BIOCHEMISTRY 418
Spring 2009

I. **Instructor**:

Dr. Edward Senkbeil
HS 324 Phone No. 543-6455
Email: egsenkbeil@salisbury.edu

II. **Texts**:

Principles of Biochemistry
Nelson, & Cox
Worth Publishers, 5th edition (2008)

III. **Objective:**

The second semester of a two semester sequence providing a thorough introduction to modern biochemical principles. The intermediary metabolism of carbohydrates, fatty acids, amino acids, and nucleic acids will be discussed. The biochemistry underlying the conversion of information contained in DNA to synthesis of biomolecules will be studied

IV. **Lecture Syllabus**:

A tentative scheduling of lecture periods and may be altered depending upon the time available for particular topics.

Week	Topic	Chapter
1	Principles of Bioenergetics	13
2	Glycolysis	14
3,4	Citric Acid Cycle	16
4,5	Oxidative Phosphorylation	19
6,7	Pentose Phosphate Pathway & Gluconeogenesis	14, 15
8	Lipid Catabolism	17
9,10	Lipid Anabolism	21
11	Amino Acid Metabolism	18, 22
12	Nucleotide Metabolism	22
13	DNA Metabolism	25

14,15 Final Exam Review

V. **Absence Policy**:

It is highly recommended and expected that you attend all lectures since the exams and quizzes will cover material discussed in the lecture. If you miss a class, it is your responsibility to obtain any appropriate notes or handouts.

VI. **Dishonesty**:

All forms of dishonesty will not be tolerated in this course. Cheating on an exam will result in a (0) grade for the exam and possible dismissal from the course.

VII. **Grading System**:

1. ***Exams*** (three equally weighted hourly exams).....……. 50%

If you know that you are going to miss an exam, let the instructor know ***at least 24 hours in advance of the regularly scheduled exam*** time and you will be allowed to take that exam at a prescheduled time. There will be no other make-up exams , the Final ACS Standardized Exam will also count for any 1 missed hourly exam. Any other missed exam will count for "0" credit.

Exam Schedule

Exam I	Friday	Feb. 27
Exam II	Friday	April 3
Exam III	Wednesday	May 6

2. ***Quizzes*** 15%

Quizzes will be given at frequent intervals covering both lecture and reading materials. There will be no make-up quizzes, but the lowest quiz grade will be dropped for computing your final quiz average.

3. ***Homework*** 5%

Homework problems will be assigned and checked. Problem sets will be handed in the beginning of the period when due. Problem sets should be **complete explanations,** be done neatly and written in Blue Books. Answers will be posted after assignments are handed in.

4. ***Presentation*** 15%

A presentation to the biochemistry class on a metabolic

disorder or drug therapy is required. *See attached list of topics from which you may choose. First come, first choice!!*
May be done by one student or pair of students (both will receive same grade).
Other topics may be approved upon request.
Requirements for the presentation:

a) Approximately 20 minutes in length.
b) Should include handout of information (outline / metabolic pathway(s) of significance to topic.)
(*Power Point Presentation.)*
c) Should include 3 questions (short answer or brief explanation) which could be used on hourly exams. Include answers.
d) Should include references in handout to students.

Presentations may begin approximately one month into the semester and continue throughout the rest of the semester. Presenters will be given at least one week's advance notice before time of presentation. Presentations will roughly follow class lecture topics as noted on attached sheet.
Deadline for Topic Approval: Friday, Feb. 20, 2009

5. ***Comprehensive Final Exam*** 15%
   a. American Chemical Society Standardized Biochemistry Exam-
      This covers both semesters of biochemistry.
      A review sheet and in class review sessions will be held for the final exam.

Total 100%

VII. **Writing Across the Curriculum**:

This course will use biochemistry publication reviews and essay type examination questions as an implementation of the University's policy of Writing Across the Curriculum. Students answers should show their ability to present ideas in a rational and logical manner. Answers will be graded not only on scientific accuracy, but also on the quality of writing, grammar, spelling , and style.

BIOCHEMISTRY PRESENTATION TOPICS

(Discussion should primarily focus on biochemistry of metabolic disorder and treatments, if any, related to disorder.)
(Show metabolic pathway and specific biochemical reactions altered.)
** Other topics acceptable if OK'd by instructor in advance.

Following Glcolysis

1. ***Pyruvate Kinase Deficiencies and Hemolytic anemia*** **–** explanation of defect and symptoms

2. ***Lactose Intolerance*** **–** explanation of defect and symptoms related to metabolism

Following Phosphogluconate Pathway and Gluconeogenesis

3. ***Leber's Hereditary Optic Neuropathy*** – explanation of metabolic defect in electron transport system which affects central nervous system.

4. ***Glucose 6-Phosphate Dehydrogenase Deficiency*** – explanation / effects of enzyme deficiency

5. ***Von Gierke Disease- A Glycogen Storage disease*** – explanation, effects of deficiency

6. ***Aldose Reductase and Diabetic Cataract Formation*** – overview of diabetes, action of aldose reductase, reason for cataract formation, and drug therapies

Following Fatty Acid Metabolism

7. ***Starvation*** - effects/changes in fuel metabolism (sugars, amino acids, fats)

8. ***Pernicious Anemia*** - effects related to deficient vitamin B_{12} factor

9. ***Familial Hypercholesterolemia*** - relationship to LDL receptors in body

10. ***Alcoholism*** - metabolic effects / problems

11. ***Refsum's Disease*** - explanation of defects in α-oxidation of branched fatty acids

12. ***MCAD (Medium-chain Acyl-CoA Dehydrogenase) Deficiency*** – explanation of disorder / inability to metabolize medium size chain fatty acids.

Following Amino Acid Metabolism

13. ***Parkinson's Disease*** - relationship to tyrosine metabolism

14. ***PKU - Phenylketonuria*** - relationship to phenylalanine metabolism

15. ***Acute Pancreatitis*** - relationship to secretion of proteolytic enzymes from pancreas

16. ***Albinism*** - tyrosine metabolism and lack of pigment production

17. ***Maple Syrup Urine Disease*** - explanation of disorder in metabolism of branched chain amino acids

18. ***Hartnup Disease*** - relationship to deficiency in tryptophan metabolism

19. ***Porphyrias*** - genetic disorders in biosynthetic pathway from glycine to porphyrins
Vampire Disease

20. ***Hyperammonemia*** - defects in urea cycle and effects of excess ammonia

Following Nucleotide Metabolism

21. ***Gout*** - relationship to over production of uric acid

22. ***African Sleeping Sickness*** - relationship to polyamine biosynthesis and treatments utilized

23. ***Adenosine Deaminase Deficiency*** - relationship to purine metabolism

24. ***Lesh Nyhan Syndrome*** - relationship to defects in purine metabolism

25. ***Chemotherapeutic Inhibitors of Nucleotide Biosynthesis*** - discussion / explanation of cancer chemotherapeutic agents (choose one or two- azaserine, acivicin, fluorouracil, methotrexate, etc).

Following DNA Metabolism

26. ***Xeroderma Pigmentosum (XP)*** – deficiency of DNA repair system causing increased sunlight –induced skin cancers.

27. ***Treatment for Aids*** – explanation of inhibitors of HIV reverse transcriptase

28. ***Inhibitors of Protein Synthesis*** – explanation of metabolic effects. Examples (tetracyclines, chloroamphenicol, diptheria toxin, etc.)