Montgomery County Community College
BIT 124
Molecular Techniques
2-1-2

COURSE DESCRIPTION:
This course is designed to introduce students to the areas of medical biotechnology and molecular diagnostics. Students will learn the theory behind these areas and will practice molecular techniques used in medical laboratories.

REQUISITES:
Previous Course Requirements
* BIO 141 Clinical Microbiology I with a minimum grade of "C"

Concurrent or Previous Course Requirements
* MLT 235 Clinical Practicum in MLT I

LEARNING OUTCOMES Upon successful completion of this course, the student will be able to:	LEARNING ACTIVITIES	EVALUATION METHODS
1. Describe the function and basic properties of DNA, RNA and Proteins.	Lecture Small Group Discussions Laboratory Experiments Videos	Section Examination Final Comprehensive Examination Lab Exercises and Reports
2. Discuss the principles and methodologies behind DNA and protein based diagnostic techniques.	Lecture Small Group Discussions Laboratory Experiments Videos Case Studies	Section Examination Final Comprehensive Examination Lab Exercises and Reports
3. Correlate microbial and medical biotechnology to patient treatment, diagnostics and surveillance.	Lecture Small Group Discussions Laboratory Experiments Reading and Problem-Solving Assignments	Section Examination Final Comprehensive Examination Lab Exercises and Reports
4. Perform molecular diagnostic techniques.	Lecture Small Group Discussions Laboratory Experiments Videos Case Studies	Section Examination Final Comprehensive Examination Lab Exercises and Reports

LEARNING OUTCOMES :	LEARNING ACTIVITIES	EVALUATION METHODS
5. Discuss relevant medical biotechnology techniques.	Reading and Research Case Studies	Written Assignment or Oral Presentation Following Detailed Rubric

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. Course Introduction and Policies, Safety, Genes and Genomes
2. Cellular Processes, Molecular Techniques Lab #1: Electrophoresis of DNA
3. Molecular Techniques Lab #2: NAATs, DNA Sequencing
4. Proteins and Antibodies, Molecular Techniques Lab #3: Western Blot and ELISA
5. Medical Biotechnology, Molecular Techniques Lab #4: Microarray, IHC
6. Biomarkers and Therapies, Molecular Techniques Lab #5: Aseptic Technique and Cell Culture
7. Biotechnology Analytics, Molecular Techniques Lab #6: HPLC Analytics

LEARNING MATERIALS:
Instructor provided handouts, case studies and on-line resources.
Samples:
Case 340 -- Familial adenomatous polyposis: A molecular diagnostic approach
Contributed by Diana Ionescu, MD, Federico Monzon, MD*, Georgios Papachristou MD**, Robert Schoen MD**, Karen Weck, MD* and Sydney Finkelstein, MD, PhD* University of Pittsburgh Medical Center, *Department of Pathology and Laboratory Medicine and **Department of Medicine*. *Published on line in February 2003*
http://path.upmc.edu/cases/case340.html

Rapid PCR detection of group a streptococcus from flocked throat swabs: A retrospective clinical study
Slinger et al. Annals of Clinical Microbiology and Antimicrobials 2011,
https://ann-clinmicrob.biomedcentral.com/articles/10.1186/1476-0711-10-33

Accelerating Science Using Integrated PCR Tools – Genetic Engineering eBook
https://portal.nxtbook.com/gateway/ebook/lgc_ebook

Jeffrey W. Mercante, Jonas M. Winchell. Current and Emerging *Legionella* Diagnostics for Laboratory and Outbreak Investigations. Pneumonia Response and Surveillance Laboratory, Respiratory Diseases Branch, U.S. Centers for Disease Control and Prevention, Atlanta, Georgia, USA
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4284297/

Journal of Clinical Microbiology Reviews, January 2015, Volume 28 Number 1
cmr.asm.org

Medical Microbiology Laboratory Case Studies – Laboratory Curriculum
American Microbiology Society. PDF Mostly biochemical tests but will be used as a template for differential molecular diagnostic tests

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: Debra Lynn Eckman and Margaret Bryans Date: 9/6/2017
VPAA/Provost or designee Compliance Verification: Date: 10/25/2017

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.