

American University of Antigua

College of Medicine

Medical Biochemistry

January – April 2009

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Professor and Chair, Department of Medical Biochemistry and Genetics
Office Hours: Mon, Tue, Thu, Fri 11am – 12 pm and 3 pm – 4 pm **by appointment only**

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Associate Professor of Biochemistry and Genetics
Office Hours: Mon – Fri 11 a.m. – 12 p.m. and 3 p.m. to 4 p.m.

Class Hours:

8 a.m. – 9:50 a.m. (Mon – Fri) Section B
2:00 p.m. – 3:50 p.m. (Mon – Fri) Section A

Course Description and Purpose

Medical biochemistry is a 6 credit course that focuses on the study of human metabolism in health and disease. Metabolism requires the interaction of a diverse group of the following biomolecules: proteins, carbohydrates, lipids, hormones, vitamins and nucleic acids. Studying the structure and function of each of these major groups of molecules is essential to the understanding of their significance in human metabolism and clinical medicine.

Goal

The goal of this course is to provide a solid understanding and foundation of biochemistry relevant to human metabolism and clinical medicine.

Course Objectives

Upon completion of this course, you should

- Understand and be able to explain biochemical pathways and the role of the major biomolecules in human metabolism;
- Understand and be able to explain the mechanism and clinical relevance of particular defects in metabolic pathways;
- Be able to integrate the different types of biomolecules and metabolic pathways within the context of understanding the human system under conditions of the well-fed state, under stress, and during nutrient depletion, disease and injury;
- Be able to deal with biochemistry questions on the **USMLE Step I Exam** with ease, confidence, and competence

Format

Course material will be presented in a lecture and discussion format.

Required Texts

- Champe, P.C., Harvey, R.A. and Ferrier, D.R.: **Lippincott's Illustrated Reviews Biochemistry**, latest edition, Lippincott Williams and Wilkins.
- Baynes, J. and Dominiczak, M.H. **Medical Biochemistry**, latest edition, Elsevier Mosby

Recommended Texts

- Devlin, T.M. **Biochemistry with clinical correlations**, latest edition, Wiley-Liss.
- Smith, C., Marks, A.D., and Lieberman, M. **Basic Medical Biochemistry – A Clinical Approach**, latest edition, Lippincott Williams& Wilkins
- Cooper, G.M. and Hausman, R.E. **The Cell – A Molecular Approach**, latest edition, Sinauer Associates.
- Lodish et al., **Molecular Cell Biology**, latest edition, Freeman and Company Publishing

Supplemental Resources

- Biochemistry Handout - distributed first day of class as electronic file
- The Internet provides a number of web pages that can be found easily with a search engine.
- Detailed Course Outline of Biochemistry. (2006). This detailed course outline is about 50 pages in length and describes the learning objectives, reading assignments and contents of lectures for each day in the course.

Examinations and Grading System

- Four “mini” exams and the final exam (shelf) will assess your ability to master the course material.
- Material to be covered in exams and weight of the individual exams: see below.
- The exams are in multiple choice format. Each question will be assigned 72 seconds. Exams 1 to 4 will have 50 questions each; the final exam (shelf) will have 125. Thus, the allocated time for exams 1 to 4 will be 60 minutes, for the final exam (shelf) 150 minutes.
- Every attempt possible will be made to phrase exam questions clear and unambiguous.
 - Exams will focus on but may not be limited to the material that has been covered in class.

Note:

- **All material covered by the reading assignments plus all of the additional material supplied during the course is testable!**
- **Exams 2, 3, and 4 will contain comprehensive bonus questions. The allocated time for these exams will be adjusted according to the number of bonus questions.**
- Exams will not be curved.
- During exams all electronic devices such as cell phones, laptop computers, walkman, portable CD players, iPods, etc. are to be turned off and stowed away in bags that are stored in the back of the examination room. During exams students are further **NOT** allowed to wear caps or hats.
- Performance grades from each exam (except the final exam) will be posted using individual secret ID numbers on the day following examination days 1 to 4. The grades for the final exam and the final course grades will be communicated after the final exam.
- The final exam will be comprehensive
- A failing grade (“zero”) will be normally assigned for any missed exam. The only accepted exceptions are **documented** medical or family emergencies. **Make-up exams are not given.** Instead, in approved cases of a missed exam the course score will be averaged out of the remaining exams. Missing the final exam will result in the grade of “incomplete” and the student must complete the course within one semester.
- Re-take of exams will not be possible.

Exam	Weight (%)	Content
1	17.5	Introduction, Molecular Biology, Proteins, and Biotechnology
2	17.5	Enzymes, Metabolic Control, Intermediary and Carbohydrate Metabolism,
3	17.5	Lipid and Amino Acid Metabolism
4	17.5	Nucleotide Metabolism and Integration of Metabolism

Final Exam	30	Comprehensive Subject Shelf Exam
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Grading:

A	>89.5%
B	79.5 – 89.4%
C	69.5 – 79.4%
F	<69.4%

Note:

- A score of **64 or better** on the Final Exam (Shelf) is considered a pass of the exam and will result in passing the course. Any score lower than 64.0 on the Shelf exam is considered failing the exam. In such cases the mini exams will be factored in with their full weight.
- A minimum score of **54** on the shelf exam is required to be eligible for passing the course. Any student who fails to meet this requirement will not pass the course, irrespective of the scores on the mini exams.
- Be aware that the Shelf exam will most likely contain a substantial number of questions concerning **genetics and molecular cell biology**.

Course Policy on Attendance

- The general University policy regarding absences applies. American University of Antigua – College of Medicine – allows 20% absences (**14 days**) per semester during the basic science program. The 'twenty percent rule' specifically includes unanticipated emergency leaves, for any reason, from the basic science campus.
- Students who have a persistent tendency to come late and thus disrupt the teaching process may be subject to notification to administration.
- Attendance will be taken daily. No student will fail the course purely based on lack of attendance. However, be aware that we will have a close look at the attendance of those students whose final numerical grades are considered borderline between the grades C and F. Borderline students who have 80% or more of recorded class attendance may receive a passing grade.

Rules of Conduct

See Student Handbook for University policy. University policy will be enforced

Recording of Lectures

You are allowed to audiotape lectures. University policy prohibits video taping of lectures.

DETAILED OUTLINE OF COURSE:

Block 1 Introduction, Molecular Biology, and Molecular Diagnostics

<u>Date</u>	<u>TOPIC</u>	<u>READING ASSIGNMENTS</u>	
		<u>Baynes</u>	<u>Champe</u>
Jan. 7	Introduction to the Course, Review of Course Outline		
	Amino acids	7 -12	1-12
8	DNA Structure and Replication	425-436	393-412
9	RNA Structure and Synthesis	437-446	413-429
12	Protein synthesis	447-458	429-444
13, 14	Regulation of Gene Expression	459 – 472	449-464
15	Structure of Proteins	12-24	13-24
16	Biotechnology and Human Disease	473-496	445-468
19, 20	Biotechnology and Human Disease	473-496	445-468
20	Bioenergetics	93-95	69-73
21	Globular Proteins	25-50, 401-402	25-42
22	Fibrous Proteins	387-393, 401-402	
43-52			
23	Review		

January 26, 2009: EXAM #1 (17.5%)

Block 2 Intermediary and Carbohydrate Metabolism

Jan. 27	Enzymes	51-62	53-68
28	Metabolic Control	77-92; 541-554	91-96
29	Introduction to Carbohydrates	116-120	83-88
30	Glycolysis	143-150,	
	96-106		
Feb. 2	Gluconeogenesis	167-174	115-122
3, 4	Citric Acid Cycle, Oxidative Phosphorylation	96-111, 175-187	73-82,
107-114			
5, 6	Glycogen Metabolism	157-166	123-134
9	Metabolism of Mono- and Disaccharides	362-365	135-142
10	Hexose Monophosphate Pathway and NADPH Metabolism	150-156, 405-406	
	143-154		
		497-506	
11	Glycosaminoglycans and Glycoproteins	359-374, 394-398	
155-170			
12	Review Block 2		
13	Reading Day		

February 16, 2009: EXAM #2 (17.5%)

Block 3: Lipid and Amino Acid Metabolism

Feb. 17	Metabolism of dietary Lipids	120-123	171-178
18, 19	Fatty Acid and Triglyceride Metabolism	189-209	179-198
20, 23	Complex Lipid Metabolism	77-92, 375-386,	199-216
	Complex Lipid Metabolism	554-558	199-216

	24 - 26	Cholesterol and Steroid Metabolism	209-243	
		217-242		
	27	Amino Acids: Nitrogen Disposal	123-126, 245-253	
		243-258		
			399-412	
March	2	Amino Acid Degradation and Synthesis	253-260	259-274
	3	Conversion of Amino Acids to specialized Products	403-405, 410-412	
		275-288		
			574-579	
	4, 5	Review Block 3		
	6	Reading Day		

March 9, 2008: EXAM #3 (17.5%)

Block 4: Nucleotide Metabolism and Integration of Metabolism

March	10, 11	Nucleotide Metabolism	413-424	289-304
	12	Metabolic Effect of Insulin and Glucagon	167, 273-279	305-318
	13	The Feed/Fast Cycle	279-282	319-334
	16	Diabetes Mellitus and Injury	282-298, 401-402, 32-34	335-346
	17	Obesity	204-207	347-354
	18	Nutrition	299-314, 139-141	
		355-370		
	14	Vitamins	127-142, 345-358	
		371-392		
	19, 20	Vitamins	127-142, 345-358	
		371-392		
	23, 24	Blood Clotting and Thrombosis	63-76	
	25, 26	Review Block 4		
	27	Reading Day		

March 30, 2009: EXAM #4 (17.5%)

Block 5: Special Topics, Clinical Biochemistry and Case Discussions

March	31	Special Topics Lectures, Small Group Self Study, Clinical Biochemistry, and Case Discussions
April	1 - 10	Special Topics Lectures, Small Group Self Study, Clinical Biochemistry, and Case Discussions

April 13 - 17, 2009: Final Exam Week: NBME Subject Shelf Exam (30%)