Organic Chemistry II, CHEM F325

4 Credits

Spring 2022

General Information

Instructor:	Dr. Tom Green	*Office Location:*	Reichardt 174
Email:	tkgreen@alaska.edu	*Office Hours:*	TBA, by Zoom.
Telephone:	(907) 452-6370 home (907) 744-2726 cell	**Course Type:*	Lecture: Online asynchronous Laboratory: Online
***Course Location:*	Online Lecture Online Laboratory	*Meeting Time:*	Problem Sessions by Zoom, recorded.

Prerequisites

Organic Chem II + Lab (Chem F321 + Chem 321L, or similar)

Co-requisites

An online laboratory accompanies the lecture and must be taken concurrently as part of the course. The laboratory requires that the student be able to conduct experiments at home or other appropriate safe location using a laboratory kit supplied by the department.

Course description

A systematic study of the more important functional groups of carbon compounds, including their mechanisms of reaction, methods of synthesis, and physical and spectroscopic properties. Lab portion will include synthetic techniques and spectroscopy.

In-depth Course description

Organic chemistry, simply defined, is the chemistry of carbon-containing molecules, but it is much more than that. In this course, we will explore the fundamental properties of organic molecules including their bonding, functionality, physical properties, reactions, synthesis and analysis. In this second semester, we will continue with our study of the reactions and synthesis of different classes of compounds, including conjugated systems, aromatic compounds, ketones/aldehydes, carboxylic and derivatives, and amines. Biomolecules include amino acids, peptides, carbohydrates, and lipids. The topic of stereochemistry, the spatial arrangement of atoms, is integrated throughout the course since it plays a central role in the biochemistry of life.

This course also has a laboratory component. In the laboratory, you build and study organic molecules using modern computational methods, and then synthesize, isolate, purify and characterized organic compounds. You will submit products for analysis and interpretation using modern instrumentation in our department. My

vision is that this course will serve as a foundational experience in organic chemistry, as you pursue your field of study, whether it be chemistry, biochemistry, biology, medicine, pharmacy, or some other field.

Course Readings/Materials

The following materials are *required* for the course and can be purchased.

1. Organic Chemistry, 9th edition, Leroy G. Wade and Jan William Simek, Pearson, 2017

2. Mastering Chemistry, digital platform from Pearson for online Homework.

3. Lab notebook for recording experimental data, results and conclusions. The lab notebook will be supplied by the department. Student Lab Notebook, 2012 Book Factory, Lab-050-7GSS, 50 pages.

4. Textbook: Making the Connections3; A How-to-Guide for Organic Chemistry Lab Techniques, 3rd edition, Anne B. Padias, 2015, Hayden McNeil.

5. Laboratory kit with chemicals and equipment for conducting online experiments. Your lab fee was used to help offset the costs of this kit. We will send this to you by mail. **It is important to understand that you are required to return this laboratory kit at the end of the semester, and that you agree to do this.** Please inform me immediately if you cannot agree to do this. A separate laboratory schedule with more details will be on Canvas.

Purchasing Options:
Organic Chemistry, 9th edition, eText and Mastering: ISBN-13: 9780134130040, $120

A University of Alaska email address is required for all communication in the class. This also provides access to the Canvas system for individual scores and grades.

Technology requirements

A University of **Alaska email address** is required for all communication in the class. This also provides access to the Canvas system for individual scores and grades.

Students must have regular **access to a computer and the Internet to access online materials in Canvas**. Students will be expected to download course material as well as upload assignments. The lectures for this course will be posted in Canvas in the form of recorded videos.

Mastering Homework problems will be assigned using questions from the textbook in coordination with the Mastering digital platform. Mastering will be accessed through Canvas. **All students need to purchase the access code and register through Canvas.** The course ID is **green86917**

The videos will be short, typically no more than 10-15 min, with identified topics. The video content will correlate with the order of chapters in the textbook, covering Chapters 15-. Students are expected to watch all videos that are posted.

Course Goals

1. Be able to interpret, explain, and predict the physical and chemical properties of organic molecules based on their molecular structures, functional groups, and reaction conditions.
2. Be able to identify and illustrate mechanisms (step-by-step pathways) associated with the reactions of organic molecules.
3. Be able to identify, classify and illustrate stereochemical (spatial) relationships of organic molecules.
4. In the laboratory, learn the following:
    a. Common safety procedures
    b. Reaction methods
    c. Isolation and Purification Procedures
    d. Spectroscopic and chromatographic analyses to verify structure
    e. Molecular modelling methods to understand structure and reactivity

Student Learning Outcomes

Specific Learning Outcomes are defined for each chapter in the textbook. Please refer to the Canvas course under Course Content for listing of these Learning Outcomes.

General Learning Outcomes for the Course are:

- Demonstrate a knowledge of organic chemistry, molecular structure, orbital theory, bonding patterns, reaction chemistry, mechanistic interpretation and nomenclature.
- Demonstrate an understanding of modern spectroscopic principles and their application to organic molecules.

- Demonstrate competency of modern laboratory techniques, including reaction, isolation, purification, and analyses of organic molecules.
- Demonstrate how organic chemistry is relevant to other scientific disciplines such as biochemistry and molecular biology.

Instructional Methods

Lectures: All lectures will be delivered asynchronously by Canvas. Good internet connectivity is required.

Homework will be delivered online using a program called Mastering, Homework is correlated with each chapter as covered in the text. **All students need to purchase the access code and register through Canvas.**

Exams. All exams will be delivered via Gradescope. The student is responsible for all information from the assigned text, lecture, and homework. Any of these sources will be used to construct exam questions. Three exams and a cumulative final exam will be given as indicated in the course schedule. **All students are required to take the final exam in order to pass the course. No exam scores will be dropped.**

Laboratory. The laboratory will be entirely conducted at your place of residence. I will publish guidelines for the lab. **You will need to have a place to conduct the laboratory experiments in a safe manner**. You are also required to agree to return the equipment to the Department of Chemistry & Biochemistry, UAF, at a later date, depending upon whether you decide to take the second semester of organic chemistry.

Explanation of Student Effort

Students are expected to spend 2-3 hours per credit hour outside of class to be successful. Thus, you should expect to spend 8-12 hours outside of class on study for this class. Although this is typical, you may spend more or less than this, depending on your previous experience studying chemistry.

Lecture Schedule

Mastering due on Sunday, 11:59 pm.
Exams due on Sunday, 11:59 pm.
Laboratory Reports must be submitted via Gradescope

Week	Dates	Topic/Activities	Due Dates *all times 11:59 pm Alaska Time (AST)
Week 1	Jan 10 - Jan 16	**Conjugated Systems and UV-Vis Spectroscopy** Chapter 15 Mastering: Register for Mastering; Chapter 15	Register for Mastering
Week 2	Jan 17 - Jan 23	**Aromatic Compounds** Chapter 16 Mastering Chapter 16	Mastering Chapter 15 Due Jan 23
Week 3	Jan 24 - Jan 30	**Reactions of Aromatic Compounds** Chapter 17 Mastering Chapter 17	Mastering Chapter 16 Due Jan 30
Week 4	Jan 31 - Feb 6	**Review Chapter 15-17, Problems**	Mastering Chapter 17 Due Feb 6
Week 5	Feb 7 - Feb 13	**Exam 1, Chapters 15-17** **Ketones and Aldehydes** Chapter 18	**Exam 1: Due Feb 13, Midnight**

		Mastering Chapter 18	
Week 6	Feb 14 - Feb 20	**Amines** Chapter 19 Mastering Chapter 19	Mastering Chapter 18 Due Feb 20
Week 7	Feb 21 - Feb 27	**Carboxylic Acid** Chapter 20 Mastering Chapter 20	Mastering Chapter 19 Due Feb 27
Week 8	Feb 28 - Mar 6	**Review Chapter 18-20, Problems**	Mastering Chapter 20 Due Mar 6
Spring Break	Mar 7 - Mar 13	**Spring Break**	**Spring Break**
Week 9	Mar 14 - Mar 20	**Exam 2 Chapters 18-20** **Carboxylic Acid Derivatives** Chapter 21 Mastering Chapter 21	**Exam 2, Due Mar 20, Midnight**
Week 10	Mar 21 - Mar 27	**Condensations of Carbonyl Compounds** Chapter 22 Mastering Chapter 22	Mastering Chapter 21 Due Mar 27
Week 11	Mar 28 – Apr 3	**Condensations of Carbonyl Compounds** Chapter 22 Mastering Chapter 22	
Week 12	Apr 4 – Apr 10	**Review Chapter 21-22, Problems**	Mastering Chapter 23 Due April 10
Week 13	Apr 11 - Apr 17	**Exam 3 Chapters 21-22** **Carbohydrates - Selected Topics** Chapter 23 Mastering Chapter 23	**Exam 3 Due April 17, Midnight**
Week 14	Apr 18 – Apr 24	**Amino Acids, Peptides -Selected Topics** Chapter 24 Mastering Chapter 24	Mastering Chapter 23.24 Due Apr 24
Week 15	Apr 25	**Final Exam: Carbohydrates, Amino Acids**	**Final Exam Due on April 29**

	– Apr 29		

Evaluation

Grades will be posted to Canvas Course Site. Class grades may be adjusted (curved) from the following schedule only in the students' favor.

	Points
Examination 1	100
Examination 2	100
Examination 3	100
Final Examination	100
Laboratory	250
Mastering Homework	250
BACON	100
Total	1000

Grade Range	Letter Grade	Points
100 - 90%	A	1000-900
89 - 80%	B	899-800
79 - 70%	C	799-700
69 - 60%	D	699-600
59% or less	F	< 600

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Laboratory Description

The laboratory is designed to illustrate modern techniques of isolation, purification, analysis and structure determination of covalent, principally organic, compounds. Lab portion will include an introduction to synthetic techniques and spectroscopy.

Laboratory Student Learning Outcomes

1. Know the hazards associated with common chemicals, especially those encountered in the experiments.
2. Know how to safely assemble reaction systems using glassware commonly employed in the organic laboratory. These methods include reflux, heating and cooling of reactions, and addition of reagents.
3. Know how to isolate and purify organic products using methods such as extraction, filtration, crystallization, distillation, solvent removal, and thin layer chromatography.
4. Learn the importance of stoichiometry to a chemical reaction. Learn how to assess the efficiency of a chemical reaction (percent yield and atom economy).
5. Learn the practical aspects of spectroscopic analyses of organic compounds.
6. Learn how to build and optimize simple molecules using WebMO/Gaussian and how to measure properties of those molecules.

Lab Schedule

Experiment	Week	Concepts/Techniques	Chapter Wade
No Lab	Jan 10	No Lab	-
Exp 1: NMR/IR of Unknowns	Jan 24	^{13}C, ^{1}H NMR, IR Structure Determination	13
Exp 2: Mass Spectrometry	Feb 7	Structure Determination, Fragmentation of Functional Groups	12
Exp 3: Isolation of Natural Product from Spices	Feb 14	Mass Spectrometry; Solvent Extraction	12
Exp 4: Diels-Alder Reaction	Feb 21	Reflux, NMR Coupling Constants, Molecular Modeling	15
Exp 5a: Iodination of Vanillin	Feb 28	Electrophilic Aromatic Substitution, Modeling, Redox	17
Exp 5b: Iodination of Vanillin	Mar 7	Continued WebMO	17
Exp 6: Suzuki Coupling	Mar 14	Catalysis, Reflux, NMR	17
Exp 7: Synthesis of Soap; Saponification	Mar 21	Lipids, ester hydrolysis, micelles, NMR	20
Exp 8: Synthesis of Aspirin	Mar 28	Nucleophilic acyl substitution, Reflux, Esterification, NMR	21

Tentativwe Due Dates for Lab Reports

Experiment	**Due Date (11:59 pm)**
Exp 1:: NMR of Unknowns (30 pts)	Feb 6
Exp 2 Mass Spectrometry and Fragmentations (30 pts)	Feb 20
Exp 3: Isolation of Natural Products (50 pts)	Feb 27
Exp 4: Diels-Alder Reaction (50 pts)	Mar 6
Exp 5a and b: Iodination of Vanillin (50 pts), WebMO (30 pts)	Mar 20
Exp 6: Suzuki Coupling (50 pts)	Mar 27
Exp 7: Synthesis of Soap; Saponification (50 pts)	Apr 3
Exp 8: Synthesis of Aspirin (50 pts)	Apr 10

Category	**Points**
Lab Reports	390 pts
Lab Notebook	50 pts
Total Points	**440 pts***

Grading

*The points that you earn will be normalized to 250 pts of your overall grade, which represents 25% of the grade 4.

All lab reports will be on Sunday night, at 11:59 pm. All lab reports are to be submitted by **Gradescope**. There are instructions about how to do this on the Canvas site.

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Course Policies

Expectations on Progress in Coursework.

Students are expected to complete all online homework in timely manner. Students are expected to take all quizzes and exams during the scheduled times. If these are not completed on time, the students is expected to provide a legitimate excuse or explanation to the Professor in writing, preferably prior the anticipated missed deadline, so that appropriate rearrangements can be made to make up the missed assignment.

Plagiarism and Academic Integrity

Academic dishonesty applies to examinations, assignments, and laboratory reports. Examples include, but are not limited to:

- Presenting as their own the ideas or works of others without proper citation of sources;
- Utilizing devices not authorized by the faculty member;
- Using sources (including but not limited to text, images, computer code, and audio/video files) not authorized by the faculty member;
- Providing assistance without the faculty member's permission to another student, or receiving assistance not authorized by the faculty member from anyone (with or without their knowledge);
- Submitting work done for academic credit in previous classes, without the knowledge and advance permission of the current faculty member;
- Acting as a substitute or utilizing a substitute;
- Deceiving faculty members or other representatives of the university to affect a grade or to gain admission to a program or course;
- fabricating or misrepresenting data;
- Possessing, buying, selling, obtaining, or using a copy of any material intended to be used as an instrument of assessment in advance of its administration;
- Altering grade records of their own or another student's work;
- Offering a monetary payment or other remuneration in exchange for a grade; or
- Violating the ethical guidelines or professional standards of a given program.

For more, see Students Rights and Responsibilities.

Extended Absence Policy

Extended absences are defined as missed classes or course work by students beyond what is permissible by the instructor's written course policies. Students may need to miss class and/or course work for a variety of reasons, including, but not limited to:

- Official UAF activities such participation in athletic events, conferences, etc.

- Bereavement
- Personal illness or injury
- Serious illness of a friend, family member or loved one
- Military obligations
- Jury service
- Other emergency or obligatory situations

For more information, go to the student handbook or the Center for Students Rights and Responsibilities.

UAF Incomplete Grade Policy:

Your instructor follows the University of Alaska Fairbanks Incomplete Grade Policy:

"The letter "I" (Incomplete) is a temporary grade used to indicate that the student has satisfactorily completed (C- or better) the majority of work in a course but for personal reasons beyond the student's control, such as sickness, has not been able to complete the course during the regular semester. Negligence or indifference are not acceptable reasons for an "I" grade."

For more information, see the UAF regulations regarding grades.

Student Protections Statement

I will work with the Office of Disability Services to provide reasonable accommodation to students with disabilities. The Office of Disability Services implements the Americans with Disabilities Act (ADA), and ensures that UAF students have equal access to the campus and course materials. I will work with the Office of Disabilities Services (208 Whitaker, 907-474-5655) to provide reasonable accommodation to students with disabilities uaf.edu/disability/

UAF embraces and grows a culture of respect, diversity, inclusion, and caring. Students at this university are protected against sexual harassment and discrimination (Title IX).

Faculty members are designated as responsible employees, which means they are required to report sexual misconduct. Graduate teaching assistants do not share the same reporting obligations. For more information on your rights as a student and the resources available to you to resolve problems, please go to the following site: https://www.uaf.edu/handbook/

Title IX

University of Alaska Board of Regents have clearly stated in BOR Policy that discrimination, harassment and violence will not be tolerated on any campus of the University of Alaska. If you believe you are experiencing discrimination or any form of harassment including sexual harassment/misconduct/assault, you are

encouraged to report that behavior. If you report to a faculty member or any university employee, they must notify the UAF Title IX Coordinator about the basic facts of the incident.

Your choices for reporting include:

1) You may access confidential counseling by contacting the UAF Health & Counseling Center at 907-474-7043;

2) You may access support and file a Title IX report by contacting the UAF Title IX Coordinator at 907-474-6600;

3) You may file a criminal complaint by contacting the University Police Department at 907-474-7721. https://uaf.edu/oeo/civil-rights/aa-eo/

Any UAF employee or volunteer who reasonably suspects or observes minor abuse or maltreatment is required to report the incident. Reporting procedures are available on the UAF Protection of Minors. Violation of this policy by employees shall be reported as well.

Equal Opportunity Employer

UA is an AA/EO employer and educational institution and prohibits illegal discrimination against any individual: alaska.edu/nondiscrimination.

Library

Contact the Elmer E. Rasmuson Library at UAF reference desk for help with research. library.uaf.edu or 907-474-7481

Student Support Services

The Student Support Services (SSS) program, located in 514 Gruening Building, provides opportunities for academic development, assists students with college requirements, and serves to motivate students towards successful completion of their degree program.

Students have access to services if they meet any of the three eligibility requirements: a) limited income, b) documented disability, or c) first generation college student. Students receive intensive advising, one-one-one tutoring, technology check-outs, free printing and copying, computer lab space, and many other services. Additional information is at https://www.uaf.edu/sss, or contact them directly at (907) 474-6844.

Rural Student Services

Responding to student needs by providing quality services to Native and rural students who expend positive effort in the pursuit of higher education and its opportunities. Please see: https://uaf.edu/ruralss/. Additional student support services can be found here: https://www.uaf.edu/ruralss/tutoring-services/.

UAF Help Desk

Go to https://alaska.edu/oit/ to see about current network outages and news. Reach the Help Desk at: helpdesk@alaska.edu or 907-450-8300 (in the Fairbanks area) or 1-800-478-8226 (outside of Fairbanks).

eCampus Student Services

UAF eCampus Student Services helps online students with registration and course schedules, provides information about lessons and student records, assists with the examination process, and answers general questions. Their Academic Advisor can help students communicate with instructors, locate helpful resources, and maximize their learning experience. Contact the UAF eCampus Student Services staff at 907-479-3444 (toll free 1-800-277-8060) or contact staff directly – for directory listing see: https://ecampus.uaf.edu/contact

Effective Communication Resources

- UAF Speaking Center (907-474-5470, speak@uaf.edu, Gruening 507)
- Writing Center (907-474-5314, uaf-writingcenter@alaska.edu, Gruening 8th floor)
- UAF Math Services, uafmathstatlab@gmail.com, Chapman 305 (for math fee paying students only)
- Debbie Moses Learning Center at CTC (907-455-2860, 604 Barnette St, Room 120).
- Developmental Math Lab, Gruening Building, Rm 406

For more information and resources, please see the academic advising resource list: https://www.uaf.edu/advising/lr/SKM_364e19011717281.pdf

Veteran and Military Support Services

UAF is committed to all veterans and military students—active duty, reserve, guard, separated and retired—as well as their dependents who are exploring UAF's academic opportunities. Staff members in Financial Aid, Admissions, Career Services, Veterans' Services and the Veterans' Resource Center are here to help you with any challenges you encounter while working while in or transitioning from a military to an academic environment. Please contact the Veterans Resources Center, 907-474-2475, https://uaf.edu/veterans/ in room 111 in the Eielson Building.

Emergency Notification Plan

Students will receive emergency notifications via phone or email. Please check your uaonline account to confirm your emergency notification settings. for more information, please refer to the student handbook. in cases where you do not have access to your devices, as your instructor, I will take responsibility to relay any emergency notifications.

COVID-19

Students should keep up-to-date on the university's policies, practices, and mandates related to COVID-19 by regularly checking this website:
https://sites.google.com/alaska.edu/coronavirus/uaf/uaf-students?authuser=0
Further, students are expected to adhere to the university's policies, practices, and mandates and are subject to disciplinary actions if they do not comply.

Student protections statement

UAF embraces and grows a culture of respect, diversity, inclusion, and caring. Students at this university are protected against sexual harassment and discrimination (Title IX). Faculty
members are designated as responsible employees which means they are required to report sexual misconduct. Graduate teaching assistants do not share the same reporting obligations. For more information on your rights
as a student and the resources available to you to resolve problems, please go to the following site:
https://catalog.uaf.edu/academicsregulations/students-rights-responsibilities/.