

Biology 4350 – Laboratory Research Experience in Molecular Bacterial Genetics

SYLLABUS

The objective of the course is to introduce you to a real-life discovery based laboratory research experience centered identification of genes controlling bacterial behavior. To meet this objective, you will attempt to identify genes that control the developmental lifecycle of the soil bacteria, *Myxococcus xanthus*. You will design experiments to characterize any genes that you have identified and characterize their role in regulating *M. xanthus* behavior. To complete these objectives, you will employ a series of common bacteriology and molecular biology techniques including bacterial transformation, phenotypic assays, PCR amplification, cloning, plasmid isolation, immunoblot, and web-based bioinformatic analyses. You will understand the theory behind these techniques from assigned readings and short lectures. You will generate hypotheses, design experiments with appropriate controls, interpret findings, and troubleshoot experiments by interaction with instructors. Your success at meeting the objectives will be evaluated by homework, laboratory notebook grading, observation of your participation in lab, and in a term-end final presentation.

This course is most suitable for students with an interest in performing biomedical research in industry as a graduate student.

Content Learning Objectives

Students will be able to:

1. use a genetic screen to identify mutants that control *Myxococcus xanthus* development
2. assay the behavior of *M. xanthus* by inducing development or sporulation
3. recover mutated genes resulting using chromosomal digest and DNA sequencing
4. predict the function of identified genes with basic bioinformatic characterization
5. assay protein accumulation patterns by immunoblot

Skill Learning Objectives

Students will be able to:

1. **design experiments** using appropriate methods and identify controls necessary to interpret the results of the experiment.
2. **interpret and evaluate data** from your experiments and from relevant results of your classmates.
3. **keep a precise record of your experimental protocols and findings** as part of a laboratory notebook
4. **present your findings in a formal presentation** at the end of the semester.

Prerequisites: Completing Bio 2200 and Bio3070 with grades of C- or above is the prerequisite for this course.

Instructor: Dr. Penelope Higgs

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Course website: www.blackboard.wayne.edu

Office hours: 2 independent hours per week or arranged by e-mail at least 24 hours in advance.

Lab/lecture sessions: Course to meet two times per week for combined lecture and lab.

Textbook: There is no required text book for this course- we will use review material and methods provided by course instructors.

Assignments: You will have assignments due in Blackboard before certain labs. The maximum number of assignment points that will count towards your final grade is 50 points. You will be awarded all 50 points if you attain at least 85% of the total points, so if you miss one or two assignments for personal or technical reasons, you can still earn a perfect homework score. This system is **instead of** make-up opportunities for individual missed points.

Lab notebooks: There will be regular submission of lab notebooks for a total of 100 points. Each lab section will be scored for title, date, statement of purpose, procedure, results, and discussion/interpretation of the results according to a standard protocol. You will be awarded all 150 points if you attain at least 90% of the total points.

Participation: There will be participation points available each lab session. Most points will be earned based on your attention to the laboratory safety, organization of samples, and preparation for experimental methods during lab sessions. The maximum number of participation points that will count towards your final grade is 50 points. You will be awarded all 50 points if you attain at least 90% of the total points.

Presentations: Each student will present two 25 min presentation on their research problem and results: presentation 1 will occurs after the results of mutant sequencing and presentation 2 will occur on the final day of classes. You will be scored for organization, clarity, figures, and answering of questions.

Term-end report: Each student will prepare a term-end report in the format of a short research paper describing the research performed in this course. Each paper will consist of Introduction, Materials and Methods, Results (including Figures and Figure legends), Discussion, and References. The report will be scored out of 50 points. Students will turn in initial drafts for each section of the report throughout the semester and instructors will provide feedback.

Grades:	Assignments	50 points
	Participation	50 points
	Lab Notebook	100 points
	Presentations	50 points
	Final Report	50 points
	Total	300 points

Grading Policy: Grades will be calculated on the following scale: (out of 300 points)

	A	92.5-100%	A-	90.0-92.4%	
B+	87.5-89.9%	B	82.5-87.4%	B-	80.0-82.4%
C+	77.5-79.9%	C	72.5-77.9%	C-	70.0-72.4%
D+	67.5-69.9%	D	62.5-67.4%	D-	60.0-62.4%
	F	0-59.9%			

Grades will not be curved. Everyone can earn an A, if they perform well.

General Policies:

1) Anyone caught cheating or plagiarizing will automatically receive a failing grade for the exam, assignment or class, and may be expelled from the University.

Because our goal is to help you learn how to not plagiarize, information on how to avoid plagiarism will be provided in class, on blackboard, and by your TAs. If you do not understand how to avoid plagiarism, please ask for help from your TA or from Professor Higgs in office hours. **For discussions of cheating see the “Student Code of Conduct,” which is available at <http://doso.wayne.edu/assets/codeofconduct.pdf>**

2) Email guidelines: Email conversations are an important aspect of professional life. To encourage students to develop a sense of professionalism and personal responsibility for success, the following criteria will be enforced:

I will not reply to emails when the answer can be found in the syllabus or on Blackboard.

You must email me from your WSU account for privacy reasons and for professionalism.

I will respond to most emails within two business days. After two business days, you may email me again.

I expect emails to be in a professional style, including an informative subject heading, a proper greeting, e.g. “Dear Dr. Higgs,” a proper salutation, e.g. “Sincerely, Chris Smith,” correct punctuation including capitalization and no texting abbreviations. Emails that do not follow these rules may take longer get a reply, may be returned for correction, or ignored.

If I cannot figure out what you want, I cannot help you. Following these guidelines will improve your success at WSU and beyond.

I do not answer questions by email if they require a discussion. This includes questions on content and study or writing strategies. Please come talk to me during office hours to discuss

these issues. This may require planning ahead so that you can get your answers before assignment deadlines or exams.

3) If you cannot come to office hours because you have conflicts with classes, you need to set up an appointment by email.

4) Any special considerations (disabilities, religious holiday conflicts, etc.) must be brought to the attention of the instructor by Sept. 15, 2016 or as soon as possible as the situation arises. If you have a documented disability that requires accommodations, you will need to register with Student Disability Services for coordination of your academic accommodations. The Student Disability Services (SDS) office is located at 1600 David Adamany Undergraduate Library in the Student Academic Success Services department. SDS telephone number is 313-577-1851 or 313-577-3365 (TTY: telecommunication device for the deaf; phone for hearing impaired students only). Once you have your accommodations in place, I will be glad to meet with you privately during my office hours to discuss your special needs. Please let me know of all disabilities that I can help you with as soon as possible. I cannot always accommodate on short notice, and I cannot accommodate issues I do not know about. Please refer to the SDS website for further information about students with disabilities and the services we provide for faculty and students: <http://studentdisability.wayne.edu/>

5) Problems and challenges regarding the grading of any assignment or exam must be sent to Professor Higgs as an email explaining the issue. For challenges to multiple-choice questions, you need to convince me that your answer was the best answer, given reasonable assumptions that you explain. For short answers, you need to convince me there was an error in the grading, not simply that you want more points. I will regrade exams from my scanned copy of the graded exam.

6) **Professional behavior** is expected in lab, which includes respecting your classmates by

- arriving prepared and on time
- actively contributing to your group experiments
- not interrupting or talking when others are talking
- turning off cell phones and
- following safety and organization policies in the lab

All students must show respect in language and attitude towards the instructor and their fellow students. Disrespectful students will be asked to leave the lecture, and will lose their opportunity to turn in any missed assignments.

7) **Withdrawals: Sept. 13, 2017** is the last day you can drop the class and get your tuition refunded. The last day you can drop this course and have no record on your transcript is **Sept. 27, 2017**. The last day to drop this course is **Nov. 12, 2017**. If you withdraw between Sept. 27 and Nov. 12, 2017, inclusive, you will receive a WN on your transcript if you never completed any assignment; a WP if you have greater than 60% of the points possible at the time of your request on exams, homework, quizzes and class participation; or a WF if you have less than 60% of the

points possible at the time of your request. No exams or other grades are dropped in this calculation. You initiate a withdrawal request in Pipeline by selecting "Withdraw from a Class" on the Student Self Service Menu.

9) For any and all issues not covered in this syllabus, refer to the "Student Code of Conduct", which can be found at <http://doso.wayne.edu/assets/codeofconduct.pdf>

10) University closures will be publicized through:

- the University Newsline (313) 577-5345*,
- WSU Homepage (www.wayne.edu)*,
- WSU Pipeline (www.pipeline.wayne.edu)*,
- WDET-FM (Public Radio 101.9) and
- by other local radio and television stations.

* Note: The information on closures and class cancellations is likely to be found at these locations before it is broadcast by local radio and television stations.

If an hourly exam is scheduled on a day when the University or lecture room is officially closed during class, the exam will be held during the next scheduled meeting of lecture that occurs when the University and room are open, or as indicated on the class blackboard site.

If the University is officially closed, any assignment that was due that day is then due at the next scheduled meeting of lecture that occurs when the University is open, or as indicated on the blackboard site.

11) Updates and corrections to this syllabus will be described in class and/or posted on the course Blackboard site. You are responsible for checking Blackboard announcements and your University email account. I recommend checking at least once each business day of a semester in which you are enrolled.

I will post a detailed schedule for lectures, reading, assignments, homework, and reports on Blackboard after the first day of class.