

CHEM 3785 - Biochemistry 1

Fall 2026 Syllabus, Section 01, CRN 40765,

Credit hours: 3

Instructor

Ganesaratnam Balendiran

Professional Qualifications:

PhD University of Wisconsin-Madison

Professor

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Communication Expectations:

Communication Expectations: Avoid repeating information in email that is already discussed in the class.

Course Description

3785. Biochemistry 1. Structure and function of proteins, nucleic acids, and carbohydrates. Includes techniques of protein purification and analysis, the study of enzyme catalysis and kinetics. Study of the organization and regulation of metabolic pathways: glycolysis, the citric acid cycle, and oxidative phosphorylation. Prereq.: "C" or better in CHEM 3720. 3 s.h.

Course Readings

Group	Title	Author	ISBN
Optional	Fundamentals of Biochemistry 6th edition	Heilman and Woski, John Wiley & Sons, Inc., 2024	

The course readings are subject to change in the event of extenuating circumstances, research developments, current events, and/or to ensure better learning.

Schedule of Topics and Assignments

Day	Date	Proposed Topic	Due/To Prepare for Class
Mon	8/24	Physical Properties of Water 2.1A,B,C,D	
Wed	8/26	Hydrophobic Effect, Chemical Properties of Water 2.2A,B	
Fri	8/28	Buffers 2.2C	
Mon	8/31	Nucleotides, Nucleic Acid Structure 6.1A,B, 6.2A	
Wed	9/2	Lipids 7.1A, 7.1E	
Fri	9/4	Amino Acid Structure and Stereochemistry 3.1A-E, 3.3A,B	

Wed	9/9	Peptide Bond Polypeptide Diversity, Genes Direct Protein Synthesis Protein Purification 3.2A, 3.4A,B 4 Introduction, 4.1A 6.4A,B Appendix A.1B , A.1C, A.1D
Fri	9/11	Quiz1
Mon	9/14	Protein Sequencing Appendix A.2A,B,C,D
Wed	9/16	Secondary Structure 4.1B,C
Fri	9/18	Tertiary Structure 4.2A,B,C
Mon	9/21	Quaternary Structure, Protein Stability Salting Out, Denaturation 4.3A,B, 4.4A,B A.1B
Wed	9/23	Myoglobin and Hemoglobin Cooperativity Box 4.6. page 108-119
Fri	9/25	Exam 1: Ch. 2, 3, 4, Appendix A (Exclude Myoglobin Hemoglobin), 6, 7
Mon	9/28	Allosteric Proteins, Abnormal Hemoglobin
Wed	9/30	Monosaccharides 5.1A
Fri	10/2	Glycosidic bonds, Polysaccharides 5.1B,C, 5.2A,C
Mon	10/5	Properties of Enzymes, Activation Energy 9.1A,B,C, 9.2A
Wed	10/7	Catalytic Mechanisms 9.2B, 9.2C, 9.3A Lysozyme: acid-base catalysis 9.3B-E,
Mon	10/12	Serine Proteases: covalent catalysis 9.4A,B,C, 9.5A,B,C
Wed	10/14	Enzyme Kinetics 10.1B
Fri	10/16	Exam 2: Ch. Box 4.6. page 108-119, 5, 9
Mon	10/19	Enzyme Inhibition 10.1C, 10.2A,B,C
Wed	10/21	Allosteric Regulation 10.3A
Fri	10/23	Free Energy Review 1.3C,D
Mon	10/26	Overview of Metabolism 12.1A,B
Wed	10/28	"High-Energy" Compounds 12.1C,D,E,
Fri	10/30	Coupled Reactions 12.2A,B,C,D
Mon	11/2	Oxidation-Reduction Reactions 12.3A,B,C
Wed	11/4	Reduction Potential and Free Energy Overview of Glycolysis 13.1, 13.2A Rxns. of Glycolysis 13.2B-J
Mon	11/9	Fermentation, Control of Glycolysis 13.4A- C,13.6A Metabolism of Hexoses Other than Glucose 13.3A,B,C
Fri	11/13	Overview of the Citric Acid Cycle, Synthesis of acetyl-CoA 15.1, 15.2A,B
Mon	11/16	Exam 3: Ch. 10, 1, 12, 13
Wed	11/18	Reactions of the CAC 15.3A-H
Fri	11/20	Regulation of the CAC 15.4A,B,
Mon	11/23	Reactions Related to the CAC 15.5A,B
Mon	11/30	The Mitochondrion, Electron Transport 16.1A, 16.2A,B
Wed	12/2	Electron Transport 16.2C,D,E,F
Fri	12/4	Oxidative Phosphorylation 16.3A,B P/O Ratio, Uncoupling 16.1B,16.3C, Control of Oxidative Metabolism 16.4A,C

Mon 12/7

Comprehensive Final Exam: 10:30 – 12:30
p.m.

The course schedule, policies, procedures, and assignments in this course are subject to change in the event of extenuating circumstances, by mutual agreement, and/or to ensure better learning.