Republic of Iraq

The Ministry Of Higher Education

& Scientific Research

بسم الله الرحمن الرحيم

University: University of Baghdad
College: Science for women
Department: Chemistry
Stage: 4th stage
Lecturer name:, Dr.Kadhim Khudhair
Qualification: Ph.D biochemistry
Place of work

Syllabus Form

Course Instructor	Assist. Prof.Dr. Kadhim Khudhair				
E-mail	kadhimkgh@gmail.com				
Title	Fundamentals of Bio – Separation				
Course Coordinator					
Course Objective	The aim of this course is to learn about: Bioseperation concepts, bioseparation techniques include precipitation, centrifugation, and extraction methods of bio-molecules that include proteins, lipids, DNA. Purification of proteins by different techniques such as chromatographic methods and characterization of the purified proteins.				
Course Description	The semester includes overview of bio-separation to know the concepts of bio separation and the methods that can be applied for extraction of a certain type of the interest bio-molecules (proteins, lipids and DNA). In addition to purification techniques that can be used to purify and characterize of proteins.				
Textbook	- We will not use a specific textbook but rather chapters from various books include biotechnology, bioanalytical chemistry.				
Course Assessments	**Term Tests**	**Monthly exams**	**Project**	**H. work**	**Final Exam**
	40%	35%	3%	2%	**60%**
General Notes	• **Term tests 40% includes** – Theoretical exam 35% together with project.. and H.work 5% = 40% • **Final exam. 60%**				

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University: University of Baghdad
College: Science for women
Department: Chemistry
Stage: 2nd stage
Lecturer name: Dr. Sanad Baker, D.Kadhim Khudhair
Qualification: Ph.D biochemistry

Course Weekly Outline

Week	Date	Topics Covered
1	2015/10/12	**Overview of bio-separation**: classification of bio-processing categories, Nature of bio-separation properties, Basis of separation in bio-separation processes. -
2	2015/10/19	**Physical forms separated in bio-separations**: Bio separation techniques, Current trends in the bio-separation, steps of bio-separation.
3	2015/10/26	**Properties of biological materials**: fundamental properties of biological substances, Size Molecular weight, Diffusivity. Sedimentation coefficient, Osmotic pressure, Electrostatic charge, Solubility Partition coefficient, Light absorption, Fluorescence.
4	2015/11/2	**Cell lysis**: Cell Structure, methods to break down cell walls, Mechanical methods of cell disruption, Mortar and pestle, Bead beating.
5	2015/11/9	Sonication, Homogenizer, Freezing High temperatures (Microwave, Autoclave) Non-mechanical methods, Enzymes, Chemicals.
6	2015/11/16	**Extraction, Solvent systems**: Extraction methods of proteins, Extraction methods of proteins (enzyme) from liver: Extraction with a solution of 10% NaCl at pH 5, Extraction with a solution of 5% sodium carbonate, Extraction with a solution of 2% potassium chloride,
7	2015/11/23	**First exam.**
8	2015/11/30	Extraction with a solution of 2% calcium chloride, Extraction with a solution of 0.2M acetate buffer at pH 5, Extraction with a solution of 0.2M phosphate buffer at pH 5. Extraction with 20% glycerol. methods of plant protein extraction (plant origin)
9	2015/11/7	**Extraction methods of lipids**: Lipids extraction (general procedure), Folch method, Extraction of all lipids with a mixture of hexane/isopropanol,

		Extraction of plasma total lipids, Delipidation of plasma, serum or plant seeds
10	2015/12/14	**Extraction steps of DNA**: Purpose of DNA Extraction, Basic Protocol, Lysis, Precipitation, Wash , Resuspension, A comparison of DNA extraction methods used in research labs as opposed to classroom labs,
11	2015/12/21	**Protein Purification Buffer factors**: pH, buffering system, salt, reducing agents, and stabilizing elements, **Purification techniques of proteins**, ultracentrif-ugation, Size exclusion chromatography,
12	2015/12/28	Ion exchange chromatography, Affinity chromatography, Dialysis, Gel-Filtration Chromatography.
13	2016/1/4	High pressure liquid chromatography, Polyacrylamide Gel Electrophoresis. **Characterization of the purified protein**: Protein assay (lowry method), determination of molecular weight of protein by gel electrophoresis.
14	2016/1/11	**2nd exam.**

Instructor: Signature: **Dean Signature:**