Biology 3492: Laboratory experiments with eukaryotic microbes
Spring 2012

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. Enrollment limited to 16.

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

Instructors:
Professor Error! Contact not defined. (coursemaster): 935-8838;
dchalker@biology2.wustl.edu
Office Monsanto Hall 304,
Scott Horrell (TA): scott.horrell@wustl.edu
Christine Carle (TA): cmcarle@wustl.edu
Annie Shieh (TA): wyshieh@wustl.edu
Lab/office Psychology 454

Grading:
Lab Notebooks
   Midterm evaluation (Midterm) 75 pts
   Final evaluation (Final) 75 pts
Lab write-up 1 100 pts
Major report (Drafts and Final) 450 pts
Ciliate Wiki 100 pts
Oral presentation 1 100 pts
Poster (draft and final) 100 pts
Poster presentation (Saturday, April 30th) 100 pts
In-term exam 150 pts
Peer review 50 pts
Problem sets/writing exercises 200 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 the 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 could 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. We have only one exam, so make sure that you do not miss this class period as no make-up exams will be given. 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 (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. Do not use a spiral notebook as they are not sufficiently durable. We will collect and edit 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. 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 give you access to a copier if you wish to do this).

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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Jan 17 Computer lab (NSLC): Picking a gene/Information Gathering/Pubmed/TGD/TGED
Jan 18 Lecture 1: Scientific approaches using model systems
Jan 19 Computer lab (NSLC): Predicting coding regions for analysis; cloning primer design

Jan 24 Working with microorganisms; aseptic technique and cell counting (PS1: gene map due- writing a legend)
Jan 25 Lecture 2: DNA manipulations
Jan 25 Microscopes: making an invisible world visible; PCR amplification of candidate genes

Jan 31 Gel electrophoresis of PCR reactions; TA cloning and E. coli transformation
Feb 1 Lecture 3: DNA transformation techniques (Lab report 1 due)
Feb 2 PCR screening of E. coli transformants

Feb 6 Plasmid DNA isolation, Restriction enzyme analysis, DNA sequencing (PS2: pENTR map due)
Feb 7 Lecture 4: Tetrahymena cell biology and development
Feb 8 Fusion of gene of interest to Fluorescent protein sequence

Feb 14 Plasmid DNA isolation, Verification of correct fusion by restriction enzyme analysis (PS3: pICY map due)
Feb 15 Lecture 5: Microscopy techniques
Feb 16 Tetrahymena electroporation
  Homework: Selection of Transformants arrange time with Prof. Chalker

Feb 21 Scoring Tetrahymena electroporation; cultures for microscopy
Feb 22 Lecture 6: Scientific writing
Feb 23 Fluorescence microscopy of gene-YFP fusions

Feb 28 Fluorescence microscopy of gene-YFP fusion protein; Protein isolations
Feb 29 Lecture 7: Molecular and Genetic Analyses to understand gene function
Mar 1 Fluorescence microscopy of gene-YFP fusions protein; Protein isolations

Mar 6 Western-blot analysis of GFP-fusions; RNA isolations
Mar 7 In Term Exam on lecture material
Mar 8 Western-blot analysis of GFP-fusions (Notebooks Collected and Graded)

SPRING BREAK (Lab report 2:draft 1 due Mar 6)
Mar 20 rtPCR expression analysis
Mar 21 Discussion: Giving Scientific Presentations:
Mar 22 rtPCR expression analysis (continued)

Mar 27 Oral presentations of protein localization
Mar 28 Oral presentations of protein localization
Mar 29 Oral presentations of protein localization

Apr 3 Gel electrophoresis of rtPCR analysis; Begin co-localization or gene knockdown expts.
Apr 4 Experimental design; testing hypotheses (Lab report 2 draft 2 due)
Apr 5 Student proposed experiments

Apr 10 Student proposed experiments
Apr 11 Discussion
Apr 12 Student proposed experiments

Apr 17 Student proposed experiments
Apr 18 TBA Draft of ciliatewiki due
Apr 19 Student proposed experiments

Apr 24 Wrap-up/ make poster
Apr 25 Discussion of Data
Apr 26 Wrap-up/ make poster

Saturday April 28? Final: poster presentations – undergraduate research symposium
(Final Report due Friday, May 4)