Texas Tech University
Center for Biotechnology and Genomics

Fall 2016 Course Syllabus

Course Number: BTEC 6301 – 001
Course Name: Introduction to Biotechnology
Course Instructor: J. N. Tripathy
Title: Research Associate Professor
Office: EXPSC Room 103
Phone: (806) 834-1837
Email: jatindra.n.tripathy@ttu.edu
Office hours: by appointment
Course Schedule: T, TH, 10:00 – 11:20 am, 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 modern biotechnology as an innovation in science and engineering.

Prerequisites:
Admission to MS Biotechnology or bachelor’s degree in Natural Sciences or consent of course instructor

Required Text:
ISBN 978-0-07-352535-8 and access to “Connect Genetics”

Required Course Materials:
Access to Blackboard: 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.
✓ Describe the application of recombinant DNA technology.
✓ Describe how to make transgenic plants and animals.
✓ 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 criteria:
✓ Reading assignments - 20%
✓ Three one-hour Exam. (9/15, 10/20, 11/17) - 45% (equally distributed)
✓ Comprehensive final exam (12/10) - 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.
<table>
<thead>
<tr>
<th>Lecture</th>
<th>Topics</th>
<th>Week</th>
<th>Exam Date</th>
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<tbody>
<tr>
<td></td>
<td><strong>Section A: Biotechnology, its origin and progress, Biochemistry</strong></td>
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| 1, 2    | Introduction: Concepts in Biotechnology  
          Cells: The fundamental units of life | 1    |           |
| 3, 4    | Chemical components of Cell, Biomolecules: Structure and Function | 2    |           |
|         | **Section B: Transmission Genetics, Biochemical Genetics** |      |           |
| 5, 6    | EXAM #1 (15% of Grade) – WEEK 1 and 2  
          Chap.1. Overview of Genetics  
          Chap.2. Reproduction and Chromosome Transmission  
          Chap.3. Mendelian Inheritance | 3    | 9/15      |
| 7, 8    | Chap. 4. Sex determination and Sex Chromosomes  
          Chap. 5. Extension of Mendelian Inheritance  
          Chap. 7. Genetic Linkage and Mapping in Eukaryotes | 4    |           |
| 9, 10   | Basics of Human Genetics  
          Introduction to Biochemical Genetics | 5    |           |
| 11, 12  | Chap. 9. Genetics of Bacteria  
          Chap. 10. Genetics of Viruses | 6    |           |
|         | **Section C: Molecular Genetics, Molecular Biology, r-DNA Technology** |      |           |
| 13, 14  | Chap. 11. Molecular Structure of DNA and RNA  
          Chap. 12. Molecular Structure and Organization of Chromosomes | 7    |           |
| 15, 16  | EXAM #2 (15% of Grade) – WEEK 3, 4, 5 and 6  
          Chap 13. DNA Replication | 8    | 10/20     |
| 17, 18  | Chap. 14. Gene Transcription and RNA Modification  
          Chap. 15. Translation of mRNA | 9    |           |
| 119, 20 | Chap. 20. DNA Technologies | 10   |           |
| 21, 22  | Chap. 16. Gene Regulation in Bacteria | 11   |           |
|         | **Section D: Genomics, Proteomics and Bioinformatics** |      |           |
| 23, 24  | EXAM #3 (15% of Grade) – WEEK 7, 8, 9, 10, and 11  
          Chap. 22. Genomics I: Analysis of DNA | 12   | 11/17     |
| 25, 26  | Chap. 23. Genomics II: Functional Genomics, Proteomics, and Bioinformatics | 13   |           |
|         | Thanksgiving holiday week – No Class | 14   |           |
| 27, 28  | Human Genome Project, Review for Final Exam. | 15   |           |
|         | EXAM #4 Comprehensive Final EXAM (25% of Grade), Dec 10, 7:30 to 10:00 AM | 12/10|           |