

University of Montana

## ScholarWorks at University of Montana

---

University of Montana Course Syllabi, 2021-2025

---

Spring 2-1-2022

### CHMY 123.00: Introduction to Organic and Biochemistry

Brooke D. Martin

*University of Montana, Missoula*, [brooke.martin@umontana.edu](mailto:brooke.martin@umontana.edu)

Follow this and additional works at: <https://scholarworks.umt.edu/syllabi2021-2025>

**Let us know how access to this document benefits you.**

---

#### Recommended Citation

This syllabi is used for all sections of CHMY 123.

This Syllabus is brought to you for free and open access by ScholarWorks at University of Montana. It has been accepted for inclusion in University of Montana Course Syllabi, 2021-2025 by an authorized administrator of ScholarWorks at University of Montana. For more information, please contact [scholarworks@mso.umt.edu](mailto:scholarworks@mso.umt.edu).

# CHMY 123 Syllabus Spring 2022

---

Dr. Brooke Martin; Instructor and Associate Professor – Dept. Chemistry and Biochemistry

Student hours: Mon and Wed 11-NOON or by appointment

Email: [brooke.martin@umontana.edu](mailto:brooke.martin@umontana.edu)

Office: CHMY 215

**Course Description :** CHMY 123 is a course with two halves. In the first 6-7 weeks you are introduced to “**Organic Chemistry**” – meaning chemistry based on the element **Carbon**. Chemists have a way a systematically naming chemical compounds (“nomenclature”) that you will start to use. You will learn different ways to draw molecules and then predict chemical and physical properties of molecules just by looking at their structure. You can think about the first half of the course as building your toolkit that you will use to describe much larger molecules – called macromolecules - that define the structures and properties of biology.

The Chemistry of Biology – or life – is really just a lot of molecules interacting with each other to build ever more complex systems. The repetitive combining of a small “organic” molecules is called polymerization and it is an efficient way to build large molecules. Knowing the chemistry of these large molecules then explains how they go about their role in biology – it might be a metabolic or structural function or it might be information transfer. Together this characterizes life as we know it: the chemistry of biology – also known as - “**Biochemistry**”.

**This is a list of things we want you to learn and we will measure (i.e test) how well you have learned them (Learning Outcomes).**

1. Can you name simple organic compounds using the systematic naming system (nomenclature)? You should get very good at this.
2. If you look at the structure of an organic compound, how well can you predict how it will interact with another molecule and how does that dictate its function?
3. How familiar are you with the ionization of functional groups (this means turning uncharged molecules into charged ones). Do you understand that this is the same as Acid/Base chemistry? Can you explain this for specific molecules like amino acids, proteins, and nucleic acids? Can you explain why this changes the function of the molecule?
4. Some proteins are called enzymes. Can you explain that enzymes are catalysts? How well can you explain the thermodynamics (energy requirements) and kinetics (chances that molecules will run into each other) in enzyme catalyzed reaction?
5. Life occurs in the presence of a reactive gas we call oxygen. How familiar are you with the reactions of oxygen with organic compounds (oxidation-reduction reactions). How well do you understand that you don't always need oxygen for oxidation-reduction reactions? How well can you explain the role of these types of reactions in metabolism including the energy requiring and energy yielding steps.
6. Can you describe how the oxidation of organic substrates can be coupled to the production of chemical energy in biological systems?

7. In biology, an organism is what it is and not something else because it was programmed to be that thing. Can you describe how biochemical mechanisms can program in this information? Can you describe the biochemistry that copies information from one molecule to another? (replication, transcription, and translation).

## **How to get into this class aka Pre-requisites and Co-requisites for CHMY 123:**

It is helpful to have a bit of chemistry background so a grade of “C-” or better in CHMY 121 is expected. In some –very rare - cases this can be over-ridden with permission of the instructor. CHMY 124 is the Introduction to Organic & Biochemistry Lab course that accompanies CHMY123. Most majors that require CHMY 123 also require CHMY 124, which is listed as a co-requisite for that reason. You can take them separately.

## **Things you need for this course - Course Materials.**

**Note that most is included in your tuition.** The access code is available through the RedShelf link in the Moodle webpage.

- **Included: Text Book: Fundamentals of General, Organic and Biological Chemistry. 8th Edition** by McMurry, Ballantine, Hoeger and Person, Pearson Education Inc., 2017 is included in the bookstore's Inclusive Access Program. This gives you access to your required course materials, including an e-copy of the textbook. A loose-leaf paper copy of the textbook is also available for a nominal charge – inquire at the University Bookstore. **Mastering Chemistry plus** online homework is included . You will need to register as a student in the course to access the homework [www.pearson.com/mastering](http://www.pearson.com/mastering). The course ID is **martin37014**. The course name is **CHMY123 Spring 2022**.
- Molecular Model Kit: CHMY 123 model kit, available in UM bookstore. You need this.
- **A scientific calculator.** A scientific calculator is sometimes useful for this course but you could get by most of the time without one.
- We do a lot through the Moodle portal besides just getting e-text and homework access. You will use it to submit exams and occasionally for in-class exercises. A laptop computer with wi-fi will be needed. See Mansfield Library about a loaner laptop if you do not have one that will work for you.

**How the course works:** Moodle will be used to provide content to you and as a message board for grades – the “official” gradebook is kept by the Professor. The exception is the on-line homework. You sign up for homework through Moodle but then use the *second* platform that you access via Pearson mylabandmastering. Your homework grade is added in at the end.

# CHMY 123 Syllabus Spring 2022

---

## Weekly Schedule :

**Recitations:** M at 1 PM, 2 PM or 3 PM (which you sign up for in advance). You will do one of these IN PERSON per week. Check cyberbear for rooms. If you miss a recitation for unavoidable reasons – with documentation - you can have up to two weeks to go over the recitation and its associated Quiz with your TA or LA. This is really only for emergencies and you are expected to have documentation to confirm the emergency nature of the accommodation request. Remember that the TAs and LAs are students too. Their time with you is precious - Use it well.

**Lectures:** These are held in North Underground lecture hall. If you are new to campus – it is one of the two underground lecture halls underneath the brick plaza in front of the Chemistry building. MWF (3 days) 9:00-9:50pm UM-Msla Campus | NULH

**Lectures are in person.** There is no remote option. The lecture is where we cover the CONTENT of the course and the powerpoints for each week will be posted on Moodle. This will give you something to annotate with notes and to give you a permanent copy to follow along. I want to see a lot of you writing notes during the lecture. The main thing about the lectures is that they are an opportunity for you – the student – to ask me – the teacher – any questions you have about the material and clear up your understanding. Remember – if you have a question – so does someone else. Questions about Chemistry are my favorite!

**COVID:** COVID protocols and precautions are determined by the University and may change in response to community infection levels. As of the time of writing the COVID protocols and precautions include:

Face coverings required in lecture and in recitation. Hand sanitizer and sanitizing wipes are available so take advantage of them to wipe down your seat and desk area every time.

As of this time a seating map is not required however this may change. For now: The first time you come to lecture, choose a seat that is not right next to somebody else – in other words – try to have a vacant seat next to you. EVERY time you come to class, swipe your GrizCard in the GrizCard reader.

Do not eat or drink during lecture or recitation. This is a departure from past practices and I know that some of you like to bring a bottle of water to class. Please do not do this. Come to class sufficiently hydrated to remain for the 50 minute lecture without eating or drinking. If you have a medical condition that prevents you from refraining, please contact the Office of Disability Equity as soon as possible so that we can work out a plan for you that also ensures the health and safety of the entire class. (ODE) in the Lommasson Center room 154, phone 406.243.2243 and 406.243.4216.

The President and Provost have committed to in-person classes at the University of Montana so there is no remote option for this class. However – if you feel ill or are experiencing early COVID symptoms (including a scratchy sore throat) you may attend via Zoom out of an abundance of caution. You will need to contact me by 7 AM the day of the lecture. ONLY those students who have advised me that they are experiencing symptoms will be

admitted from a waiting room. If you require 2 or more consecutive remote accommodations, you are expected to provide written documentation that you have been seen by a health care professional. Both vaccines and symptomatic testing are available through Curry Health Center from 9 a.m. to 4 p.m. Monday through Friday. (406-243-5171) . The Missoula City-County Health Department testing site has moved to a new location: 3665 W. Broadway. Call 406-258-4696 to schedule a test. Walgreens continues to offer free drive-up testing in Missoula. Visit their website to learn more and to schedule an appointment.

**Recitation Exercises:** are guided exercises and an opportunity for you to spend time on – and get help with - some more challenging material. They are posted on Moodle the week before the recitation meets, usually on Friday. These are designed to (mostly) FOLLOW the lecture material and to be review. Every semester there is always the one thing that just doesn't match up but we will do our best to make them all meaningful reviews for you. You need to print out a copy and take it with you to recitation.

Recitations will usually require you to build a molecule using your model kit and answer questions about it. Complete as much as you can ahead of time and bring your – largely completed – recitation and at least one model to the recitation. The TAs and LAs will look at your models to see if you have built them properly and go over any of the questions and concepts that were more challenging for you, including helping you to answer the questions that you could not complete ahead of time. Make sure you don't leave before you have asked all the questions you have on the topic. Work in small groups to go through the tutorial. If you know something really well – be the one that explains it to someone else. Ask and answer questions! These tutorials and models are designed to be more challenging to give you a chance to get a deeper understanding of the material with support from the TAs and LAs. Completion of these is really closely associated with success in this course.

Once most of the class has completed the recitation, you will be given a short 10 point quiz that asked some questions related to the recitation.. This is assessed material so you will do this part on your own BUT – you can use the tutorial and model you built (BUT NOT LECTURE SLIDES NOR NOTES) to help you answer the quiz. You must show a fully worked recitation to take the quiz. There are thirteen 10 point quizzes. The best ten quizzes will contribute to a total of 100 possible points from the recitations. Completion of more than ten recitations can contribute up to 30 points of extra credit for your grade.

**In Class Activities:** As time permits, we will work through course material using in-class activities. There will be some nominal – up to five points – extra credit associated with this for active participants.

**Online Homework (Mastering Chemistry):** is required and will be graded.

There is ~ 2 hours of homework per Chapter. Some students take less or more time to so give yourself plenty of time to go through it slowly. The homework is set BEFORE you see the lecture material and the point is to get you working on and thinking about the material BEFORE

lecture starts. You will have lots of opportunities to change your answer after the lecture so come to class with your questions.

Due to the scheduling of holidays this semester, homework assignments of often due the evening of the last anticipated lecture of that topic. The plan is that you work on homework CONCURRENTLY with the lecture, so in reality you are EXPECTED to have the material large completed on Sunday evenings at 11:45 PM leaving only clean up questions to be due the evening of the last lecture day on that topic. There is a no-penalty re-do option so please attempt all questions even if we have not covered the material. You will have an opportunity to re-do the question and it is the intent to have you thinking about the material early. If we have not covered material, the homework deadline will be extended but only until the evening of the last lecture on that material. Each of the homework assignments is worth 10 points. If the homework is not completed by the due date a penalty of 5% will apply to that assignment for up to two weeks. An additional two Chemistry Primer units are available for extra practice – they are not for credit.

**Exams:** This is your chance to really show off your mastery of this new topic! There are 4 x 100 point midterm exams all held on Wednesdays (see Calendar below) during lectures. Exams are mostly multiple choice with one or two written answers. The exams are closed book so help sheets, periodic tables, calculators, cell phones etc are NOT permitted. Exams are based on the new material covered from the previous test but the very nature of the chemical sciences is that this knowledge is cumulative.

Because life happens, your lowest exam grade is dropped. If you have to miss an exam due to unforeseen circumstances that will be your lowest grade (obviously as it will be zero) and it will be dropped. We will retest you on the material on the final anyway. There are no make-up exams – we just let you drop that exam and it doesn't affect your grade. Everyone's best three exam grades go into their final grade. A word of caution – life does happen. You never know when you will have to drop an exam due to events you can't possibly predict. Treat every exam as if it will be one of the three that is counted!

In case you missed it: **No make-up exams will be given.**

**Final Exam:** The final exam is comprehensive and worth 200 pts (and cannot be dropped). The final exam is scheduled Wednesday, May 11th 10:10 AM-12:10. The exam date is set by registrar and cannot be changed. The final exam is mandatory and IN PERSON. Schedule your plane reservations, internships, employment for AFTER THIS TIME. No early finals will be given!

**Letter Grades** : The points from best 3 exams (300) + final exam (200) + best 10 quizzes from recitations (100) + homework (100) gives a total of 700 points. Letter grades will be assigned using the traditional 90-80-70-60; A-B-C-D format. The use of + and – grading is at the discretion of the Professor.

## Getting Help with CHMY 123

- The TA for your recitation section has office hours that will be posted on Moodle.
- Study Jams (regular study groups led by a student tutor) <https://www.umt.edu/study-jam>
- check the TRIO website to find out if you qualify for TRIO assistance  
<http://www.umt.edu/trioss/apply.php#Eligibility>
- names of private tutors can be found through the Office of Student Success  
<http://www.umt.edu/oss/> .

## Student Conduct and Academic Honesty

*All students must practice academic honesty. Academic misconduct is subject to an academic penalty by the course instructor and/or a disciplinary sanction by the University. All students need to be familiar with the Student Conduct Code. The Code is available at <http://www.umt.edu/student-affairs/dean-of-students/default.php>*

Students are especially reminded that plagiarism – representing someone else’s work (another student or internet content – Google/wikipedia) as the student’s own without evidence of independent contribution - and misconduct during examination fall under items 1 and 2 of the student conduct code. The majority of CHMY 123 students are honest and responsible. As academic misconduct may affect those students, please be advised that I do enforce the Student Conduct Code in order to protect the honest students from academic misconduct.

**Disability Modifications** : Students with disabilities should contact the Office of Disability Equity (ODE) in the Lommasson Center room 154, phone 406.243.2243 and 406.243.4216. [Please note that this office will be moving during the semester]. Any student with a disability that may prevent you from fully demonstrating your abilities, should contact the instructor and ODE (DSS) as soon as possible. Testing services gets very busy and fully scheduled early so get any modifications you need to succeed in this course in place early.

**UM Policies on drop/add and grade changes**- dates are set by the registrar’s office:  
<https://www.umt.edu/registrar/calendar/autumn-2021.php>

- Day 15: Feb 7<sup>th</sup> by 5:00 Last day to drop individual classes on CyberBear with refund.
- Day 45: Mar 29 is the last day to drop with the signatures of your advisor and the instructor with W appearing on your transcript.
- Mar 30-May 6, 2022 drops with the signatures of your advisor, the instructor and the Dean of the College and WP or a WF will appear on your transcript

# CHMY 123 Syllabus Spring 2022

---

- *UM policy allows you to change your grade option (typically occurs when students are not doing well and they change from traditional letter grade to credit/no credit option) up to the last regular day of classes, May 6<sup>th</sup>, 2022.*

**Semester Schedule :** We start at Chapter 12 and go sequentially through to Chapter 26, omitting Chapter 25. Portions of some chapters sometimes need to be omitted but we cover all the important pieces. The dates given in the calendar are subject to change based on the pace of lecture. At times we may be slightly ahead or slightly behind but the goal is to cover 3-4 chapters prior to testing.

CHMY 123 Intro to General Organic and Biochemistry: SPRING 2022

Date	Lecture
January 19	Lecture 1: Introduction to Organic and Biochemistry
January 21	Chapter 12: Alkanes.
January 24	Chapter 12: Alkanes.
January 26, 27	Chapter 13: Unsaturated and Aromatic Hydrocarbons
Jan 31	Chapter 13: Unsaturated and Aromatic Hydrocarbons
February 2,4	Chapter 14: Compounds with oxygen, sulfur or halogens
February 7	Chapter 14: Compounds with oxygen, sulfur or halogens
February 11	Chapter 15: Functional Groups: Aldehydes and Ketones
February 14,16	Chapter 15: Functional Groups: Aldehydes and Ketones
February 18	Chapter 16: Amines
February 23	Chapter 16: Amines
February 25	Chapter 17: Carboxylic Acids and their Derivatives
Feb 28, March 2	Chapter 17: Carboxylic Acids and their Derivatives
March 4	Chapter 18: Amino Acids and Proteins
March 7	Chapter 18: Amino Acids and Proteins



## CHMY 123 Syllabus Spring 2022

---

Date	Lecture
March 11	Chapter 18: Amino Acids and Proteins
March 14,16	Chapter 19: Enzymes
March 19	Chapter 20: Carbohydrates
March 28, 30	Chapter 20: Carbohydrates
April 1	Chapter 21: The Generation of Biochemical Energy
April 4	Chapter 21: The Generation of Biochemical Energy
April 8	Chapter 22: Carbohydrate Metabolism
April 11,13	Chapter 22: Carbohydrate Metabolism
April 15	Chapter 23: Lipids
April 18	Chapter 23: Lipids
April 20 & 22	Chapter 24: Lipid Metabolism
April 25	Chapter 24: Lipid Metabolism
April 29	Chapter 26: Nucleic Acid and Protein Synthesis
May 2,4	Chapter 26: Nucleic Acid and Protein Synthesis
May 6	Last Day of Class –Wrap up and Final Exam Review