the field, you must keep track of your data as official records, which are important during corroboration or repetition of your results or for patent purposes.

BIOL 202 (002-104): Foundations in Biology: Cellular & Molecular LAB

LEARNING OUTCOMES:

Through selected readings, lectures, discussions and occasional group activities, students are encouraged to learn on their own about the main processes taking place in the cell from a molecular perspective. After successfully completing the course, students will have

- 1.) the ability to describe the general structure of biomolecules as well as their role in cellular metabolism and the flow of genetic information;
- 2.) information and concepts on bioenergetics and the use of energy by cells;
- 3.) the information on the principles of membrane transport mechanisms and their role in important physiological processes at the organismal level;
- 4.) acquired concepts and general principles on gene expression and its regulation;
- 5.) knowledge on the concepts and general principles on eukaryotic signal transduction;
- 6.) the skills to read, interpret and apply general information in the fields of cell and molecular biology;
- 7.) evaluate contemporary hypotheses on the functional mechanisms of the cell;
- 8.) reinterpret and/or postulate alternative hypotheses or ideas to explain or describe the phenomena studied in the course;
- 9.) the opportunity to explore the topics covered in the course in higher level classes which require Foundations 201/202 as pre-requisites in the biology major and minor.

COURSE GRADE:

Your grade for lab will be determined based on Notebooks, Exams, Canvas assignments, and lab reports.

- Notebooks:** Notebooks are to be typed in Word or an open-source word clone. Photographs of hand-written pages will not be accepted for any assignments. If any portion of any assignment is plagiarized, you will be given a zero for that assignment.
- Assignments:** Each week, complete the worksheet that accompanies your lab handout. Some of it will be completed during the lab; often, there are analyses or interpretive questions that you'll need to complete on your own time. Please note that while you usually work in groups during the lab and will share data and discuss results with your group, your worksheet and other parts of the assignment must be your own work.
- Lab Report:** Formatting: Times New Roman, Palatino or a readable serif-font type, single spaced, no longer than 6 pages. Failure to turn in either section of the draft will result in a loss of 25 points. Each person will write their own lab report. Sharing any information other than the raw data is plagiarism and will result in a zero for the assignment. Failure to turn in a draft on time will result in a loss of up to 25 points. Each day that the Draft and Final Report are late will result in a 10% penalty.

% BREAKDOWN		
Attendance/Pre-lab	10%	
Notebook	40%	
Two Lab Reports	20%	TOTAL 100%
Two Exams	30%	

GRADING SCALE			
A	≥90%	C	70-74.99%
B+	84.5-89.99%	D	65-69.99%
B	79.99-84.99%	F	≤64.99%
C+	75-79.99%		

BIOL 202 (002-104): Foundations in Biology: Cellular & Molecular LAB

- ☒ **Notes about grading:** Please be advised that you must hand-write your pre-lab and your protocols. Printed and pasted sheets will result in subtracting up to 25 points from that lab grade. If plagiarism is detected and confirmed in a portion of your laboratory notebook, report or assignments, up to 25 points will be subtracted. If the entire report has been plagiarized, you will be given a zero for that laboratory. Please see lab manual for report structure and specific points per item.
- ☒ **Attendance, Make-Up, and Lateness Policy:** Attendance at every lab is **required** and necessary to earn a good grade in lab. If you must miss lab for a valid reason you must bring documentation to the Office of the Dean of Student Affairs and arrangements can be made to allow you to take the quiz for that week, but you will still be unable to carry out the lab activities. You **MUST** let your TA know if you want to make-up a missed lab.
- ☒ **Academic Dishonesty:** The course has a zero tolerance policy for academic dishonesty, including plagiarism and cheating. Instances of dishonesty will be punished by a zero on the assignment and consultation with the office of the Dean of Students to determine if further action is required. If you have any questions about what constitutes plagiarism or cheating, please ask your TA or refer to the academic integrity code [NJIT Academic Integrity Code](#).

LAB SAFETY: General safety precautions:

- **No eating or drinking in the lab. No Water Bottles!**
- Wear closed-toed shoes to lab.
- Follow the directions for lab procedures and ask your TA if you are unsure about how to operate any equipment. Keep an organized workspace and label all materials. Your lab handouts and your TA will alert you to safety concerns specific to a particular lab.

NOTE: You should notify your TA immediately of any injuries, spills, or broken equipment.

COVID-19 SAFETY REQUIREMENTS: All persons physically present in any department facility or classroom shall comply fully with the NJIT COVID-19 safety policy at all times. Masks must be worn before entry to all department facilities, and social distancing guidelines must be followed. Individuals who are unable to wear a face mask due to medical reasons should contact the Office of Disability Services or Human Resources. Students who enter a classroom without wearing a mask properly, or remove their mask, will be cautioned by the instructor. The same is true for students who disregard the seating order or guidelines for social distancing. Students with obvious symptoms of respiratory illness should not come to campus and will be asked to leave. Students who do not comply with a request by a department instructor to adjust their behavior, in accordance with the University Policy, will be subject to disciplinary actions. Instructors have the right to expel the student or terminate the class session at which any student fails to comply with the University Policy.

BIOL 202 (002-104): Foundations in Biology: Cellular & Molecular LAB

LAB SCHEDULE:

WEEK OF	ACTIVITY
No Labs for the first two weeks of January February 1	Orientation Session Lab 2. Titration of the diprotic amino acid glycine Group A
February 8	Orientation Session Lab 2. Titration of the diprotic amino acid glycine Group B
February 15	Lab 3. Biological buffers Group A
February 22	Lab 3. Biological buffers Group B
March 1	Laboratory First Exam (Experiments 2 & 3) Lab Notebook Review I Group A
March 8	Laboratory First Exam (Experiments 2 & 3) Lab Notebook Review I Group B
March 15	No Labs-Spring Break
March 22	Lab 4. Protein Determination using the Bradford method. Group A
March 29	No Labs - Good Friday
April 5	Lab 4. Protein Determination using the Bradford method. Group A
April 12	Lab 9. Molecular Biology of Sickle-Cell Anemia Group A
April 19	Lab 9. Molecular Biology of Sickle-Cell Anemia Group B
April 26 <u>Finals</u>	Laboratory Second Exam (Experiments 4 & 9) Online Lab Notebook Review 2 Group A & B

BIOL 202 (002-104): Foundations in Biology: Cellular & Molecular LAB

LAB REPORT FORMAT: Formatting: Times New Roman, Palatino or a readable serif-font type, single spaced, no longer than 6 pages.

- Report structure and specific points per item: These are to be followed in order and any portion left out will result in the points for that section being deducted.
 - Title page and appropriate title 5
 - Introduction and Background 10
 - Methods 5
 - Data and Results 30
 - Discussion 35
 - Conclusion 5
 - References 5
 - Grammar and Formatting 5
(including Bibliography; see style on p. 8)
- If there are any quizzes during the semester, they will consist of short-answer type questions on the following aspects of the laboratories:
- Review
 - Background
 - Experimental errors
 - Results from the previous laboratories

Guidelines for the preparation of laboratory reports

This section on how to write a lab report for Foundations of Biology CMB has been adapted from the General Biology Laboratory at Rutgers Newark. Please notice that the style to write a report is markedly different from notebook keeping.

- **Title Page (5%)**
Include the title of the experiment, your name, your instructor's name, your group number, and the date the lab report was submitted. The title says what you did. It should be brief (aim for ten words or less) and describe the main point of the experiment or investigation. Begin your title using a keyword instead of an article like 'The' or 'A'.
- **Introduction (10%)**
The introduction should be about one page and should provide some background knowledge of the lab and explains its objective or purpose. You must state the purpose of the experiment and the hypothesis being tested. The introduction should not be copied from the lab manual; you must write your own.
- **Methods (5%)**
Describe the approach you used to complete your investigation. Do not list the specific steps you followed or the specific materials you used, as this can be found in the lab manual. Instead, summarize what you did in one or two paragraphs.

BIOL 202 (002-104): Foundations in Biology: Cellular & Molecular LAB

- **Data/Results (30%)**

Data are the numbers, graphs, pictures, illustrations, etc., that you recorded as you conducted the experiment. Data are just the facts without any interpretation of what they mean. They are presented in the form of tables or graphs. These must be labeled with a number and a descriptive title (e.g. Figure 1. Titration curve of glycine with NaOH). Always label both axes on all graphs and all columns of a table, including any units of measurement if applicable (e.g. Reaction time (sec); A_{600} ; Reaction rate ($\mu\text{mol}/\text{min}$)).

- **Discussion (35%)**

Discuss your results, including any calculations that help to analyze the data. As you go through the data, discuss/interpret it. Say whether or not the data are consistent with what you would expect if your hypothesis is true. In the text of your report, refer to tables and graphs by number (As you can see in Table 1...). This is also where you would discuss any mistakes you might have made while conducting the investigation. You may also describe ways the study might have been improved.

- **Conclusions (5%)**

The conclusion is typically a single paragraph that sums up what happened in the experiment. If applicable, whether your hypothesis was accepted or rejected, and what this means.

- **References (5%)**

Any outside sources that were used in the writing of the report need to be cited within the text of the report and listed in the reference section. Instructions for properly citing and referencing outside sources can be found in the preceding pages. Remember, you are not to reference the lab manual.

- **Grammar/format (5%)**

Write several drafts of your lab report and edit them for correct grammar before submission, including spelling, complete and structured sentences, punctuation, etc.