

## Lab Guide, 2006

The Biology 445 laboratory is based on guided independent research. Each group of two students will identify a problem of interest, propose a research plan, submit their proposal for funding, and carry out the proposed experiments. The laboratory is open-ended, and will require students to spend time in lab outside of formal class meeting times, which will often be used for student presentations. Since you get to choose your own laboratory project, spending time on your project should be fun and interesting!

### Choosing a Project

Don't expect to come to class the first day knowing what your project will be. The more time you spend deciding what you would like to do, the better the rest of the semester will go. Perhaps you have done molecular research, and would like to continue your project. Maybe you have always wanted to clone DNA from a library or to purify a protein. Students are encouraged to extend projects they began in other project-based classes or research experiences, but make sure that your project is not just a rehash of something you have already done. In general, the project you propose should be a complete, self-contained unit, and must either result in new, publishable data or verify the published results of others using a number of techniques that are new to all members of the lab group.

The scope of your project should be such that it is doable in about forty hours of laboratory time (not counting long incubations or library research) if all goes well. For example, one suggested project might involve identifying an *E. coli* promoter that is regulated in response to some environmental condition, and demonstrating this regulation with a reporter gene. This is an example of a project that is not publishable, but will nonetheless require

extensive planning, and is likely to be new to most students. An outline of this type of project might involve library and database searches to identify the DNA sequences bound by the regulatory protein(s), choice of a reporter construct, design of PCR primers, isolation of template DNA, PCR, cloning, subcloning, transformation, and reporter assay. The experiments are in principle doable by a team of two talented, hard-working students over the course of about a week. In reality it will probably take longer to repeat and troubleshoot if all steps do not succeed the first time.

When you think you know what you want to do, schedule a meeting with Dr. Ernsting, on or before 28 August, 2006. You should consult with your instructor and others about the outline of your plan. Once you get approval, your lab group should write a proposal describing your plan in detail. The proposal should follow the format of a UExplore proposal (available at the Undergraduate Research web page: <http://undergraduateresearch.evansville.edu/documents.html>). This proposal must be funded by either the UExplore committee or the Biology department, so make sure it is high quality and on time. Finally, the proposal should have a grade agreement that outlines what grade you will expect for completing each stage of your project. Successful completion is worth 50% of the lab grade (50 lab points).

The proposal is due 1 September, 2006, and will be followed by an in-class presentation of your proposal. As always, material you present to the class may appear on exams, so do a good job! After your presentation, you can revise your proposal, with the final version due on 8 September, 2004. Then, you will have the rest of the semester to complete your project.

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## Completing your Project

Stick to your timeline! It is important to have results to present at each progress report. Lab groups are encouraged to finish their project as early in the semester as possible, to avoid last-minute panic and insanity. All lab work must end on 20 November (before Thanksgiving). The following weeks are to be spent writing a manuscript in the form of a journal article, giving a final oral presentation of your work, and getting ready for the final exam.

## Grading

Laboratory grades will be based on the quality of the proposal, the successful completion of the experiments, and clarity of communication. The proposal and proposal presentation are together worth 10% of the lab grade (10 lab points). Each progress report, including the final report is worth 10% of

the lab grade, and the final lab manuscript is worth another 10%. This totals 50% (50 lab points) of the lab grade for written and oral communication of your work. The other 50% (50 lab points) is awarded upon completion of your proposed research.

