Syllabus
BIOE 456 Cell and Tissue Engineering Laboratory

Instructors	Dave Eddington
Teaching Assistants	Joel Wise, Brian Rady
Time	Spring Semester, 2008
Location	Lectures will be held in 2BH B10 from 10 to 10:50 pm Monday. Laboratory sessions will be held in SEL4012 **(except Lab 8)** - Section 1: 11 to 2 pm Monday - Section 2: 2 to 5 pm Tuesday - Section 3: 11 to 2 pm Wednesday - Section 4: 2 to 5 pm Thursday

Course Objectives

The overall objective of the course is to give the students hands-on experience with (1) experimental techniques (2) data analysis and (3) journal-quality report writing. Small groups of 3 students participate as teams in each laboratory session with the reports prepared independently. The specific objectives are given below with respect to each experiment.

Lab 1. Me Write Pretty Good. Explore good and bad writing using published articles.

Lab 2. Introduction to Cell Culture: This lab module will cover the basics of cell culture. In this lab you will learn how to make media and phosphate buffered saline (PBS), count cells, passage cells, change cell culture media, freeze cells, and thaw cells.

Lab 3. Dental Composites I: In Part I of this lab, you will make eight dental composite bar samples using a universal restorative. You will then measure the weight and size of the bars. These samples will be aged in four different environments at room temperature and 37ºC.

Lab 4. Effect of VEGF of Cytoskeleton: In this lab you will expose HUVECs to VEGF and observe the effects it has on cytoskeletal actin fibers. You will fix the cells using paraformaldehyde and stain the cytoskeleton with phalloidin. After the cells are prepared you will image the cells using a fluorescence microscope.

Lab 5. Cell Proliferation: In this lab you will measure the effect of serum on the proliferation of MSC cells.

Lab 6. Tissue Engineering of Fat I: Mesenchymal stem cells (MSCs) can differentiate into a variety of cell types. In this lab MSCs will be stimulated to differentiate into adipocytes in a 3D environment to produce fat tissue.

Lab 7. Tissue Engineering of Fat II: In this lab you will stain the tissue constructs made in Part I.

Lab 8. Dental Composites II: In Part II of this lab you will test the aged dental composites you made in Lab 3.

Attendance:
Attendance to all laboratory sessions and lectures is required. **No make-up sessions will be made available.** Prior to each scheduled lab session, a lecture will be given to introduce the concept and provide the necessary background. Each laboratory session has been extended to 3 hours to allow sufficient time for completion of experiments. It is anticipated that, for some of the scheduled experiments (e.g., long-term cell adhesion experiment), the student may have to spend additional time in the laboratory to complete the experiment.

Teamwork:
Students will work in teams with no more than 3 students in each team. The team members will remain *unchanged* throughout the entire semester. If a team member misses a lab, they will not be able to share data with their team. Attendance is required.

Grade:
Each student is required to maintain a laboratory notebook. The final grade will be determined based on the following;

Lab Notebook Quality: 20%
Lab Reports (6): 80%

Lab reports due at the beginning of the next lab period as indicated below.

Recommended Textbooks:
1. Culture of Animal Cell; R. Ian Freshney
2. Principle of Tissue Engineering; Lanza, Langer, and Chick
3. Handbook of Fluorescent Probes and Research Products, Haugland (available online)

Lab Reports
The reports are evaluated as follows: (a) format: 30% of the grade (b) technical content: 70% of the grade. The goal is to make the students understand the technical concepts and be able to express them in the form of a good technical report confirming to a standard format. This will assess the student's compositional skills as well as their laboratory experience.

The written report should include the experimental designs and results of scientific problems, or unique designs and techniques relating to cell and tissue engineering. It must have the following subsections,10 pages maximum (excluding figures and references);

a) abstract
b) introduction and background
c) materials and methods
d) results
e) discussion
f) conclusions
e) references (excluded from the page limit)

Week	Lab	Due
Week 1: 1/14	**Lab 1**	
Week 2: 1/21	Class Cancelled (MLK Jr).	
Week 3: 1/28	**Lab 2: Intro to Cell Culture**	**Lab 1**
Week 4: 2/4	No Lab/makeup	
Week 5: 2/11	**Lab 3: Dental Composites II**	**Lab 2**
Week 6: 2/18	**Lab 4: VEGF on Cytoskeleton**	
Week 7: 2/25	No Lab/makeup	
Week 8: 3/3	**Lab 5: Cell Proliferation**	**Lab 4**
Week 9: 3/10	No Lab/makeup	
Week 10: 3/17	**Lab 6: TE of Fat I**	**Lab 5**
Week 11: 3/24	Spring Break	
Week 12: 3/31	**Lab 7: TE of Fat II**	
Week 13: 4/7	No Lab/makeup	
Week 14: 4/14	**Lab 8: Dental Composite II**	**Lab 6&7**
Week 15: 4/21	No Lab/makeup	
Week 16: 4/28	**No Lab/makeup**	**Lab 3&8**