Course Syllabus
UHSA Bioch205
Winter 2005
University Health Sciences Antigua
On-line
10 January - 4 April

Course description

Metabolic biochemistry: electron transport; oxidative phosphorylation; glycolysis; gluconeogenesis; glycogen; pentose phosphate and photosynthesis; fatty acid oxidation and synthesis; amino synthesis and degradation, purine and pyrimidine synthesis, degradation, and recycling; lipids; synthesis and degradation of macromolecules proteins and nucleic acids; and regulation and signaling.

Calendar

<table>
<thead>
<tr>
<th>Sun</th>
<th>Mon - discussion communication due, each wk</th>
<th>Tue</th>
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**Instructor**

Franklin R. Leach

Home addresses

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Personal homepage:

http://biochem2.okstate.edu/~leach/homepage.html

Metabolism Course homepage:

http://biochem2.okstate.edu/~leach/bioch5853/homepage.html

UHSABioch205 Course homepages:

Embanet

http://campus.embanet.com/uhsa

Alternative site

http://opbs.okstate.edu/~leach/bioch205/bioch205.home.htm

Goals
1. To learn biochemical principles as a foundation for your medical education and to allow you to pass the board examinations.

2. To transform your view of biochemistry from being a required basic science hurdle to being a useful companion in your quest to improve the health and treatment of your patients.

3. To learn sufficient chemistry so that we may understand the pervasive structure/function theme. This will entail learning the major players, their structures, and some of their properties.

   Amino acids and proteins

   Purine and pyrimidines and nucleic acids
   Fatty acids, steroids, and lipids
   Carbohydrates and polysaccharides.

4. To learn the metabolic pathways of

   Electron transport

   Oxidative Phosphorylation
   Photosynthesis
   The Tricarboxylic Acid Cycle
   Glycolysis
   Pyruvate Synthesis and Utilization
   Glycogenesis and Other
   Carbohydrate Synthesis
Lipid Degradation and Synthesis
Amino Acid Degradation and Synthesis
Urea Cycle
Nitrogen Fixation and Heme
Synthesis and Degradation
Purine and Pyrimidine Degradation and Synthesis

5. To learn the interrelationships among the various metabolic pathways.
6. To learn the energetic relationships.
7. To learn the chemical principles of metabolism and biochemical conversions.
8. To learn the enzymes and coenzymes involved in metabolism and how they participate in the reactions.
9. To learn how metabolic signals are sent, received, interpreted, and answered.
10. To learn how the structures of cells, tissues, and organs influence metabolism.
11. To learn how the whole metabolic system and subsystems are integrated and controlled.
12. To learn of the errors or defects that occur in metabolism and how they can be treated.
13. To develop effective learning and study habits and a thirst for life-long learning.
14. To develop biochemical problem-solving skills.
15. To gain a perspective of the history and contribution of investigators to our knowledge of biochemistry.
16. To learn how to identify and utilize current biochemical literature on specific topics.
17. To appreciate the breadth and practical application of biochemical science.
18. To learn how to use the internet for obtaining biochemical information.
19. To develop, explore, and use different teaching/learning technologies.
20. To learn how biochemical science relates to physiology, the other basic medical sciences, and the clinical medical sciences.
21. To integrate biochemical knowledge into the larger biological system of the human body.
22. To recognize the limitations of biochemical science, its data, and to develop an enquiring mind that see each patient as a biochemical individual.

**Grades**

Components of the Grade:

A. On line 2/3 of course grade

   1. Pathway examinations

      Two examinations on the glycolytic pathway
and on the citric acid cycle will be given January 30 and February 13 via email.

Each of these examinations will be worth 50 points and they will not be solely multiple choice.

2. Multiple choice course examinations

Two major examinations, a mid-term and a final exam will be given February 26 and April 4, respectively. Each exam will be worth 100 points of the in-residence grade. These exams will be multiple choice and hosted by thetestingcenter.

2. Discussion Twelve contributions worth 5 points each required by Monday morning of each class week. These are to be contributed on the Embanet discussion site. They may consist of: the posing of a significant biochemical question, answering a question of another participant,
discovering a new resource or important finding in biochemistry as related to bioch205, or a written minireview on an appropriate subject (consult the instructor).

Specific tasks (I will look specifically for each one of these topics):

find a new internet site for metabolism,

answer at least one question from another, pose a metabolic question (to which
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3. On line chat.
Participation in
Embanet's chat site for
this course on chat #1
January 19, or 21; chat #2 February 2, or 4; chat #3 February 16, or 18; chat #4 March 2, or 4; chat #5 March 16, or 18; and chat #6 March 30, or April 1 between 1:00 p.m. Central Time (Fridays only) or 9:00-10:30 pm eastern, 8:00-9:30 pm central, 7:00-8:30 pm mountain, and 6:00-7:30 pm pacific times (both Wednesdays and Fridays).

B. On-campus 1/3 of final grade

1. Laboratory in Antigua

A grade of 70 is required to pass the course.

Students consistently receiving 70 or below on exams are in serious difficulty and should seek help from the instructor.
Text

Primary Text:

**Biochemistry**


**Supplemental materials**

Web sites

**Slice of Life, Integrated Biochemistry Learning Series, by James Baggott**

Link to [http://www.mcphu.edu/netbiochem/NetWelco.htm](http://www.mcphu.edu/netbiochem/NetWelco.htm)

Mirror in UT [http://www-]
Medical Biochemistry, by M.W. King

Home

http://www.indstate.edu/thcme/mwking/subjects.html

Mirror - England
http://www.dentistry.leeds.ac.uk/biochemistry/thcme/home.html

Mirror - Italy
http://www.med.unibs.it/~marchesi/subjects.html

Other current text books

Textbook of Biochemistry with Clinical Correlations, Fifth Edition,

Strength and weakness is the multiauthor nature. Expert written and uneven differing type of coverage.

Biochemistry

This is an excellent text. See text books section.

See
http://faculty.virginia.edu/biochemages/

for
biochemimages.

Principle of Biochemistry with a Human Focus
Their earlier text on a diet with lost muscle mass.

Biochemistry

This is an excellent text. See text books section on-line.

Lehninger Principles of Biochemistry
This is an excellent text. See text books section on-line.

The Metabolic & Molecular Bases of Inherited Disease

and

The Metabolic & Molecular Bases of Inherited Disease

Biochemistry, Second Edition

by Donald Voet
(http://www.sas.upenn.edu/chem/faculty/voet/voet.html)

and

Judith G. Voet
(http://www.swarthmore.edu/NatSci/chemistry/voet/)

Biochemistry, Third Edition

A top textbook, recently revised. A good text for majors.


Biochemistry: The Chemical Reactions of Living Cells

by David E. Metzler, Two volumes


The ultimate in biochemical information. Amazing accomplishment by a sole author with thousands of literature references documenting the points. Information that every biochemist wants handy in a two-volume series.

Biochemistry, Fourth Edition
Course Reading Assignments based on

Biochemistry, Fifth Edition
Berg, Tymoczko, & Stryer
W.H. Freeman, 2002

<table>
<thead>
<tr>
<th>Week</th>
<th>Chapter #</th>
<th>Title</th>
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<td>1</td>
<td>14 15</td>
<td>Metabolism: Basic Concepts and Design</td>
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<td>Signal-Transduction Pathways</td>
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<td>2</td>
<td>16 17</td>
<td>Glycolysis and Gluconeogenesis The Citric Acid Cycle</td>
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<td>3</td>
<td>18 19</td>
<td>Oxidative Phosphorylation The Light Reactions of Photosynthesis</td>
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<td>4</td>
<td>20</td>
<td>The Calvin Cycle and The Pentose</td>
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</tbody>
</table>
| Page | 21 | Phosphate Pathway  
|      | Glycogen Metabolism |
| 5 | 22 | Fatty Acid Metabolism  
|    | 23 | Protein Turnover and Amino Acid Catabolism |
| 6 | 24 | Nitrogen Fixation  
|    | 25 | Nucleotide Biosynthesis |
| 7 | 26 | The Biosynthesis of Membrane Lipids and Steroids  
|    | 27 | DNA Replication, Recombination and Repair |
| 8 | 28 | RNA Synthesis and Splicing  
|    | 29 | Protein Synthesis |
| 9 | 30 | The Integration of Metabolism |

Additional topics web supplements are expected to be posted

Hormones  
Digestion and Absorption of Basic Nutritional Constituent Nutrition

UHSA  
Biochemistry 2  
2005
List of Topics

bioch205

Jan 10 - Apr 4, 2005

class-lesson-module [clm]

Two modules or topics per week,

12 weeks.

Designated as B205clm#

1. Metabolism: Basic Design, Coenzymes
2. Pathways, Maps, and Strategies
3. Energetics, ATP
4. Electron Transport Chain
5. Oxidative Phosphorylation and Photophosphorylation
6. Glycolysis
7. Pyruvate Metabolism
8. Tricarboxylic Acid Cycle
9. Gluconeogenesis
10. Glycogen Metabolism
11. Pentose Phosphate Pathway/Photosynthesis
12. Fatty acid Degradation and Ketone Bodies
13. Fatty Acid Synthesis
14. Other Lipids, Cholesterol, Eicosanoids
15. Nitrogen Fixation, Heme Metabolism
16. Amino Acid Degradation
17. Amino Acid Synthesis
18. Urea Cycle and Nitrogen Excretion
19. Purine and Pyrimidine and dRTP Synthesis
20. Nucleotide Metabolism and Recycling
21. DNA Replication, Repair, and Recombination
22. RNA Transcription, Processing, and Function
23. Protein Synthesis, Genetic Code, and Turnover
24. Integration

Possible Additional topics (reading)

1. Transport & digestion
2. Nutrition

3. Hormones

FRL 1/01/05