Master Course Syllabus

For additional course information, including prerequisites, corequisites, and course fees, please refer to the Catalog: https://catalog.uvu.edu/

Semester: Spring
Year: 2025
Course Prefix: CHEM
Course and Section #: 2325-204
Course Title: Organic Chemistry Lab II
Credits: 1

Course Description

Organic Chemistry Laboratory II (CHEM 2321) is the second course in a two-part series designed for students pursuing science majors and careers in medicine, dentistry, veterinary science, pharmacy, and related fields. This course builds upon foundational laboratory skills acquired in the first semester and emphasizes advanced organic synthesis, analytical techniques, and the exploration of key organic reactions.

Students will gain hands-on experience with essential laboratory methods including crystallization, distillation, and chromatography, while also refining their skills in product isolation and purification. The course includes experiments focused on reaction mechanisms and the synthesis of organic compounds, such as the Diels-Alder reaction, nitration of bromobenzene, and Grignard reagent reactions. In addition, students will explore natural product isolation and advanced techniques like IR and NMR spectroscopy for product analysis.

A key component of this course is the use of NMR and IR spectroscopy to confirm the identity and purity of synthesized compounds. Throughout the semester, students will also be introduced to laboratory safety practices, proper waste disposal, and the importance of maintaining a well-organized lab notebook.

Lab experiments include:

- **Diels-Alder Reaction**: Reaction of 1,3-butadiene and maleic anhydride
- **Nitration of Bromobenzene**
- **Oxidation of Cyclododecanol**
- **Grignard Reagents**: Synthesis of triphenylmethanol
- **Wittig Reaction**: Preparation of (Z)- and (E)-stilbenes
- **Fischer Esterification**: Synthesis of benzocaine
- **Chemiluminescence of Luminol**
- **Aldol Condensation**: Synthesis of trans-p-anisalacetophenone
- **Solution Polymerization**: Synthesis of polystyrene

This laboratory course provides students with the opportunity to refine their experimental techniques while reinforcing the theoretical principles of organic chemistry through practical application.

Course Attributes

This course has the following attributes:

☐ General Education Requirements
☐ Global/Intercultural Graduation Requirements
☐ Writing Enriched Graduation Requirements

☒ Discipline Core Requirements in Program
☐ Elective Core Requirements in Program
☐ Open Elective
Other: *Click here to enter text.*

Instructor Information

Instructor Name: Ryan Toomey, Ph.D.

Student Learning Outcomes

1. Demonstrate a thorough understanding of laboratory safety protocols and the proper disposal of organic chemical waste.
2. Synthesize a variety of organic compounds using a range of reaction mechanisms and techniques, including Diels-Alder, nitration, Grignard reagents, and Wittig reactions.
3. Apply essential separatory and purification techniques such as distillation, crystallization, and chromatography to isolate and purify organic compounds.
4. Utilize advanced analytical methods, including Infrared (IR) and Nuclear Magnetic Resonance (NMR) spectroscopy, to characterize and confirm the identity and purity of synthesized products.
5. Interpret and analyze experimental data effectively, maintaining accurate records and lab notebooks throughout the course.
6. Integrate theoretical knowledge from organic chemistry lectures with practical laboratory skills to solve complex synthetic problems.

Course Materials and Texts

1. **Textbook**: *Experimental Organic Chemistry – A Miniscale and Microscale Approach, Sixth Edition*.
2. Each student is required to maintain detailed notes and records of their experiments. This can be done using either a spiral-bound notebook or a digital notebook, depending on the student's preference.

Course Requirements

Course Assignments, Assessments, and Grading Policy

The grading scale for this course is as follows:

A	94% - 100 %	B	83% - 85.9%	C	73% - 75.9%	D	63% - 65.9%
A-	90% - 93.9%	B-	80% - 82.9%	C-	70% - 72.9%	D-	60% - 62.9%
B+	86% - 89.9%	C+	76% - 79.9%	D+	66% - 69.9%	E	Below 60%

Required or Recommended Reading Assignments

Selections from *Experimental Organic Chemistry – A Miniscale and Microscale Approach, Sixth Edition*

General Description of the Subject Matter of Each Lecture or Discussion

List of experiments:
NMR and IR Spectroscopy

Diels-Alder: Reaction of 1,3-Butadiene and Maleic Anhydride
Nitration of Bromobenzene
Oxidation of Cyclododecanol
Grignard Reagents: Triphenylmethanol
Wittig: Preparation of (Z)- and (E)-Stilbenes
Fischer Esterification: Benzocaine
Preparation and Chemiluminescence of Luminol
Aldol Condensation: trans-p-Anisalacetophenone
Solution Polymerization of Styrene

Required Course Syllabus Statements

Generative AI
Potential employers will expect graduates to know how to use tools like ChatGPT to generate content, code, and data. You should learn how to use artificial intelligence (AI) and in what instances AI can be helpful to you. Remember, AI programs are not a replacement for your human creativity, originality, and critical thinking. Writing, thinking, and researching are crafts you must develop over time to develop your own voice.

The use of generative AI tools (e.g., ChatGPT, Google Bard, etc.) is permitted for the following activities:

Brainstorming and refining your ideas.
Fine-tuning your research questions; don't accept anything AI generates at face value without checking it critically.
Finding accurate information on your topic.
Drafting an outline to organize your thoughts.
Checking grammar and style.
The use of generative AI tools is not permitted in this course for the following activities:

Impersonating you in classroom contexts, such as by using the tool to compose discussion board prompts/responses assigned to you or content that you put into a Teams/Canvas chat.
Completing group work that your group has assigned to you unless it is mutually agreed upon that you may utilize the tool.
Writing entire sentences, paragraphs, or papers to complete class assignments.
You are responsible for the information you submit based on an AI query (for instance, that it does not violate intellectual property laws or contains misinformation or unethical content). Your use of AI tools must be appropriately documented and cited to stay within university policies on academic honesty.

Any student work submitted using AI tools should clearly indicate what work is the student's work and what part is generated by the AI. In such cases, no more than 25% of the student work should be generated by AI. If any part of this is confusing or uncertain, please get in touch with the course instructor for a conversation before submitting your work. Additional university resources regarding the use of AI are available through the UVU Office of Teaching and Learning

Using Remote Testing Software
☒ This course does not use remote testing software.

☐ This course uses remote testing software. Remote test-takers may choose their remote testing locations. Please note, however, that the testing software used for this may conduct a brief scan of remote test-takers' immediate surroundings, may require use of a webcam while taking an exam, may require the microphone be on while taking an exam, or may require other practices to confirm academic honesty. Test-takers therefore shall have no expectation of privacy in their test-taking location during, or immediately preceding, remote testing. If a student strongly objects to using test-taking software, the student should contact the instructor at the beginning of the semester to determine whether alternative testing arrangements are feasible. Alternatives are not guaranteed.

Required University Syllabus Statements

Accommodations/Students with Disabilities
Students needing accommodations due to a permanent or temporary disability, pregnancy or pregnancy-related conditions may contact UVU Accessibility Services at accessibilityservices@uvu.edu or 801-863-8747.

Accessibility Services is located on the Orem Campus in BA 110.

Deaf/Hard of Hearing students requesting ASL interpreters or transcribers can contact Accessibility Services to set up accommodations. Deaf/Hard of Hearing services can be contacted at DHHservices@uvu.edu

DHH is located on the Orem Campus in BA 112.

Academic Integrity
At Utah Valley University, faculty and students operate in an atmosphere of mutual trust. Maintaining an atmosphere of academic integrity allows for free exchange of ideas and enables all members of the community to achieve their highest potential. Our goal is to foster an intellectual atmosphere that produces scholars of integrity and imaginative thought. In all academic work, the ideas and contributions of others must be appropriately acknowledged and UVU students are expected to produce their own original academic work.

Faculty and students share the responsibility of ensuring the honesty and fairness of the intellectual environment at UVU. Students have a responsibility to promote academic integrity at the university by not participating in or facilitating others' participation in any act of academic dishonesty. As members of the academic community, students must become familiar with their rights and responsibilities. In each course, they are responsible for knowing the requirements and restrictions regarding research and writing, assessments, collaborative work, the use of study aids, the appropriateness of assistance, and other issues. Likewise, instructors are responsible to clearly state expectations and model best practices.

Further information on what constitutes academic dishonesty is detailed in UVU Policy 541: *Student Code of Conduct*.

Equity and Title IX
Utah Valley University does not discriminate on the basis of race, color, religion, national origin, sex, sexual orientation, gender identity, gender expression, age (40 and over), disability, veteran status, pregnancy, childbirth, or pregnancy-related conditions, citizenship, genetic information, or other basis

protected by applicable law, including Title IX and 34 C.F.R. Part 106, in employment, treatment, admission, access to educational programs and activities, or other University benefits or services. Inquiries about nondiscrimination at UVU may be directed to the U.S. Department of Education's Office for Civil Rights or UVU's Title IX Coordinator at 801-863-7999 – TitleIX@uvu.edu – 800 W University Pkwy, Orem, 84058, Suite BA 203.

Religious Accommodation

UVU values and acknowledges the array of worldviews, faiths, and religions represented in our student body, and as such provides supportive accommodations for students. Religious belief or conscience broadly includes religious, non-religious, theistic, or non-theistic moral or ethical beliefs as well as participation in religious holidays, observances, or activities. Accommodations may include scheduling or due-date modifications or make-up assignments for missed class work.

To seek a religious accommodation, a student must provide written notice to the instructor and the Director of Accessibility Services at accessibilityservices@uvu.edu. If the accommodation relates to a scheduling conflict, the notice should include the date, time, and brief description of the difficulty posed by the conflict. Such requests should be made as soon as the student is aware of the prospective scheduling conflict.

While religious expression is welcome throughout campus, UVU also has a specially dedicated space for meditation, prayer, reflection, or other forms of religious expression.