

CHEM 1600

Chemistry in Modern Society

Course Syllabus

Course Goal:

This course is designed to explore how chemistry is connected to our modern society, which includes interactions with our economy and environment. We will think about chemistry as the building blocks of the living and non-living world and its role in future sustainability. The course emphasizes conceptual understanding of chemical ideas but will include some mathematics as well because quantitative reasoning is an important part of how chemistry explains the world around us.

Lecture Times:

11:00 – 12:15 Tuesday/Thursday 2354 Gilman Hall

Instructor details:

Mrs. Micke Reynders
Email: micke@iastate.edu

Teaching Assistant:

To be updated

Office Hours:

I will be available every Tuesday after our lecture from 12:15-13:30. Additionally, I will be available in person or online by appointment. Please don't hesitate to send me an email and we can schedule a time and a place to meet.

Drops and Audits:

Students may not register to audit Chem 1600 after 5:00 p.m. on Friday, September 1, 2024. The audit does not count toward full-time student status.

Required Textbooks & Supplies:

Chemistry in Context (10th Edition), Fahlman, Purvis-Roberts, Kirk, Kelly, Daubenmire, McGraw-Hill Publishers. This book is part of the Inclusive Access program at Iowa State, which means that by enrolling in this course you will have the e-book version included as part of your U-Bill. By using this option you have a much lower price than other textbook options. An inexpensive, non-programmable (no data storage) calculator is required, one with $\ln x$, $\log x$, 10^x , e^x , and y^x functions.

Online Discussions:

Throughout the course, we will engage in online discussions that will happen on our canvas course page. At the beginning of the course, you will be asked to introduce yourself to your peers and can use pseudonyms if you want to. Engaging in each discussion should take you between **5 and 15 minutes at most**. You can be asked to share your thoughts or answer questions that involve visiting interactive live maps, calculating your water footprint, looking at images, videos or reading material. The discussion will be **open for the duration of the topic** which will allow you to ask questions and comment on other student questions. Another discussion thread will also be available for you to ask questions about the recommended end-of-chapter problems. You can submit your comments from your smartphone, tablet, or laptop. To get resurrection points for this course additional credit for this course, you should answer the questions and comment on at least 2 other posts per topic.

Lectures:

You are expected to attend classes and read the text material before the lecture. I tend to use a lot of visualizations and therefore note taking on presentation slides either on printed-out versions or on your tablet or device is encouraged. The content covered in the lecture presentation will be uploaded before class as a PDF file and any added content will be uploaded after class. When additional resources, figures, or links are used during class time, these will be uploaded as resources on the course canvas page. There will be times during the lectures that you will be asked to visit a website on your device, open a simulation, or conduct research, thus bring your device to class. Also from time to time, you will be asked to work with people around you and to share your thoughts.

Homework:

Our textbook has homework problems at the end of each chapter and you can work through the suggested questions. These problems are not graded, but you can evaluate yourself to check your understanding as the correct responses will be posted. Try the problems first before looking at the answers!

Tips:

- Come to class ready to participate and to share your thoughts and ideas
- Read textbook chapters in advance to better understand the content
- Work through textbook-suggested problems for your exam preparation
- Make use of your resources (office hours, the chemistry help centre, and your TA)

Concept Mapping:

Concept maps are tools that help to visualize how key ideas about a topic are related. It is a useful learning tool that can help to **summarize and organize information**. We

will use concept mapping in this course to think differently and learn about how chemistry connects to aspects of our society, economy, and environment. These connections can become more complex and involve many different **smaller focus areas, known as subsystems**. To help understand how these subsystems are related we will create **SOCMEs (Systems Oriented Concept Map Extension)** throughout this course. To guide the process of working through the complexity, the concept mapping activities will start with paper and pencil methods and progress towards expanding these to SOCMEs that will be built on a web interface. These concept maps will be created in class while working in a group (usually between **10-15 minutes**) and as homework activities when working individually. You are encouraged throughout these activities to use your creativity and understanding gained to show meaningful connections that make sense as justified by your reasoning. If you are not asked to create a concept map or SOCME, you might be given one and be asked to fill in appropriate concepts or linking words that will be missing.

Click here to look at the [concept mapping tutorials](#)

Group Project:

The purpose of the project is to get you to think about core chemistry ideas, make connections to larger-scale impacts, explore potential subsystem boundaries, and make predictions. The project involves an online canvas quiz that can be completed individually, however it is recommended to work in groups. When working in groups, you are allowed to work together and discuss possible answers, but make sure to submit your work. The project consists of two parts:

In part 1 you will be given an option to choose any 1 of 3 possible articles. Based on the article your group has chosen you will have to complete a quiz on Canvas that will include multiple-choice and open-ended questions about its contents. You will have to investigate the chemistry content and aspects related to broader scale implications. You will also have to think about the relationships between chemistry and sustainability. You can also be asked to evaluate the risks and benefits, make future predictions, and give your opinion on whether aspects of the article information can be trusted. You will be allowed to do research. This part will count for 60 points.

In part 2 you will use the article as a reference to create a SOCME diagram, showing key concept and their connections within appropriate subsystems. There is no limit to what can be included, however, it must relate to the topic of the paper you have chosen. Within the canvas quiz, you will be asked to upload your created SOCME. This part will count for 40 points.

This group project is due on **November 14**. If you do additional research you need to include your references.

Exam Information

There will be three exams (1 hour each) during the semester. The format for each exam will be a closed notes = section on factual material and an open notes (not book) section where you need to interpret science in the context of the world around you. Anything in your handwriting counts as open notes for this section. You may take printouts of the PowerPoint notes that you have annotated with your notes taken in class. Photocopies of pages in the book or other material (including notes from other people in the class) are NOT allowed as open notes. If you take notes on your computer, you will need to print them out to use them in class, we will not be able to allow computers to be open during the open notes portion of the test. The test will be out of 125 points. The closed notes portion will be 15 multiple choice questions that count 3 points each to total 45. The open notes portion will include shorter and longer open-ended questions. You could be asked to draw a diagram to support your answers or to draw a concept map associated with a particular subsystem. To help you prepare for the exam, study guides will be posted closer to time.

Exam #1

On **October 1**, you will write the first exam during class time on the content covered in **topics 1-4**. The exam will be out of 125 points.

Exam #2

On **November 5**, you will write the second exam during class time on the content covered in **topics 5-7**. The exam will be out of 125 points.

Exam #3

On **December 5**, you will be asked to interpret and complete a SOCME quiz on **topic 8** (Nuclear Energy). The quiz will be out of 40 points and will be graded based on the appropriateness of your chosen words to fill in the blanks.

Final Exam

The final 2-hour exam is scheduled on **Wednesday, December 18th**. In both parts, the emphasis will be placed on reasoning skills, associated with applying principles we learn in chemistry to problems of sustainability. The exam will be done individually and with **open notes**.

You will be provided with three pieces of written work (from a journal article, a news blog, a case study, or a section from a book). You have to choose any one of these pieces to (1) **answer shorter questions about the science based on what you have learned**, (2) **write a paragraph about the accuracy of the science** by using your chemistry knowledge, provide your (3) **reasoning about the sustainability content** and (4) **comment on how science and engineering** can play an important role in building sustainability and how chemistry, in particular, provides the *molecular basis for sustainability*. This exam will count for 100 marks.

Course Grades:

Your final grade

- In total your final grade will be based on a total out of 600 points
- Exam #1 and Exam #2 will count for 125 points each contributing to 41.6% of the course grade
- Exam #3 (40 points) will be combined with points assigned to concept mapping activities (110 points) to give a total of 150 points, which is 25% of the course grade
- The group quiz will count for 100 points and will contribute to 16.7% of the course grade
- The final exam will count for 100 points and will contribute to 16.7% of the course grade

Grade Cutoffs

- The final letter grade will be based on a straight percentage noted as total points in the table below. Plus-minus grading will be used for the final grades. A blackboard grade book will be used.
- Any errors in points or grades posted should be addressed to Mrs. Reynders within two weeks from the date posted.
- It is your responsibility to monitor your score. *The Canvas system is not able to handle some types of points correctly in terms of the "out of" component it shows. You should use this syllabus to tell you the "out of" points, NOT Canvas.*

A	A-	B+	B	B-	C+	C	C-	D+	D	D-	F
560	540	520	500	480	450	420	390	360	330	300	< 300

Resurrection Points

If you lost points on your exams and want to get points back, you can do the following:

- Participate in all the online discussions by answering each question and replying to at least 2 other students' comments to get 8 points. Remember, no there are no correct or wrong answers.
- You can get 2 points extra credit for each concept mapping activity if you include solutions to address sustainability challenges or add additional information linking chemistry to sustainability
- You will be allowed to resubmit a SOCME diagram created with the SOCKit tool to earn back 5 points. However, this would require adding **more than 3 subsystems**, evaluating your SOCME **improving the propositions**, and adding **more detailed chemistry** concepts to it. You will also have to explain what you have changed and why you have changed it. Your new grade will replace the grade you had for that SOCME.
- If you already have full marks for all your concept mapping activities, you can submit a SOCME of any OTHER topic that you find interesting that we haven't yet mapped out. It will be graded similarly to the other topics to earn back 5 points.

Some aspects to take note of:

Chemistry Help Center:

Teaching assistants are available in the Martha E. Russell Chemistry Help Center and Resource Room, room 1761 Gilman. This Center is staffed by general chemistry teaching assistants and is open M - R, 9 - 5, and F, 9 - 1. Answers to all previous quizzes and previous exams are on file in the Center. Resources in the Help Center are not to be removed from the room.

Accessibility:

Iowa State University is committed to assuring that all educational activities are free from discrimination and harassment based on disability status. Students requesting accommodations for a documented disability are required to work directly with staff in Student Accessibility Services (SAS) to establish eligibility and learn about related processes before accommodations will be identified. After eligibility is established, SAS staff will create and issue a Notification Letter for each course listing approved reasonable accommodations. This document will be made available to the student and instructor either electronically or in hard-copy every semester. Students and instructors are encouraged to review contents of the Notification Letters as early in the semester as possible to identify a specific, timely plan to deliver/receive the indicated accommodations. Reasonable accommodations are not retroactive in nature and are not intended to be an unfair advantage. Additional information or assistance is available online at www.sas.dso.iastate.edu, by contacting SAS staff by email at accessibility@iastate.edu, or by calling 515-294-7220. Student Accessibility Services is a unit in the Dean of Students Office located at 1076 Student Services Building.

Academic Misconduct:

The class will follow Iowa State University's policy on academic dishonesty. Anyone suspected of academic dishonesty will be reported to the Dean of Students Office. See the Conduct Code at <https://www.policy.iastate.edu/policy/SDR#4.0> for more details and a full explanation of the ISU Academic Misconduct policies. Instances of suspected academic misconduct will be reported to the Dean of Students' office.

Free Speech:

Iowa State University supports and upholds the First Amendment protection of [freedom of speech](#) and the principle of [academic freedom](#)[Links to an external site.](#)[Links to an external site.](#) in order to foster a learning environment where open inquiry and the vigorous debate of a diversity of ideas are encouraged. Students will not be penalized for the content or viewpoints of their speech as long as student expression in a class context is germane to the subject matter of the class and conveyed in an appropriate manner.

Harassment and Discrimination:

Iowa State University does not discriminate on the basis of race, color, age, ethnicity, religion, national origin, pregnancy, sexual orientation, gender identity, genetic information, sex, marital status, disability, or status as a U.S. Veteran. Inquiries regarding non-discrimination policies may be directed to Office of Equal Opportunity, 3410 Beardshear Hall, 515 Morrill Road, Ames, Iowa 50011, Tel. 515-294-7612, Hotline 515-294-1222, email eooffice@iastate.edu

Religious Accommodation:

Iowa State University welcomes diversity of religious beliefs and practices, recognizing the contributions differing experiences and viewpoints can bring to the community. There may be times when an academic requirement conflicts with religious observances and practices. If that happens, students may request the reasonable accommodation for religious practices. In all cases, you must put your request in writing. The instructor will review the situation in an effort to provide a reasonable accommodation when possible to do so without fundamentally altering a course. For students, you should first discuss the conflict and your requested accommodation with your professor at the earliest possible time. You or your instructor may also seek assistance from the [Dean of Students Office](#) at 515-294-1020 or the [Office of Equal Opportunity](#) at 515-294-7612.

Course Overview:

Due Dates and Exam dates are **set**. Content coverage is **approximate**

DATE	Topic/Chapter	Activities and Exams
Week 1 26-30 Aug	Topic 1 Introduction to Chemistry in Modern Society (Chapter 1)	Atomic structure concept map and discussion starts 22 Aug - due by 1 Sept
Week 2 2-6 Sept	Topic 2: Building Blocks of Technology (Chapter 1)	Rare earths concept map and discussion starts 2 Sept - due by 8 Sept
Week 3 9-13 Sept	Topic 3: The Breath of Life (Chapter 2)	Air pollutants concept map and discussion starts 9 Sept – due by 22 Sept
Week 4 16-20 Sept	Topic 3: The Breath of Life (Chapter 2)	
Week 5 23-27 Sept	Topic 4: The Furnace of Life (Chapter 3)	SOCME quiz and discussion starts 23 Sept- due by 6 Oct
Week 6 30 Sept-4 Oct	Topic 4: The Furnace of Life (Chapter 3)	Exam #1 1 Oct
Week 7 7-11 Oct	Topic 5: Balance and interference (Chapter 4)	Climate concept map and discussion starts 7 Oct- due by 20 Oct
Week 8 14-18 Oct	Topic 5: Balance and interference (Chapter 4)	
Week 9 21-25 Oct	Topic 5/6: Balance and interference (Chapter 4)/ Water essential for Life (Chapter 5)	
Week 10 28 Oct- 1 Nov	Topic 6: Water essential for Life (Chapter 5)	Water concept map and discussion starts 21 Oct- due by 10 Nov
Week 11 4-8 Nov	Topic 6: Water essential for Life (Chapter 5)	Exam #2 5 Nov
Week 12 11-15 Nov	Topic 7: Living in the Pyrocene (Chapter 6)	Group Project Starts 17 Oct- due by 17 Nov
Week 13 18-22 Nov	Topic 7: Living in the Pyrocene (Chapter 6)	Energy concept map and discussion Starts 11 Nov- due by 24 Nov
Week 14 25-29 Nov- Thanksgiving Break		
Week 15 2-6 Dec	Topic 8: Energy and the Future (Chapter 7)	Exam #3 5 Dec
Week 16: 9-13 Dec	Topic 8: Energy and the Future (Chapter 7)	Discussion Starts 25 Nov- Due by 13 Dec
Week 17 16-19 Dec	Finals week	Final Exam 18 Dec

