

November, 2023

**Prerequisites:** General Chemistry with Lab**Instructors:** David Gallaher, Ph.D.  
Heather Dorman, Ph.D.  
Rodney Austin, Ph.D.**Contact Information:** Faculty may be contacted through the Canvas messaging system**Additional Information:** [www.portagelearning.edu](http://www.portagelearning.edu)\***Course Meeting Times:** CHEM 219 is offered continuously

**Course Description:** This course is a one-semester study of the major topics and concepts of organic chemistry. The course will focus on the element carbon and compounds formed by carbon and other elements of interest. The course will explore and characterize organic compounds classified into families or groups according to the constitution of the hydrocarbon skeleton and functional groupings of heteroatoms. Specifically, for each class or family of compound, the course will explore the nomenclature, properties, reactivity, and preparation of (by synthesis or other means) that class or family of molecule.

The laboratory portion of the course will focus on the skills and techniques common to the organic chemistry lab for the isolation, purification, and characterization of organic compounds. Selected synthetic methods for the preparation of organic compounds will also be explored focusing on foundational reaction types and synthetic methodologies. The laboratory component is delivered using virtual labs and interactive simulations with detailed instruction and demonstrations from an experienced chemist.

**Course Goals:** As a result of this course experience a student should be able to:

- Identify and characterize organic molecules according to the nature and composition of their hydrocarbon skeleton and by the types of functional groupings contained within.
- Describe the bonding, geometry, and polarity of a given organic molecule and describe how these affect the physical and chemical properties of the molecule.
- Name typical organic molecules according to the IUPAC rules for the systematic nomenclature of organic compounds.
- Describe aspects of stereochemistry possessed by certain organic molecules and explain the impact (if any) on the properties and reactivity of those molecules.
- Describe the properties, reactions, and preparation of (by synthesis or other means) of typical organic compounds.

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\* Portage Learning college courses are offered by Geneva College, which is accredited by the Middle States Commission on Higher Education. Portage Learning is included in the College's Department of Professional and Online Graduate Studies; courses are delivered through the [Portagelearning.edu](http://Portagelearning.edu) platform.

- Identify and describe the structure, composition, properties, and reactivity of major types of heterocyclic organic compounds.
- Identify and describe the structure, composition, properties, and synthesis of major types of polymeric organic compounds.

*\*Please see the [Module Topics](#) section below for expanded course outcomes.*

**Lab Goals:** After successful completion of the coursework, students should be able to:

- Identify and describe common techniques for the isolation and purification of organic compounds.
- Identify and describe common methods for the characterization of the purity of organic compounds.
- Discuss common aspects of synthetic organic chemistry reactions.
- Characterize an organic synthesis in terms of reaction yield and purity of the product obtained.
- Identify and describe experimental methods for the elucidation and characterization of products from a synthetic organic chemistry reaction.

Each of these CHEM 219 student learning outcomes is measured:

Directly by: (1) Module review questions (with instructor feedback)

(2) Module exams

(3) Written Lab Reports

(4) Lab Exams

(5) Cumulative final exam

Indirectly: Through use of an end of course student-completed evaluation survey

**Course Delivery:** This course is asynchronously delivered online. Contact hours include 40 - 50 hours of reviewed module assignments with instructor feedback and video lectures. There are 8 additional contact hours composed of secure online exams.

**Course Progression:** It is the policy for all Portage Learning courses that only one (module lecture/final) exam is to be completed within a 48-hour period. Research on the best practices in learning indicates that time is needed to process material for optimal learning. This means that once an exam has been completed, the next exam may not be opened or taken until 48 hours after the submission of the previous module exam. This allows for instructor feedback/class expectations as the student moves through the material. Instructors, like the College, are not available during the weekend; grading, therefore, is M-F and may take up to 72 hours during these days. Also, it is the policy of Portage Learning to support a minimum of 28 days to complete a course; this is not a negotiable time period. Please plan your time accordingly.

**Note:** Professors reserve the right to reset any exam taken in violation of these guidelines.



**Required readings, lectures and assignments:** Students are required to read the online lesson modules written by the course author which contain the standard information covered in a typical course. Please note the exam questions are based upon the readings. Video lectures which support each lesson module subject should be viewed as many times as is necessary to fully understand the material.

*We do not support the use of outside resources to study, except for the ones listed in the syllabus under “Suggested External References”.* If you have questions about the material or would like further explanation of the concepts, please contact your instructor.

**Academic Integrity** is a serious matter. In the educational context, any dishonesty violates freedom and trust, which are essential for effective learning. Dishonesty limits a student's ability to reach his or her potential. Portage places a high value on honest independent work. We depend on the student's desire to succeed in the program he or she is entering. It is in a student's own best interests not to cheat on an exam or put their work into question, as this would compromise the student's preparation for future work. It is the student's responsibility to review the **Student Handbook** and all policies related to academic integrity. If clarification is necessary, the student should reach out to their instructor for further explanation **before** initiating module one.

**Required Computer Accessories:** It is recommended that students use a desktop or laptop computer, PC or Mac, when taking the course. Some tablet computers are potentially compatible with the course, but not all features are available for all tablet computers. The latest full version of Google Chrome, Firefox, Edge, or Safari browser is required for the optimal operation of the Canvas Learning Management System. In addition, this course will use the Respondus Lockdown Browser for exams; a strong internet connection is needed. You are also **required to use LockDown Browser with a webcam**, which will record you during an online, nonproctored exam. (The webcam feature is sometimes referred to as “Respondus Monitor.”) **Your computer must have a functioning webcam and microphone. Additionally, students will need a photo ID that includes your picture and full name is required. Please note, Chromebooks and tablets (other than iPad) are not compatible on exams using the Lockdown Browser.** Instructions on downloading and installing this browser will be given at the start of the course. We highly recommend using a high-speed Internet connection to view the video lectures and labs. You may experience significant difficulties viewing the videos using a dial-up connection.

For more information on basic system and browser requirements, please reference the following:

Canvas browser and system requirements: <https://community.canvaslms.com/t5/Canvas-Basics-Guide/What-are-the-browser-and-computer-requirements-for-Canvas/ta-p/66>

Respondus Requirements: <https://web.respondus.com/he/lockdownbrowser/resources/>

Respondus Monitor Requirements: <https://web.respondus.com/he/monitor/resources/>



## Module Topics

- Module 1: A review of fundamental chemical principles relevant to the study of organic molecules, including atomic valence, bonding, formal charge, electron resonance, and molecular geometry. This module also introduces the concept of constitutional isomerism and the different conventions for representing the structural formulae of organic molecules.
- Module 2: An exploration of the classification, structure, properties, and fundamental reactivity of hydrocarbons – the skeletal foundation for any organic molecule. This module introduces the basics of the IUPAC method for systematic nomenclature of organic molecule. Other topics include conformational analysis, cis/trans stereoisomerism and the major reaction types associated with alkanes, alkenes, alkynes, as well as aromatic hydrocarbons.
- Module 3: An introduction to the concept of stereoisomerism and relevance to organic compounds. Topics include chirality and enantiomers, diastereomers, R/S naming conventions, E/Z naming conventions, and meso compounds. The use of Fisher projection formulae is introduced as well as brief discussions on the biological relevance of chirality, and the methods used to determine enantiomeric composition of a mixture of chiral molecules.
- Module 4: An exploration of halogen derivatives of organic compounds, with a specific focus on alkyl and aryl halides. This module introduces the concept of reaction mechanisms in organic chemistry and examines the differences between nucleophilic substitution and elimination reactions of organohalide substrates. The concept of competitive reactions is explored. IUPAC nomenclature and classification of alkyl and aryl halides are discussed.
- Module 5: This module explores the structure, classification, nomenclature, properties, and reactivity of organic compounds containing oxygen. Specific focus is on alcohols, phenols, ethers, aldehydes, and ketones. Major pathways for the preparation of these functional groups as well as the fundamental modes of reaction of each are discussed. An additional focus in this module explores the chemistry of carboxylic acids and their derivatives, including acid chlorides, esters, and anhydrides.
- Module 6: This module explores the structure, classification, nomenclature, properties, and reactivity of organic compounds containing nitrogen. Specific focus is on includes amines, amides, and nitriles. Major pathways for the preparation of these functional groups as well as the fundamental modes of reaction of each are discussed. Aspects of acidity and basicity of amines and amides is discussed.



- Module 7: This module introduces heterocyclic organic compounds, with a focus on aromatic heterocycles. Important five- and six-membered heterocyclic compounds are discussed in terms of their structure and reactivity. The importance of heterocyclic compounds as fundamental building blocks of nature and in biochemistry is explored.
- Module 8: This module explores organic synthetic polymers. Discussion focuses on the mechanisms for polymer synthesis as well as stereochemical orientation in polymeric molecules and its impact on polymer properties.

**Suggested Timed Course Schedule** (to complete the course within a typical college semester)

All Portage courses are offered asynchronously with no required schedule to better fit the normal routine of adult students, but the schedule below is suggested to allow a student to complete the course within a typical college semester. Students may feel free to complete the course on a schedule determined by them within the parameters outlined under "Course Progression."

| <b><u>Time Period</u></b> | <b><u>Assignments</u></b> | <b><u>Subject Matter</u></b>  |
|---------------------------|---------------------------|---|
| Days 1-12                 | Module 1, Exam 1          | Foundations of Structure<br>(Bonding and Isomerism)   |
|                           | Lab 1, Lab Exam 1         | Comparison of Simple vs.<br>Fractional Distillation for the<br>Separation of a Binary Mixture |
| Days 13-24                | Module 2, Exam 2          | Hydrocarbons  |
|                           | Lab 2, Lab Exam 2         | Crystallization – Purification of<br>a Sample of Impure<br>Naphthalene                        |
| Days 25-36                | Module 3, Exam 3          | Stereoisomerism   |
|                           | Lab 3, Lab Exam 3         | Extraction – Isolation of<br>Caffeine from Tea  |
| Days 37-48                | Module 4, Exam 4          | Organic Compounds<br>Containing Halogens  |
|                           | Lab 4, Lab Exam 4         | Biosynthesis – Synthesis and<br>Characterization of Ethanol<br>from Sucrose                   |



|            |                   |   |
|------------|-------------------|---|
| Days 49-60 | Module 5, Exam 5  | Organic Compounds<br>Containing Oxygen  |
|            | Lab 5, Lab Exam 5 | Column Chromatography –<br>Separation and Isolation of<br>Pigments from Spinach<br>Leaves |
| Days 61-72 | Module 6, Exam 6  | Organic Compounds<br>Containing Nitrogen  |
|            | Lab 6, Lab Exam 6 | Green Oxidation – Synthesis<br>of Cyclohexanone from<br>Cyclohexanol                      |
| Day 73-84  | Module 7, Exam 7  | Heterocyclic Organic<br>Compounds   |
|            | Lab 7, Lab Exam 7 | Nitration of Methyl Benzoate –<br>Electrophilic Aromatic<br>Substitution (EAS) Reaction   |
| Day 85-96  | Module 8, Exam 8  | Polymers  |
|            | Lab 8, Lab Exam 8 | Synthesis of Methyl Orange<br>and Investigation of Acid Base<br>Indicating Properties     |
| Day 97-108 | Final Exam        | Comprehensive   |

#### Grading Rubric:

|  |                 |
|--|-----------------|
| Check for Understanding =                  | 1 pt.           |
| 8 Module Problem Sets = 10 pts. each x 8 = | 80 pts.         |
| 8 Written Lab Reports = 5 pts. each x 8 =  | 40 pts.         |
| 8 Module Exams = 100 pts. each x 8 =       | 800 pts.        |
| 8 Lab Exams = 30 pts. Each x 8 =           | 240 pts.        |
| <u>Final Exam = 120 pts.</u>               | <u>120 pts.</u> |
| Total                                      | 1281 pts.       |

The current course grade and progress is continuously displayed within the student dashboard.



### Grading Scale:

96.5% - 100% = A+  
92.5% - 96.4% = A  
89.5% - 92.4% = A-  
86.5% - 89.4% = B+  
82.5% - 86.4% = B  
79.5% - 82.4% = B-  
76.5% - 79.4% = C+  
72.5% - 76.4% = C  
69.5% - 72.4% = C-  
66.5% - 69.4% = D+  
62.5% - 66.4% = D  
59.5% - 62.4% = D-  
0.00% - 59.4% = F

### Suggested External References:

If the student desires to consult a reference for additional information, the following textbook is recommended as providing complete treatment of the course subject matter:

**Organic Chemistry** by Hart, Craine, and Hart 11th edition. ISBN: 978-0618215362

**Fundamentals of Organic Chemistry** by McMurray/Simanek. 6th edition. ISBN: 0-495-01203-3

**NOTE:** We do not support the use of outside resources to study, except those listed above.

### Learning Support Services:

Each student should be sure to take advantage of and use the following learning support services provided to increase student academic performance:

**Video lectures:** Supports diverse learning styles in conjunction with the text material of each module

**Messaging system:** Provides individual instructor/student interaction

**Tech support:** Available by submitting a help ticket through the student dashboard

### Accommodations for Students with Learning Disabilities:

Students with documented learning disabilities may receive accommodations in the form of an extended time limit on exams, when applicable. To receive the accommodations, the student should furnish documentation of the learning disability at the time of registration, if possible. Scan and e-mail the documentation to [studentservices@portagelearning.edu](mailto:studentservices@portagelearning.edu). Upon receipt of the learning disability documentation, Portage staff will provide the student with instructions for a variation of the course containing exams with extended time limits.



This accommodation does not alter the content of any assignments/exams, change what the exam is intended to measure or otherwise impact the outcomes of objectives of the course.

### One-on-one Instruction:

Each student is assigned to his/her own instructor. Personalized questions are addressed via the student dashboard messaging system.

Online learning presents an opportunity for flexibility; however, a discipline to maintain connection to the course is required; therefore, communication is essential to successful learning. **Check your messages daily.** Instructors are checking messages daily Monday-Friday to be sure to answer any questions that may arise from you. It is important that you do the same, so you do not miss any pertinent information from us.

Holidays: During the following holidays, all administrative and instructional functions are suspended, including the grading of exams and issuance of transcripts.

New Year's Day

MLK Day

Easter

Memorial Day

Juneteenth

Independence Day

Labor Day

Thanksgiving weekend

Christmas Break

The schedule of holidays for the current calendar year may be found under the Student Services menu at [www.portagelearning.edu](http://www.portagelearning.edu)

Code of Conduct: Students are expected to conduct themselves in a way that supports learning and teaching and promotes an atmosphere of civility and respect in their interactions with others. Verbal and written aggression, abuse, or misconduct is prohibited and may be grounds for immediate dismissal from the program.

This is a classroom; therefore, instructors have the academic freedom to set forth policy for their respective class. Instructors send a welcome e-mail detailing the policy of their class, which students are required to read prior to beginning the course.

Grievances: If a student has a complaint about the course, the student is advised to first consult the instructor of the course. After communicating with the instructor, if the matter is still unresolved, students may file a formal grievance for consideration by the Academic Review Committee. The process must be initiated via written communication to [academics@portagelearning.edu](mailto:academics@portagelearning.edu), with "Academic Grievance" listed in the subject line of the email.

Remediation: At Portage Learning we allow a "one-time" only opportunity to re-take an alternate version of **one** module exam AND **one** lab exam on which a student has earned a grade lower than 70%. This option



must be exercised before the final exam is started. If an exam is retaken, the original exam grade will be erased, and the new exam grade will become a permanent part of the course grade. However, before scheduling and attempting this retest, the student must resolve the questions they have regarding the material by reviewing both the old exam and the lesson module material. Once ready to attempt the retest of the exam they must contact their instructor to request that the exam be reset for the retest. Remember, any module retest must be requested and completed **before** the final exam is opened.

**Note:** Exams on which a student has been penalized for a violation of the academic integrity policy may not be re-taken.

Syllabi are subject to change as part of ongoing educational review practices. Students are responsible for accessing and using the most recent version of the course syllabus.

