

**BIOL 390 Molecular Techniques, Fall 2021**  
**Tuesday 1:00- 4:50 pm (ISC 304)**

**Instructor and Virtual Office Hours:**

Dr. Ming-Mei Chang, ISC 352 (office)/ 346 (lab), Phone: 245-5416, E-mail: [chang@geneseo.edu](mailto:chang@geneseo.edu)  
M (12:00- 1:30 pm)

<https://geneseo.zoom.us/j/98291704864?pwd=TmlNMDRRTUHIORk9SRGxKai93SEJ1dz09>  
Meeting ID: 982 9170 4864 Passcode: 342590

F (12:30- 2 pm)

<https://geneseo.zoom.us/j/96471276528?pwd=Uk5LNXPTRW4wZ242Om5iU2ptemU2UT09>  
Meeting ID: 964 7127 6528 Passcode: 147256

OR e-mail for appointments

**Learning Outcomes:**

Techniques for studying molecular biology have advanced rapidly and continued to evolve. From previous courses, you might have learned about various molecular techniques without hands-on experience. This lab course will provide you opportunities to practice some common molecular techniques used in research. Each lab consists of a pre-laboratory lecture on background information followed by a lab exercise. **Three major** learning outcomes are to:

***Practice and understand basic molecular techniques commonly used in research***

You will learn techniques in DNA isolations and quantifications, degenerate PCR cloning, microbial culture, restriction digest, agarose gel electrophoresis, DNA extraction from agarose gel, synthesis of Dig-labeled DNA probe, Southern blot analysis, web-based sequence analysis, RNA isolation and quantification, reverse transcription, and realtime PCR. Your understanding of the background information and efforts that you put into the course are as important as the experimental results.

***Gain skill in collecting, analyzing, interpreting, and communicating experimental data with others***

You are required to keep a well-written weekly lab note that includes all the information and data of each lab. You will use the content to write up three lab reports following the format of 1<sup>o</sup> scientific research papers.

***Be able to work as a team***

Most if not all biological studies, particularly in the field of molecular biology, are done by teamwork. In this lab, you will work as a group of two. The joint effort between you and your partner is required for successful completion of each lab. You need to be a good team player.

*After completing this course, you should understand each topic covered and can carry out the associated technique independently. Most important, you can apply what you learn to perform similar experiments in molecular biology research.*

**Course Materials and Supplies:**

*A 3-ring binder, notebook or loose-leaf notepaper, Sharpie fine point permanent marker, lab coat and a pair of UV-resistant glasses/goggles are required. Lab protocols will be posted in Canvas. Please PRINT, READ, and PLACE it in the 3- ring binder and BRING to the lab. Failing to do so will affect your lab grade because searching and following protocols on your electronic devices while carrying out the steps often result in experimental errors. It is also a good practice to make a physical mark as you complete each step in a complicated multi-step procedure. Due to the COVID pandemic, we need to protect ourselves and minimize the risk of spreading illness by*

wearing *masks* in addition to keeping a proper social distance.

### Grading:

Organized Lab Note	15%
Group Homework	25%
Three Group Lab Reports	30%
Three Quizzes	25%
Lab Performance	5%

A (100- 93%) A<sup>-</sup>(92.9- 90%) B<sup>+</sup> (89.9- 87%) B (86.9- 83%) B<sup>-</sup> (82.9- 80%)  
C<sup>+</sup> (79.9- 77%) C (76.9- 73%) C<sup>-</sup> (72.9- 70%) D (69.9- 60%)

### Organized Lab Note (LN)

You should organize your experimental results in a format of **electronic copy** containing detailed information about each lab, which is useful for lab write-up later. You need to print it out and submit its **hard** copy at the beginning of the following week's lab. Keeping up your lab note writing should be an on-going activity throughout the semester. You need to i) write clearly and show obvious care taken to make it easy to understand; ii) have each lab note in A PROPER ORDER specified below:

*DATE, TITLE, NAME and LAB PARTNER on the top of the FIRST page*

*PURPOSE/OBJECTIVES*

*RESULTS:*

- Record the RAW DATA during the lab and organize them into **TABLES** with TITLES on the TOP and/or FOOTNOTES at the BOTTOM, or **FIGURES** labeled properly with LEGENDS containing TITLES followed by a brief DESCRIPTION at the BOTTOM or on the SIDE.
- Briefly describe what you did/ the no. of the protocol step when record an *observation*.
- Show all your *calculations*.

### *INTERPRETATION and DISCUSSION*

You should interpret/discuss your results but NOT repeat them. For examples, what do the results mean? Do you get the expected results? Why? Why NOT? This part is as important as the RESULTS because it shows your understanding of the lab exercise.

### Group Homework (GH)

These are questions at the end of lab protocol to help you to understand the lab contents.

### Group Laboratory Reports (LR)

Lab reports should be written according to the format of PRIMARY scientific research papers, which includes TITLE, ABSTRACT, INTRODUCTION\*, RESULTS, DISCUSSION, and REFERENCES.

### Three Quizzes

Each lab unit includes several exercises extending over multiple weeks with each exercise building on the foundation established in the previous week. After each lab unit, there will be a quiz covering its content.

*All assignments are due at the BEGINNING of the following week's lab. No late LN or GH is accepted. There will be a 10% penalty per day for each late LR.*

### Accommodations:

SUNY Geneseo is dedicated to providing an equitable and inclusive educational experience for all students. The Office of Accessibility (Erwin Hall 22, (585) 245-5112, [access@geneseo.edu](mailto:access@geneseo.edu)) will coordinate reasonable accommodations for persons with physical, emotional, or cognitive disabilities to ensure equal access to academic programs, activities, and services at Geneseo. Students with letters of accommodation should submit a letter to each faculty member and discuss their needs at the beginning of each semester. Please contact the Office of Accessibility Services for questions related to access and accommodations.

### Academic Policies of the Biology Department-ACADEMIC DISHONESTY:

You should be aware of and obey the College policies concerning academic dishonesty. Any alleged cheating and/or plagiarism may be dealt with by the School as a disciplinary problem in accord with College policies as stated in the Bulletin. Be especially aware that **academic dishonesty** includes *putting your name on a group project that you did not contribute to and turning in lab reports where material is copied from reports from previous semesters' classes. Beware- if your name is on a project, you need to be sure that the work is authentic and properly referenced; you are responsible if your partner(s) has plagiarized material.* To learn more about plagiarism and how to avoid it, self-enroll in the Canvas Plagiarism Tutorial ([geneseo.edu/library/library-workshops](http://geneseo.edu/library/library-workshops)).

**Tentative Schedule:** \*These are schedules for you and your partner to work outside lab periods.

DATE	LAB EXERCISE	DUE
8/31	<i>Introduction</i>	GH: Calculation
	<i>I. Cloning Genomic nbs Sequences by Degenerate PCR</i>	
9/7	<b>1-1</b> Genomic DNA Isolation and Degenerate PCR	
9/14	<b>1-2</b> Agarose Gel Electrophoresis and PCR product Purification	LN:1-1; GH:1-1
9/21	<b>1-3</b> DNA Ligation and Bacterial Transformation ( <i>return next day, 5 min</i> )*	LN:1-2 GH:1-2
9/28	<b>1-4</b> Data Analysis and Discussion on Lab Write-up 1, <i>Quiz 1: Unit 1</i>	GH:1-3
	<i>2. Southern blot and Web based Sequence Analysis of cloned DNA</i>	
<b>10/5</b>	<b>2-1</b> Plasmid DNA Isolation and Quantification (start <i>the night before, 10 min</i> )* and Restriction Digest	<b>LR 1</b>
<b>10/12</b>	<i>Fall Break</i>	
10/19	<b>2-2</b> Agarose Gel Electrophoresis; Southern Transfer ( <i>return next day, 10 min</i> )*	LN: 2-1 GH: 2-1
10/26	<b>2-3</b> Isolation and Quantification of <i>nbs</i> -containing Insert from Agarose Gel Synthesis of Dig-labeled Probe by PCR	LN: 2-2 GH: 2-2
11/2	<b>2-4</b> Southern Hybridization & Detection ( <i>start the night before, 1 hr</i> )*	GH: 2-3
11/9	<b>2-5</b> Web-based Sequence Analysis and Discussion on Lab Write-up 2 <i>Quiz 2: Unit 2</i>	LN: 2-4
	<i>3. Studying Gene Expressions by Realtime RT-PCR</i>	
<b>11/16</b>	<b>3-1</b> Total RNA Isolation and Purification;	<b>LR 2</b>
11/23	<b>3-2</b> Reverse Transcription and Realtime PCR (RT-qPCR)	LN: 3-1; GH 3-1
11/30	<b>3-3</b> Data Analysis and Discussion on Lab Write-up 3.	GH 3-2
<b>12/7</b>	<i>Quiz 3: Unit 3</i>	<b>LR 3</b>

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