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

Course Prefix and Number: Biotech 220

Course Title: Cell Culture Laboratory

Length of Course: 16 weeks

PCS Code: 1.2

IAI Code:

Semester Credit Hours: 3.0

Contact Hours (minutes): 5.0 (4000 minutes)

Lecture Hours (minutes): 1 (800 minutes)

Lab Hours (minutes): 4 (3200 minutes)

Method of Delivery (mark all that apply): Face to Face __X_ Online ____ Hybrid _X___

Course Catalog Description: Covers the basic techniques of plant and animal cell culture. Plant unit includes media preparation isolation of explants and establishment of callus from suspension cultures, growth factor bioassays, regeneration of whole plants from tissue and plant genetic engineering techniques. Mammalian cell units include media preparation, maintenance of cultured cells, transfection of cultured cells, cloning and ELISA assays and monoclonal antibody production. Writing assignments, as appropriate to the discipline, are part of the course.

Prerequisites: A grade of C or better in Biology 121 and Microbiology 233

Course Objectives:
This course covers:

1. Basic cell culture techniques.
2. Lab safety and why it is important to adhere to the rules of a cell culture laboratory.
3. How to use aseptic techniques to minimize contamination of cell lines.
4. The different types of lab equipment used in a cell culture laboratory.
5. How to prepare and sterilize culture vessels and media for various cell lines.
6. The different types of cultures used for plant cell lines.
7. How the low-tech monoclonal antibody production system works.

Student Learning Outcomes:

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

1. Demonstrate their understanding of basic cell culture techniques for a biotechnology laboratory.
2. Apply appropriate safety protocols for cell culture in a biotechnology laboratory.
3. Make use of aseptic technique for a cell culture laboratory in order to limit contamination of cell lines.
4. Classify the different types of lab equipment for a cell culture laboratory.
5. Distinguish the preparation and sterilization of culture vessels and media for different cell lines in the biotechnology laboratory.

6. Design a concept map which demonstrates their understanding of cell separation, selection and cloning techniques.
7. Compare and contrast the different types of culture techniques (e.g., Callus, seed) in a cell culture laboratory.
8. Discuss how to characterize and differentiate and transform different cell lines.
9. Design an experiment which demonstrates their understanding of low-tech monoclonal antibody production for animal cell lines.

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	Growing Cells and Microscopy	Reading: Culture Media for Intact Cells p. Problems: 1 - 12	Introduction to Growing Cells Introduction to Microscopy	1, 2, 4	
Unit 2	Aseptic Technique		Aseptic Technique in a Biological Safety Cabinet	1, 2, 3, 4	Lab notebook check
Unit 3	Medium Preparation for various cell lines		Making Ham's F12 Medium and more	3, 5	
Unit 4	Examining and Documenting and care of various cell lines	Reading: The Immortal Life of Henrietta	Examining, Photographing and Feeding CHO cells, HeLa cells, SF 9 cells	1, 2, 3, 4, 7	Lab notebook check

		Lacks by Rebecca Skloot			
Unit 5	Counting mammalian cells Maintaining mammalian cell lines	Reading: The Immortal Life of Henrietta Lacks by Rebecca Skloot	Counting cells using a Hemacytometer and Cell Counter Subculturing CHO cells	8	
Unit 6	QC mammalian cells Medium Low tech mAB production	Reading: The Immortal Life of Henrietta Lacks by Rebecca Skloot	Preparing a growth curve for CHO cells Upstream: Resuscitation of CHO cells	1, 2, 3, 4, 5, 9	Lab notebook check
Unit 7	Low tech mAB production	Reading: The Immortal Life of Henrietta Lacks by Rebecca Skloot	Upstream: Expansion and Harvest of CHO cells Downstream: prepare Conditioned Media	1, 2, 3, 4, 5, 9	
Unit 8	Low tech mAB production		Downstream: Use Affinity	1, 2, 3, 4, 5, 9	Midterm Lab Exam

			Chromatography Protein A to purify		Lab notebook check
Unit 9	Low tech mAB production		Downstream: Analysis using SDS Page and Western blot	1, 2, 3, 4, 5, 9	
Unit 10	Introduction to Arabidopsis and other plant cell lines		Introduction to Arabidopsis How to propagate healthy plants for cell culture	1, 2, 3, 4,	Lab notebook check
Unit 11	Examining and Documenting and care of plant cell lines		Growing, Examining, Photographing and Feeding Arabidopsis in cell culture	1, 2, 3, 4, 5, 7	
Unit 12	Preparation of nutrient media and sterilization techniques		Lab with Arabidopsis	1, 2, 3, 4, 5,	Lab notebook check
Unit 13	Survey of culture types (e.g. Callus)		Lab with Arabidopsis	1, 2, 3, 4, 5, 7, 8	
Unit 14	Micropropagation techniques		Lab with Arabidopsis	6, 7, 8	Lab notebook check
Unit 15	Producing cell suspensions and secondary metabolites		Lab with Arabidopsis	1,2, 3, 4, 5, 6, 7, 8	
Unit 16	Presentations of semester work				Final Lab Exam Lab book 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: Seidman, L. A. (2022). Laboratory Manual for Biotechnology and Laboratory Science: The basics (LMB&LS). CRC Press; 2nd edition. Units 1 - 6

Materials:
Resources:
Supplies: a lab coat, goggles and gloves are helpful

Suggested Methods of Instruction: We will use lectures, discussion, laboratory work.

Suggested Methods of Assessment and Evaluation:
(Formative and Summative) We will utilize exams, lab reports and homework 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

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 Collge_____

ICCB Submission Date: (/ /)
ICCB Approval Date: (/ /)
IAI Submission Date: (/ /) IAI Panel: _____
IAI Approval Date: (if applicable) (/ /) IAI Code: _____