

CEM 121: Explorations in Chemistry – Fall 2017

Course Overview

Catalog Description

Introduction to core ideas in chemistry (structure and properties of matter, energy, and electrical forces) blended with science practices (use of models, argumentation, construction of scientific explanations, mathematical thinking) to understand and explain chemical phenomena.

Course Units

Unit 1 – Particle Models for Matter, Motion, and Phase Changes

Unit 2 – Atoms and the Periodic Table

Unit 3 – Molecules and Bonding

Unit 4 – Chemical Reactions

People

Instructors

Dr. Lynmarie Posey

email: poseyl@msu.edu; office: 61 Chemistry; phone: 517-353-1193

Dr. Becky Matz

email: matz@msu.edu; office: D101 Wells; phone: 517-353-2958

Dr. Pamela Mosley

email: plm@msu.edu; office: 40 Chemistry; phone: 517-353-1176

Note: When sending email, please use your MSU email account and include "CEM 121" in the subject line.

Learning Assistants

Josh Abatie, abatiejo@msu.edu (Sections 001 and 004)

Jon Kremer, kremerj3@msu.edu (Section 002 and 006)

Kim O'Connell, conn308@msu.edu (Section 003)

Ryan Spain, spainrya@msu.edu (Section 005)

Schedule

Weekly Class Schedule

Sections 001 & 002

Class: MWF 10:20–11:10 AM

Recitations:

Section 001: Tu 6:00–6:50 PM

Section 002: W 3:00 PM–3:50 PM

Sections 003 & 004

Class: MWF 1:50–2:40 PM

Recitations:

Section 003: Th 3:00–3:50 PM

Section 004: W 6:00 PM–6:50 PM

Sections 005 & 006

Class: MWF 11:30 AM–12:20 PM

Recitations:

Section 005: Th 6:00–6:50 PM

Section 006: W 4:10 PM–5:00 PM

All classes and recitations meet in 323 Chemistry, except for the Section 006 recitation, which meets in 102 Farrall Agricultural Engineering Hall.

Recitations will begin the week of September 4. Recitations will not meet during Thanksgiving week.

Instructor Office Hours

Office hours will begin after Labor Day.

Dr. Posey, M 3:00–4:00 PM, W 4:00–5:00 PM, and other times by appointment in 61 Chemistry

Dr. Matz, Tu 11:30 AM– 12:45 PM and other times by appointment in D101 Wells

Dr. Mosley, Th 11:00 AM–1:00 PM and other times by appointment in 40 Chemistry

You are welcome to attend the office hours of any CEM 121 instructor independent of the section in which you are enrolled. Any changes to the office hour schedule will be announced in advance as “News” in Desire2Learn (D2L) (<https://d2l.msu.edu>).

Important Dates*

Important Dates	Event
Monday, September 25, 7:15–8:15 PM, 101 BCH	Exam #1
Monday, October 16, 7:15–8:15 PM, 101 BCH	Exam #2
Wednesday, October 18, 8 PM	Last day to drop with no grade reported
Monday, November 6, 7:15–8:15 PM, 101 BCH	Exam #3
Monday, December 4, 7:15–8:15 PM, 101 BCH	Exam #4
Wednesday, December 13, 8:00–10:00 PM	Final Exam

*Exam and final exam dates are fixed. Please plan accordingly.

Exam review sessions will be held on the following Fridays, 4–6 PM in 136 Chemistry: September 22, October 13, November 3, December 1, and December 8.

Announcements & Reminders

Course announcements will be posted as “News” in D2L (<https://d2l.msu.edu>). Reminders of exam and final exam dates can also be found on the D2L Calendar.

Outcomes, Objectives, & Expectations

Overall Course Learning Outcomes:

Students will

- develop their understanding of several core ideas in chemistry (the structure and properties of matter and the role of electrostatic forces) and their ability to apply these ideas to explain chemical phenomena.
- build capacity to engage with the scientific practices of using models, constructing scientific explanations, engaging in argumentation, and **applying mathematical thinking**.
- build a robust, transferrable understanding of core ideas in chemistry through integration with science practices to support learning in subsequent chemistry and other gateway science courses.
- develop proficiency and gain confidence in applying appropriate mathematics in chemistry, including the use of graphs, proportional reasoning, and covariance.

Learning Objectives

Specific learning objectives for each course unit will be provided in D2L. Taken together, the learning objectives detail what you should know, understand, and be able to do. As such, they **can be used as a study guide when preparing for exams and the final exam as well as a self-assessment tool**. Self-assessment rubrics will also be provided to help you assess your understanding.

Alignment of CEM 121 with MSU's Undergraduate Learning Goals¹

CEM 121 will provide students with ample opportunities to develop, apply, and refine their use of analytical thinking in the context of chemistry. The analytical thinking component of MSU's Undergraduate Learning Goals encompasses acquisition of information coupled with critical analysis "to evaluate evidence, construct reasoned arguments, and communicate inferences and conclusions."¹ Specifically, this course will focus on

- synthesis and application of information and methods from the discipline of chemistry to develop an understanding of the structure and properties of matter and the governing role of electrostatic forces.
- identification and application of appropriate quantitative methods.

Teaching Philosophy and Expectation for Roles

The instructors will serve as your coaches and guides as you learn to use models and apply ideas in chemistry to understand and explain the structure and properties of matter. As your coaches, we are responsible for setting up a training program to help you build your understanding of chemistry. Constructing knowledge is analogous to building muscle memory in sports; **it doesn't happen without practice and repetition**. (The people who you consider to be experts got there through practice and persistence, not because they started with special abilities. Most experts will tell you that they had many failures along the way, but they didn't give up.) In order to support your learning of new material, you will be given a variety of tasks

¹Undergraduate Learning Goals developed by MSU's University Committee on Liberal Learning, <http://undergrad.msu.edu/programs/learninggoals>

both during class and outside of class that will require you to use new knowledge and skills. Both lecture and recitation meetings will be guided by the motto “less talking from the front of the room, more talking and doing all around.” Don’t wait until you think that you have a completely correct answer before writing something down. Acknowledging your preexisting ideas, those that are correct, incorrect, and not fully formed, is a first step in constructing new understanding. Be open to exploring ideas and making mistakes. Making mistakes, confronting these mistakes, and revising your thinking in response is more beneficial to learning than getting the “correct” answer on the first attempt. Do not be afraid to ask questions.

Course Materials

Required Materials

Student Lab Notebook with Spiral Binding, Chemistry, 100 Carbonless Duplicate Sets, Hayden-McNeil (ISBN 978-1-930882-74-4)

Computer with Internet access (DSL, LAN, or cable connection desirable)

Scientific calculator

Instructor-Provided Course Materials

Course materials will be published in the Desire2Learn (D2L) course management system (<https://d2l.msu.edu>). Assistance with D2L is available 24/7 through MSU Distance Learning Services (aka. the Help Desk) at (517) 432-6200 or (844) 678-6200.

A composition book will be provided for developing your Chemistry Toolbox (see below).

At the end of the semester, you will be introduced to the online beSocratic homework system used in CEM 141. Access to this system for CEM 121 will be provided at no cost. You will pay a fee to use beSocratic in CEM 141.

Commercialization of Course Materials

MSU prohibits students from commercializing their notes of lectures and University-provided class materials without the written consent of the instructor. The instructor and Michigan State University retain copyright to all materials provided in this course unless otherwise indicated.

Grading

Grading Criteria

The grade in this course will be based on

- | | |
|---|-----|
| • Four exams (12% each) | 48% |
| • Final exam | 15% |
| • In-class work & notes (Learning Notebook) | 12% |
| • Recitations (Learning Notebook) | 10% |
| • Homework (Learning Notebook) | 10% |
| • Chemistry Toolbox | 5% |

Grading Scale

The following fixed grading scale will be used to determine semester grades:

≥ 90% 4.0; 85–89% 3.5; 80–84% 3.0; 75–79% 2.5; 70–74% 2.0; 65–69% 1.5; 60–64% 1.0; < 60% 0.0

Grades will be recorded in the Gradebook in D2L. You will be able to see all grades that have been entered and to check them for accuracy. D2L will also display your current grade based on the grading scale shown above and the scores entered to date.

Standard rounding rules apply. The instructors reserve the right to adjust the grading scale downward, but under no circumstances will the criterion for any grade be raised. Everyone has an opportunity to earn a grade of 4.0 in this course.

The deadline for reporting grade discrepancies and requesting regrades is 5 PM on Friday, December 8, 2017.

Exams

Four closed-book exams will be given on Monday evenings, 9/25, 10/16, 11/6, and 12/4, 7:15–8:15 PM in 101 Biochemistry. Equations and other useful information (periodic table, physical constants, etc.) will be provided when necessary. Sample equation sheets will be published on D2L in advance. Scientific calculators are the only electronic devices that may be used during exams and the final exam. Accessing a cell phone, tablet, MP3 player, or computer during an exam or the final exam is considered use of unauthorized materials and will result in assignment of a penalty grade and filing of an Academic Dishonesty Report.

Make-up exams **will not** be given. In the event of a missed exam with an excused absence approved ***in advance***, the weighted final exam score will be used in place of one missed exam. For a second missed exam, a grade of zero will be used in computing the semester grade. If your final exam percentage score is higher than your lowest exam score, it will be substituted for your lowest exam score in calculating your semester grade.

Final Exam

A cumulative final exam will be given on **Wednesday, December 13, 8:00–10:00 PM for all sections**, location TBD.

Students are reminded of the following University policy outlined in *Academic Programs*:

A student absent from a final examination without a satisfactory explanation will receive a grade of 0.0 on the numerical system, NC on the CR-NC system, or N in the case of a course authorized for grading on the P-N system. Students unable to take a final examination because of illness or other reason over which they have no control should notify the associate deans of their colleges immediately.

Learning Notebook

The required carbonless, duplicate laboratory notebook (see Course Materials) will be used for in-class work, class notes, homework, and recitation work. Guidelines for this notebook will be provided in a separate document. The Learning Notebook will be a place to collect all of your ideas, ranging from partially formed and perhaps not entirely correct to fully developed and

reflecting solid understanding. Learning is a process of constructing deeper understanding over time that is both more sophisticated and more correct. An important aspect of the Learning Notebook will be revision and refinement of your ideas. The format used in the Learning Notebook will leave space for revision and self-assessment. The carbonless notebook will permit you to submit the duplicate pages for credit and grading while retaining a copy of your original work.

In-Class Work and Class Notes in Learning Notebook

You will be expected to actively engage in doing work during class. Class work includes taking notes, responding to questions posed during class, and completing in-class activities. Most of the time, you will collaborate with members of your group to complete this work. From time to time, you will be asked to do an in-class activity on your own. Please participate with an open mind, be willing to share your ideas, and be respectful of the ideas of others. This work will provide formative assessment for both student and instructor and is intended to help you begin to synthesize and apply course content knowledge. You will receive full credit for making a good effort to take notes and complete the in-class work. Your answers for the in-class work do not have to be 100% correct to receive full credit (5 points); however, incomplete work will only receive partial credit (3 points or 1 point). Every member of a group will receive the same credit for any in-class work completed as a group. The following criteria will be used:

- 5 points** (conscientious effort to participate in the in-class activity and/or take notes; actively contributing and working effectively with group on chemistry; remaining on-task and making good progress toward completing activity)
- 3 points** (moderate effort to participate in the in-class activity and/or take notes; not always on-task; doing in-class activity but not working with group when appropriate; **more than 5 minutes late to class automatically results in less than full credit**)
- 1 point** (minimal effort on the in-class activity and/or taking notes in Learning Notebook; significant time spent off-task and/or on devices)
- 0 points** (absent and/or no work submitted)

Recitations

Recitations meet weekly, except during the first week of the semester before Labor Day and Thanksgiving week. **Recitations begin on September 5**. Recitation time will be used for activities, discussion of course content, and review of exams. Recitations also provide an opportunity for you to ask questions about anything related to the course.

Your participation and work in recitation will be graded on a 5-3-1-0 scale according to the following criteria:

- 5 points** (conscientious effort to participate in the recitation activity; actively contributing and working effectively with group on chemistry; remaining on-task and making good progress toward completing activity)
- 3 points** (moderate effort to participate in the recitation activity; not always on-task; doing activity but not working effectively with group; **more than 5 minutes late to recitation automatically results in less than full credit**)

1 point (minimal effort on the recitation activity; significant time spent off-task and/or on devices)

0 points (absent and/or no work submitted)

Attendance is required at all recitations. Attendance and participation in recitation will count for 10% of your semester grade. Content missed because of failure to attend a recitation session cannot be made up, unless **PRIOR** arrangements have been made with the learning assistant in charge of your recitation or one of the course instructors.

Homework

Homework in this course will consist primarily of assignments completed in your Learning Notebook. However, you will also be asked to answer questions in the Qualtrics survey system as homework from time to time. At the end of the semester, you will be introduced to the **beSocratic** online assessment system used in CEM 141. You will complete several homework assignments using beSocratic to prepare you for CEM 141. Homework will be assigned 2 or 3 times each week to coincide with the coverage of material in class.

There are a few things that you should keep in mind when completing homework. Initially, **you should try work on these activities independently without consulting outside resources, such as books, the web, or friends.** **Why?** The goal is for you to practice constructing answers based on your current understanding, which will become more correct over time. Simply copying down someone else's ideas has little benefit for your learning. We want to see your work, not someone else's! It is fine to consult notes that you have taken in class and course materials while completing homework assignments. You should use answering homework questions as an opportunity to revise and refine your notes.

We want you to use homework assignments to actively engage in building and using your knowledge of chemistry without worrying about being evaluated for correctness. Therefore, credit will be given for **completion of these activities with your best effort** rather than for the correctness of responses. Credit for homework will be assigned on a 5-3-1-0 scale.

5 points (**conscientious** effort to complete the **entire** assignment)

3 points (completion of at least half of the assignment, but less than full completion with limited effort)

1 point (started on the assignment, but did not complete or showed minimal effort)

0 points (no work submitted)

Sometimes homework will cover content before it is discussed in class because we are interested in your preexisting knowledge and we also want you to acknowledge your current ideas, both correct and incorrect. What you already know or think impacts your learning. Homework assignments will be discussed in class.

Links for questionnaires administered through the Qualtrics survey system will be sent to your **MSU email account**. It is important that you check your MSU email account regularly (at least once per day) because this is the official channel that the University and your instructors will use to communicate with you. **We strongly discourage you from forwarding your MSU email to another account because other mail servers may reject email forwarded from MSU**

accounts. Failure to look at your MSU email or loss of email in forwarding is not a valid excuse for missing homework assignments.

Chemistry Toolbox

Over the course of the semester you will be developing a personal Chemistry Toolbox with our guidance that you can use in CEM 121 and CEM 141. The Toolbox is intended to help you identify themes/big ideas in chemistry, organize your ideas about chemistry, and make connections between ideas in chemistry. Your Toolbox may also include problem-solving strategies. We are interested in what each of you includes in your Toolbox as being important to helping you understand and use ideas in chemistry. We strongly encourage you to continue using and adding to your Toolbox notebooks in CEM 141. A composition book to use in creating your Chemistry Toolbox will be provided.

Toolbox notebooks will be checked (for a grade) in recitation by your LA during the weeks of September 18, October 9, October 30, and November 27. Toolbox notebooks will be collected at each test for grading.

Why is it important to develop a Toolbox? Experts in scientific disciplines organize their knowledge around the big or central ideas in the discipline and the relationships between these big ideas. We want you to become more expert-like in your ability to use ideas and make connections between ideas in chemistry.

Academic Integrity

By enrolling as a student at Michigan State University, you have joined an academic community built on trust and mutual respect. As stated in *Academic Freedom for Students at Michigan State University*, "The student shares with the faculty the responsibility for maintaining the integrity of scholarship, grades, and professional standards."² As such, each time that you submit work for a grade you are attesting that this work is your work and that it has been prepared following the guidelines provided for the assignment. Further, if you observe an act of academic dishonesty, you are obligated to report it to the instructor. In any work that involves collaboration, you are expected to make a good-faith effort to contribute.

In Spring 2016, the Associated Students of MSU (ASMSU) adopted The Spartan Code of Honor (<https://honorcode.msu.edu>):

As a Spartan, I will strive to uphold values of the highest ethical standard. I will practice honesty in my work, foster honesty in my peers, and take pride in knowing that honor in ownership is worth more than grades. I will carry these values beyond my time as a student at Michigan State University, continuing the endeavor to build personal integrity in all that I do.

The Spartan Code of Honor has been endorsed by Academic Governance, the Provost, President, and Board of Trustees. You are encouraged to take the pledge at <https://honorcode.msu.edu/take-the-pledge/>

²Academic Freedom for Students at Michigan State University, Article 2: Academic Rights and Responsibilities (<http://splife.studentlife.msu.edu/academic-freedom-for-students-at-michigan-state-university/article-2-academic-rights-and-responsibilities>)

The Department of Chemistry adheres to *MSU Policies, Regulations and Ordinances Regarding Academic Honesty and Integrity* (<https://www.msu.edu/~ombud/academic-integrity/index.html>). In this course, any student who cheats by copying the work of others, using unauthorized materials, or communicating with others during an exam or final exam will receive a penalty grade of 0. Students who submit in-class work for another student who is not present will receive no credit for their work on that day.

An Academic Dishonesty Report will be filed as required by MSU policy any time that a penalty grade is given. A student's academic dean will receive this report, and it will be added to the student's academic record. If a student feels that he/she has been unjustly accused of academic dishonesty, he/she should first meet with his/her instructor to resolve the dispute. If dissatisfied with the outcome of this meeting, the student can meet with the Chair of the Department of Chemistry. Finally, a student can contest an allegation of academic dishonesty and penalty grade by filing a grievance with the University Academic Integrity Hearing Board after meeting with his/her instructor and the Chemistry Department Chair.

Attendance & Classroom Etiquette

Attendance

In-class work is integral to this course. To encourage your attendance and participation in class, a portion of the semester grade is tied to in-class assignments. Attendance will be taken in each class period. You may miss a maximum of three classes without penalty. For every additional class missed, you will lose 5 points from your in-class work score. **If you are late in arriving for class, you will not receive full credit** because it is likely that you will not know what is going on and consequently will be unable to participate fully and contribute productively to your group.

Attendance is required at all recitations. You will receive credit for attendance and participation. You will not be able to make up missed work, unless you have made arrangements with your learning assistant or instructor **prior** to the missed recitation.

Grief Absence Policy

MSU's Policy on Grief Absence states "The faculty and staff should be sensitive to and accommodate the bereavement process of a student who has lost a family member or who is experiencing emotional distress from a similar tragedy so that the student is not academically disadvantaged in their classes or other academic work."³ The responsibilities of the student in requesting a grief absence **before leaving campus** can be found in the complete Grief Absence Policy statement at <http://splife.studentlife.msu.edu/regulations/selected/grief-absence-policy>. A link to the Grief Absence Request Form is provided at the bottom of the page.

Classroom Etiquette

- Please arrive to class on time and prepared to work.
- Cell phones, tablets, and computers should be put away during class, unless instructed otherwise. Not only are they a distraction to the user, but research has shown that the use of electronic devices negatively impacts the performance of other students who are

³Grief Absence Policy (<http://splife.studentlife.msu.edu/regulations/selected/grief-absence-policy>)

seated near the user. (By the way, research has shown that “multitasking” diminishes effectiveness on all tasks.)

- Please silence your cell phone during class; otherwise, Dr. Posey, Dr. Matz, or Dr. Mosley might have to answer your phone for you, which could be embarrassing.
- Please be courteous and respectful of the opinions and contributions of others.
- Participate in discussions with your group. The rest of your group wants to hear what you have to say.
- If you must arrive in class late or leave early, please show your classmates respect by doing this with minimum disruption.
- Please refrain from using headphones and earbuds during class.

Media Derived from the Classroom

As members of a learning community, students are expected to respect the intellectual property of course instructors. All course materials presented to students are the copyrighted property of the course instructor and are subject to the following conditions of use:

1. Students may record lectures or any other classroom activities and use the recordings only for their own course-related purposes.
2. Students may share the recordings with other students enrolled in the class. Sharing is limited to using the recordings only for their own course-related purposes.
3. Students may not post the recordings or other course materials online or distribute them to anyone not enrolled in the class without the advance written permission of the course instructor and, if applicable, any students whose voice or image is included in the recordings.
4. Any student violating the conditions described above may face academic disciplinary sanctions.

Americans with Disabilities Act Accommodations

Michigan State University is committed to providing equal opportunity for participation in all programs, services, and activities. Requests for accommodations by persons with disabilities may be made by contacting the Resource Center for Persons with Disabilities by phone at 517-884-RCPD or through the web at <https://www.rcpd.msu.edu>. Once eligibility for an accommodation has been determined, a verified individual services accommodation (“VISA”) form will be issued. This form should be presented to instructors at the start of the semester and/or at least two weeks prior to the accommodation date (exam, final exam, homework, etc.). Requests received after this date will be honored whenever possible. Web-accessible course materials will be provided upon request.