AGU Graduate School of Engineering and Science Bioengineering Program

COURSE RECORD

Code	**BENG545**
Name	**Protein Expression and Purification**
Hour per week	3 (Theory + Practice)
Credit	3
ECTS	10
Level/Year	Graduate
Semester	Fall
Type	Elective
Location	
Prerequisites	
Special Conditions	
Coordinator(s)	
Webpage	
Content	Overview of bacterial and eukaryotic protein expression systems and protein extraction methods from different sources. Principles of protein purification methods such as precipitation, centrifugation, electrophoresis, liquid chromatography and affinity enrichment.
Objectives	-Evaluate pros and cons of variety of protein expression systems -Learn basic principles of protein extraction and quantification methods -Outline chromatography methods -Design protein purification strategy
Learning Outcomes	LO1 Students completing this course will be able to design a protein purification strategy for a given protein. LO2 Students completing this course will be able to criticize of a research paper reporting the protein expression and separation techniques. LO3 Students completing this course will be able to learn chromatography instruments and columns LO4 During this class students will be able to participate in group discussions
Requirements	You need to read assigned research articles before class and participate in-group discussion. You will need to search a relevant publication to present in the class.
Reading List	Protein Purification Techniques: A Practical Approach, Simon Roe, OUP Oxford 2001 Protein Purification: Principles, High Resolution Methods, and Applications, Third Edition,Jan-Christer Janson, John Wiley & Sons, Inc., 2011
Ethical Rules and Course Policy	

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

Activities	**Number**	**Weight (%)**
Lecture	26	40%
Group Works	13	25%
Presentations	1	25%
Site Visits	1	10%
	Total	100

ASSESSMENT

Evaluation Criteria	**Weight** (%)
Quizzes	0 %
Weekly Assignments	10%
Group Project Assignments & Presentations	20%

Attendance/Participation	10%
Midterm	20%
Final Exam/Submission	40%
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	2	13	26
Lab	0	0	0
Group work	1	12	12
Research (web, library)	1	13	13
Required Readings	3	13	39
Pre-work for Presentation	10	1	10
Lab reports	0	0	0
		General Sum	**100**

ECTS: 4 (Work Load/25-30)

CONTRIBUTION TO PROGRAMME OUTCOMES*

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14
LO1	4	5	3	2	1	0	0	0						
LO2	1	3	1	5	2	5	5	3						
LO3	5	5	5	2	1	0	0	0						
LO4	1	1	1	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 protein expression and purification	LO1
2	Prokaryotic protein expression systems Activity: Group discussion	LO1, LO2, LO4
3	Eukaryotic protein expression systems Activity: Group discussion	LO1, LO2, LO4
4	Cell-free expression systems Activity: Group discussion	LO1, LO2, LO4
5	Protein extraction methods Activity: Group discussion	LO1, LO2, LO4
6	Protein quantification methods Activity: Group discussion	LO1, LO2, LO4
7	Protein separation methods (Precipitation and Seperation) Activity: Group discussion	LO1, LO2, LO4
8	Chromatography Methods	LO1, LO2, LO3, LO4
9	Gel Filtration Chromatography Activity: Group discussion	LO1, LO2, LO3, LO4
10	Ion Exchange Chromatography Activity: Group discussion	LO1, LO2, LO3, LO4
11	Hydrophobic/Hydrophilic interaction Chromatography Activity: Group discussion	LO1, LO2, LO3, LO4
12	Electrophoresis Activity: Group discussion	LO1, LO2, LO3, LO4
13	Affinity Enrichment Activity: Group discussion	LO1, LO2, LO3, LO4
14	Student Presentations	LO2, LO4

Prepared by
Date