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| Sec. 01 (14456) | Mon 2:30 – 5:20 | Mr. Mike Gehner | office 110, phone 2055 e-mail: gehner@xavier.edu |
| Sec. 02 (14458) | Tue 1:00 – 3:50 | Mr. Mike Gehner | office 110, phone 2055 e-mail: gehner@xavier.edu |
| Sec. 03 (14460) | Wed 12:30 – 3:20 | Mr. Neema Nourian | office 105C phone 2055 e-mail: nourian@xavier.edu |
| Sec. 04 (14461) | Thu 1:00 – 3:50 | Mr. Mike Gehner | office 110, phone 2055 e-mail: gehner@xavier.edu |
| Sec. 05 (14462) | Fri 12:30 – 3:20 | Mr. Neema Nourian | office 105C phone 3808 e-mail: nourian@xavier.edu |

Purpose: To provide students with experience in modern genetic technology, with emphasis on methods of manipulating and studying nucleic acids.

Texts:

Unraveling DNA: Molecular Biology for the Laboratory, by Winfrey, Rott & Wortman (required)

Lab Handouts (packet given out in class) This has hints and changes for each lab.

A Short Guide to Writing About Biology by Pechenik or some other science writing guide (recommended)

Materials to be provided by the student:

lab notebook or ring binder (format is your choice, we will not need duplicate pages)

Assignments

1. Lab Notebook:

Each student will keep records of experiments in a lab notebook. This is very important for keeping track of your work on a daily basis. It is also critical for writing the final paper; ideally we should be able to confiscate your lab manual near the end of the semester, leaving you only your notebook from which to write your paper!

On the first page put a table of contents. Number the pages so that you can indicate page numbers for each exercise. Then for each Exercise include:

****Plan or Flow Chart:**

Consulting the lab manual Unraveling DNA and the Lab Handouts, write a flow chart or set of recipes. Include enough detail or rationale so that you can use your notebook instead of the lab manual while in class. These will be checked at the beginning of lab.

***Results:**

Before lab, prepare labeled tables in which to record data. In lab, or ahead of time if appropriate, do calculations. During or after class, tape in photographs (with hand-written labels).

***Notes:**

Your instructor will be giving you valuable information in class relative to the quizzes and also the Discussion section of your paper. Plus, you are highly likely to have helpful conversations with your classmates. Ask questions! Write things down!

To prepare for class, do the Plan/Flow Chart ahead of time. In lab, you will work from your notebook, not the lab manual. Note that most days involve overlapping exercises; we will finish one and start the next, so you will need to refer back to one or more previous exercises.

2. Paper:

Just as in the “real world” of molecular biology, it takes a long time to accumulate a publishable body of work. We will make a final report of our work in the standard format of a research article, including Title, Abstract, Introduction, Materials and Methods, Results, Discussion, and References. (Refer back to your materials on scientific writing from

Gen Bio I and II, Vert. Phys, and any other science course that has included writing.) The paper encompasses the work involved in the successful cloning of the *lux* operon, as described in the lab manual. For each exercise in the lab manual, consider how you will include the methods, results and discussion into your paper. As much as possible, you should work on these during lab while waiting for experiments to incubate, wash, stain, etc.. You may discuss the paper sections with other students, but each student must turn in a paper that was composed independently. We highly recommend that you start a document now that will become your final paper. Each week you should paste in the current figure(s) and paragraphs. Then at the end of the semester, all you have to do is smooth out the transitions and write an abstract and your paper is done. Really! Ask someone reasonable who took this class last year. We will incorporate peer reviews throughout the semester but instructors will not grade your paper until the final paper is submitted.

Occasionally you will have data in the form of digital photographs. You are responsible for saving them to obtain a picture file (usually jpg), then posting the files electronically in the portal so you and your partner can retrieve them for your paper.

4. Safety Quiz, Exams and Final Exam: The dates of quizzes and the final exam are indicated on the schedule.

The “safety quiz” is to make sure that you know how to handle certain pieces of equipment and certain reagents; you must ace this one in order to participate in class, but there are no points attached to it.

We will have 3 comprehensive exams in this class. Each exam will consist of questions dealing with concepts, calculations and the ability to analyze and discuss results from actual lab work. In addition to the written questions every exam will have a practical portion where you can demonstrate your mastered lab skills.

In the event of an approved conflict with an exam date, exams may be taken early. Approved conflicts are generally limited to interviews for graduate school or employment, funerals, or absence due to a University-sanctioned event. (Leaving early for a holiday is not an approved conflict.)

5. Attendance/Lab Accountability: This is where you get credit for attendance, turning in assignments on time, and a good work ethic. Failure to complete lab responsibilities will cause you to lose some points, for example, forgetting to come in the day after lab for a brief chore as indicated on the schedule.

Grading Final grades will be determined as follows:

The grading scale is:

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| Exam #1 | 15% | A = 93 - 100%, A- = 90 – 92%, |
| Exam #2 | 20% | B+ = 87 – 89%, B = 83 – 87%, B- = 80 - 82%, |
| Exam #3 | 35% | C+ = 77 – 79%, C = 73 – 76%, C- = 70 - 72%, |
| Lab Accountability | 5% | D+ = 67 – 69%, D = 60 - 66%, |
| <u>Final paper</u> | <u>25%</u> | F = 59% and below. |
| | 100% | |

Academic Honesty: According to the University Catalog, “The pursuit of truth demands high standards of personal honesty. Academic and professional life requires a trust based on integrity of the written and spoken word. Accordingly, violations of certain standards of ethical behavior will not be tolerated at Xavier University. These include theft, cheating, plagiarism, unauthorized assistance in assignments and tests, unauthorized copying of computer software, the falsification of results and material submitted in reports or admission documents and the falsification of any academic record including letters of recommendation.” (my underline)

This policy applies to Genetics Lab in the following ways:

1. Papers: You are encouraged to discuss your results and interpretation with your partner and others in the class. However, written work turned in for grading must be your own work, in your own words. It is acceptable for your figure labels and legends to be very similar, but not identical, to your partner’s work.
2. Exams: You are encouraged to study and discuss post/pre lab questions together. But, you may not discuss the contents of each exam to anyone – including those in other lab sections.
3. Emergencies: If you have some serious problem or emergency that causes you to be unprepared for a test or assignment, then consult with your instructor to find some options other than cheating.

Data Access and Sharing: For technical reasons, we will have an all-section option for posting shared data and for emailing. (This will be a separate Blackboard course or a portal group – details to follow.) You must use your Xavier email address and check it several times a week at least. “I didn’t get the e-mail” will not be an acceptable excuse in this course. Sometimes e-mail may be used to share files; we recommend that you NOT use Hotmail because we found that it doesn’t allow large files.

Schedule

Please note that, occasionally, one member of each pair will be expected to perform a relatively small task outside of class time.

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| <p>Lab 1 1/14 – 1/18 Purpose: Learn to use micropipettors and practice the calculations necessary for making reagent solutions.</p> <p><u>TO DO TODAY:</u> EX 1 PT I Introduction To The Laboratory EX 2 B Preparation Of Media & Reagents Intro to RefWorks for beginners (experts are excused)</p> | <p>Lab 2 1/22 – 1/25 Monday students must attend a different lab section! Purpose: To prepare <i>Vibrio fischeri</i> DNA. This will be the source of inserts for the library.</p> <p><u>TO DO TODAY:</u> SAFETY QUIZ EX 5 <i>V. fischeri</i> Chromosomal DNA Prep steps 1 – 17</p> |
| <p>Lab 3 1/28 – 2/1 Purpose: to finish preparing <i>V. f.</i> DNA.</p> <p><u>CONT.:</u> Finish EX 5 Chromosomal DNA Prep SIGN-UP FOR LAB EXAM DAY AND TIME!</p> | <p>Lab 4 2/4 – 2/8 Purpose: To prepare plasmid DNA (pGEM) from <i>E. coli</i>, to use as a vector for the library.</p> <p><u>TO DO TODAY:</u> EX 6 Large Scale Plasmid Prep</p> |
| <p>LAB 5 EXAM #1 2/11, 2/12, 2/13</p> <p>**MONDAY, TUESDAY & WEDNESDAY** 12 – 1:30 AND 1:30 – 3:00</p> | |
| <p>Lab 6 2/18 – 2/22 Purpose: To assess the amount of and purity of our pGEM plasmid and <i>V. f.</i> chromosomal DNA.</p> <p>To cut the pGEM and chromosomal DNAs with a restriction enzyme in preparation for making the library.</p> <p><u>TO DO TODAY:</u> EX 7 Spectrophotometric Analysis of DNA EX 8 Restriction Digestion procedure A</p> | <p>Lab 7 2/25 – 2/29 Purpose: To check the success of the restriction digests by gel electrophoresis.</p> <p><u>TO DO TODAY:</u> CONT: EX 8 procedures B and C</p> <p><u>NEW:</u> PAPER: INTRODUCTION PEER REVIEW</p> |
| <p>Lab 8 3/3 – 3/7 Purpose: To make the library by ligating vectors (pGEM plasmids) and inserts (<i>V.f.</i> DNA fragments) together.</p> <p><u>TO DO TODAY:</u> NEW: EX 10 Ligation of Restriction Fragments Into Plasmid Part I steps 1 – 8</p> <p>NEW: PEER REVIEW GEL FIGURE (RESULTS SECTION)</p> | <p>Lab 9 3/10 – 3/14 Purpose: To assess the success of the ligations by gel electrophoresis.</p> <p>To transform competent cells with the ligations; this is the last step in making the library.</p> <p><u>TO DO TODAY:</u> CONT: EX 10 Ligation Part II EX 11 Part II A NEW: EX 12 Transformation of <i>E. coli</i> with Recombinant Plasmids Part I (next day do Part II)</p> |
| <p>Lab 10 EXAM #2 3/25 – 3/28</p> | <p>Lab 11 3/31 – 4/4</p> |

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| <p>Monday students must attend a different lab section!</p> <p>Purpose: To screen the library for glowing colonies, streak out positives on fresh plates, and do an overall colony count to determine the efficiency of the library production.</p> <p><u>TO DO TODAY:</u> NEW: Screening the Library</p> | <p>Purpose: To prepare the recombinant plasmids from the lux⁺ and lux⁻ colonies. To digest the plasmids with restriction enzymes in order to check the sizes of the inserts.</p> <p><u>TO DO TODAY:</u> (day before lab: Inoculate Positives for Minipreps) NEW: EX 14 Small Scale Plasmid Preps Part A, B</p> |
| <p>Lab 12 4/7 – 4/11 Purpose: To check the digests of the recombinant plasmids by gel electrophoresis.</p> <p>To digest the lux⁺ recombinant plasmid with various restriction enzymes in order to make a restriction map.</p> <p><u>TO DO TODAY:</u> CONT: EX 14 Small Scale Plasmid Preps Part C, D NEW: EX 15 Restriction Mapping of Plasmids Part A</p> | <p>Lab 13 4/14 – 4/18 Purpose: To run the gels of the lux⁺ clone restriction digests.</p> <p>PCR DEMONSTRATION</p> <p><u>TO DO TODAY:</u> CONT: EX 15 Restriction Mapping Part B, C NEW: PEER ANALYSIS OF RESTRICTION MAP, EX. 15 GELS MUST BE POSTED BY SUNDAY APRIL 20TH</p> |
| <p>Lab 14 4/21 – 4/25 Purpose: Analyze sequences of <i>lux</i> genes</p> <p>To finalize the restriction map of the cloned lux operon</p> <p><u>TO DO TODAY:</u> CONT: Ex 15 Restriction Mapping of Plasmids (examine one another's gels to get complete maps) NEW: EX 25 Sequencing of <i>luxA</i> genes from natural isolates (information only) EX 26 Analysis of PCR Experiment or Sequencing</p> | <p>Lab 15 4/28 - 5/2 Purpose: Demonstrate that you are now a capable gene jockey!</p> <p><u>DUE TODAY:</u> FINAL PAPER</p> <p><u>TO DO TODAY:</u> FINAL EXAM</p> |