Biology 3492: Laboratory experiments with eukaryotic microbes
Spring 2019

Description:
Laboratory Experiments with Eukaryotic Microbes. An introduction to diverse molecular and cell biology techniques used in model experimental organisms to explore fundamental biological questions. Experiments will be performed using selected fungi and protozoans commonly used in major research efforts. Emphasis will be placed on choosing the appropriate organism for the question posed using the most current technologies. Prerequisites: Bio 2960 and 2970 and permission of instructor. One hour of lecture and six hours of laboratory a week. This course fulfills the laboratory requirement for the Biology major and the writing intensive requirement.

Meeting Times:

Laboratory: Tues/Thurs 9 am – 12 noon; in Rebstock 126
Lecture: Wed 3 pm – 4 pm; in Rebstock 322

Instructors:
Professor Douglas Chalker (coursemaster): dchalker@wustl.edu
Office Monsanto Hall 304, 935-8838;

Lisa McLellan (teaching assistant): lmclellan@wustl.edu
Justin Miller (teaching assistant): jjmiller@wustl.edu

Office hours: Prof Chalker and the TAs are available by appointment. Please contact us to schedule a time to meet.

Assignments and Point Values:
Lab Notebooks
Midterm evaluation (Midterm) 75 pts
Final evaluation (Final) 75 pts
Lab write-up 1-cell counts (due Jan. 28) 100 pts
Predict your localization (due Feb. 11) 75 pts
What’s next assignment (due Apr. 1) 75 pts
Research report (drafts and Final due May 1) 500 pts
Oral presentation 1 100 pts
Poster (draft and final) 100 pts
Poster presentation (Friday, April 17) 100 pts
Peer reviews 75 pts
Problem sets 100 pts
Total 1500 pts
General Policies:

You are expected to attend every lab and lecture session. This is a laboratory course, so hands-on experience you will gain has a major instructional value. **Unexcused absences will result in a deduction of 50pts for each absence.** Arrive on time so that we can complete the experiments planned. You will be working as a team this semester, so those arriving late affect everyone. Consistent tardiness may result in deductions from your point total. If you know you have to miss a class, please inform both me and your partners at least one week before. A doctor's note stating that you were seen for an illness of sufficient severity to warrant an excuse is needed - a note simply stating that you visited the health center is insufficient. In the event of a death or serious illness in the family, certification will be needed to validate your absence. If you have a legitimate excuse for an absence, your final grade will be determined by calculating the mean of the other assignments. Unexcused, missed assignments will be given a grade of zero and may well necessitate withdrawal from the course.

**If you are having any difficulties, come talk to me sooner, not later, when I still have time to help.**

**Lab Reports**

You will have two lab reports due this semester. Both will require drafts. The major report on your research project (10-15 pages) will be divided into individual sections, each will require drafts that will be edited, graded and returned prior assembly of the final report. The final report is a cumulative report of all your lab work this semester related to the gene you are studying. This will take the form of a scientific paper. Each assignment will focus on what information should be incorporated into the major sections of a scientific paper: Introduction, Methods, Results, and Discussion. The due dates on the syllabus are tentative, depending upon our progress with our experiments.

**Lab Notebooks**

You will need to purchase a bound lab book for the semester. Spiral notebooks are allowed, but many are not sufficiently durable to survive the semester. We will collect and grade these around week 6 and provide comments on how to write a notebook more effectively. Keep all your lab notes and experimental procedures in this book (see detailed handout on lab notebooks). This will need to be left with Prof. Chalker at the end of the semester, but you are welcome to photocopy your notebook (I will provide copier access).

**Plagiarism**

Definition (from www.Dictionary.com): n 1: a piece of writing that has been copied from someone else and is presented as being your own work 2: the act of plagiarizing; taking someone's words or ideas as if they were your own.

Plagiarism will be taken very seriously and will be reported to the dean’s office for appropriate action. In writing assignments, be careful not to simply copy reference material, but use it to help you formulate and support your own thoughts and ideas. **Always give proper reference to material used.** Long sections of text taken verbatim should always be in quotations, but try to avoid using this style in most scientific writing. Make your own conclusions, don’t just rely on what you read.

**For those using the Credit/No Credit option, a grade of C- is required to receive credit.**
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Spring 2017 (subject to change depending upon progress)

Jan 15 Computer lab (NSLC): Picking a gene/Information Gathering/Pubmed/TGD/TGED
Jan 16 Lecture 1: Scientific approaches using model systems
Jan 17 Computer lab (NSLC): Predicting coding regions for analysis; cloning primer design

Jan 22 Working with microorganisms; aseptic technique and cell counting
Jan 23 Lecture 2: Scientific writing I (PS1: gene map due- writing a legend- peer review)
Jan 24 Microscopes: making an invisible world visible; PCR amplification of candidate genes

Jan 29 Gel electrophoresis of PCR reactions; TA cloning and E. coli transformation
Jan 30 Lecture 3: DNA manipulations (Lab report 1 due)
Jan 31 PCR screening of E. coli transformants

Feb 5 Plasmid DNA isolation, Restriction enzyme analysis, DNA sequencing (PS2: pENTR map due)
Feb 8 Lecture 4: Tetrahymena cell biology and development
Feb 9 Fusion of gene of interest to Fluorescent protein sequence

Feb 12 Plasmid DNA isolation, Verification of correct fusion by restriction enzyme analysis (PS3: pICY map due)
Feb 15 Lecture 5: DNA transformation techniques (Predict your localization due)
Feb 16 Tetrahymena electroporation

   Homework: Selection of Transformants arrange time with Prof. Chalker

Feb 19 Scoring Tetrahymena electroporation; cultures for microscopy
Feb 20 Lecture 6: Scientific writing II
Feb 21 Fluorescence microscopy of gene-YFP fusions

Feb 26 Fluorescence microscopy of gene-YFP fusion protein; Protein isolations (Writing assignment 2 due)
Feb 27 Lecture 7: Microscopy techniques
Feb 28 Fluorescence microscopy of gene-YFP fusions protein; Protein isolations

Mar 5 Western-blot analysis of GFP-fusions; RNA isolations
Mar 6 Exam on lecture material (this may be given as a take-home exam over spring break)
Mar 7 Western-blot analysis of GFP-fusions (Notebooks Collected and Graded)

SPRING BREAK (Research report:draft 1 due Mar 8)

Mar 19 rtPCR expression analysis
Mar 20 Discussion: Giving Scientific Presentations:
Mar 21 rtPCR expression analysis (continued)

Mar 26 Oral presentations of protein localization
Mar 27 Oral presentations of protein localization
Mar 28 Oral presentations of protein localization

Apr 2 Gel electrophoresis of rtPCR analysis; Begin co-localization or gene knockdown expts.
Apr 3 Experimental design; testing hypotheses (Writing assignment 3: What’s next? due)
Apr 4 Student proposed experiments

Apr 9 Student proposed experiments/ make poster
Apr 10 Discussion
Apr 11 Student proposed experiments/ make poster
Apr 16 Student proposed experiments
Apr 17 TBA (Research report 2 draft 2 due)
Apr 18 Student proposed experiments

Apr 23 Student proposed experiments/ Wrap-up
Apr 24 Discussion of Data
Apr 25 Student proposed experiments/ Wrap-up

WU Undergraduate Research Symposium (Date, time, and other details to Follow)
(Final Report and Notebooks due Friday, May 3 noon)