SYLLABUS

Course Code	*Course Num.*	*Course Name*	*Credit Hours*	*Lec.*	*Lab.*	*Tut.*	*Private study*	*Pre-requisites*	*Course Level*	*Teaching Language*
BIO	**437**	**Biochemistry**	**3**	**2**	**2**	**0**	**3-5**	**BIO 436**	**8**	**English**

A. Course Description

This course covers the tools and techniques by which biological molecules are isolated, separated, identified, and analysed. Detailed discussion of experimental methods for macromolecule purification and characterization is included.

B. Course Outcomes

Upon completion of the course, the student should achieve an understanding of the following:

1. Basic cellular structure.
2. The special properties of water and how the aqueous environment influences the behavior of biological macromolecules.
3. The structures of amino acids, their chemical properties and their organization into polypeptides and proteins.
4. Methods for isolating and characterizing proteins.
5. The basic elements of protein structure.
6. Key principles of protein function.
7. Enzymes and how they catalyze reactions as well as enzyme kinetics.
8. Structure of fundamental monosaccharaides and polysaccharides.
9. Structure and basic function of nucleotides.
10. Structure of different classes of lipids and their roles in biological processes.

C. References:

Required Textbook

- *David L. Nelson Lehninger Principles of Biochemistry* Sixth Edition, (2012) ISBN-13: 978-1429234146, ISBN-10: 1429234148.
- *Biochemistry* – LubertStryer ISBN-13: 978-1429229364. 2010 ISBN-10: 1429229365.

Other references:

- *Harper's Biochemistry – Murray, Granner, Mayes, and Rodwell* – Prentice Hall International Inc.
- *Text Book of Biochemistry* – West, Todd, Mason, Bruggen – Amerind Publishing Co. Pvt., Ltd

Course Website: Google Classroom Webpage: http://www.imamm.org/

D. Topics Outline

D1. Lectures topics

1. Amino acids and peptides Structure and Function; Protein structure; primary structure, secondary, tertiary and quaternary; Enzymes: role.
2. Carbohydrates: structure, mono saccharides disaccharides***;*** Polysaccharides; physical properties of glycogen, starch, chitin, peptidoglycan, hyaluronic acid, chondroitin sulphate; extracellular matrix.
3. Lipids structure and functions; Fatty acids are key constituents of Lipids; Three common types of membrane lipids; Membrane channel and pumps.
4. Nucleotides biosynthesis; Nucleic acids: determination of sequence; chemical synthesis; Genomics and proteomics.
5. Glycolysis and gluconeogenesis.
6. The Citric Acid Cycle.
7. Oxidative Phosphorylation.
8. The Light Reaction of photosynthesis.
9. The Calvin Cycle and Pentose.
10. Carbohydrates Metabolism.
11. Lipids Metabolism.
12. Protein Metabolism.

D2. Laboratories topics

1. **Preparation of buffers** (acidic, neutral and alkaline) and determination of ph; Qualitative identification of carbohydrates- glucose, fructose, ribose/xylose, maltose, sucrose, lactose, starch/glycogen.
2. **Qualitative identification** of amino acids histidine, tyrosine, tryptophan, cysteine, arginine.
3. **Qualitative identification** of lipids- solubility, saponification, acrolein test, Salkowski test, Lieberman-Burchard test.
4. Determination of optimum temperature for amylase; Determination of optimum pH for phosphatase.
5. **Assay of amylase**; Assay of urease; Assay of catalase.
6. **Preparation of Ozone's and their identification**; Titration curve of glycine and determination of pK and pI values.
7. **Estimation of amino acid** by ninhydrin method; Estimation of protein by Biuret method; Estimation of protein by Lowry method.

8. **Estimation of glucose** by DNS method; Estimation of glucose by Benedict's titrimetric method; Estimation of total carbohydrates by anthrone method; Isolation of egg albumin from egg white; Isolation of cholesterol from egg yolk; Isolation of starch from potatoes; Isolation of casein from milk.
9. **Separation of amino acids by paper chromatography**; Determination of exchange capacity of resin by titrimetry; Separation of serum proteins by paper electrophoresis; Separation of plant pigments by TLC.

E. Office Hours

Office hours give students the opportunity to ask in-depth questions and to explore points of confusion or interest that cannot be fully addressed in class.

F. Exams & Grading System

The semi-official dates of the exams for this course are:

- **Midterm 1:** 6th or 7th week.
- **Midterm 2:** 11th or 12th week.
- **Quizzes & Homeworks:** During the semester.
- **Final lab. Exam** : 14th or 15th week.
- **Final Exam:** 16th week.

Your course grade will be based on your semester work as follows:

Midterm 1: 15 %	**Midterm 2:** 15 %	**Final lab. Exam: 20%**	**Final Exam:** 40 %
Quizzes, Homework, Attendance & Participation:10 %			

The grading distribution:

A+	A	B+	B	C+	C	D+	D	F
[95, 100]	[90, 95)	[85, 90)	[80, 85)	[75, 80)	[70, 75)	[65, 70)	[60, 65)	[0, 60)

Student workload

#	Teaching/Learning activities	Contact hours	Frequency	Total contact hours	Self-study hours	Total self-study hours	Student learning time
5	Lecture	2	15	30	2	30	60
2	Tutorial	0	0	0	0	0	0
0	Lab\practical	2	15	30	1	15	45
5	Homework	0	4	0	2	8	8
4	Quiz	0.5	2	1	1	2	3
6	Midterm	1.5	2	3	5	10	13
7	Final Exam	2	1	2	12	12	14
Total				66		77	143

G. Student Attendance/Absence

Only three situations will be considered as possible excused absences:

- Occurrence of a birth or death in the immediate family will be excused. ("Immediate family" is defined by the University as spouse, grandparents, parents, brother, or sister).
- Severe illness in which a student is under the care of a doctor and physically unable to attend class will be excused. Students are not excused for a doctor's appointment. Do not make appointments that conflict with rehearsals. Notes from the University Health Center will be accepted.

Executive Rules for Study Regulations and Exams

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