Research Methodologies Course – FALL 2014
Course # BIOL 6100/8100
Mondays and Wednesdays, 9:00-10:15 WO3246

Instructor:

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Course Description:

An in-depth discussion of techniques used in the study of cell and molecular biology. Examples include nucleic acid manipulation, electrophoresis, molecular cloning, cell culture, gene expression changes and analysis, protein analysis and interaction assays, genome wide association studies and stem cells. Emphasis will be on understanding research methods and application of experimental methods to scientific problems.

Course Objectives:

Students will learn basic and cutting-edge laboratory techniques so they can:
  a) Effectively generate and analyze data in their own research laboratories
  b) Understand the work of other labs, inside and outside of UT
  c) Be exposed to newest techniques, to stimulate the imagination for how their research may be taken to the next level

Course Format:

The Research Methodologies course will be lecture-based. There is no required textbook and lecture notes can be downloaded from the course website on Blackboard at least one day before the lectures. These lecture notes will be updated regularly, **but cannot substitute for class attendance**. Some handouts will also be provided throughout the semester to students enrolled in the course and useful papers from the primary literature will be discussed on occasion. For many announced quizzes and exams, standard calculators (able to add/subtract/multiply/divide) will be required. Please bring along a calculator for the lectures. Makeup exams will require a valid excuse for missing the scheduled test.

Student Evaluation:

Grades will be determined based upon student performance on quizzes and exams. Two midterm examinations and a final examination will be worth APPROXIMATELY 20%, 20% and 40% of the final grade, respectively. Exams will be comprised of short answer, multiple choice, calculation and

essay-based questions derived from the lectures. Brief quizzes and take-home assignments will make up the remaining 20% of the student's grade. Since attendance at all lectures is expected of students enrolled in this course, some quizzes may be unannounced if attendance becomes a problem. Grades will be letter-based and will utilize a straight scale (see below) unless overall class performance dictates use of a curve.

A =	90-100%	B- =	65-69%
A- =	80-89%	C+ =	60-64%
B+ =	75-79%	C =	55-59%
B =	70-74%	C- =	50-54%

Office Hours: **Tuesdays 10:00-12:00AM**

The instructor is also available by appointment if you can't make it to the office hours, and can answer Email questions at most any time.

Tentative Class Schedule:

Date:

8/25   (L1) Laboratory Solutions, Calculation, Buffers
8/27   (L2) Cell Culture Overview
9/1   Labor Day, no class.
9/3   (L3) Transfection (Quiz 1)
9/8   (L4) Nucleic acid structure, detection, quantitation and electrophoresis
9/10   (L5) DNA Cloning: Vectors, Restriction and modifying enzymes
9/15   (L6) Cloning: Strategies and practical approaches
9/17   (L7) PCR and PCR-based cloning methods **(Quiz 2)**
9/22   (L8) Nucleic acid hybridization and sequencing
9/24   (L9) RNA isolation, analysis, Real-Time PCR
9/29   (L10) Gene regulation – promoter studies
10/1   **MIDTERM EXAM 1**
10/6   (L11) Genome Wide Association Studies
10/8   (L12) Global transcriptional analyses – gene arrays, RNAseq
10/13   Fall Break, no class.
10/15   (L13) Global transcriptional analyses – gene arrays, RNAseq
10/20   (L14) Protein Detection – Electrophoresis, Western Blotting, Far Westerns
10/22   (L15) Proteomics
10/27   (L16) Recombinant protein expression **(Quiz 3)**
10/29   (L17) Protein interaction assays
11/3   (L18) Immunoprecipitation
11/5   (L19) Ablating gene expression – RNAi
11/10   (L20) Knockdown, knockout and genome engineering

11/12 **MIDTERM EXAM 2**
11/17 (L21) Immunofluorescence and immunocytochemistry
11/19 (L22) Flow, FACS and ELISA
11/24 (L23) Transgenic mice approaches
11/26 Thanksgiving No Class
12/1 (L24) Stem cells
12/3 (L25) Model Organisms
12/8 (L26) High throughput screening
12/10 (L27) Microscopy and statistics
12/16 FINAL EXAM (10:15-12:15, WO3246 - TENTATIVE)

Please review the attached statement on Academic Dishonesty.

STATEMENT ON ACADEMIC DISHONESTY

Department of Biological Sciences

Academic dishonesty by students enrolled in undergraduate or graduate courses and programs offered by the Department of Biological Science will not be tolerated. Academic dishonesty includes, but is not limited to:

1. Obtaining assistance from another individual during an examination.

2. Giving assistance to another individual during an examination.

3. The unauthorized use of study material or textbooks during an examination.

4. Changing answers on an examination after it has been returned and then submitting it for regrading.

5. Plagiarizing written assignments. Plagiarizing includes: (a) copying laboratory reports from previous years, (b) copying or paraphrasing reports, term papers, or theses prepared by other students, (c) unauthorized collaboration in the preparation of reports, term papers, or theses, and (d) use of another author's materials without appropriate acknowledgment through quotation and citation.

6. Attempting to bribe or otherwise induce an instructor to alter either a grade or examination score.

7. Obtaining or attempting to obtain a copy of an examination prior to its administration.

In accordance with policy outlined in the Student Handbook and the University Catalog, instructors have the responsibility and right to bring cases of alleged dishonesty to departmental, college, and university administrative units. Students involved in academic dishonesty may expect to receive a grade of F on specific assignments as well as in the course where the assignment was made. In addition, disciplinary action may be recommended through appropriate college and university disciplinary committees.

HL/SG/WLB/PRK