Laboratory: Expectations & Effort

Time Commitment- “Don’t be a tourist”

- Remember that the laboratory is an essential component of this class and is worth 2 of the 5 credits in LBS 145. This means that you should be prepared to spend on average 6 hours in the LBS 145 laboratory as well as time outside of the lab with your group per week – so plan accordingly.
- The above also means that if you explain to your research team that you are “busy” with social events every evening and intend to go home each weekend, realize you won’t succeed in this course. Do NOT be a TOURIST - make college a priority in your life.

The LBS 145 laboratory is a RESEARCH TEAM LAB

- Your research group will need to meet outside of class at least once a week to coordinate the projects and the papers you write as a group. It is essential that you read and prepare prior to coming to lab each week, because the experiments require a good amount of organization to complete in a timely manner.
- Please familiarize yourself with the concept behind this lab – it will help you to keep your “eyes on the prize” (so to speak) as the semester progresses.
- The lab schedule indicates the times that the 145 lab is open. You and your group will often need to “sign up” for additional lab usage times (this will be explained to you during week 1) as 3 hours a week may not be enough to complete your project.
- Attendance WILL BE TAKEN at the beginning of each lab, so it is important that you arrive ON TIME.
The semester is broken into 2 halves. The first half is called, “Cell Physiology Stream,” during which you will be assigned a four member TEAM that you will collaboratively write a paper with. The second half is called the “Molecular Biology Stream.” In this second stream you will be assigned a partner to work with, but will independently pursue your own project and write your own paper. The first 20-30 minutes of each lab period will be devoted to a lecture component in which the TAs will brief you on relevant lecture material to use in lab that week. You should anticipate the need to come into lab more than just 3 hours a week on many occasions.

**Stream 1 - Cell Physiology**

- This stream involves mastering the techniques of modern cell physiology and then using this knowledge to perform novel investigations of your own design.
- The 3 sections of this stream (carbohydrate analysis, photosynthetic analysis, and enzyme kinetics) all have a “structured” component (to teach you the technique) followed by an independent week. It is during this “independent” week that you will pursue your own research.
- Your group will be assigned a RESEARCH BENCH in the laboratory where you will conduct your experiments. This bench will be equipped with all of the materials that we predict you will need to successfully complete the investigation.
- **Your group will develop a research plan and first draft of a scientific paper in the first week of the course. As you can probably see, this will require a lot of work RIGHT UP FRONT in the first weeks of classes for your group (coming up with a question is hard) – DO NOT PROCRASTINATE!!!**

**Stream 2 – Molecular Biology**

- In this stream you will be issued unknown plasmid DNA and assigned a partner and be expected to be even more independent than in the first stream.
- After reading the required chapters and the primers in the lab manual, you will be expected to utilize a book of methods to design and implement the protocols necessary to identify your unknown molecule of DNA.
- You will then be expected to write up your results as you did in the first stream. In this section there will be MUCH less guidance and you will be expected to obtain much more information through your own reading and investigating.
Research Group Roles in Stream 1

The Research Teams in LBS 145 will usually consist of 4 individuals. You are expected to help out in all tasks and editing the whole group paper, but you will have specific responsibilities during experiments at the bench as well as specific responsibilities in the writing of each group paper.

**Primary Investigator (PI)**
The primary investigator will be responsible for organizing meeting times, overall project planning, as well as implementing troubleshooting techniques throughout the investigations. In addition to sharing the final grade for each group paper, the PI is assigned and graded for writing these sections of the paper: *DRAFT 1*: ‘Title’, ‘Abstract’, and ‘Introduction,’ *DRAFT 2*: ‘Methods’ and ‘Results,’ *FINAL PAPER*: ‘Discussion’ and ‘References’ as well as editorial duties on all sections in creating all complete papers.

**Protocol Expert (PE)**
This individual is responsible for overseeing the creation of scientific protocols for each week’s independent investigation (written experiments and steps you plan to do). In addition to sharing the grade for each full draft paper, the PE is assigned and graded for writing these sections of the paper: *DRAFT 1*: ‘Methods’ and ‘Results’ *DRAFT 2*: ‘Figures’ and ‘Tables’ *FINAL PAPER*: ‘Title’, ‘Abstract’, and ‘Introduction’ as well as editorial duties.

**Data Recorder/Documentarian (DRD)**
The Data Recorder is responsible for recording and organizing the results and taking many pictures to document the team's efforts. In addition to sharing the grade for each full draft paper, the DRD is assigned and graded for writing these sections of the paper: *DRAFT 1*: ‘Figures’ and ‘Tables’ *DRAFT 2*: ‘Discussion’ and ‘References’ *FINAL PAPER*: ‘Methods’ and ‘Results’ as well as editorial duties throughout.

**Laboratory Technician (LT)**
This individual is responsible for learning the many experimental procedures and becoming an expert on how to use the various pieces of equipment. In addition to sharing the grade for each full draft paper, the LT is assigned and graded for writing these sections of the paper: *DRAFT 1*: ‘Discussion’ and ‘References’ *DRAFT 2*: ‘Title’, ‘Abstract’, and ‘Introduction’ *FINAL PAPER*: ‘Figures’ and ‘Tables’ as well as editorial duties throughout.
Components of Investigations

In the Cell Physiology Stream I there will be three “Structured” investigations (Cookbook Labs) that your team will perform. Each of these will be followed by an “independent” investigation week during which your team will pursue its own research project(s). Each investigation will have a similar basic format that your team will follow.

Preparation

Each individual will be responsible for preparing for the week’s investigation. This will require reading of the Laboratory Guide for the particular structured investigation. For your independent weeks, your group will need to propose ideas to the instructor prior to performing the independent investigations. It is essential that you have written in your lab notebook the protocols and methods that you will be using during your independent investigations. It is very important that every team member is on the same page so that your investigation runs efficiently and effectively.

Investigation

The Research Team will then come to lab and work to complete the investigation and gather their results. If your group is well organized the experimental portion of the investigation may only take 3 hours in a given week. The remainder of your lab time should be spent on presentation of your findings (i.e. working on your paper). You are encouraged to meet outside of your normal lab hours to complete your work (it is often easier to work in the lounge or library than in the lab when writing your papers).

Publication

Publication will be a very important part of your investigation. This will involve a great deal more than simply writing “lab reports” for your experiments. You will be expected to generate a Draft 1 (first draft) of your manuscript (in its entirety) very early on in the investigation. This will then be proofread, revised, and updated to Draft 2 as your investigation progresses. You and your team will be graded not only on the finished product of your own investigation Final Paper, but also on the proofreading of your peers’ papers in ‘peer-review’ assignments.