AGU Graduate School of Engineering and Science Bioengineering Program

COURSE RECORD

Code	**BENG548**
Name	**Cell Culture Techniques**
Hour per week	3+0 (Theory+Practice)
Credit	3
ECTS	7.5
Level/Year	Graduate
Semester	Fall
Type	Elective
Location	Classroom
Prerequisites	Some background knowledge of biology and familiarity with structure and functions of cells is expected.
Special Conditions	-
Coordinator(s)	Dr. Zeliha Soran Erdem
Webpage	-
Content	This course provides knowledge of basic cell culture concepts and terminology, and it aims to be a guide for the grad students to design and carry on an *in vitro* experiment. The topics covered in this course include aseptic working area, maintenance of cells in the culture, cell-based assays, 2D/3D cell culture strategies, transfection and hybridoma technologies, and preventative and/or corrective actions for the contamination problem.
Objectives	- To introduce laboratory equipment, cell biology terminology and general information about the cell culture. - To provide the knowledge of cell types together with the key principles for the maintenance of cells *in vitro*. - To explain qualitative and quantitative characterization techniques in the cell culture. - To describe 2D and 3D cell culture techniques and the use of biomaterials for the design of novel 3D cell cultures. - To make students familiar with the transfection and hybridoma technologies. - Providing the necessary background for understanding the fundamentals and applications of cell culture.
Learning Outcomes	LO1 Learning basic principles of cell culture and required equipment to establish a cell culture laboratory. LO2 Understanding the key parameters to maintenance cells *in vitro* (such as media preparation, cryopreservation, thawing etc.) and the ability to optimize cell culture conditions for different cell types. LO3 Learning how to troubleshoot in the cell culture laboratory. LO4 Learning the varying cell-based assays for the evaluation of cell health and quality. LO5 Having knowledge of the difference between 2D and 3D cell cultures along with the strategies for 3D cell culture. LO6 Learning how to design an experiment *in vitro* for the academic research.
Requirements	Maureen A. Harrison and Ian F. Rae, "General Techniques of Cell Culture", ISBN: 9780511623226, Cambridge University Press, 1997.
Reading List	- John Davis, "Animal Cell Culture: Essential Methods", ISBN: 978-0-470-97563-3, Wiley-Blackwell, 2011. - R. Ian. Freshney, "Culture of Animal Cells: A Manual of Basic Technique and Specialized Applications", 7th Edition, Wiley-Blackwell, 2016.
Ethical Rules and Course Policy	University Ethics (Academic Honesty) Rules

LEARNING ACTIVITIES *Please, use this one as a reference for your course*

Activities	Number	Weight (%)
Lecture	13	40%
Group Works	4	20%
Presentations	2	30%
Web search	5	10%
	Total	100

ASSESSMENT

Evaluation Criteria	Weight (%)
Quizzes	15%
Weekly Assignments	10%
Group Project Assignments & Presentations	25%
Attendance/Participation	05%
Midterm	15%
Final Exam/Submission	30%
Total	100%

For a detailed description of grading policy and scale, please refer to the website https://goo.gl/HbPM2y section 28.

COURSE LOAD *Please, use this one as a reference for your course*

Activity	**Duration** (hour)	**Quantity**	**Work Load** (hour)
In class activities	3	14	42
Group work	3	8	24
Weekly Assignments	3	12	36
Research (web, library)	3	10	30
Required Readings	3	5	15
Pre-work for Presentation	5	5	25
Quiz	3	5	15
Studying for Midterm	15	1	15
Studying for Final Exam	25	1	25
		General Sum	**227**

ECTS: 7.5 (Work Load/25-30)

CONTRIBUTION TO PROGRAMME OUTCOMES*

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14
LO1	4	4	5	3	2	4	3	3						
LO2	4	5	4	4	3	5	5	4						
LO3	5	4	4	4	3	4	4	5						
LO4	5	5	5	5	4	5	4	5						
LO5	5	4	5	5	4	5	5	5						
LO6	5	5	5	5	5	5	5	5						

* Contribution Level: 0: None, 1: Very Low, 2: Low, 3: Medium, 4: High, 5: Very High

WEEKLY SCHEDULE

W	**Topic**	**Outcomes**
1	Introduction to Cell Culture Laboratory and Equipment	LO1
	Lab/Activity: Lecture, Web Search	
2	Working in a Cell Culture Laboratory: Aseptic Techniques and Safety Considerations	LO1, LO2, LO3
	Lab/Activity: Lecture, Web Search	
3	Types of Cells and Their Characteristics in the Culture	LO2, LO5
	Activity: Lecture, Group Work	
4	Stem Cell Types and Their Use in Cell Culture	LO2, LO5
	Activity: Lecture, Group Work	
5	Cell Culture Media and Growth Requirements for Animal and Stem Cells	LO2
	Activity: Lecture, Web Search	
6	Cryopreservation, Thawing, and Maintenance of the Cell Culture	LO1, LO2
	Activity: Lecture, Web Search	
7	Identification and Eradication of Common Contaminants in Cell Culture	LO3, LO4
	Activity: Lecture, Web Search	
8	Midterm Exam	
	Activity:	
9	Qualitative and Quantitative Assays in the Cell Culture	LO4
	Activity: Lecture, Group Work	
10	Transfection Techniques	LO6
	Activity: Lecture, Group Work	
11	Hybridoma Technology	LO6
	Activity: Lecture, Group Work	
12	3D Cell Culture Strategies and Biomaterials	LO5, LO6
	Activity: Lecture, Group Work	
13	Designing a Cell Culture Experiment	LO2, LO4, LO5, LO6
	Activity: Web Search, Group Work	
14	Presentation of Term Project to Class	
	Activity: Group Work, Presentation	

Prepared by: Dr. Zeliha Soran Erdem
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