Biomedical Sciences Lab Techniques, MEDS2030C
Syllabus for Fall Semester, 2021
Tuesday or Thursday 2:20-5:00
Lecture hall MSB 2351, Laboratory CVC G940


EXPECTATIONS:

Before coming to lab: Read the lab manual and familiarize yourself with all the material relevant to the day’s lab. In your notebook, write out the **purpose and protocol** for what you plan on doing that day and include any prior calculations that you will need for the activity. All notebooks will be checked by instructors prior to entering the lab and are required for participation points. Note: We will not have time to complete all activities in the lab manual. Pay close attention to the specific activities listed in the syllabus and only answer the worksheet questions listed on the syllabus pertaining to the activities performed in class.

Leaving the lab: It is your responsibility to record all data, observations, changes to protocol, and discussion in your notebook/worksheet before leaving the lab. You can never include too much in your lab notebook, but you **can** be too brief. After you finish each lab, clean up your lab space, wipe down all surfaces with a bleach or ethanol squirt bottle and leave your space in the condition you found it.

Worksheets: The lab worksheet is meant to serve as a **polished** final report of the data you record in your lab notebook throughout the entire module. Worksheets are to be turned in at the beginning of class before each module practical.

Practical exams: For the exams, 10-20 test stations will be set up throughout the lab where each student will be asked to complete hands-on tasks or to answer knowledge-based questions relevant to the module material.

Exam 1: Module 1  Sept 7/9
Exam 2: Modules 2 & 3  Oct 26/28
Exam 3: Modules 4 & 5  Dec 7/9

To purchase course manual:

LABORATORY SCHEDULE:

Module One: Laboratory Basics & Instrumentation

Week 1: Aug 24/26
Orientation-students form lab teams
1.1: Micropipette-use & calibration
1.3: Use of pH meter (may carry over to week 2)
1.6: Light microscopy, part 1: cell staining, Diff Quick
1.7: Informatics: scientific literature search (complete at home for worksheet – question #24)

Week 2: Aug 31/ Sept 2
1.4: Spectrophotometer; serial dilutions
1.5: BCA assay: unknown protein concentration determination
1.6: Light microscopy, part 2: Mouse embryology and development (during BCA incubation)

Week 3: Sept 7/9
MODULE 1 PRACTICAL EXAM (At the start of lab)
MODULE 1 WORKSHEET DUE (At the start of lab)
Answer questions: 1-6, 8-11, 12-19, 20-22, and 24

Module Two: Microbiology & Infectious Disease

Week 3: Sept 7/9
2.1: Aseptic technique, pour plates
2.3: Isolation streak plates of mixed cultures onto different nutrient media

Week 4: Sept 14/16
2.5: Assess colony morphology and streaking technique
2.6: Gram stain
2.7: Streak differential & selective media
2.8: Kirby-Bauer antibiotic sensitivity assay

Week 5: Sept 21/23
2.9: Microbial growth on selective media
2.10 (if there is time): Catalase test to distinguish staphylococcus from streptococcus
2.11: Record antibiotic sensitivity
2.12: Slide study of infection, tissue injury & immune response

Week 6: Sept 28/30
MODULE 2 WORKSHEET DUE (At the start of lab)
Answer questions: 1, 5, 8-18, 21-24

Module Three: Recombinant DNA

Week 6: Sept 28/30
3.1: Affinity column purification of plasmid DNA, Nanodrop spectrophotometer quantification

Week 7: Oct 5/7
3.2: Agarose gel electrophoresis of purified plasmid DNA
3.3: Bacterial transformation
3.4: Polymerase chain reaction (PCR) DNA amplification

Week 8: Oct 12/14
*University Reading Days no lab*

Week 9: Oct 19/21
3.3 (continued): Calculate plasmid transformation efficiency
3.5: DNA ligation reactions
3.4 (continued): Gel of PCR reaction and DNA ligations

Week 10: Oct 26/28
MODULES 2 & 3 COMBINED PRACTICAL EXAM (At the start of lab)
MODULE 3 WORKSHEET DUE - Answer questions: 1-20, 24-26

Module Five: Cell Biology

Week 10: Oct 26/28
5.1: Sterile technique in hoods, (trypsin passage cells from flask to 6 well dishes, ?) EVOS-XL inverted microscopy
5.2: Fluorescent microscopy and cell viability assay: H₂O₂ (Instructor Pre-challenged)
5.3 Cell transfection using GFP reporter plasmid

Week 11: Nov 2/4
5.4: Flloid imaging of GFP reporter gene expression, Capture images, Quantify GFP expression

Week 12: Nov 9/11
*Veteran's Day Holiday no lab*

Week 13: Nov 16/18
MODULE 5 WORKSHEET DUE (At the start of lab)
Answer questions 1-4, 6-11

Module Four: Protein Biochemistry

Week 13: Nov 16/18
4.2 Affinity Column Procedure: Cell lysis and affinity column purification-collect fractions UV image to I.D. protein enriched fractions

Week 14: Nov 23/25
*Thanksgiving, no lab*

Week 15: Nov 30/ Dec 2
4.3: Polyacrylamide gel electrophoresis of fractions, staining, image capture, protein size determination

Week of Dec 7/9
*University FINAL EXAM WEEK –*
MODULE 4 & 5 COMBINED PRACTICAL EXAM
MODULE 4 WORKSHEET DUE – **before exam** Answer questions: 4-21
**Grading: 100 points per module**

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93-100 A  
90-92 A-  
87-89 B+  
83-86 B  
80-82 B-  
77-79 C+  
71-76 C  
67-70 C-

Grades are based on 3 metrics during each of the 5 modules and 3 practical exams. The final grade is a composite of these 25 cumulative assessments. We understand that by using the extended grade scale that includes +/- designations the grade ranges are narrow. Grades will not be adjusted (rounded up etc.) to shift a student's grade to a higher mark. Please do not ask us to modify your grade at the end of semester or to create additional extra credit activities. Excused absences and an opportunity to make up a missed lab session will only be offered with documentation of a medical or family emergency.

**Lab Inquiries:** It is preferable that you ask questions in class, as demonstrations are often the best way for instructors to answer questions. If you need to ask a question outside of lab/class, email any of the instructors, SI's, or TA's. However, Drs. Glasser or Fischesser MUST be Cc-ed on these emails.

**Academic Integrity:** In this lab you will be working in teams of two. Although you will be doing the lab work as a team, it is very important that both team members contribute equally to the experiments. This will also ensure that both lab members are prepared to perform each task during the practical exams. The worksheets, therefore, will be very similar in terms of purpose, methods and results. However, the discussion is to be done individually. Cheating, sharing of answers/test questions, etc. will result in an immediate loss of all points for that assignment.