

**COLLEGE OF HUMAN MEDICINE**  
**WAIVER EXAMINATION INFORMATION – 2009**

If you intend to take the Medical Biochemistry (BMB 514) and/or the Molecular Biology & Genetics (BMB 526) waiver exam, you need to register by **Wednesday, August 26, 2009**. Please [email](#) Dr. Wang and indicate your name, college, and the waiver exam (course name and number) that you intend to attempt. Specific information pertaining to each course and its waiver exam is provided on the following pages.

**Medical Biochemistry (BMB 514) waiver:** Thursday, August 27, 2009  
6:00 – 8:00 pm  
E105 Fee Hall

**Molecular Biology & Genetics (BMB 526) waiver:** Saturday, August 29, 2009  
1:00 – 3:00 pm  
E105 Fee Hall

**Cell Biology and Physiology (PSL 534):**

Due to the sweeping scope of the Cell Biology and Physiology sequence (PSL 534/535) and the unlikelihood that a student will exhibit prior mastery in all aspects of the course content, waiver by examination is not being offered as an option. The course director, [Dr. Stephenson](#), would CONSIDER a request for waiver on the basis of past experience, but ONLY in the case of a student who can document strong achievement in graduate-level coursework and/or substantial upper-level teaching experience in ALL of the following areas: cell biology, biochemistry, histology (including lab practical), and human physiology.

**Gross Anatomy (ANTR 551):**

Waivers are not offered for this course. Medical Gross Anatomy is a unique element of medical education at Michigan State University, in which students spend a great proportion of their first semester closely interacting in Gross Anatomy laboratory. In the laboratory, anatomical knowledge is gained as part of a cooperative GROUP experience with colleagues – a paradigm that will be repeated throughout your medical career.

Beyond the acquisition of anatomical expertise, another major objective of the course experience includes getting to know fellow students and their relative degrees of competence in a wide range of fields. Students at our medical schools are selected in large part for what they can contribute to the group learning processes that are a major emphasis of our instructional mode. Students are expected to gain a very large component of their training from one another: **the faculty believes that engaging in learning as a cooperative venture is the best preparation for a professional career wherein practitioners learn to draw upon one another as major resources in solving individual medical problems.**

Students who enter with expertise in anatomy can thus contribute a great deal to the education of their peers and, since teaching is a superb way to learn and to reinforce learning, they can greatly enhance their own anatomical knowledge, as well as winning the respect and trust of their classmates. For teammates to function well, it is good for team members to know well the strengths and weaknesses of one another. The extended time in the Medical Gross Anatomy laboratory is the best opportunity to achieve this at the beginning stage of medical education at Michigan State University.

It is also the best opportunity for inculcating the traditions of class cohesion and mutual instruction that form a prime benefit of the medical education obtained here. This education is widely recognized as among the best available in the world, largely for its production of cooperative physicians who can master a far wider range of resources by constructively seeking and making use of the expertise of their peers, than can others who were trained in a greater degree of isolation.

It is for these reasons that the Department of Radiology does not offer a waiver exam for ANTR 551.

**If you have any questions please do not hesitate to contact:**

Dr. John Fitzsimmons, ANTR 551 Associate Course Director

[jmf@rad.msu.edu](mailto:jmf@rad.msu.edu)

517-353-4547

TO: CHM/COM Students Beginning in 2009

FROM: John L. Wang, PhD  
Department of Biochemistry and Molecular Biology

DATE: May 26, 2009

SUBJECT: Waiver Examination for BMB 514 and Waiver Examination for BMB 526

Welcome to Michigan State University. We look forward to meeting and working with you in medical school.

As most of you may already know, Biochemistry BMB 514, *Medical Biochemistry*, and BMB 526, *Molecular Biology and Genetics*, will be two of the Fall Semester courses for students beginning in the Colleges of Human Medicine and Osteopathic Medicine. Students who have completed biochemistry and genetics courses in prior academic programs will find little new here. Accordingly, there will be two waiver examinations (one for each course), and we strongly suggest students with a biochemistry and/or genetics background attempt to pass the appropriate waiver exam, so that the actual class will be composed of individuals who require an introduction to the subjects.

The purpose of this letter is to inform you of the nature of the waiver exams, in the hope that you will be able to devote some time to review this summer. Those students who pass the waiver examination for one or both of the courses will receive a P grade when they enroll for the course in Fall Semester, 2009. If you intend to take one or both of the waiver exams, **you need to register by Wednesday, August 26, 2009**. Please send me an [email](#) indicating your name, college, and the waiver exam (course name and number) that you intend to attempt. Specific information pertaining to each course and its waiver exam is provided below.

**BMB 514 – Medical Biochemistry Waiver Exam:  
Thursday, August 27, 2009, 6:00 – 8:00 pm, E-105 Fee Hall**

This exam, like the course, is directed at basic biochemistry. Familiarity will be needed with basic biochemical terminology; structures of the major types of biochemical compounds; pH and the Henderson-Hasselbalch equation; protein structure and function; enzyme behavior and kinetics; significant aspects of the major metabolic pathways, including their control; and structure, biosynthesis, and catabolism of nucleotides. The processes of DNA replication, RNA synthesis, and protein production will be covered in the course entitled, *Molecular Biology and Genetics* (BMB 526) and will **NOT** be a part of this exam. The waiver exam will consist of 60 questions, to be completed in two hours. The passing grade is 75%.

Most students will probably need appreciable review in order to pass the waiver exam. Attached is a syllabus of the topics to be covered in BMB 514. The text chosen for the Fall 2009 course is: Champe, Pamela, Richard Harvey, and Denise Ferrier. *Lippincott's Illustrated Reviews: Biochemistry*. 4<sup>th</sup> ed. Lippincott Williams & Wilkins, 2008. This text would be an excellent one for reviewing for the waiver exam, although any text at this level should also suffice. Sample exam questions derived from previous offerings of this course can be found online at <http://www.bmb.msu.edu/courses/514/bch514XM.htm>.

**BMB 526 – Molecular Biology and Genetics Waiver Exam:  
Saturday, August 29, 2009, 1:00 – 3:00 pm, E-105 Fee Hall**

This course will cover fundamental concepts of molecular biology of prokaryotes and eukaryotes, as well as basic concepts in genetics with an emphasis on human medical genetics. Our experience suggests that most upper-level undergraduate courses in molecular biology will address the key concepts in adequate depth for this stage of medical training. These concepts include the mechanisms and regulation of DNA replication, repair, and recombination; RNA synthesis and processing; protein synthesis and modification; regulation of gene expression; and recombinant DNA technology. In contrast, few undergraduate genetics courses have the depth in human genetics that is necessary as a basis for medical training. This basic understanding should include inheritance patterns and factors that affect these patterns; biochemical and population genetics; molecular analysis of genes and gene expression; cytogenetics; genomics, and gene therapy.

Therefore, we recommend that only those students with significant course work or training in both molecular biology and human genetics should attempt the waiver exam. For review, many biochemistry textbooks (e.g. the Champe, et al. text described above for BMB 514) will address the molecular biology concepts at an appropriate level. Among the human genetics textbooks that would suffice are: (a) Jorde, Lynne, John Carey, Michael Bamshad, and Raymond White. Medical Genetics. 3<sup>rd</sup> ed. Mosby, 2006. (this will be the textbook used for the Fall, 2009 course); or (b) Nussbaum, Robert, Roderick McInnes, and Huntington Willard. Thompson and Thompson Genetics in Medicine. 7<sup>th</sup> ed. Saunders, 2007. . The syllabus for BMB 526 appears below. Sample questions can be found online at <http://www.bmb.msu.edu/courses/526/bch526XM.htm>. The waiver exam will contain 60 points and the passing grade is 75%.

## BMB 514 (BIOCHEMISTRY)

### Lecture schedule, reading assignments, and other homework

Date	#	Subject	Instructor	Readings (Champe et al. text)	Other Assignments (course pack)
8/31	1	Chemical principles Tutorial #1: Amino acid structures	Wang	Chapter 1: 1-5	p. 4 Course Pack
9/1	2	Amino acids: acid-base properties	" "	Chapter 1: 6-11	
9/2	3	Proteins: structure and properties	" "	Chapter 2: 13-14; 16-23	CAI Kinemages, p. 48
9/2	4	Globular proteins: myoglobin and hemoglobin	" "	Chapter 3: 25-29	
9/3	5	Regulation of O <sub>2</sub> binding	" "	Chapter 3: 29-39	Problem set JW-1, p. 60
9/4	6	Blood buffers	" "	<i>[PSL text: Rhoades and Bell]</i>	Clinical Case A , p. 79
9/8	7	Acid-base balance Clinical Case A (mini case discussion on acidosis)	Wang	Chapter 24: 442-449; 455-461	Item 8b, p. 78 (optional)
9/9	8	Enzymes: distinctive properties, mechanism of catalysis	" "	Chapter 5: 53-58	
9/9	9	Enzymes: kinetics, Michaelis-Menten analysis	" "	Chapter 5: 58-62	Case study, p. 97
9/10	10	Enzymes: inhibition/allosteric effects Tutorial #2: Nucleotide structures Tutorial #3: Oxidation-reduction states	" "	Chapter 5: 62-67	Problem set JW-2, p. 102
9/11	11	Vitamins	LaPres	Chapter 28: 373-381, 392-393	Folic acid questions, p. 144
9/14	12	Metabolic principles Clinical Case A (mini case discussion on diabetes)	LaPres	Chapter 8: 91-96	
9/15	13	Energetics Tutorial #4: Carbohydrate structure and function	" "	Chapter 6: 69-73 Chapter 7: 83-90	Problem set JJJ-1, p. 166
<b>SEPTEMBER 18, 2009 – EXAM I (covering sessions 1-13 and tutorials #1-4)</b>					
9/18	14	Glycolysis: reactions	LaPres	Chapter 8: 96-108	
9/21	15	Glycolysis: regulation Self-study Module #1: Gluconeogenesis	LaPres	Chapter 12: 137-143 Chapter 10: 117-124	Case study, PK deficiency, p. 204
9/21	16	Pentose phosphate pathway	" "	Chapter 13: 145-156	
9/22	17	Glycogen metabolism: overview Clinical Case B assigned	" "	Chapter 11: 125-136	Clinical Case B, p. 226
9/23	18	Mitochondrial structure/function; PDH	" "	Chapter 8: 105-106; Chapter 6: 73-74	Case studies, PDH deficiency, p. 243
9/24	19	TCA cycle, regulation, anaplerotic routes	" "	Chapter 9: 109-116	Mitochondrial neuromyopathy, p257
9/25	20	Energy transduction – electron transport	" "	Chapter 6: 73-82	Cytochrome oxidase inhibition, p. 280

Date	#	Subject	Instructor	Readings (Champe et al. text)	Other Assignments (course pack)
9/28	21	Ox. phos./regulation	LaPres		Problem set JJJ-2, p. 281
9/28	22	Lipid metabolism: $\beta$ -oxidation of fatty acids	Wilkins	Chapter 16: 181-182; 189-195	Case study, carnitine deficiency, p. 304
9/29	23	Ketone bodies; Fatty acid synthesis	" "	Chapter 16: 183-188; 195-197	
9/30	24	Fatty acid synthesis, processing, regulation	" "	Chapter 16: 183-188; Chap. 27: 360-365	
10/1	25	Triglyceride/phospholipid synthesis; lipid storage disease	" "	Chapter 16: 188-189; Chap 17: 201-214	
10/2	26	Cholesterol synthesis/regulation; derivatives; vitamins	" "	Chapter 18: 219-224; Chap. 28: 381-391	Problem Set CW-1, p. 324
10/5	27	Bile salts; Lipid digestion/absorption/transport; lipoproteins	Wilkins	Chapter 15: 173-178; Chap. 18: 224-237	Metabolism Assignment, p. 348 Case study, FA oxidation in heart, p. 353 Problem Set CW-2, p. 355
10/6	28	Lipoproteins; endocytosis; hypercholesterolemia	" "	Chapter 18: 227-237	
10/7	29	Clinical Case B discussion	LaPres		
10/7	30	(two-hour i-clicker session)	" "		

## BMB 526 (MEDICAL BIOLOGY AND GENETICS)

Lecture schedule, reading assignments, and other homework

DATE	SES. #	TOPIC	PROF	SUGGESTED READING		OTHER ACTIVITIES OR ASSIGNMENTS
				Champe et al.	Jorde/Carey/White	
Oct 26	1	DNA structure, sequences, and the genetic code	CW	395-398, 409-410, 431-434	1-5, 16, 21-22	<b>Kinimage exercise 1</b> <b>BioSciExplorer: replication</b>
Oct 27	2	DNA replication and cell cycle regulation	CW	399-409	6-10	
Oct 27	3	DNA recombination, damage and repair	CW	410-413	36-40	
Oct 28	4	Genetic effects of mutations	CW	432-434	29-31	
Oct 29	5	Genetic diversity and disease	CW		31-36, 136-158, 183	
Oct 29	6	RNA structure, types, and function	JW	417-418		
Nov 3	7	RNA synthesis	JW	419-424	11-15	<b>BioSciExplorer: transcript.</b>  <b>BioSciExplorer: translat.</b> <b>Website problem set 1</b> <b>Kinimage exercise 2</b>
Nov 3	8	RNA processing; protein synthesis	JW	424-427	15	
Nov 4	9	Protein synthesis and post-translational processing	JW	431-444; 165-170	16-17	
Nov 5	10	Regulation of gene expression: prokaryotes	JW	449-454		
Nov 5	11	Regulation of gene expression: eukaryotes	JW	454-461		
<b>MONDAY, NOVEMBER 9: MIDTERM EXAM 1 (covering sessions 1-11)</b>						
Nov 9	12	Introduction to clinical medical genetics; chromosomes	AA		22-28	
Nov 10	13	Cytogenetics	SW		107-133, 309	
Nov 11	14	Common chromosome disorder	AA			
Nov 11	15	Modes of inheritance	RM			
Nov 12	16	Factors modulating inheritance patterns-1	RM			
Nov 13	17	Factors modulating inheritance patterns-2	RM		63-67, 83-85	
Nov 16	18	Microdeletions	AA		88-98, 101-105	
Nov 17	19	Multi-factorial inheritance	AA		68-77	
Nov 18	20	Trinucleotide repeat disorders	AA		68-77	
Nov 19	21	Imprinting	AA			
Nov 24	22	Population genetics	CW			<b>Website problem set 2</b>
Nov 24	23	Recombinant DNA	CW		248-277	
Nov 25	24	PCR, microarrays, gene mapping	CW		80-82	
Nov 25	25	Molecular diagnostic applications	AA		77-80	
Nov 30	26	Clinical Case X ---	???			
Nov 30	27	(two-hour i-clicker session)				
<b>WEDNESDAY, DECEMBER 2: MIDTERM EXAM 2 (covering sessions 12-27)</b>						
Dec 3	28	Prenatal screening and diagnosis	RM		278-295	<b>Website problem set 3</b>
Dec 7	29	Teratogens	RM		316-323	
Dec 8	30	Cancer genetics	RM		228-247	
Dec 9	31	Presymptomatic and predispositional genetic testing	RM		282-284	
Dec 10	32	Cutting edge and future approaches to genetic disorders	AA		296-303, 306, 308, 316-323	
<b>FRIDAY, DECEMBER 18: FINAL EXAM (comprehensive)</b>						