COURSE SYLLABUS - Spring 2022

BIOL583- General Biochemistry

Monday/Wednesday 4:30-6:20

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Date** | **Lecture Topic** | **Chapter (pg)** | **Problems** | **Assignments DUE** |
| M, 1/24 | Intro to BiochemistryWater, pH and Buffers | 1 (1-3, 8-19) (Pg 472-478)2 (43-64) | 1: 6, 7a&c, 122: 2, 4, 5, 8, 10, 14, 15, 16 |  |
| W, 1/25 | Amino Acids, peptides, and proteins | 3 (70-87)  | 3: 2, 6, 13, 14, 15, 16, 18 |  |
| M, 1/31 | Protein structure | 4 (107-132) | 4: 2, 5, 7, 8 |  |
| W, 2/2 | Protein function | 5 (147-164) | 5: 1, 7, 8, 9, 10 | **Amino acid**   |
| M, 2/7 | Kinetics | 6 (177-191) | 6: 6, 7, 8, 9a, 12 |  |
| W, 2/9 | Kinetics | 6 (191-200) | 6: 22 |  |
| M, 2/14 | **EXAM 1** |  |  |  |
| W, 2/16 | Mechanism/Bioenergetics | 6 (203-207)13 (465-494) | 6: 2513: 2, 3, 4, 6, 9, 12, 27, 28 |  |
| M, 2/21 | Carbohydrates  | 7 (229-250) | 7: 2, 4, 15 |  |
| W, 2/23 | Carbohydrate synthesis | 20 (700-701) (719-727) |  | **BioE**  |
| M, 2/28 | Glycolysis | 14 (510-529) | 14: 2, 6, 8 |  |
| W, 3/2 | Glycolysis /Gluconeo | 14 (521-551) | 14: 13, 25, 28 |  |
| M, 3/7 | regulation | 6 (313-236), 15 (539-545) 13 (497-503) | 15: 12(b,c,d) |  |
| W, 3/9 | **EXAM 2** |  |  |  |
| M&W 3/14 &16 | **SPRING BREAK** |  |  |  |
| M, 3/21 | Glycogen Synthesis and More Regulation | 15 (556--570) | 15: 4, 7, 10 (b,c,d) |  |
| W, 3/23 | Citric Acid Cycle | 16(574-596) | 16: 1, 6, 7, 24, 25 |  |
| M, 3/28 | Lipids | 10 (341-361) | 10: 2, 4, 5, 16 |  |
| W, 3/30 | Fatty Acid Oxidation | 17 (601-618) | 17: 4, 8, 10, 11, 17 |  |
| M, 4/4 | Fatty Acid Ox-cont |  |  |  |
| W, 4/6 | Lipid Biosynthesis | 21 7(744-788) | 21:3, 8, 12, 17 | **FA Ox**  |
| M, 4/11 | Membranes  | 11(367-380) | 11: 2, 4, 6, 11, 12, |  |
| W, 4/13 | **EXAM 3** |  |  |  |
| M, 4/18 | Transport | 11 (385-403) | 11: 15 |  |
| W, 4/20 | Oxidative phosphorylation | 19 (659-690) | 19: 1, 4, 6, 16, 19 |  |
| M, 4/25 | Ox-Phosph cont/Biosignal | 12 (408-446) | 12: 4, 6,19 | **Ox-Phos**  |
| W, 4/27 | Biosignaling continued |  | 12: 3, 12, 14, 15,16,17 |  |
| M, 5/2 | Hormonal Regulation | 23 (841-843,867-875) | 23: 13 |  |
|  W, 5/4 | **EXAM 4** | During last day of classes |  |  |

Instructor: Dr. Deborah Polayes Office: Exploratory Hall Room 1206

Office hours: by appointment. (Blackboard)

Email: dpolayes@gmu.edu

**Required text:** Nelson & Cox, 2021 **Lehninger Principles of Biochemistry**,

8th edition, Macmillan Learning

**Overview:** My goal in teaching General Biochemistry is to impart the knowledge necessary to appreciate the complexity of the cell through its biochemical reactions. The content of the course is described in the list of weekly lectures. Students are expected to attend lectures and to read the chapters listed below. The problems listed are recommended to help in your understanding of the material.

Lecture material will be presented by PowerPoint slides, and will contain material not found in the textbook. Questions and/or comments to the instructor during class are encouraged

**POLICIES:** To enroll in BIOL 483 you must have completed BIOL 213, Chem. 313 **OR** you must have transferred equivalent courses, OR you must have permission of the instructor.

**Late work is not accepted** in this course.

Make-up examinations are **not** given in this course. If a student misses a scheduled examination without prior permission, they will receive a grade of zero. If, for any reason, the class does not meet on a scheduled exam day, the test will be given the next time the class does meet.

If you require any accommodations due to a learning disability, you must provide information from the GMU Office of Disability Services before accommodations can be provided.

The honor code protects the honest student, the reputation of George Mason University, and the value of the degree earned here. We should all support it both by personal honesty and by refusing to tolerate dishonesty in others. Students should report suspected cheating to the Honor Committee.

**Additional Work for Graduate BIOL583**

**BITN which means “Biochemistry in the News.”**

 **This can be handed in anytime before April 9th. See what you find in the news that is biochemical and tell me about it.**

Everyone will submit a contribution to BITN and it will be worth 10 points.

The assignment will consist of providing one report on a biochemical discovery or finding or new application of biochemistry. The report will contain a journal or appropriate news citation with at least one

peer-reviewed reference describing the discovery, finding or application; a URL address for

linking to the paper or news report; and a brief commentary (3-5 sentences) describing, the discovery, finding or application.

The format of your submission should be exactly as shown below.

Date and your name

interesting short title that you create

 URL to the news article (where readers can find the journal article if they wish to read more about

the news item) and reference for a peer -reviewed journal source for the news item

 3 - 4 sentences about the news item in your own words

**Readings**

The following articles are assigned reading for Biol583 (General Biochemistry). The articles can be downloaded on-line at University libraries, e-journal finder. Please Read the paper and Write a summary of the paper following the guidelines below.

**How to write a summary of a Paper?**

Assume your audience is someone knowledgeable in science but isn’t an expert on the topic of the paper. Basically, a “book report” where you describe in your own voice using the prompts I’ve provided based solely on the paper assigned.

1. Make sure you explain the background information for the paper. (The original author assumed a very knowledgeable reader who knew all the common jargon of that field).
	1. Why should we care about this topic?
2. Summarize an important aspect of the paper.
	1. Do not copy what the authors have said!
	2. Use your own words
3. Pick some aspect of the paper that you either did not understand or disagree with or think the results are confusing to you.

The paper is 2 pages double-spaced. (~500 words)

|  |  |
| --- | --- |
| **Article title** | **DUE Date** |
| Heidy JC, Goretzki B, Johnson CM, Hellmich UA and Neuweiler HMethionine in a Protein Hydrophobic Core Drives Tight Interactions Required for Assembly of Spider Silk NATURE COMMUNICATIONS | (2019) 10:4378 | https://doi.org/10.1038/s41467-019-12365-5 | | **Fri 2/18** |
| Tomilov A, Tomilova N, Shan Y, Hagapian K, Bettaieb A, Kim K, Peliccci PG, Haj F, Ramsey J, and Cortopassi G. p46Shc Inhibits Thiolase and Lipid Oxidation in Mitochondria (2016) Journal of Biological Chemistry 291: 12575-12585 | **Fri 4/1** |
| Hong, S, et. al (2017) Dissociation of Muscle Insulin Sensitivity from Exercise Endurance in Mice by HDAC3 Depletion. Nature Medicine 23:223-234 | **Fri 5/6** |

**GRADING:** Exams, Assignments. Paper summaries, BITN and in class questions. The assignments will be available on Blackboard and are worked on at home. Bring them to class on the day they are due. The exams will consist of matching, multiple choice, True/False, definition and short answer questions. The exams will eb live and in person on the dates shown on the syllabus.

|  |  |  |
| --- | --- | --- |
| Assessment | Points per  | Total points |
| Exam (4) | 75 pts each | 300 |
| Assignments (4) | 8 pts each |  32 |
| In class work (15)  | 1 pt each |  15 |
| BITN | 5 pt |  5 |
| Summaries of Papers | 10 pt each |  30 |
| **TOTAL POINTS** |  | **382** |

FINAL GRADES: 93-100 =A, 90-92 = A-, 85-89 = B+, 80-84 = B, 75-79 = C+, 70-74 = C, 60-69 = D, <60 = F