

REGULAR COURSE SYLLABUS

School of: Letters, Arts & Sciences

Department: Chemistry

CIP Code: 26.0202

Prefix & Course Number: CHE 4310

Crosslisted With*: _____

Course Title: Biochemistry I

Check All That Apply: Required for Major: _____ Required for Minor: _____ Specified Elective: _____

Required for Concentration: Elective: Service Course: _____

Credit Hours: 4 (4+0)

Total Contact Hours per semester (assuming 15-16 week semester):

Lecture 60 Lab _____ Internship _____ Practicum _____ Other (please specify type and hours): _____

Schedule Type(s): L Grading Mode(s): L

Variable Topics Courses (list restrictions, including the maximum number of hours that can be earned**):

** NOTE: This information must be included in the course description.

Restrictions (Variable Topics Course): None

Prerequisite(s): CHE 3100

Corequisite(s): _____

Prerequisite(s) or Corequisite(s): _____

Banner Enforced:

Prerequisite(s):

Corequisite(s):

Prerequisite(s) or Corequisite(s):

Catalog Course Description:

This course is an introduction to the chemistry of living systems with emphasis placed on metabolism, bioenergetics, molecular strategy and regulation. Applications to the related fields of nutrition, human physiology and medicine are stressed.

APPROVED:

Charles G. Tindall

10/7/05

Department Chair OR Program Director

Hal Ramsey

11/18/05

Date

Dean OR Associate Dean

Judith S. Curran

2/6/06

Date

Associate VP, Academic Affairs

Date

Prefix and Course Number: CHE 4310

Required Reading and Other Materials will be equivalent to:

Principles of Biochemistry, Lehninger, Nelson and Cox, 4th edition, Worth, 2005.

Specific, *Measurable* Student Behavioral Learning Objectives:

Upon completion of this course the student should be able to:

1. Evaluate the oxidation states of carbon in any biomolecule.
2. Calculate bioenergetic parameters (ΔG° , ΔG , ΔE° , efficiency of energy conversion).
3. Draw structures of identity, and name the common mono- and disaccharides.
4. Reproduce the following metabolic schemes in detail (structures of metabolites, and names of co-factors and enzymes): glycolysis, TCA cycle, electron transport and oxidative phosphorylation, gluconeogenesis, glycogen metabolism, fatty acid oxidation.
5. Discuss protein structure (primary, secondary, tertiary, and quaternary structures) with illustrative examples from studies on ribonuclease, hemoglobin and insulin.
6. Calculate K_M and V_{MAX} from kinetic data from enzymes.
7. State why ATP is a high-energy compound.
8. Calculate ATP costs for and yields from all pathways studied: glycolysis, TCA cycle, photosynthesis, gluconeogenesis, glycogen metabolism, amino acid catabolism, urea cycle, beta-oxidation of fatty acids, ketone body catabolism, pentose pathway, cholesterol synthesis and disaccharide metabolism.
9. Write reaction mechanisms for all reactions in the glycolytic scheme, TCA cycle and analogous reactions.
10. State the similarities and differences between chloroplasts and mitochondria.
11. Trace C-14 radio labeled metabolites through all pathways listed in objective #8.
12. State and discuss the main points of molecular logic of all pathways listed in objective #8.
13. Compare the different modes of regulation metabolism: isozymes, feedback inhibition, covalent modification of enzymes, biological amplification and gene expression.

Detailed Outline of Course Content (Major Topics and Subtopics) or Outline of Field Experience/Internship (experience, responsibilities and supervision) (format: I, A, 1, a, etc.):

- A. Fundamental Chemistry of Biochemistry
- B. Mainstream Metabolism
- C. Biosynthesis of Carbohydrate
- D. Regulation of Metabolism
- E. Amino Acid Metabolism
- F. Lipid Metabolism
- G. Nutrition

Evaluation of Student Performance (format: 1, a, i, ii, etc.):

Students will be given periodic fifty minute examinations. These examinations will be supplemented by short quizzes. A final exam one hundred minutes long will terminate the course. Written assignments and metabolic pathways problems will be included. The final grade determination will be based on the student's performance on the examinations, quizzes, final exam and the instructor's evaluation of assignments.