Biomedical Sciences Laboratory Techniques, MEDS2030C
Syllabus for Fall Semester 2019
Tuesday or Thursday 2:20-5:00 (1 credit hour)

Instructors: Stephan W. Glasser Ph.D., Emma Schoch, Jordan Webb, Thomas Whitlow, & Charlotte Kirchhoff (Supplemental Instruction Leader)

Module One: Laboratory Basics & Instrumentation

Week 1: Instrumentation I (1.1 and 1.6 Part One)
Aug 27/29 Orientation-students form lab teams
Analytical balance, micropipette-use & calibration
Light Microscopy: oral cell harvest & staining

Week 2: Instrumentation II (1.4, 1.5 and 1.6 Part Two)
Sept 3/5 Spectrophotometer; serial dilutions & BCA protein determination
Light Microscopy: Mammalian development stained mouse sections, Amscope imaging

MODULE 1 PRACTICAL - Sept 10/12 (Beginning of Lab)
MODULE 1 NOTEBOOK DUE - Sept 10/12 (End of Lab)

Module Two: Microbiology Techniques

Week 3: Intro to Microbiology (2.1, 2.2 and 2.3)
Sept 10/12 Aseptic technique and pouring plates
Streak plates of mixed cultures onto different nutrient media
Environmental sampling & culturing

Week 4: Bacterial identification (2.4, 2.5, 2.6, 2.7 and 2.8)
Sept 17/19 Colony morphology, Gram stain & image capture,
Streak differential selective media
Antibiotic sensitivity

Week 5: Inflammation & Infection (2.9, 2.10, 2.11 and 2.12)
Sept 24/26 Record results of antibiotic sensitivity & selective media growth
Catalase Assay
Slide study of infection, tissue injury & immune response

MODULE 2 PRACTICAL - Oct 1/3 (Beginning of Lab)
MODULE 2 NOTEBOOK DUE - Oct 1/3 (End of Lab)

Module Three: Manipulation and Analysis of DNA

Week 6: DNA isolation (Day One Part A and Part C)
Oct 1/3 Affinity column isolation & purification of plasmid DNA
Nanodrop spectrophotometer quantification of DNA

Week 7: OFF - lab will be open and TAs will be available for any questions Oct 8th 2:20-3:20

Week 8: Gel electrophoresis and DNA amplification (Day One Part B, Day Two Part A, Part B and Part C)
Oct 15/17 Agarose gel electrophoresis of plasmid DNA,
Prepare dilutions of plasmid DNA (GFP)
Set up polymerase chain reaction (PCR) DNA amplification,
Bacterial transformation
Week 9: Analysis of PCR reactions and DNA ligation (Day Three Part A, Ligations on page 96)
Oct 22/24
DNA ligation reactions
Gel of PCR reaction and ligations
Calculate plasmid transformation efficiency

MODULE 3 PRACTICAL - Oct 29/31 (Beginning of Lab)
MODULE 3 NOTEBOOK DUE - Oct 29/31 (End of Lab)

Module Five: Cell Biology

Week 10: Cell Culture I (Day One Part A, Part B, Day Two Activity One)
Oct 29/31
Sterile technique in hoods, media prep, cell trypsin release-plating
Hemocytometer counting, cell passaging
EVOS-XL inverted microscopy
Fluorescent cell viability assay
Use of fluorescent cell imager

Week 11: Cell Culture II (Day Two Activity 1, Activity 3, Day Three Activity 1, Activity 4)
Nov 5/7
Finish fluorescence viability assay/imaging
Wound healing assay
Gene expression: Set up transient cell transfection using GFP reporter gene

Week 5: Cell Culture III (Day Three Activity 2)
Nov 12/14
Floid imaging of GFP reporter gene expression
Quantify GFP expression, capture images

MODULE 5 PRACTICAL - Nov 19/21 (Beginning of Lab)
MODULE 5 NOTEBOOK DUE - Nov 19/21 (End of Lab)

Module Four: Protein Biochemistry

Week 13: Protein Characterization I (Day One)
Nov 19/21
Cell lysis and affinity purification- collect fractions
UV image for enrichment of fluorescent protein

Week 14: OFF - Thanksgiving Break

Week 15: Protein Characterization II (Day Two)
Dec 3/5
Polyacrylamide gel electrophoresis of fractions,
staining, imaging, protein size determination

MODULE 4 PRACTICAL - Dec 10 10:30-12:30 (Tuesday Lab) / Dec 12 10:30-12:30 (Thursday Lab)
MODULE 4 NOTEBOOK DUE - Dec 10/12 (End of Practical)

Grading: 100 points per module

1. Pre-Lab written protocol, required for in-lab participation (except 1st day); 5 points each

2. Lab notebook, 2-3 per module; 10 points each
   Points will be assigned 0, half, or full credit.
   Review of notebook for completeness including data, calculations & discussion based upon questions raised in manual.

3. End-of-module practical exams; 55-70 points
   10-20 test stations where each student will be asked to complete hands-on tasks and visit additional stations to answer knowledge based questions.
**Notebook Guidelines:**

All notebooks should contain the following sections and should be written for each lab period separately:

1. **Purpose** - what is the goal of this lab?
2. **Methods** - how are you to perform this lab? This should be the same as the pre-lab protocol and needs to be complete enough that if you only had your protocol you could complete the lab.
3. **Results** - what data was obtained in this lab? This could include observations, pictures, measurements etc.
4. **Discussion** - how is the data from this lab to be interpreted? What is the significance of your results? This should also include answers to any questions posed in the lab manual.

**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 do each task asked about in the practical exams. The lab reports, therefore, will be very similar in terms of purpose, methods and results. However, the discussion is to be done individually.