

**Texas Tech University  
Center for Biotechnology and Genomics**

**Fall 2015 Course Syllabus**

Course Number: BTEC 6301 – 001  
Course Name: Introduction to Biotechnology  
Course Instructor: J. N. Tripathy  
Title: Research Associate Professor  
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Office hours: by appointment  
Course Schedule: Wednesday, 6:00 – 8:50 pm, EXPSC, Room 120

**Course Description:**

This course reviews the history and origin of biotechnology, its rich legacy and its progress overtime. It highlights the main development, the principles and concepts, and seminal events that advances our understanding in both theory and application in this field. It also offers a broad coverage of the fundamental aspects in chemistry, biochemistry, genetics, molecular biology, recombinant DNA technology, genomics and proteomics and their role on the emergence of biotechnology as a science and engineering discipline.

**Prerequisites:**

Admission to MS Biotechnology or bachelor's degree in Natural Sciences or consent of course instructor

**Required Text:**

Genetics: Concepts of Genetics, Robert J. Brooker, Second Edition (McGraw-Hill) and access to "Connect Genetics"

**Require Course Materials:**

Access to Blackboard: [www.blackboard.ttu.edu](http://www.blackboard.ttu.edu).

**Course Objectives and Expected Learning Outcomes:**

At the end of the course, the fully prepared students should be able to:

Explain the fundamental principles of chemistry in life.

Illustrate the atomic and molecular basis of life, biomolecules and their function.

Understand the diversity and commonality of life.

Illustrate Mendel's laws of inheritance and chromosomal theory of inheritance.

Explain the rationale of meiosis behind Mendelian and non-Mendelian inheritance.

Describe the structure DNA, how it replicates and maintains its fidelity.

Describe how genome evolves, how genome transcribes and translates to proteins.

Describe strategies to clone, purify, analyze and map gene.

Devise strategies to mutate a gene and editing the genome.

Describe the importance of human genome project and its impact in the field of medicine, life sciences and biotechnology.

**Assessments:**

Learning outcome will be assessed by following procedures:

Reading assignments - 20%

Three one-hour Exam. (9/9, 10/7, 11/11) - 45% (equally distributed)

Comprehensive final exam (12/5) - 25%

Class participation - 10%

**Reading assignment:**

Reading assignment will be available in Mc-Graw-Hill's Connect through Blackboard. Every week, several chapters from your text book will be assigned to you to read and the credits will be given for your work if it is completed by the due date. Once the due date passes, you will receive NO credit for that assignment. However, you can still access the chapters to study.

**Examination:**

Exam questions will be based on topics discussed in lecture, book chapters and assigned reading materials. Exams will cover multiple choice, short answer, fill in the blanks types of questions.

**Class Participation:**

You are expected to engage in learning in the class by actively taking notes, sharing your thoughts and ideas, participating in-class discussion, asking and answering questions and debating respectfully.

**Grading:**

A final letter grade will be determined by performance on the above criteria, 90% and above – "A", 80 to 89.9% - "B", 70 to 79.9% - "C" and 69 to 69.9% - "D" and below 60% - "F". 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.

**Attendance:**

Lectures will include certain facts and discussion that may not be in the assigned text or 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 me 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 more than a day due to an illness.

**Academic Integrity:**

It is the aim of the faculty of Texas Tech University to foster a spirit of complete honesty and a high standard of integrity. Each student shall be responsible for his/her conduct. Students are expected to abide by all of the rules for academic integrity, as specified by the TTU Student Affair Hand Book (<http://www.depts.ttu.edu/studentjudicialprograms/academicinteg.php>). 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.

**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.

**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.

## Lecture Schedules:

Lecture	Topics	Date
	<b>Section A: Biotechnology, its origin and progress, Biochemistry, Transmission Genetics, Biochemical Genetics</b>	
1	Introduction: Concepts in Biotechnology Cells: The fundamental units of life	8/26
2	Chemical components of Cell, Biomolecules: Structure and Function	9/2
3	<b>EXAM #1 (15% of Grade) – Lecture 1 and 2</b> Chap.1. Overview of Genetics Chap.2. Reproduction and Chromosome Transmission Chap.3. Mendelian Inheritance	<b>9/9</b>
4	Chap. 4. Sex determination and Sex Chromosomes Chap. 5. Extension of Mendelian Inheritance Chap. 7. Genetic Linkage and Mapping in Eukaryotes	9/16
5	Basics of Human Genetics Introduction to Biochemical Genetics	9/23
6	Chap. 9. Genetics of Bacteria Chap. 10. Genetics of Viruses	9/30
	<b>Section B: Molecular Genetics, Molecular Biology, r-DNA Technology</b>	
7	<b>EXAM # 2 (15% of Grade) – Lecture 3, 4, 5 and 6</b> Chap. 11. Molecular Structure of DNA and RNA Chap. 12. Molecular Structure and Organization of Chromosomes	<b>10/7</b>
8	Chap 13. DNA Replication	10/14
9	Chap. 14. Gene Transcription and RNA Modification Chap. 15. Translation of mRNA	10/21
10	Chap. 20. DNA Technologies	10/28
11	Chap. 16. Gene Regulation in Bacteria	11/4
	<b>Section C: Genomics, Proteomics and Bioinformatics</b>	
12	<b>EXAM #3 (15% of Grade) – Lecture 7, 8,9,10, and 11</b> Chap. 22. Genomics I: Analysis of DNA	<b>11/11</b>
13	Chap. 23. Genomics II: Functional Genomics, Proteomics, and Bioinformatics	11/18
14	Thanksgiving holiday week – No Class	11/25
15	Human Genome Project, Review for Final Exam.	12/2
	<b>EXAM #4 Comprehensive Final EXAM (25% of Grade), Dec 5, 7:30 to 10:00 PM</b>	12/5