Course Syllabus

Organic Chemistry 2 50:160:336 Spring 2024 Dr. Alex J. Roche alroche@camden.rutgers.edu

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Rationale: Chemistry is the *molecular* science. Chemists believe that the best understanding of the properties of matter comes from study at the *molecular level*.

For example, boiling points, acidity, chemical reactivity, taste, smell, drug efficacy, colour, toxicity, etc., can all be understood/predicted/explained by a consideration of the relevant atoms and bonds connecting them. Organic chemistry provides the basic principles that govern the structure (and therefore the behaviour and reactivity) of molecules.

Course Objective: Upon successful completion, students will understand the direct connection between the properties and behavior of a substance, and its molecular structure.

Learning Goals: Students will be familiar with the below subject matter, and be able to apply these concepts and principles to any molecule or chemical process. **Detailed goals are listed within Canvas for each Chapter/Module.**

Chapter 14 deals with Ethers and Cyclic ethers; their uses, syntheses, IUPAC naming and reactions; ring opening of epoxides, acid and base catalyzed differences in regiochemistry of nucleophilic ring opening.

Chapter 15 deals with the concept of Conjugation; different types of diene; the M.O. description of π bonds and conjugated π bonds; s-cis and s-trans conformations; 1,2 and 1,4 additions; kinetic and thermodynamic control; allylic systems; Diels Alder reactions; Woodward-Hoffmann rules, HOMO-LUMO interactions, Allowed and Forbidden Pericyclic processes; UV spectroscopy.

Chapter 16 deals with the special reactivity of Benzene; its structure, MO description; closed bonding shell; cyclobutadiene and its structure, reactivity and MO description; Polygon Rule; the distinction of Aromatic, Anti-aromatic and Non-aromatic; Huckel 4N+2 rule; aromatic ions and heterocycles; structure and reactivity differences for Pyridine and Pyrrole.

Chapter 17 deals with reactions of Aromatic systems; EAS reactions, reagents and mechanisms; activation and deactivation; o/p and m directing effects; NAS reactions, reagents and mechanisms; addition and side chain reactions for benzene derivatives.

Chapter 18 deals with Aldehydes and Ketones; IUPAC naming; syntheses; Nucleophilic addition reactions (both acid and base catalyzed); Wittig reaction; hydration; Relative reactivity;

Condensation reactions; imines, acetals, cyclic acetals; use of protecting groups; oxidation; deoxygenation reactions.

Chapter 19 deals with Amines and N containing functional groups; IUPAC naming; Basicity and factors; ammonium salts and their purification; amine (substitution) reactions; nucleophilic acyl substitution yielding amides; Hoffman elimination; Diazonium salt formation and reactions; Syntheses of amines (reductive amination, acylation-reduction, Reduction including azides and nitriles; Hoffman rearrangement, Gabriel synthesis).

Chapter 20 deals with Carboxylic acids, IUPAC; Ka and pKa values; Syntheses of carboxylic acids; Nucleophilic acyl substitution reactions; Fischer esterification; Acid chlorides preparation and reactions; Diazomethane; Reaction with amines to produce amides; Reduction to aldehydes and alcohols; Conversion to ketones.

Chapter 21 deals with Carboxylic Acids derivatives. Acid halides, anhydrides, esters, amides and nitriles. IUPAC naming of multifunctional molecules; IUPAC of carboxylic derivatives; Relative reactivity towards Nucleophilic acyl substitution, uphill/downhill reactions; effect of an early transition state and leaving group ability in substitution reactions; Acid catalyzed nucleophilic acyl substitutions; Fischer and trans-esterification; Hydrolyses of Carboxylic acid derivatives; Reduction of derivatives; Reactions with organometallics; Functional group summaries.

Full Timetable of Events

Week starting Monday	*TUES*	*THURS*	*WEEKLY ACTIVITY*
Jan 15	***MOVED ONLINE*** ***(See Announcements)***	Lecture 9.35am	Ch14
Jan 22	Recitation 8am Lecture 9.35am	Lecture 9.35am	Start Ch15
Jan29	Recitation 8am Lecture 9.35am	Lecture 9.35am	Finish Ch15 & Start Ch16
Feb 5	Recitation 8am Lecture 9.35am	Lecture 9.35am	Finish Ch16 & Start Ch17
Feb 12	Recitation 8am Lecture 9.35am	Lecture 9.35am	Finish Ch17

			HW Quiz1 due FRIDAY
Feb 19	Recitation 8am EXAM 1 - 9.35am	9.35am EXAM postmortem	Start Ch18
Feb26	Recitation 8am Lecture 9.35am	Lecture 9.35am	Finish Ch18
Mar 4	Recitation 8am Lecture 9.35am	Lecture 9.35am	Start Ch19
Mar 11	***SPRING***	***BREAK***	
Mar 18	Recitation 8am Lecture 9.35am	Lecture 9.35am	Finish Ch19 HW Quiz2 due FRIDAY
Mar 25	Recitation 8am EXAM 2 - 9.35am	9.35am EXAM postmortem	Start Ch20
Apr 1	Recitation 8am Lecture 9.35am	Lecture 9.35am	Finish Ch20
Apr 8	Recitation 8am Lecture 9.35am	Lecture 9.35am	Start Ch21
Apr 15	Recitation 8am Lecture 9.35am	Lecture 9.35am	Finish Ch21 HW Quiz3 due FRIDAY
Apr 22	Recitation 8am EXAM 3 - 9.35am	9.35am EXAM postmortem and Final Exam advice	Study for Final
		FINAL EXAM is THUR May 2nd 8-11am	

TUESDAYS and THURSDAYS 9.35-10.55am will be formal LECTURE classes as i present the (provided) Lecture Notes.

TUESDAYS 8-9am will be a RECITATION where i review the previous week's content on the chalkboard, and address any questions or issues from the students.

Grade Scheme: There are 3 homework assignment Quizzes, 3 Exams and 1 cumulative Final: If you score an A (44.5 or above /50) on each of the 3 exams, you do NOT need to take the final (and will get an A). (The homework assignments do not feature in this generous and motivational offering). This is usually referred to as "*achieving the dream*".

Grade Scheme	% Score and Letter Grade
Homework Quizzes are 10pts	90% + = A
Exams are 50pts	85% = B+
Final is 150pts	80% = B
Total is (3x10) + (3×50) + 150 = 330	75% = C+
	70% = C
Total your scores and divide by 3.30 to get a % score.	60% = D
(9% + 45.5% + 45.5% = 100%)	-60% = F
There is no curve / extra credit / favours, your grade is your grade.	

Required Textbook: There is no REQUIRED textbook or materials, although the lecture materials are based on the excellent books "*Organic Chemistry*" by L.G. Wade, Jr., 4th…9th eds.

Communication Guidelines: I want to help you succeed in this course and do the best that you can! Please don't hesitate to reach out to me throughout the semester with any questions or concerns you may have. It's a good thing to ask for help–it means you're paying attention and you know what you need–and you are **not** bothering me.

Please check both the Home page and syllabus **before** asking a question.

If you need to email me, be sure to include your name. Depending on when you send your email, you can expect a response:

- Monday-Friday: within a couple of hours.
- Weekend emails: I'll respond within 24 hours.
- Emails received between 8pm and 7am will likely not be addressed until the morning.

If you do not receive a response from me within the above listed time frame, please send the email again.

Office hours: I have no set time, but if my office door is open you are welcome to stop by. More office hours can be requested via email. We can also meet via web conference (using Webex). If you'd like to request an appointment, email me. Please include the reason why you'd like to meet in your email.

What you can expect from me in this course: Learning can be uncomfortable and stressful at times–I would argue that if it weren't, you might not be learning that much! However, I do want to help make sure that you make progress and persist through the course, and don't feel discouraged or overwhelmed. To do this, you can expect me to:

- Communicate with the whole class using Announcements in Canvas on a regular basis. Please make sure your Canvas Notifications (Links to an external site.) are set to alert you to new Announcements immediately.
- Grade your Examinations within 24 hours.
- Respond to all of your email communications with me based on the communication guidelines above.
- Reach out to you–multiple times if needed!–if I notice that you're falling behind or seem to be struggling. I want to help you succeed.
- Encourage you to strive for better and congratulate you on your achievements.

Academic Integrity: As a student at the University, you are expected to adhere to the Student Code of Conduct Links to an external site. and Academic Integrity Policy Links to an external site.. The consequences of scholastic dishonesty are very serious. You are responsible for reading and understanding our policy on academic integrity,

Links to an external site.which means among other things, that all Rutgers students are required to:

- *make sure that all work submitted as his or her own in a course or other academic activity is produced without the aid of **unsanctioned materials** or **unsanctioned collaboration**.*
- *treat all other students in an ethical manner, respecting their integrity and right to pursue their educational goals without interference. This requires that a student neither facilitate academic dishonesty by others nor obstruct their academic progress.*

Office of Disability Services (ODS)—Students with Disabilities: If you need academic support for your courses, accommodations can be provided once you share a Letter of Accommodation issued by the Office of Disability Services (ODS) that specifies your accommodations indicated. If you have already registered with ODS and have your Letter of

Accommodation, please share this with your instructor early in the course. If you have not registered with ODS and you have or think you have a disability (learning, sensory, physical, chronic health, mental health or attentional), please visit the ODS website

Links to an external site., email, or call (856) 225-6954.

Please Note: Accommodations will be provided only for students with a Letter of Accommodation from ODS. Accommodation Letters only provide information about the accommodation, not about the disability or diagnosis.

Inclusivity: I am committed to diversity and inclusion in this course and want to include all perspectives. Please let me know if you perceive any bias in any form in this course. I'll be asking for your pronouns in the first module, and will ask all class members to respect the pronoun and name choices of each individual in this class. Rutgers does allow students to request a preferred name change on official university documents and systems, which can be submitted

Links to an external site. at this link if you're interested. However, I understand that all students may not have the ability to have their preferred name displayed officially, and I will use the preferred name you submit informally in this course.

Full list of Campus Resources available: https://studentaffairs.camden.rutgers.edu/student-resource-list

Links to an external site.