Course Description: The primary objective of this course is for the student to gain an understanding of the metabolic processes in prokaryotes and eukaryotes, and how metabolism is affected by membranes, enzymes, substrates, other metabolites and by bio-production of commercial products.

Prerequisite: BIOT 5312  
Co-requisite: BIOT 5222L

Goals of Course & Course Objectives:

Course Objectives:
1. To be able to communicate and discuss fundamental metabolic processes.
2. To be able to communicate and discuss the role of membranes in cellular function.
3. To be able to communicate and discuss the basic theory and practice of enzymology and enzyme kinetics.

Student Learning Outcomes (Course Competencies):
1. The student will be able to describe the characteristics of a biological membrane and its components.
2. The student will be able to describe the importance and mechanism of action of ion pumps and sodium channels.
3. The student will be able to describe the general characteristics of polysaccharides and the effect of polysaccharides on expression of recombinant proteins in various expression systems.
4. The student will be able to describe and apply Michaelis-Menton kinetics in the context of an enzyme.
5. The student will be able to discuss the principles of action of various enzymes, methods for regulation of enzyme, and methods of measuring enzyme activity.
6. The student will be able to discuss cellular metabolic processes and how they relate to biotechnology.
7. The student will be able to describe inside-out and outside-in signal transduction processes and provide examples.

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. Students who successfully complete the course will demonstrate a thorough understanding of fundamental metabolic, cellular and enzymological principles used in biotechnology, including basic background information, theory and application.

- Lecture Examinations: 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:** These will be short in-class quizzes and will be worth 30% of the total lecture grade.

• **Class Participation:** This will be based on attendance and participation in class polls and discussions (10% of grade).

**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:**

**Course Content:**

1. **Module 1. **MEMBRANES
   A) Lipids
   i) Classes
   ii) Properties
   B) Biological membranes
   C) Lipoproteins

2. **Module 2. **MEMBRANE TRANSPORT
   A) Ion pumps
   B) Sodium Channels

3. **Module 3. **SUGARS AND POLYSACCHARIDES
   A) Monosaccharides
   B) Polysaccharides
   C) Glycoproteins

4. **Module 4. **ENZYMES
   A) Enzyme function and rates
   B) Enzyme catalysis
   i) Michaelis-Menton
   ii) Briggs-Haldane
   C) Enzyme regulation
   i) Inhibition
   ii) Cofactors
   D) Methods in enzymology
   i) Molecular biology application
   ii) Biochemical applications

5. **Module 5. **METABOLIC PATHWAYS
   A) Glycolysis
   B) Lipid metabolism
   C) Nucleic acid metabolism
   D) Amino acid metabolism
6. Module 6. SIGNAL TRANSDUCTION
   A) Outside-In signaling
   B) Inside-Out signaling

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.