

Syllabus for CHEM 453: *Biomolecular Structure & Function* – Fall 2020
Coastal Carolina University
Version 12 November 2019

Instructor: Brian Lee, Ph.D. **Email:** brianlee@coastal.edu
Office Hours: 9⁰⁰ – 10⁰⁰ am MWF **Office:** Science II 301-C
Lecture: 1⁰⁰ – 1⁵⁰ pm MWF in Smith Science 208
Final Exam: Tuesday, Dec 8th 1³⁰ – 3³⁰ pm

Required Text:

The Molecules of Life, W. W. Norton & Co., Inc., New York, NY, 2012 (U.S. edition only).
by John Kuriyan, Boyana Konforti and David Wemmer ISBN13: 978-0-815-34188-8

Biochemistry Texts on Reserved in Kimbel Library:

Biochemistry, 3rd Ed., Voet & Voet, QP514.2.V64 2004
Biochemistry, 6th Ed., Berg, Tymoczko & Stryer, QP514.2.S66 2007
Fundamentals of Biochemistry, 2nd Ed., Voet, Voet & Pratt QD 415.V63 2006
Protein Structure and Function, Petsko & Ringe QP551.P48 2004

Prerequisite: *General Organic Chemistry* (CHEM 331/331L/332/332L) and *Calculus* (MATH 160)

Pre/Co-requisites: *Physics* (PHYS 205 or PHYS 211)

Co-requisite: *Biomolecular Structure & Function Lab* (CHEM 453L)

Course Description: This course will explore the correlation between biomolecular structure and function through molecular modeling, structural biology and biophysical techniques. Topics will include protein structure, nucleic acid structure, folding and dynamics, molecular recognition, catalysis, allostery, comparative modeling, molecular dynamics simulations, structure determination with experimental data, and analysis of molecular motions.

Course Objectives: Students should develop knowledge and skills in the following areas:

1. structure and chemical properties of biomolecules.
2. functions of biomolecules including ligand binding and enzymatic catalysis.
3. techniques to study the structural and functional aspects of biomolecules.

Student Learning Outcomes: Students will be expected to complete the following tasks:

1. describe the secondary structural features of biomolecules.
2. identify non-covalent interactions that provide structural stability.
3. describe the role of functional groups in biomolecular interactions.
4. describe the structural determinants of chemical reactivity and catalysis.
5. identify allosteric pathways that regulate biomolecular activities.
6. determine correlations between kinetic data and molecular dynamics.
7. describe computational and experimental techniques to determine structures.
8. identify biophysical techniques that measure biological functions.
9. correlate functional assays results with biomolecular structure.

Course Requirements: Three mid-term exams and a final exam will be given. Exams not taken will be assigned a grade of zero. The date of each exam is given in the course schedule. All exams are cumulative.

Grading Scale:	A 1000–900 pts	B ⁺ 899–870 pts	B 869–800 pts	C ⁺ 799-770 pts
	C 769–700 pts	D ⁺ 699-670 pts	D 699–600	F 599–0 pts

Grading Policy: Your final grade will be based on exams and quizzes, as follows:

3 mid-term exams (250 points each) =	750 maximum points =	75 %
1 final exam (250 points) =	250 maximum points =	25 %
Total =	1000 maximum points =	100 %

Academic Integrity Code: Coastal Carolina University is an academic community that expects the highest standards of honesty, integrity and personal responsibility. Members of this community are accountable for their actions and reporting the inappropriate action of others and are committed to creating an atmosphere of mutual respect and trust. In accordance with the Code of Student Conduct and your Honor Pledge, plagiarism, cheating, attempted cheating and all other forms of academic dishonesty will not be tolerated. Any student caught cheating on an exam will automatically receive zero points for that exam, which cannot be dropped from the final grade.

Class Attendance Policy: You are obligated to attend class regularly. The instructor is required to report attendance to the Financial Aid Office in compliance with Title IV of the Higher Education Act of 1965 and University Policies. Absences, excused or not, do not absolve you from the responsibility of completing all assigned work promptly. Excused absences must be approved beforehand (emergencies excepted). Accommodations for excused absences may be made at the discretion of the instructor.

Class Etiquette: Please, if you must arrive late or leave early, do not disrupt the class. Turn off your cell phone ringer during the class. Eating, texting, gaming, web browsing or reading a newspaper is not permitted during class. Use of a laptop, tablet or smartphone for taking notes and referencing course material is permitted as long as there is no disruption to the class. Please be polite in all discussions in class and respectfully of others. Questions and discussions are encouraged and expected in class. You are encouraged to work together and help each other understand the course material. Study groups are encouraged.

Accommodations for Students: Coastal Carolina University, in accordance with the Americans with Disabilities Act Amendments Act of 2008 (ADAAA) and Section 504 of the Federal Rehabilitation Act of 1973, will provide reasonable accommodations for eligible students with disabilities. If you require special assistance, please see me privately and seek assistance directly from the Office of Accessibility and Disability Services (843-349-2503 or www.coastal.edu/disabilityservices/). You are responsible for initiating arrangements of accommodations for tests and other assignments in collaboration with the Office of Accessibility and Disability Services and your professors.

Contingency Class Time: In the event of hazardous weather, faculty, staff, and students are requested to listen to local radio and television stations, or visit the Coastal Carolina University website for official closing announcements. If normal class activities are disrupted due to illness, emergency, inclement weather, or crisis situation, the syllabus, class schedule and course requirements may be modified to allow completion of the course. Changes may include the additional class meeting times.

Changes and Amendments: The syllabus, class schedule and course requirements are subject to change by the instructor with notice to the student as the semester progresses. All changes will be posted.

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Textbook: *The Molecules of Life*, by Kuriyan, Konforti and Wemmer (2012).

Tentative Class Schedule:

<u>Date</u>	<u>Topic</u>	<u>Ch</u>	<u>Date</u>	<u>Topic</u>	<u>Ch</u>
Aug 19	Genes to RNA and Proteins	1	Oct 14	Molecular Recognition	12
21	Genes to RNA and Proteins	1	16	Molecular Recognition	12
24	Genes to RNA and Proteins	1	19	Molecular Recognition	12
26	Genes to RNA and Proteins	1	21	Molecular Recognition	12
28	Nucleic Acid Structure	2	23	Specificity	13
31	Nucleic Acid Structure	2	26	Specificity	13
Sep 2	Nucleic Acid Structure	2	28	Specificity	13
7	<i>Labor Day</i>		30	Allostery	14
9	Glycans and Lipids	3	Nov 2	Allostery	14
11	Glycans and Lipids	3	4	Allostery	14
14	Glycans and Lipids	3	6 Third Exam		
16 First Exam			9	Protein Folding	18
18	Protein Structure	4	11	Protein Folding	18
21	Protein Structure	4	13	Protein Folding	18
23	Protein Structure	4	16	Protein Folding	18
25	Protein Structure	4	18	Fidelity in Synthesis	19
28	Protein Structure	4	20	Fidelity in Synthesis	19
30	Evolutionary Variation	5	23	<i>Thanksgiving Break</i>	
Oct 2	<i>Fall Break</i>		30	Fidelity in Synthesis	19
5	Evolutionary Variation	5	2	Fidelity in Synthesis	19
7	Evolutionary Variation	5	8 Final Exam		
9	Evolutionary Variation	5			
12 Second Exam					

*Last day to change registration is **August 25, 2020***

*Last day to drop the course with a W grade is **October 26, 2020***

- after that date, any withdrawals receive a WF grade