

**Master Course Syllabus
Kennedy King College
One of the City Colleges of Chicago
Biotechnology
Semester/Academic Year (20__ - 20__)**

Course Prefix and Number: Biotech 262

Course Title: Biomanufacturing

Length of Course: 16 weeks

PCS Code: 1.2

IAI Code:

Semester Credit Hours: 4.0

Contact Hours (minutes): 6 (4800 minutes)

Lecture Hours (minutes): 2 (1600 minutes)

Lab Hours (minutes): 4 (3200 minutes)

Method of Delivery (mark all that apply): Face to Face ☒ Online ☐ Hybrid ☒

Course Catalog Description: The production of biopharmaceutical products by bacteria, yeast, and eukaryotic cell lines constitutes what is referred to as Biomanufacturing. Biomanufacturing of the products is a multi-step process which involves the use of bioreactors, flow cytometers, cell counters and many other instruments. In this course students will learn various biomanufacturing protocols and the theoretical background to analyze their results and problem solve errors that arise. Writing assignments, as appropriate to the discipline, are part of the course. Topical coverage may change based on evolving industry standards and needs.

Prerequisites: Grade of C or better in Biotechnology 230 and Biotechnology 220, or Consent of Department Chairperson.

Course Objectives:

This course covers:

1. How to produce monoclonal antibodies using animal cell lines.
2. How to produce various biopharmaceutical products using bacteria, yeast, algae and animal cells in a biotechnology laboratory setting.
3. How to produce human serum albumin (HSA) using fungi.
4. How to produce fatty acid methyl esters (FAME) using algae.

Student Learning Outcomes:

Upon successful completion of the course, students will be able to:

1. Develop a Standard Operating Procedure (SOP) that illustrates how to create a cell therapy product that can be used to treat patients.
2. Develop an SOP which illustrates how to create a monoclonal antibody (m ab) (cell therapy product) that can be used to treat patients.

3. Design an experiment to produce other protein and lipid products which are of interest to biomanufacturing companies using bacteria, yeast, algae, and mammalian cells.

Suggested Topical Outline					
Class Units (# of units is dependent on course – adjust accordingly)	Topic (Required)	Content (Optional - provide details)	Lab Information	Desired Outcome(s)	Suggested Assessment Method(s)
Unit 1	Introduction to Human serum albumin (HSA) production		Using common yeast	1	Weekly notebook check 1
Unit 2	Upstream process for HSA		Use the yeast to begin the production process	1, 2, 3,	Weekly notebook check 2
Unit 3	Downstream process for HSA		Use the yeast to complete the production	1, 2, 3, 4	Weekly notebook check 3
Unit 4	QC Biochemistry		Analysis of the HSA production process	1, 2, 3	Weekly notebook check 4
Unit 5	Introduction to biomanufacturing		Choose the organism to produce the biopharmaceutical product		Weekly notebook check 5
Unit 6	Upstream processing using bacteria, yeast, or animal cell lines.		Use the chosen organism to carry out the production	6, 7	Weekly notebook check 6
Unit 7	Downstream processing of bacteria, yeast, or animal cell lines.		Use the chosen organism to carry out the production	6, 7	Weekly notebook check 7
Unit 8	QC Biochemistry for biopharmaceutical products		Use the chosen organism to carry out the production	6, 7	Midterm lab Exam
Unit 9	Introduction to cell therapy		Carry out the cell therapy process		Weekly notebook check 8
Unit 10	How to produce CAR-T cells		Carry out the cell therapy process	5, 7	Weekly notebook check 9
Unit 11	How to use Single use bioreactors to produce therapeutic products: cell production		Carry out the cell therapy process	5, 7	Weekly notebook check 10
Unit 12	How to use Single use bioreactors to produce therapeutic products: cell production		Carry out the cell therapy process	5, 7	Weekly notebook check 11
Unit 13	How to use Single use bioreactors to		Carry out the cell therapy process	5, 7	Weekly notebook check

	produce therapeutic products: cell production				12
Unit 14	Analysis of CAR-T cells using Flow cytometry and Fluorescence activated cell sorting		Carry out the cell therapy process	5, 7	Weekly notebook check 13
Unit 15	storage and cryopreservation methods		Carry out the cell therapy process	5, 7	Weekly notebook check 14
Unit 16	Presentations of work				Final Lab Exam Lab notebook submission

Students Course Is Expected to Serve: Students who are pursuing an Associates of Applied Science degree in Biotechnology.

Suggested Texts, Materials, and Resources:

Text: Pichia pastoris Laboratory Manual by Northeast Biomanufacturing Center and Collaborative (NBC²) and Biomanufacturing Laboratory Manual by Northeast Biomanufacturing Center and Collaborative (NBC²)

Materials:

Resources: Use appropriate web sites and instructor provided text/lab books to supplement the material.

Supplies: a lab coat, goggles and gloves are helpful

Suggested Methods of Instruction: We will utilize lectures, discussion, laboratories, group activities.

Suggested Methods of Assessment and Evaluation:

(Formative and Summative): We will utilize quizzes, exams, lab reports, homework, and papers to assess students in this course.

Suggested Grading Scale:

Assignments:	Grade Distribution: 90 % to 100 % = A 80 % to 89% = B 70 % to 79 % = C 60 % to 69 % = D Below 60% = F
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Suggested Exit Assessment/Competencies (as applicable):

Processing Validation (To be completed by College)

Add – Effective Term/Year: _____ Reactivate – Effective Term/Year: _____
Inactivate – End Term/Year: _____ Withdraw – End Term/Year: _____

Approved College(s):

DA: ____ HW: ____ KK: _X_ MX: ____ OH: ____ TR: ____ WR: ____

Syllabus Preparer/Advocate: _____ Clifford Wilson, III _____

Title of Advocate: _____ Assistant Professor _____

College of Advocate: _____ Kennedy King College _____

ICCB Submission Date: (/ /)

ICCB Approval Date: (/ /)

IAI Submission Date: (/ /)

IAI Approval Date: (if applicable) (/ /)

IAI Panel: _____

IAI Code: _____

PACC Master Course Syllabus Template –August 2020