

## **Syllabus for Biology 421L and 422L**

### **General information**

Biology 422 has an optional lab. There are two lab sections: a two credit section on Tuesday afternoon taught as Biol 421L and a one credit section on Wed. afternoon taught as Biol 422L. For either section you will need to come in for about 30-60 min the next day to pick mutants and score and count plates. (That is the Tuesday section will require you to come in Wed. and the Wed. section will require you to come in Thursday, in both cases between 9 and 5). The two credit lab will do all of the experiments done in the one credit lab and also phage growth and an actual research experiment as part of the larger project on research on the genome of *A. tumefaciens*. This semi-independent research will be directed at defining functions of genes in the sequenced genome of this bacterium. Your results will be added to the national data base. The research component of 421L means that this course counts as EE. Those of you applying to veterinary school who have not done independent research should take the 2 credit lab.

The experiments in these labs are designed to introduce students to the basics of microbiology lab technique and to provide a background for further work in molecular biology, biotechnology, bacterial ecology, and bacterial genetics. **This lab does not provide experience in clinical microbiology.**

You must be taking Biology 422 at the same time as the lab or have taken Biology 422 in the past. In addition **Biology 202 is an absolute prerequisite for Biology 422.**

**Biology 421L and 422L Laboratory Experiments  
Fall, 2011**

**Laboratory objective – Both labs:** To learn some of the major techniques and procedures used in working with bacteria. Although the results you will obtain in these experiments are standard and easily verifiable in published papers and texts, the experiments are designed to provide you with experience in a variety of the most commonly used techniques of bacteriology. In a working microbiology laboratory if you wished to use a new technique you would check whether you were doing the technique correctly by using it in a standard well-documented experiment as you are doing here. **421L (two credit lab) only:** To gain experience with the approaches and methods used in conducting scientific experiments. You will design and carry out a real experiment providing new information to the scientific community.

**Schedule for 421L (2 credit lab)**

Date	Experiment	Hand In
Aug. 30 & Sept. 6 (S)	*1) Sterile Technique Viable cell count Plate streaking	1) Plates
Sept. 13 (L)	*2) Growth Curve OD growth curve Gram stain Separating individual colonies	2) Report (graph & 2 pages) 2)hand in plates
Sept. 20 (L)	*3) $\beta$ -galactosidase Induction	3) Report (graph, table & 2 pages)
Sept. 27	*4) Isolation of Bacteria from Nature *5) Transposon mutagenesis Part 1	--- ----
Oct. 4	*4) Isolation of bacteria from nature *5) Transposon mutagenesis Part 2	4) Report (2-4 pages) & Chart. Due after experiment completed in Oct.
Oct. 11	*5) Transposon mutagenesis Part 2 6) Biochemical Pathways 8) Part1 Begin planning your experiment	5) Report (2 pages)Plate of Mutants 6) Report (2 pages)
Oct. 18	8) Part 1 Plan and make materials for your experiment	
Oct. 25	7) One-Step Phage Growth 8) Continue working on your experiment	7) Report (graph, OD growth curve, plaque counts)

Nov. 1 (L) 8) Part 2 Transposon mutagenesis: preparation of the plasmid and introduction of the transposon

Nov. 8 (L) 8) Part 3 Screen and characterize mutants.

Nov. 15 8) Part 4 Continue characterizing mutants and prepare stocks of the mutants

Nov. 20 (S) \*Completion of all experiments  
\*Clean up lab  
\*Meet to discuss lab

Nov. 29 (S) \*Hand in all lab reports  
\*Laboratory final exam

(S) short lab You should be done by 3 PM.

(L) long lab this lab may last after 4 PM: if this is a problem for you, make arrangements with your TA before the lab.

\* Labs which will be done by 422L

Please note that you will need to come in the next day between 9AM and noon and 2 and 5PM to check your plates and transfer your cultures. The lab will be open 9 to 5 weekdays. However, you should avoid coming in during the first hour of any other lab section since this may disrupt that section.

### Schedule for 422L (one credit lab)

Date (all labs begin at 1 PM)	Experiment
Aug. 31 & Sept. 7 (S)	1) Sterile technique
Sept. 14 (L)	2) Growth curve, Gram stain, pure cultures
Sept. 21 (L)	3) $\beta$ -galactosidase induction
Sept. 28	4) Isolation of bacteria from nature
	5) Transposon mutagenesis part 1
Oct. 5	4) Isolation of bacteria from nature
	5) Transposon mutagenesis Part 2
Oct. 12 (S)	5) Transposon mutagenesis finish
Oct. 26 (S)	Clean up lab
	Meet to discuss lab
Nov. 31 (S)	Laboratory final exam

(S) short lab You should be done by 3 PM.

(L) long lab this lab may last after 4 PM: if this is a problem for you, make arrangements with your TA before the lab.

Please note that you will need to come in the next day between 9 AM and 5 PM to check your plates and transfer your cultures. The lab will be open 9 to 5 weekdays. However, you should avoid coming in during the first hour of any other lab section since this may disrupt that section.

## General Information for Biology 422L Fall, 2011

**Before** each class meeting, read the directions and references for that laboratory. This will help you to use your time to the best advantage. All the laboratory experiments have preliminary worksheets included in the manual. **These are to be completed and turned in before you begin the lab.**

Laboratory is scheduled for only 3 hours on Tuesday or Wednesday afternoons. The remaining hours of laboratory will be the time the next day when you come in to examine plates, test cultures, etc. You may do this on your own. If you wish help, schedule an appointment with the teaching assistants or Dr. Matthyse generally goes to the lab briefly after lecture and will help you then.

If you are not satisfied with your results on a particular experiment, some (but not all) experiments can be repeated. You should arrange a time to do this with the teaching assistants.

The week following most of the laboratory experiments a brief report will be due. **All reports must be printed** (except diagrams or graphs which may be hand drawn, use the graph paper in the back of this manual) **and handed directly to the TA concerned.** In addition, for some experiments you may need to hand in plates or cultures. Some laboratory exercises will also include problems for you to work. The laboratory grade will be based on the laboratory reports and plates handed in, the lab final exam, and the teaching assistant's evaluation of your microbiology laboratory skills.

Reports will be graded on:

1. Clarity and organization
2. Scientific correctness of results
3. Completeness - all questions answered. All results present.  
All calculations made. All procedures described (if you used the procedures in the directions, it is adequate to state this).
4. All reports should contain your data from the experiment in a table or other easily readable form. If for some reason you were unable to obtain data, consult with your TA about what to do. If you use someone else's data or invented data, **this must be clearly stated.** In the case in which you use data from another student, they must sign the report to show that they consent to your use of their data. While it may be unavoidable and no fault of yours that you have to use someone else's data, this should be a rare occurrence. If you are having trouble getting good data, consult with the teaching assistants or Dr. Matthyse regarding your lab technique.  
**Poor lab technique will affect your grade adversely.**
5. Late lab reports will lose 1 point for each week day they are overdue. No lab report will be accepted after Dec. 1.

The final examination will consist of protocols and data similar to those from the experiments done in class. It will last 1 hour. Grades will be calculated with each laboratory from number 2 through 8 (2 credit lab) or 2 through 5 (1 credit lab) counting 10 points except the laboratory on isolation of bacteria from nature which will count 20 points and laboratory 8 which

will count 40 points. The final will count 30 points and an evaluation of your work in the laboratory by the TA will count 40 points. **The TA evaluation will be based on their assessment of your lab skills and technique and understanding of the experiments.**