

BIOT 5312**Molecular Biochemistry****Credit Hours: 3****Semester:** Fall**Year:** 2013**Class Day/Time:** Tuesdays, 1pm-4pm**Class Location:** Room 116.1**Instructor of Record:** Dr. Pierre Neuenschwander

Professor

Office: B628

Office Phone: 903-877-7480

E-Mail: Pierre.Neuenschwander@uthct.edu

Office Hours: Mondays, 12pm-1pm, or anytime arranged by email.

Course Description: Graduate-level course of biotechnological aspects of gene expression, transcription control mechanisms; molecular cloning, and its applications to biotechnology at the molecular level. The student will gain a thorough understanding of fundamental molecular biochemical principles used in biotechnology, including basic background information, theory and applications.

Prerequisite: As per program admission.**Co-requisite:** None**Goals of Course & Course Objectives:***Course Objectives:*

1. To be able to communicate and discuss fundamental molecular biochemical principles.
2. To be able to discuss the background and theory behind various nucleic-acid-based biotechnology techniques.
3. To be able to find and process scientific information.

Student Learning Outcomes (Course Competencies):

1. The student will be able to explain the thermodynamic principles behind enzymatic catalysis.
2. The student will be able to describe the structural features of nucleic acid and compare and contrast its different forms and modifications.
3. The student will be able to discuss the mode of action of restriction enzymes and describe their uses in biotechnology.
4. The student will be able to explain the DNA replication process, discuss the various steps and place them in context to cellular function.
5. The student will be able to explain transcription, discuss the various steps and place them in context to cellular function.
6. The student will be able to explain translation, discuss the various steps and place them in context to cellular function.

Course Assessment/Methods of Evaluation:

Student understanding will be evaluated with comprehensive examinations of a purely subjective nature covering each topic in detail, evaluations of quizzes, homework assignments, and class participation.

- **Lecture Examinations (60%):** There will be two non-comprehensive exams (a midterm and a final). These two exams will be of a subjective format based on preceding lectures and are each worth 30% of the final grade.
- **Quizzes (30%):** These will be short in-class quizzes and will be worth 30% of the total lecture grade.
- **Class Participation (10%):** This will be based on attendance and participation in class polls and discussions.

Linked Program Learning Outcomes:

The student learning outcomes listed above address the following Biotechnology Program PLOs:

- PLO-2. The student will demonstrate mastery of basic and advanced biotechnology methods
- PLO-4. The student will demonstrate independent and critical thinking skills integrated with the ability to utilize multiple informational resources.
- PLO-5. The student will explain the principles, mechanisms and interrelatedness of both in vivo and in vitro biochemical, molecular biological and genetic processes.

Textbook:

Biochemistry (4th Edition), by Donald Voet and Judith G. Voet, © John Wiley & Sons, Inc., 2011; ISBN 978-0-470-57095-1.

Course Content:

Lectures 1- 4 Introduction and Review

- Course description/grading policies (Handout)
- Review
 - Prokaryotes/Eukaryotes (Chapter 1; pp3-19, 26-28, 34-37)
 - Aqueous solutions (Chapter 2; pp40-45)
 - Thermodynamic Principles (Chapter 3; pp58-59)
- Nucleic acids and DNA (Chapter 5)
 - Theory and properties
 - Applications
 - Nucleic acid purification (Chapter 6; pp156-159)
 - Nucleic acid sequencing (Chapter 7; pp176-185)
 - Nucleic acid synthesis (Chapter 7; pp209-214)
- Enzymes and Biotechnology
 - Review of enzyme function and regulation (Chapter 13; pp469-480)
 - Restriction enzymes
 - Polymerases
- Nucleotide Metabolism (Chapter 28)
 - Formation
 - Degradation
 - Energy source

Lectures 5 & 6 Nucleic Acid Structure and Topology (Chapter 29)

- Double helix
- Base pairing
- Methylation
- Circular/linear
- Supercoiling

Lectures 7-9 DNA Replication (Chapter 30)

Lectures 10 & 11 Transcription (Chapter 31)

Lectures 12 & 13 Translation (Chapter 32)

Lecture 14 Viruses (Chapter 33) & Gene Expression (Chapter 34)

Lecture 15 REVIEW FOR FINAL

Other Class Policies:

Attendance:

Regular or punctual attendance is expected. If a student misses a class or lab, the student is responsible for obtaining any information distributed during those times. Make-ups are possible only under certain instances (labs cannot be made up). Arrangements for any make-ups and/or missed labs should be discussed directly with the instructor for that day's class.

Academic Honesty:

Any student who commits an act of scholastic dishonesty is subject to discipline. Scholastic dishonesty includes, but is not limited to, cheating, plagiarism, collusion, the submission for credit of any work or materials that are attributable in whole or in part to another person, taking an examination for another person, any act designed to give unfair advantage to a student or the attempt to commit such acts.

Cheating

Dishonesty of any kind involving examinations, assignments, alteration of records, wrongful possession of examinations, and unpermitted submission of duplicate papers for multiple classes or unauthorized use of keys to examinations is considered cheating. Cheating includes but is not limited to:

- Using or attempting to use unauthorized materials to aid in achieving a better grade on a component of a class.
- Falsifying or inventing any information, including citations, on an assigned exercise.
- Helping or attempting to help another in an act of cheating or plagiarism.

Plagiarism

Plagiarism is presenting the words or ideas of another person as if they were your own. Materials, even ideas, borrowed from others necessitate full and complete acknowledgment of the original authors. Offering the work of another as one's own is plagiarism and is unacceptable in the academic community. A lack of adequate recognition constitutes plagiarism, whether it utilizes a few sentences, whole paragraphs, articles, books, audio-visual materials, or even the writing of a fellow student. In addition, the presentation of material gathered, assembled or formatted by others as one's own is also plagiarism. Because the university takes such misconduct very seriously, the student is urged to carefully read university policies on Misconduct in Research and Other Scholarly Activity 05.00. Examples of plagiarism are:

- Submitting an assignment as if it were one's own work when, in fact, it is at least partly the work of another.
- Submitting a work that has been purchased or otherwise obtained from an Internet source or another source.
- Incorporating the words or ideas of an author into one's paper without giving the author due credit.

Adding/Dropping:

The official deadline for adding and dropping courses is as published in the academic calendar and Graduate Bulletin (typically the day before Census Day). However, students are strongly encouraged to meet with their graduate advisor or the Program Coordinator prior to adding/dropping courses. Movement into and out of classes after the 4th class day requires approval of the Program Director. Students can drop until mid-semester without a WP or WF. Drops after mid-semester require approval of the Dean. Each student is responsible for their own enrollment status with the university.

Disability Accommodations:

UTHSCT abides by Section 504 of the Rehabilitation Act of 1973 and the Americans with Disabilities Act, which mandate reasonable accommodations be provided for students with documented disabilities. If you have a disability and may require some type of instructional and/or examination accommodations, please contact me early in the semester so that I can provide or facilitate provision of accommodations you may need. If you have not already done so, you will need to register with the Student Services Office (located on the UT Tyler Campus). You may call 903-566-7079 for more information.