BIOCHEMISTRY 401 **Spring 2023**

Instructors: Prof. M. Feig (MF; feig@msu.edu) **M, Tu, Th, F; 9:10-10:00 am**
Prof. T. Zacharewski (TRZ; tzachare@msu.edu) **Natural Resources 158**
Prof. J. Kaguni (JMK; kaguni@msu.edu)
Office Hours: by arrangement via email

Teaching Assistant: Warren Sink (TA; sinkwarr@msu.edu) **Recitation: Wed; 9:10-10:00 am**
Office Hours: Tuesdays 2-4 pm (BCH208) **BPS 1420**

Text: Biochemistry, Garrett & Grisham, 5th or 6th eds.

Exams (in person): February 9, March 2, April 14, May 2 (Final, 12:45 pm-2:45 pm)

Schedule:

Date			Chapter/Topic	*G&G 5th ed. pages*	*6th ed. pages*
			PROTEIN STRUCTURE AND ENZYMES		
1/9/23	*Mo*	MF	1. Introduction	*7-17*	*4-17*
1/10	*Tu*	MF	2. Water, pH, and ion equilibria	*30-50*	*31-49*
1/11	*We*	TA	Recitation		
1/12	*Th*	MF	3. Thermodynamics	*51-74*	*53-76*
1/13	*Fr*	MF	3. Thermodynamics		
1/16			***Martin Luther King Jr. Day***	**NO CLASS**	
1/17	*Tu*	MF	4. Amino acids	*77-98*	*79-101*
1/18	*We*	TA	Recitation		
1/19	*Th*	MF	4. Amino acids		
1/20	*Fr*	MF	5. Protein primary structure	*101-105,122-135*	*105-109; 126-143*
1/23	*Mo*	MF	6. Protein 3D structure	*141-188*	*147-197*
1/24	*Tu*	MF	6. Protein 3D structure		
1/25	*We*	TA	Recitation		
1/26	*Th*	MF	13/14. Enzyme introduction	*407-411, 435-436, 447-455*	*437-441; 465-466; 477-485*
1/27	*Fr*	MF	13. Enzyme kinetics	*134-135,411-423*	*138-139; 441-453*
1/30	*Mo*	MF	13. Enzyme kinetics		
1/31	*Tu*	MF	13/14. Enzyme inhibition	*472, 423-429*	*504; 453-460*
2/1	*We*	TA	Recitation		
2/2	*Th*	MF	15. Enzyme regulation	*481-503*	*513-536*
			CARBOHYDRATES AND LIPIDS		
2/3	*Fr*	MF	7. Carbohydrates	*193-232*	*203-242*
2/6	*Mo*	MF	7. Carbohydrates		
2/7	*Tu*	MF	8. Lipids	*233-255*	*245-269*
2/8	*We*	TA	Recitation		
2/9	*Th*	MF	**EXAM 1 (covers: Jan. 9 - Feb. 2 lectures, or as per instructor)**		
2/10	*Fr*	MF	8. Lipids		
2/13	*Mo*	MF	9. Membranes	*260-308*	*273-319*

			DNA STRUCTURE AND DNA TOPOLOGY		
2/14	*Tu*	JMK	10. Composition of DNA and RNA	*309-328* *(but not insets on 312/325)*	*325-345* *but not insets on 328,331,342*
2/15	*We*	TA	Recitation		
2/16	*Th*	JMK	11. DNA and chromosomes	*341-363;961-962* *(but not 352-3 on DNA quadruplexes)*	*360-383; 999-1000 (but not 373-4 on DNA quadruplexes)*
2/17	*Fr*	JMK	11. tRNA and rRNA	*365-374*	*386-394*
			DNA REPLICATION, RECOMBINATION, AND REPAIR		
2/20	*Mo*	JMK	28. DNA replication and DNA polymerases	*947-962*	*985-1000*
2/21	*Tu*	JMK	28. Replication fork and RNA replication	*950-962; 963-964*	*988-1000; 1001-1002*
2/22	*We*	TA	Recitation		
2/23	*Th*	JMK	28. DNA recombination; RecA, RecBCD, transposons	*964-973 (but not 971-2 on knockout mice, fork restart, euk recomb)*	*1001-1012 (but not 1009-1010 on knockout mice, fork restart, euk recomb)*
2/24	*Fr*	JMK	28. DNA repair	*973-978 (but not transgenic mice)*	*1012-1017 (but not transgenic mice)*
2/27	*Mo*	JMK	28. DNA repair	*973-978*	*1012-1017*
2/28	*Tu*	JMK	28. Mutations; mutagenesis	*978-981*	*1017-1020*
3/1	*We*	TA	Recitation		
3/2	*Th*	MF/JMK	**EXAM 2 (covers: February 3 – February 27 lectures, or as per instructor)**		
			TRANSCRIPTION		
3/3	*Fr*	JMK	29. Bacterial transcription: initiation, elongation, and termination	*993-1000*	*1035-1042*
3/6 - 3/12			***SPRING BREAK***		
3/13	*Mo*	JMK	29. Transcriptional regulation: *lac*, *ara*, and *trp* operons	*1000-1011*	*1042-1053*
3/14	*Tu*	JMK	29. Eukaryotic promoters, enhancers, and response elements	*1011-1024*	*1053-1066*
3/15	*We*	TA	Recitation		
3/16	*Th*	JMK	29. RNA processing in eukaryotes; RNA structural motifs	*1024-1035*	*1066-1078*
			TRANSLATION		
3/17	*Fr*	JMK	30. Genetic code; tRNA and tRNA synthetases	*1047-1057*	*1091-1101*
3/20	*Mo*	JMK	30. Protein synthesis, ribosome structure	*1057-1061*	*1101-1105*
3/21	*Tu*	JMK	30. Mechanism of protein synthesis	*1061-1080*	*1105-1124*
3/22	*We*	TA	Recitation		
3/23	*Th*	JMK	31. Protein folding and translocation	*1087-1099*	*1131-1144*
3/24	*Fr*	JMK	31. Protein degradation	*1099-1107*	*1144-1154*
			METABOLISM		
3/27	*Mo*	TRZ	17. Overview of metabolism	*551-562*	*583-597, 601-605*
3/28	*Tu*	TRZ	17. Metabolic energy	*562-573*	*583-597, 601-605*
3/29	*We*	TA	Recitation		
3/30	*Th*	TRZ	17. Nutrition/vitamins	*577-595*	*583-597, 601-605*
3/31	*Fr*	TRZ	18. Glycolysis	*595-603*	*611-636*

4/3	*Mo*	TRZ	19. TCA cycle	*609-625*	*643-670*
4/4	*Tu*	TRZ	19. TCA cycle	*628-638*	*643-670*
4/5	*We*	TA	Recitation		
4/7	*Th*	TRZ	20. Electron transport/oxidative metabolism	*70-74; 643-660*	*679-710*
4/8	*Fr*	TRZ	20. Electron transport/oxidative metabolism	*660-674*	*679-710*
4/10	*Mo*	TRZ	22. Gluconeogenesis	*719-731*	*755-766*
4/11	*Th*	TRZ	22. Gluconeogenesis and glycogen	*719-731*	*767-779*
4/12	*We*	TA	Recitation		
4/13	*Th*	TRZ	22. Glycogen metabolism	*731-744*	*767-779*
4/14	*Fr*	JMK/TRZ	**EXAM 3 (covers: <u>February 28 - April 8</u> lectures, or as per instructor)**		
4/17	*Mo*	TRZ	22. Pentose phosphate shunt	*744-755*	*780-787*
4/18	*Tu*	TRZ	23. Fatty acid catabolism	*761-786*	*795-816, 818-819*
4/19	*We*	TA	Recitation		
4/20	*Th*	TRZ	24. Lipid metabolism	*791-808*	*825-841*
4/21	*Fr*	TRZ	24. Lipid metabolism	*808-820*	*841-851*
4/24	*Mo*	TRZ	24. Cholesterol & hormones	*820-832*	*851-865*
4/25	*Tu*	TRZ	24. Bile, steroids, and nuclear receptors	*833-837*	*869-872*
4/26	*We*	TA	Recitation		
4/27	*Th*	TRZ	25. Nitrogen assimilation & metabolism	*841-886*	*877-887*
4/28	*Fr*	TRZ	25. Amino acid metabolism	*841-886*	*889-921*
5/2	*Tu*	TRZ	**FINAL EXAM (covers: April 10 - April 28 lectures, or as per instructor) 12:45 pm**		