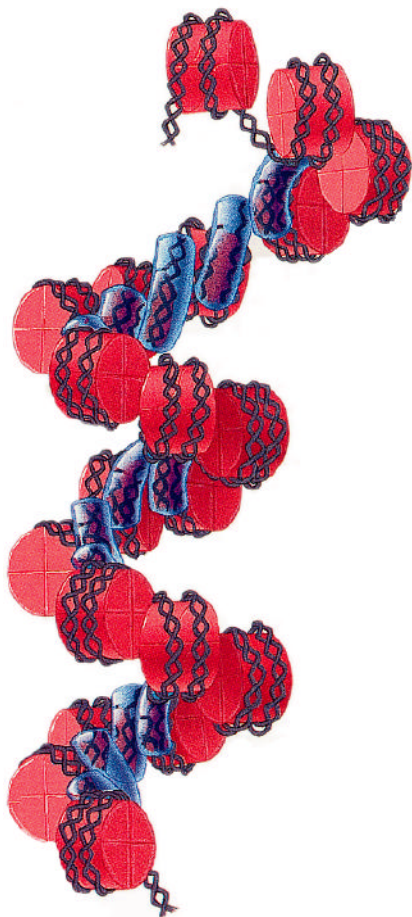


SYLLABUS • Spring 2003



COURSE OBJECTIVES: The goal of the course is to develop a conceptual knowledge of biochemical principles that be can used to understand processes that occur in living cells. More specifically, the objectives in CHEM 352 are to (1) cover some fundamental topics that were not considered in CHEM 351, (2) examine some topics of current interest, and (3) to develop students' skills in critically reading the biochemical literature. Most of the course is organized by biochemical pathways. The emphasis will be on understanding the underlying chemical and thermodynamic logic of these pathways and the chemical mechanisms by which the reactions occur and by which metabolic control is maintained. Emphasis will also be placed on the experimental evidence on which important conclusions are based, recent experimental work addressed at important gaps in our current understanding and applications of the ideas presented here to topics of current interest in medicine and biotechnology.

COURSE FORMAT: There will be three lectures (MWF, 10:00 a.m.) and one discussion session (TBA) per week.

TEXTBOOK: Garrett and Grisham, *Biochemistry*, 2nd Edition

READINGS FROM THE LITERATURE: Many of the topics that will be covered this semester will be considered in greater depth than in the textbook and with emphasis on recent developments. I will provide references to relevant papers from the current literature. If a citation is marked with an asterisk, it refers to a paper that I think everyone should read, and copies will be placed on electronic reserve. Papers not marked with an asterisk serve as a bibliography for the course. You may wish to consult them in order to clarify the lectures or if you are especially interested in a particular topic, either now or perhaps at some time in the future.

PROBLEM SETS: Practice problems will be posted on Blackboard, and it is strongly recommended that you do them as soon as possible. These assignments will not be collected, but they will be discussed at the discussion sections. Answers will be posted on Blackboard.

GRADED ASSIGNMENTS: Short written exercises will be assigned periodically. Most of these will involve reading papers from the recent research literature and answering questions on them. Some will involve the use of the molecular graphics program, RasMol, and the molecular modeling program, Deep View.

DISCUSSION SECTION: These will provide an opportunity to ask questions about homework problems, reading, and lectures. ***In addition, some material will be discussed that was not covered in lecture.*** It is therefore important that you attend.

EXAMS: There will be three hour exams and a final exam. Hour exams will be given at 10:00 a.m. on:

1. Mon. 10 February
2. Wed. 19 March
3. TBA

GRADING: Grades will be computed in two ways:

I. Hour exams.....	48%	II. Best two hour exams.....	32%
Written assignments.....	20%	Written assignments.....	20%
Final exam.....	32%	Final exam.....	48%

The higher of the two computed numerical grades will be used in determining your letter grade. No make-up hour exams will be given; students who miss an hour exam will have their grades computed by the second method.

TENTATIVE LECTURE OUTLINE

Pathways of Carbohydrate Metabolism and Synthesis

Garrett & Grisham

Oxidative phosphorylation (with a close look at the mechanism of electron transport and the coupling of proton translocation to ATP synthesis).....	CH. 21
Uncoupling proteins	
Mechanism of acetyl CoA dehydrogenase and related reactions– thiamine pyrophosphate.....	pp. 646–647
Stereochemical principles. Tracing ¹⁴ C through Krebs Cycle.....	pp. 659–661
Gluconeogenesis.....	Sect. 23.1
Glyoxalate shunt.....	Sect. 20.16
Polysaccharide breakdown and synthesis.....	Sect. 23.3
Hormonal control of carbohydrate metabolism.....	Sect. 34.1–34.2; pp. 751–752
Pentose phosphate pathway.....	Sect. 23.6
Shikimic acid pathway and its inhibition. Metabolic engineering.....	pp. 883–887
Photosynthesis.....	CH. 22

Pathways of Lipid Metabolism and Synthesis

Fatty acid metabolism.....	CH. 24
Fatty acid synthesis.....	Sect. 25.1
Complex lipids.....	Sect. 25.2
Eicosanoids. Anti-inflammatory drugs.....	Sect. 25.3
Isoprenoids.....	Sect. 25.4
Plasma lipoproteins.....	Sect. 25.5
Cholesterol homeostasis – Cholesterol-lowering drugs	
Steroid regulatory element binding proteins	
Cytochrome P450 – Drug metabolism	

Pathways of Nitrogen Assimilation and Metabolism

Pyridoxal phosphate – Transamination, decarboxylation.....	pp. 594–597
Amino acid metabolism.....	CH. 26
Nitrogen assimilation and amino acid synthesis.....	CH. 26
Protein degradation.....	Sect. 33.7
One-carbon transfer – S-adenosylmethione, folic acid. Causes and consequences of elevated serum homocysteine	
Purine and Pyrimidine Synthesis and Degradation. Anticancer drugs.....	CH. 27

Topics in Nucleic Acid Biochemistry

Kinetics and mechanism of polymerases	
RNA catalysis (splicing, ribozymes, peptidyl transferase reaction)	
Protein/DNA interactions.....	Sect. 31.5

Receptors and Signal Transduction

CH. 34
