AYDIN ADNAN MENDERES UNIVERSITY
COURSE INFORMATION FORM

Course Title	Protein Isolation and Identification Techniques								
Course Code	BYK606		Couse Level		Third Cycle (Doctorate Degree)				
ECTS Credit	5	Workload	125 *(Hours)*	Theory	2	Practice	2	Laboratory	0
Objectives of the Course	It is aimed to give new developments in the field of protein purification in the light of basic techniques.								
Course Content	Structural properties and investigation of proteins, amino acids and chemical proporties, primary structure of proteins: the amino acid sequence, N-terminal and C-terminal, amino acid sequencing / gene relationship, levels of the upper structure of proteins – secondary - tertiary and quaternary structure - the structure - function relationships, proteins and biomembranes: membrane proteins, oxygen-binding proteins: myoglobin and hemoglobin, the protein concentration measurement method I, Bradford methods, the protein concentration measurement method II, Lowry method, BCA method, Biuret method, analytical methods, TCA precipitation, acetone precipitation, immunoprecipitation, concentration of protein solutions, preparative methods, ammonium sulfate precipitation, precipitation with an organic solvent, precipitation with polyethylene glycol, ultrafiltration, dialysis, lyophilization.								
Work Placement	N/A								
Planned Learning Activities and Teaching Methods	Explanation (Presentation), Experiment, Demonstration, Discussion, Individual Study								
Name of Lecturer(s)									

Assessment Methods and Criteria		
Method	Quantity	Percentage (%)
Midterm Examination	1	40
Final Examination	1	60

Recommended or Required Reading	
1	Protein Purification Protocols: Paul Cutler
2	Protein Analysis and Purification: Benchtop Techniques
3	R. K. Scopes, Protein Purification: Principles and Practice, 3rd ed., Springer- Verlag, (1994) E. L. V. Harris, S. Angal Eds.
4	Protein Purification Methods; A Practical Approach, 2nd ed., Oxford University Press, (2001) Simpson,R.J

Week	Weekly Detailed Course Contents	
1	Theoretical	Purpose of protein purification and preliminary planning: source and localization of target protein, amount, physicochemical and physical properties
2	Theoretical	The purpose of protein purification and preliminary planning: the purpose of purification, monitoring of protein purification
3	Theoretical	Protein saflaştırma stratejisi , Ön Ayırma teknikleri; 1. Hücre parçalama/ Homojenizasyon: Mekanik olmayan Teknikler: ısı ile parçalama, Freze-Thaw, Desikasyon, Osmotik şok, Litik enzimler, Alkali, Deterjanlar vb.
	Practice	Cell lysis / Homogenization
4	Theoretical	Pre-separation techniques (continued) Mechanical methods: Blenders, homagenizers, grinders, Agitation with Abrasives, Liquid and Solid Extrusion, Ultrasonication
	Practice	Blenders, homagenizers, grinders, Agitation with Abrasives, Liquid and Solid Extrusion, Ultrasonication
5	Theoretical	2. Clarification; Centrifugal; Differential Centrifuge, Density Gradient Centrifuge, Membrane Filtration techniques
	Practice	2. Clarification; Centrifugal; Differential Centrifuge
6	Theoretical	3. Concentration of extract: Ultrafiltration, Lyophilization
7	Theoretical	3. Concentration of the extract: precipitation methods (isoelectric precipitation, precipitation by changing ionic strength, organic solvents, organic polymers and denaturation precipitation)
8	Intermediate Exam	Protein Isolation and Identification Techniques Midterm Exam
9	Theoretical	Chromatographic Methods; Introduction to chromatography and basic concepts in liquid chromatography, ion exchange chromatography
10	Theoretical	Chromatographic Methods; Hydrophobic Interaction Chromatography, Gel Filtration Chromatography
11	Theoretical	Chromatographic Methods; Affinity chromatography: Biospecific, Immunoaffinity, Lectin affinity, Dye-ligand, Metal-Chelate, Covalent affinity chromatography

12	Theoretical	Electrophoretic Methods; Principles of electrophoresis, protein electrophoresis; PAGE, SDS-PAGE, IEF, 2D-PAGE. Blotting, Immunustain, Imaging and evaluation
	Practice	Protein electrophoresis; PAGE, SDS-PAGE, IEF, 2D-PAGE. Blotting, Immunustain, Imaging and evaluation
13	Theoretical	Characterization: Functional Characteristic; Techniques to be selected according to biological activity of protein
14	Theoretical	Purity control, Molecular mass determination and IP determination Amino acid analysis, N-, C-terminal analysis, etc.
15	Theoretical	Integration and comparison, proteomic technologies and multidimensional techniques
16	Final Exam	Protein Isolation and Identification Techniques Final Exam

Workload Calculation

Activity	Quantity	Preparation	Duration	Total Workload
Lecture - Theory	14	0.5	1	21
Lecture - Practice	14	0.5	1	21
Laboratory	6	3	9	72
Midterm Examination	1	4	1	5
Final Examination	1	5	1	6
			Total Workload (Hours)	125
			[Total Workload (Hours) / 25*] = **ECTS**	5

**25 hour workload is accepted as 1 ECTS*

Learning Outcomes

1	Literature review and interpretation of target protein purification
2	Evaluate, compare and interpret research results
3	To be able to design and develop protein purification strategies
4	To be able to relate the general properties of proteins and target protein properties
5	To be able to understand the use of chromatographic and electrophoretic techniques in separation and protein sequence analysis
6	To be able to examine and compare the advantages / disadvantages of the methods used

Programme Outcomes *(Biochemistry (Medical) Doctorate)*

1	To have basic theoretical knowledge about biochemistry and to help understanding biochemistry
2	To have the basic laboratory knowledge, apparatus and methods used in biochemistry
3	Analysis: To be able to analyze information critically
4	Synthesis: To be able to synthesize and adapt the knowledge in the field from different directions
5	Evaluation: To critically evaluate research in the field

Contribution of Learning Outcomes to Programme Outcomes *1:Very Low, 2:Low, 3:Medium, 4:High, 5:Very High*

	L1	L2	L3	L4	L5	L6
P1	5	5	5	5	5	5
P2	5	4	5	4	4	4
P3	4	5	5	5	5	5
P4	5	4	4	5	5	5
P5	5	5	5	4	4	4