Chemical Systems I
CHEM 3110 Section 1
Winter Quarter 2021

Instructor: Brady Worrell

E-mail: brady.worrell@du.edu

Phone: (317)250-4680 (personal cell, text or call anytime. If possible, text is preferred)

Office: Seeley G. Mudd 120

Lab: Seeley G. Mudd 239/243 (if not in office always check lab)

Lecture: MWF 10:00 – 10:50 AM, Olin 103

Required Text: *Modern Physical Organic Chemistry*, Anslyn & Dougherty

Course Objectives: In this course we will broadly be covering the fields of advanced organic chemistry and physical organic chemistry. It is my hope that because of this course you will understand the nature of the chemical bond, the logical flow of electrons, how to analyze reaction kinetics, how thermodynamic and kinetic parameters impact reactions, the basic concepts of catalysis, and the fundamentals of addition, elimination, and substitution reactions. Additional projects and presentations will be related to concepts covered in class but are mainly geared towards aiding in your development as successful researchers.

Point Structure:
Problem Sets: 100 points (4 total, 25 points each)
Quiz: 25 points (1 total)
Presentation: 75 points (1 total)
Project: 100 points (1 total, midterm)
Final Exam: 100 points (1 total, final)

Problem Sets: You will be given 4 take home assignments throughout the duration of this course that will aide and test your comprehension of concepts covered in lecture. These assignments can be done in groups and are due by 5 pm on specified due dates.

Quiz: One in-class quiz will be given in the second week of this course. This quiz will be given to ascertain the effectiveness of the lecturing style and student comprehension. Changes to the style and structure of the course will be considered pending the results of this quiz.

Presentations: One ~10 minute in-class presentation will be given by each student in the 4th week of class. This presentation will be a summary of a paper assigned to the student, largely related to concepts covered in class. The student should prepare a minimum of 3 and a maximum of 4 slides that: 1) introduces the background and motivation for the work described in the paper (1 slide), 2) dissects the experimental methods and results of the paper (1-2 slides), and 3) a proposal for future work that could stem from the published results (1 slide).

Project/Midterm: As opposed to a written midterm examination, I will be assigning a project as a replacement. This project will be done individually and will be a 3-page review written in the format of *Accounts of Chemical Research*. As part of this project, you will be assigned 3-4 papers from the primary literature on a singular subject broadly related to Physical Organic Chemistry. From these papers and whatever other literature you deem relevant, you will write a 3 page mini-

review consisting of, *at a minimum*: 1) a title, 2) an abstract, 3) a TOC figure, 4) a minimum of 3 original figures, 5) a written introduction, 6) a summary of the literature, 7) a conclusion, and 8) a minimum of 10 citations in ACS format. We will discuss this project at length during this course and I will be available to help everyone create a strong, independent, and cogent mini-review of the provided literature. A template will be provided and will be strictly adhered to. *Everything in this mini-review should be in your own voice and all pictures/figures should be your own, plagiarized text or figures will result in a 0 on this project.*

Final Examination: A final exam covering all core concepts and materials from week 1 to 9 will be given in week 10 of this course. The student will find it most instructive to study materials covered on problem sets, class notes, and supplementary notes.

Final Grade: Your final grade will be determined out of the 400 available points obtained through problem sets, quizzes, the project, and the final exam. This class will be curved by setting the highest grade in the course as 100% and adding the difference between this score and the total available points (400) to the other scores. Although, in class/out of class engagement, attendance, and general participation *do not directly impact your final grade*, they will be considered in the case of borderline scenarios. Therefore, it is in your best interest as a student to be engaged, in attendance, and an active participant in discussions.

Cell phone and electronic device policy: While in class please have your cell phone on silent and please refrain from texting/use of cell phone during lecture. Of course, situations and emergencies arise, if you need to take a call or use your cell, I recommend that you quietly leave the class to do so. Laptops or tablets are allowed in class for notetaking purposes.

Lecture and testing accommodations: I will make every effort to accommodate students with a learning disability. If you require special accommodations to be made, please email me at any time during the class (preferably within the first week). For further information, please see the University's Disability Services' website at: http://www.du.edu/disability/dsp/index.html. I am a very slow test taker and found time provided for testing to be insufficient and stressful. Therefore, I will not put a strict time limit on quizzes or examinations. You can take as long as you need and, within reason, you will be accommodated. All quizzes and tests will be open book, open note. I hope for examination components of this course to test your comprehension of the material not your test taking ability.

Academic Integrity: I advocate for collaborative learning and teamwork, but I hope that each student will maintain high ethical standards. As such, I will support and enforce the Honor Code of the University of Denver: www.du.edu/honorcode

My commitment: It is my job to teach the students of this course the subject materials to the best of my ability. As such, *I am **your** employee*. Therefore, day or night, please contact me directly if you need help or need special accommodations. You are *never* bugging me.

Topics to be covered: Given the current COVID-19 pandemic, this schedule is subject to change but I will do my best to adhere closely to the plan detailed below.

Week	Lecture	Topic	Readings
1	1 (1/11)	Chapter 1: Structure and Bonding	pg 3 – 10 (1.1.1-1.1.6)
	2 (1/13)		pg 10 – 25 (1.1.7-1.1.12)
	3 (1/15)		pg 52 – 59 (1.4)
2	*No class, MLK holiday* (1/18). ***Problem Set 1 emailed (1/18), due (1/25)***		
	4 (1/20)	Arrow pushing bootcamp	Handouts (1-9)
	5 (1/22)	Finish arrow pushing & ***Quiz***	
3	6 (1/25)	Chapter 2: Strain and Stability	pg 65 – 82 (2.1)
	7 (1/27)		pg 82 – 100 (2.2-2.3.1)
	8 (1/29)		pg 100 – 124 (2.3.2-2.4)
4a	9 (2/1)	Chapter 6: Stereochemistry	pg 297 – 314 (6.1-6.2)
	10 (2/3)	***Problem Set 2 emailed (2/1), due (2/8)***	pg 315 – 323, pg 333 – 340 (6.3-6.5, 6.8)
	***Mini-Review Workshop* (2/5) – Review due 2/15 at 5 pm**		
5	11 (2/8)	Chapter 7: Kinetic analysis	pg 355 – 374 (7.1-7.2)
	12 (2/10)		pg 374 – 382 (7.3)
	13 (2/12)		pg 382 – 390 (7.4)
6	14 (2/15)	Chapter 8: Thermodynamics and Kinetics	pg 421 – 434 (8.1.1-8.1.4)
	15 (2/17)		pg 441 – 463 (8.2-8.4.5)
	16 (2/19)		pg 466 – 479 (8.6-8.8.8)
7	***Short presentations (2/22)*, *Problem Set 3 emailed (2/22), due (3/1)***		
	17 (2/24)	Chapter 9: Catalysis	pg 489 – 507 (9.1-9.2)
	18 (2/26)		pg 507 – 523 (9.3)
8	19 (3/1)	Chapter 10: Additions and Eliminations	pg 537 – 554 (10.1-10.5)
	20 (3/3)		pg 554 -569 (10.6-10.9)
	***SciFinder Workshop* (3/5)**		
9	21 (3/8)	Chapter 11: Substitution	pg 627 – 646 (11.1-11.5.6)
	22 (3/10)	***Problem Set 4 emailed (3/8), due (3/15)***	pg 646 – 667 (11.5.7-11.5.16)
	23 (3/12)		pg 669 – 683 (11.6-11.10)
10	24 (3/15)	**Molecular Machines (not covered on final exam)**	Handouts (emailed)
	***Review session for Final Exam* (3/17)**		
	***Final Exam* (3/19)**		

Key for student deliverables:

Red: Problem Sets (4 total, 25 pts each, 100 pts). Due dates are by 5 pm.

Blue: Examinations (Quiz [1 total, 25 pts]; Final Exam [1 total, 100 pts])

Green: Review sessions or special topics (no points, not covered on examinations, attendance optional but highly recommended).

Yellow: Presentations (1 total, 75 pts)