

# Chemistry 3719L, Organic Chemistry Laboratory I

Summer 2022

**Lab Instructor: Professor Douglas Genna**

[dtgenna@ysu.edu](mailto:dtgenna@ysu.edu)

**Text:** [Organic Chemistry Lab Techniques](#) by Professor Lindsay Nichols on LibreTexts:

## General

Chemistry 3719L is the laboratory course that runs in parallel with 3719 lecture, Organic Chemistry 1. As in General Chemistry, you will be studying the physical characteristics of compounds and their reactions to form new materials, however in Organic Chemistry we focus on compounds containing carbon. The lab section will meet once a week in Room 5037 Ward Beecher hall.

## Equipment

- You will need a knee-length (non-paper) lab coat, OSHA-approved eye protection, and a face mask to carry out in-person lab work. This gear must be worn **at all times** in the lab. Protective gloves will be provided.
- You must have a YSU email address to have access to Blackboard and Office365 for writing reports, as well as Zoom for online exercises and conferences.
- A reliable device with a Web camera and an up-to-date Web browser is essential; some of the course material is shared through YouTube videos, Web-conferencing, and screen shares.
- A lab notebook in which to record data for each chemical and reaction encountered during the course; this could be a simple English composition book. The book must be hardbound; no spiralbound books.

## Experiments

In experiment 1 you will meet in Ward Beecher 5039 for an introduction on to what to expect during the semester and perform an exercise featuring exercise featuring database searching. Your collected results from this first exercise will be summarized in an upload to Blackboard for grading. Exp. 2-8 will feature exercises on techniques that chemists use to isolate and purify organic materials, and which constitute important parts of the general organic experiment workflow. We will then move on to actual reactions in experiments 9-13 in which you will be required to convert a given starting material into a product using chemical conversions discussed in 3719 lectures.

Experiments will require prelab work the format of which will be shared with you before those labs begin. Completed work will then be uploaded to Blackboard for grading by your Instructor as outlined in the attached schedule. Your instructor will discuss the requirements for reports and a general format that should be followed. Each exercise will be available on Blackboard the week before the lab so you will have plenty of notice on what to prepare and expect.

**Assessment:** Chemistry 3719L is worth **150 points you need at least 70% in lab** to pass the class.

## Ohio Department of Higher Education Lab Course Learning Outcomes for CHEM 3719L:

Students must be proficient in all of the following core competencies:

1. In the organic chemistry laboratory, the student should perform and master the basic techniques for:
  - a) The separation and purification of organic compounds (recrystallization, distillation, chromatography).
  - b) The analysis of organic compounds (TLC, Gas Chromatography).
  - c) The characterization of organic compounds (melting, boiling points, IR spectroscopy).
2. Students should conduct a broad range of organic transformations which illustrate topics drawn from the organic chemistry lecture sequence.
3. Students should learn how to keep a laboratory notebook and write reports detailing their experiments.
4. Students should understand and practice safe laboratory techniques.

More detail on these Learning Outcomes is found [here](#).

## Safety in the Organic Laboratory

Safety is of paramount importance in the Organic laboratory where you are using chemicals and equipment with which you are unfamiliar. It is your responsibility to follow the safety rules associated with the lab space, to ensure your own well-being, but also to respect the safety concerns of your lab colleagues. Correct adherence to these policies will help ensure a safe and productive work environment for the group. Specific policies are as follows:

- You must be prepared for each experiment and have completed the pre-lab work.
- You must wear your PPE at all times during a lab session, no exceptions.
- All experiments are to be carried out in your safety (fume) hood unless directed otherwise.
- No short pants or open-toed footwear are allowed in lab at any time, you must be covered.
- No food or drink allowed in lab at any time, no exceptions as this is extremely dangerous.
- No headphones or ear buds allowed; you need to be aware of what's going on around you.
- Report spills or breakages to your Instructor immediately for cleanup, glassware will be replaced.

## Lab Schedule and Grading

You will have **10** lab assignments to complete over the 7-week term as noted on the next page. The in-person and online labs will require uploads to Blackboard after the lab session is complete, and two of the labs will require a more in-depth full formal report. Assignment point values are shown on the next page for a total of **150** points for Chemistry 3719 Lab.

Lab worksheets will be found on the course Blackboard page the week before you are due to run the lab. You must prepare a “pre-lab” before you are able to begin any experimental work and that will include details of the physical and safety properties of the chemicals you will be using. During labs you will make notes in your notebook and upload a digital copy of your work to Blackboard for grading. There will be two full reports required (see table).

**Statement of Non-Discrimination:** Youngstown State University (YSU) does not discriminate on the basis of race, color, national origin, sex, sexual orientation, gender identity and/or expression, disability, age, religion or veteran/ military status in its programs or activities. Please visit the [Equal Opportunity and Policy Development & Title IX website](#) for contact information for persons designated to handle questions about this policy.

**Academic Integrity/Honesty:** As outlined in [The Student Code of Conduct](#), all forms of academic dishonesty are prohibited at Youngstown State. This includes plagiarism, the unauthorized use of tools or notes in taking tests or completing assignments, fabrication of data or information used for an assignment, working with others without permission from the instructor, and more. A student who is believed to have violated the academic integrity policy will meet with the instructor to discuss the allegations. The student may accept responsibility for the violation and any sanctions selected by the instructor, or they have the right to ask for a hearing before a hearing panel. The full Academic Integrity Policy can be found in Article III of [The Student Code of Conduct](#), while further information on University procedures for alleged academic integrity violations can be found in Article V.\*

**Student Accessibility:** In accordance with University procedures, if you have a documented disability and require accommodations to obtain equal access in this course; please contact me privately to discuss your specific needs. To coordinate reasonable accommodations, you must be registered with [Accessibility Services](#), located in Kilcawley Center Room 2082. You can reach [Accessibility Services](#) at 330-941-1372.

**Incomplete Grade Policy:** A request for a grade of “Incomplete” (I) in the course will be considered only if more than 60% of the assignments have been completed as scheduled. An "I" will be submitted only when the cause is deemed justifiable and approved by both the instructor and the department chairperson (see YSU Bulletin). All incomplete work must be completed by September 2022 otherwise the grade will become an F.

**\*Note:** If you are struggling, it is **always** better to ask for help or advice than to do something unethical. We are here to help you get through this course, so ask for guidance whenever you are unsure of something or you are having difficulty meeting a deadline. ***Do not jeopardize your future by cheating, it just isn't worth it.***

## Experiment Schedule

	Monday	Tuesday	Wednesday	Thursday	Friday
Week 1 May 16-20	Exp. 1		Exp 2+3		
Week 2 May 23-27	Exp 4		Exp. 5		
Week 3 May 30-June 3	<b>Memorial Day. YSU Closed</b>		Exp. 6		
Week 4 June 6-10	Exp. 7		Exp 8		
Week 5 June 13-17	Exp. 9		Exp. 10		
Week 6 June 20-24	<b>Juneteenth YSU Closed</b>		Exp. 11		Exp. 12
Week 7 June 27-July 1	Expt. 13		Exp. 14		

### List of Experiments:

Experiment	Exercise	Details
1	<b>Finding Chemical Data and Molecular Modeling</b>	<b>Data Gathering:</b> Use of online Molview or ChemSpider for finding reliable chemical data and compound properties from databases <i>Blackboard upload as PDF (10 pts)</i>
2	<b>Lab Room Orientation and Syllabus Overview</b>	<b>Orientation:</b> learn about the Rm 5037 Organic lab environment; assignment of equipment lockers <i>Safety Quiz (pass/fail)</i>
3	<b>Measurement</b> <i>Prelab Reading</i>	<b>Lab Techniques:</b> Safe transfer of organic liquids and solids, use of balance, glassware, pipettes, pipette pumps, vacuum filtration <i>Notebook upload as PDF (10 pts)</i>
4	<b>Solubility &amp; Miscibility</b> <i>Prelab Reading</i>	<b>Lab Techniques:</b> Water bath for heating/evaporating of liquids, gravity filtration for removing impurities from organic solutions <i>Notebook upload as PDF (10 pts)</i>
5	<b>Recrystallization</b> <i>Prelab Reading</i>	<b>Lab Techniques:</b> Choosing an appropriate organic solvent for crystallizing, purifying solids from hot solvent, filtration & m.pt. <i>Notebook upload as PDF (10 pts)</i>
6	<b>Stereochemistry</b> <i>Prelab Reading</i>	<b>Structure:</b> Drawing and comparing stereoisomers in ChemDraw; conformational analysis of isomeric molecules using Chem3D <i>Blackboard upload as PDF (10 pts)</i>

7	<b>Extraction &amp; TLC</b> <i>Prelab Reading</i>	<b>Lab Techniques:</b> Use of separatory funnel, washing and drying of organic solutions, evaporation, Thin Layer Chromatography <i>Notebook upload (10 pts)</i>
8	<b>Distillation</b> <i>Prelab Reading</i>	<b>Lab Techniques:</b> Separation and purification of organic liquids by their boiling point; identification of unknowns in a mixture <i>Notebook upload (10 pts)</i>
9	<b>Substitution Week 1</b> <i>Prelab Reading</i>	<b>Synthesis:</b> Preparation of an organic halide from an alcohol via a substitution pathway; reaction is run twice to improve yield <i>Report due after following lab</i>
10	<b>Substitution Week 2</b> <i>No Prelab</i>	<b>Synthesis:</b> Use of distillation to purify liquid substitution product from previous week; repeated on both samples to improve yield <i>Full Report upload (25 pts)</i>
11	<b>Elimination Week 1</b> <i>Prelab Reading</i>	<b>Synthesis:</b> Conversion of alcohol into alkene via acid-catalyzed elimination; application of Le Chatelier's principle in synthesis <i>Report due after following lab</i>
12	<b>Elimination Week 2</b> <i>No Prelab</i>	<b>Synthesis:</b> Use of distillation to purify liquid substitution product from previous week; tests on product sample to prove an alkene <i>Full Report upload (25 pts)</i>
13	<b>Addition</b> <i>Prelab Reading</i>	<b>Synthesis:</b> Preparation of a halogenated organic product through electrophilic addition of bromine to an electron-deficient alkene <i>Notebook upload (10 pts)</i>
14	<b>Lab Final</b> <i>Blackboard (10 pts)</i>	<b>Overall:</b> You will be tested on lab basics; what did you do, how did you do it, and why?