Montgomery County Community College
BIT 120
Introduction to Biotechnology
4-2-3

COURSE DESCRIPTION:
This course is designed to acquaint students with the field of biotechnology. Topics will include a history of the biopharmaceutical industry, the drug discovery and development processes, medical biotechnology, forensics and bioremediation. Students will learn basic techniques and instrumentation used in biotechnology labs and the fundamentals of recombinant DNA technology. Issues that impact both the industry and the general population such as the regulation of the pharmaceutical industry, stem cell research, GMO's and bioethics will be examined in this course. This course is subject to a course fee. Refer to http://mc3.edu/adm-fin-aid/paying/tuition/course-fees for current rates.

REQUISITE(S):
Previous Course Requirements
- ENG 011 Basic Writing II or ESL 011 ESL Basic Writing II
- REA 011 Fundamentals of College Reading or REA 017 Vocabulary and Reading Comprehensive Development II
- MAT 011 Basic Algebra
- College Biology or High School Biology (College preparatory or higher) with in the last 5 years

LEARNING OUTCOMES Upon successful completion of this course, the student will be able to:	LEARNING ACTIVITIES	EVALUATION METHODS
1. Describe important historical events and figures in the development of biotechnology processes during the past century.	Lecture Small Group Discussions Reading Assignments Research Assignment	Quizzes and Exams Essays
2. Summarize the general properties of biological cells, including major organelles and their respective functions.	Lecture Small Group Discussions Reading Assignments Written Assignment Laboratory experiment and demonstrations	Quizzes and Exams Essays Laboratory report

LEARNING OUTCOMES	LEARNING ACTIVITIES	EVALUATION METHODS
3. Describe the function and the basic properties of DNA, RNA and proteins.	Lecture Small Group Discussions Reading Assignments Written Assignment Laboratory experiments and demonstrations	Quizzes and Exams Essays Laboratory report
4. Perform techniques involving common types of measurement in a biotechnology lab	Laboratory experiments and demonstrations	Quizzes and Exams Laboratory reports
5. Discuss the principles of recombinant DNA technology	Lecture Small Group Discussions Reading Assignments Written Assignment Laboratory experiments	Quizzes and Exams Essays Laboratory reports
6. Perform techniques involving the manipulation of DNA and microbial cells	Laboratory experiments and demonstrations	Quizzes and Exams Laboratory reports
7. Discuss the principles of proteins as drug products and the manufacture of these drugs	Lecture Small Group Discussions Reading Assignments Written assignment Laboratory experiments	Quizzes and Exams Essays Laboratory Reports
8. Investigate and explain current events and advances in medical biotechnology including diagnostic techniques and approved biopharmaceuticals	Lecture Guest Lecturers from Industry Small Group Discussions Reading Assignments Written Assignment	Quizzes and Exams Essays
9. Name and define the operating principles of the regulatory agencies that approve pharmaceutical products.	Lecture Guest Lecturers from Industry Small Group Discussions Reading Assignments Written Assignment Case Studies	Quizzes and Exams Written report

LEARNING OUTCOMES	LEARNING ACTIVITIES	EVALUATION METHODS
10. Discuss intellectual property and analyze what can be patented and how patents affect company profits	Lecture Guest Lecturers from Industry Small Group Discussions Reading Assignments Written Assignment	Quizzes and Exams Essays
11. Discuss global and ethical issues that affect decisions made by researchers at biotechnology and pharmaceutical companies.	Lecture Guest Lecturers from Industry Small Group Discussions Reading Assignments Written Assignment	Quizzes and Exams Essays
12. Plan and deliver an oral presentation or comprehensive review paper about relevant a biotechnology topic.	Lecture Guest Lecturers from Industry Small Group Discussions Reading Assignments	Oral Presentation or paper

At the conclusion of each semester/session, assessment of the learning outcomes will be completed by course faculty using the listed evaluation method(s). Aggregated results will be submitted to the Associate Vice President of Academic Affairs. The benchmark for each learning outcome is that *70% of students will meet or exceed outcome criteria*.

SEQUENCE OF TOPICS:

1. History of the Biotechnology/Biopharmaceutical Industry
2. Review of Applicable Cell BiologyTopics
3. Introduction to Molecular Biological Concepts and Techniques
    a. Recombinant DNA technology
    b. Mutations/genetic diseases
    c. Microbial and eukaryotic protein expression systems
    d. Microbial and eukaryotic cell culture
4. Proteins as Products
5. Microbial Biotechnology
6. Plant Biotechnology
7. Animal Biotechnology
8. Medical Biotechnology
    a. Diagnostic Techniques
    b. Approved Biopharmaceuticals
9. Forensic Biotechnology
10. Regulatory agencies and the drug approval process

11. Introduction to Patents and Business Aspects of the Biotechnology Industry
12. Bioethics in Drug Development and other biotechnology applications

LEARNING MATERIALS:

Textbook:
Thieman, J. and Palladino, M.A. *Introduction to Biotechnology* (3rd edition) Pearson Publishing Company, 2012
Other reading materials (scientific journal articles, on-line exercises and laboratory protocols) will be used throughout the course as needed.

Other learning materials may be required and made available directly to the student and/or via the College's Libraries and/or course management system.

COURSE APPROVAL:

Prepared by:	Linda R. Rehfuss, Ph.D. Biotechnology Instructor		Date: 11/1/2004
Board of Trustees Presentation			Date: 12/31/2004
VPAA/Provost Compliance Verification:		Dr. John C. Flynn, Jr.	Date: 7/1/2009
Revised by:	Kevin Lampe		Date: 2/1/2010
VPAA/Provost Compliance Verification:		Dr. John C. Flynn, Jr.	Date: 6/22/2010
Revised by:	Margaret Bryans, Ph.D.		Date: 12/22/2012
VPAA/Provost or designee Compliance Verification:	Victoria L. Bastecki-Perez, Ed.D.		Date: 5/23/2013
Revised by:	Margaret Bryans, PhD		Date: 11/13/2017
VPAA/Provost or designee Compliance Verification:			Date: 1/8/2018

This course is consistent with Montgomery County Community College's mission. It was developed, approved and will be delivered in full compliance with the policies and procedures established by the College.