

**BTEC 5313,
Experimental Mass Spectrometry in Biotechnology**

Spring 2014

Meeting: Tuesday, 2:00 - 5:00 p.m., ESB 105

Instructors: Office Hours are by Appointment

Dr. Masoud Zabet

masoud.zabet@ttu.edu

834-8947

Dr. Susan San Francisco

susan.san-francisco@ttu.edu

834-4752

Course Material:

Reading assignments, additional materials, required experimental protocols and course announcements will be provided by the instructor as needed.

Course Description:

This course is a limited enrollment, advanced level elective course and preference is given to students who are enrolled in the Biotechnology Masters program administered through TTU main campus and HSC. A sound knowledge in cell biology and biochemistry is highly recommended. This course introduces students to several instrumentation technologies that are used in modern biotechnology laboratories doing protein analysis, specifically, mass spectrometry, column chromatography and 2-dimensional gel electrophoresis. Computers are used in data analysis, hence, competency in common operating software platforms and end user programs is beneficial. Training will be “hands-on” and focus on running the instrumentation with emphasis placed on discussions of the actual technology, data analysis and the various applications for its use. Students successfully completing this course will be able to understand the basic technology and instrumentation used in gel-based and automated chromatographic isolation of proteins and the generation, analysis and interpretation of mass spectra used in identification and analysis of protein samples.

Topics:

Protein structure/function

Protein preparation – Isoelectric focusing/gel electrophoresis
Column Chromatography
proteolytic digestion

Mass Spectrometry – ionization techniques
MALDI-TOF
ESI-ion trap

Tandem mass spectrometry (MS/MS), LC/MS

MS applications – protein identification (Peptide Mass Fingerprinting, MS/MS)
PTM (Post-translational Modification)
quantitation
proteomics

Special Conditions:

Any student who, because of a disability, may require special arrangements in order to meet the course requirements should contact the instructor as soon as possible to make any necessary arrangements. Students should present appropriate verification from Student Disability Services (AccessTECH). No requirement exists that accommodations be made prior to completion of this approved university process.

Assessments and Grading:

There will be four criteria used to determine your final grade in this course. All assignments will be considered late if they are not submitted on the assigned date that they are due, and may receive a grade of "0."

1. Exams: Two **hour exams** will constitute **20% each**, of the course grade.

2. Lab Participation: Active participation such as class and lab discussions, suggestions, and answering questions is strongly encouraged. Bench work is usually done in a group setting with two to three students in a group. All members of the group should take equal responsibility to successfully complete lab exercises. Each person should be courteous and considerate of his/her lab partner and need to provide equal opportunity to follow experimental protocols. Orderly conduct during the lab is expected at all times. Once the experiments are completed the chemicals, reagents, biological agents, and enzymes need to be stored appropriately. All labware and bench surfaces should be cleaned before leaving the lab. **Lab participation will be 10% of the total grade.**

4. Laboratory Assignments: Several assignments will be made during the semester. These assignments will be **10% of the total grade.**

5. Project presentation and Lab Report: It is expected that a proper laboratory notebook is kept throughout the semester for method and data record keeping, data analysis, etc. This will form the basis for a formal lab report on a lab project that will be done during the semester. The project will also be presented orally for class discussion. **Projects presentation and lab report will be 40% of the total grade.**

A final letter grade will be determined by performance on the above criteria, with consideration given to performance of the class as a whole. In prior years, the A/B cutoff for final grades has been around 90%, the B/C cutoff around 80%, the C/D cutoff around 70%, and the D/F cutoff around 65%. A grade of "I" (Incomplete) will be awarded by the instructor prior to the end of the semester only when failure to complete the work has been due to causes beyond the student's control and when class performance has been satisfactory. Texas Tech regulations require that a form explaining the reason for the Incomplete and the method to be used to make up the missed work be submitted, after being signed by both the student and instructor, to the Registrar. Incomplete grades that are not replaced by an A, B or C grade within one year are automatically replaced by an F.

Academic Honesty: It is the aim of the faculty of Texas Tech University to foster a spirit of complete honesty and a high standard of integrity. The attempt of students to present as their own any work not honestly performed is regarded by the faculty and administration as a most serious offense and renders the offenders liable to serious consequences, possibly suspension.

"Scholastic dishonesty" includes, but not limited to, cheating, plagiarism, collusion, falsifying academic records, misrepresenting facts, and any act designed to give unfair academic advantage to the student or the attempt to commit such and act.

Cheating:

Dishonesty in examinations, quizzes, or home work assignments, illegal possession of examinations, the use of unauthorized notes during an examination or quiz, obtaining information during an examination from the examination paper or otherwise from another student, assisting others to cheat, alteration of grade records, illegal entry to or unauthorized presence in an office are instances of cheating.

Plagiarism:

Offering the work of another as one's own, without proper acknowledgement, is plagiarism; therefore any student who fails to give credit for quotations or an essentially identical expression of material taken from books, encyclopedias, magazines, internet web sites, and other reference works, or from the themes, reports or other writings of a fellow student is guilty of plagiarism.

Civility in the Classroom:

Students are expected to assist in maintaining a classroom environment that is conducive to learning. In order to ensure that all students have an opportunity to gain from time spent in class, unless otherwise approved by the instructor students are prohibited from using cellular phones or beepers or engage in any other form of distraction. No food or drink allowed in the class. Socializing in the class room should be kept to a minimum. Inappropriate behavior in the class room will result in a request to leave the class.

Attendance:

Lectures and laboratory-based exercises will include information that is not in handouts. **It is therefore necessary and expected that you will attend and participate in every scheduled class. There are no makeup classes.** If there is a reason for missing a class you must contact your instructor as soon as possible to make necessary arrangements to discuss the outcome of the absence. You may need to provide a note from your physician excusing your absence if you are absent from a class or a lab more than a day due to an illness.

Religious Holy Day:

A student who intends to observe a religious holy day should make that intention known to the instructor prior to the absence. A student who is absent from classes for the observance of a religious holy day shall be allowed to take an examination or complete an assignment scheduled for that day within a reasonable time after the absence.