

Supporting Information

Reimagining Chemistry Education for a Sustainable Future

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Reimagining the Role of Chemistry

CHEM 1560R

Meeting Time: Tuesday/Thursday 10:30-11:50 am Location TBD

Instructor: Jesse Morin | jesse_morin@brown.edu | (401) 863-3436

Course Description

Why should we study chemistry? What perspectives and voices have historically been excluded from chemistry? How has chemistry participated in and enabled systems of oppression? How can we think critically and holistically about the legacies of chemical technology? How can we examine and redefine our role as chemists?

In this course we recognize that chemistry is not an innocent endeavor. The study of matter has produced knowledge and technologies that has drastically altered (and continues to alter) lands and bodies, reshaped food and health systems, and resulted in extreme militaristic violence. Despite these extensive impacts, chemistry is taught almost exclusively in the abstract, as purely technical, and from one perspective. By grounding chemical study in its deeply rooted entanglements with colonialism, racism, and capitalism, CHEM 1560R offers chemists the critical tools to take accountability for all of chemistry's complex relations. In 'Reimagining the Role of Chemistry,' we center chemists and worldviews that have been historically marginalized not only to reconcile their erasure, but to learn from and build towards a better chemistry. This chemical study parallel to subfields like organic-, physical-, environmental-, and bio- chemistry, helps us to re-examine our values as we move towards a critical point in reimagining our role as chemists.

This course will be discussion-based, using readings and other sources (podcasts, videos, etc.) as prompts. It is meant to engage anyone interested in chemistry and its impact on society. We hope that this course will inspire the next generation of chemists to consider the impacts of their work on the world around them.

Prerequisites: Chem 0330, Chem 0350

Learning Objectives

- Build a strong, diverse foundation of critical frameworks.
- Develop an understanding of the history of modern chemistry.
- Apply critical lenses to discuss examples of chemical harms and benefits.
- Analyze the strength and limitations of the scientific method.
- Apply the scientific method to design or critique an experiment.
- Explain fundamental chemical concepts as they relate to case studies.
- Research a topic of interest using critical frameworks and the scientific literature.
- Communicate complex ideas clearly in writing and oral presentations.
- Evaluate a problem from multiple perspectives.
- Reimagine one aspect of the field of chemistry that would contribute to a more just and beneficial chemistry.
- Demonstrate proper citation format when citing the literature.

Class Topics

Introduction: Chemicals in White Space and Endocrine Disrupting Chemicals Case Study

Topic 1: Epistemology and the Scientific Method

Topic 2: Anti-racism and Storytelling

Topic 3: Anti-colonialism and Indigeneity

Topic 4: Feminist Science and Gender in Chemistry

Topic 5: Capitalism and Academia

Topic 6: Alchemy and Pre-Modern Chemistries

Topic 7: Medicinal Chemistry

Topic 8: Soil and Nitrogen Chemistry

Topic 9: Flavor and Fragrance Chemistry

Topic 10: Nuclearism and Military Chemistry

Topic 11: Green Chemistry

Topic 12: What is Our Responsibility?

Major Assignments

Midterm Assignment: Meaningfully Engaging with Chemistry at Brown

- Investigate a chemistry-related problem/issue on campus
- Research and meet with a chemistry community member (professor, postdoc, graduate student, Chemistry Department staff member) about their work, teaching, or the specific problem
- Interview a peer outside of this class about chemistry

Final Assignment: Reimagine The Role of The Chemist

- Building on your midterm assignment, use the knowledge learned in this course to develop a plan to address the problem. This will include:
 - Applying the critical lenses and frameworks to understand the problem more holistically
 - Researching the chemistry related to the problem/issue
 - Proposing a plan to address the problem/issue
- Ideas include:
 - Conduct research to expand upon one of the topics discussed in class. What was missing in the discussion?
 - Work with a community partner to develop an idea of chemistry used to address a community desire.
 - Propose a way to modify/iterate/expand an existing chemistry class to include our critical frameworks.
 - Propose a way to change an existing practice of chemistry that perpetuates racist/colonial practices.
 - Research a chemistry topic not covered in class through the frameworks we discussed.
 - Work to communicate/share the ideas of this course more broadly (internally, externally).

Assessment

- 20% Discussion participation and facilitation
- 30% Homework assignments (including reading reflections and other assignments)
- 20% Midterm Project
- 30% Final Project

Anticipated Workload

Class Time	3 hours/week
Readings	2.5-3 hours/week
Reflections	2.5 hours/week
Homework	2 hour/week
Projects	50-60 hours total

Total **180-197 hours**

Policies

Attendance and Participation

In this course, we will all get out of it what we are willing to put in. This is especially relevant in this particular course due to the focus on effecting meaningful change, which we can only do together.

Due to the collective nature of this course, it is important for everyone in the class that you attend lectures whenever possible. Discussion and group problem solving is an impactful learning tool that we use frequently. This course requires a lot of discussion, considering different perspectives, looking at problems through different lenses, and brainstorming solutions to problems. My goal is to build a community of learners who support each other in taking intellectual risks. We will often break into small groups for discussions, and the expectation is that this is an active discussion where everyone participates. Asking questions is a form of participation. In addition to this, you will all take turns facilitating different discussions throughout the semester, and I will guide you through this process.

Built into the structure of this course is the ability to miss one week of classes (2 class periods) without consequence to your grade. Examples of reasons to miss class that would fall under this policy include an athletic competition, attending a conference, medical school interviews, sick days, personal days, etc. Beyond this policy, absences will be excused unless they are serious enough in nature to require a Dean's Note. Please keep me in the loop if there is something you are working through that you worry will impact your ability to attend class.

Late Work

Late assignments will be deducted 5% per day that they are late. Everyone is granted one no-questions-asked pass on a late assignment with an up to one-week grace period, except for assignments that require an in-class presentation.

Academic Integrity Statement

All Brown students are expected to follow the Brown Academic Code, which can be found at:

<https://www.brown.edu/academics/college/degree/sites/brown.edu/academics/college/degree/files/uploads/Academic-Code.pdf>

While generative AI tools can be great as research assistants, brainstorming tools, or even in the editing process, the assumption for this course is that all written work is your own writing and not **produced** by a generative AI tool. Please ask me if you have any questions about what uses of generative AI are permissible.

Accessibility and Accommodations

I am committed to the full inclusion of all students. Please inform me early in the term if you have a disability or other conditions that might require accommodations or modification of any of these course procedures. You may speak with me after class or during office hours. For more information, please contact Student and Employee Accessibility Services at 401-863-9588 or SEAS@brown.edu. Students in need of short-term academic advice or support can contact one of the deans in the Dean of the College office.

Inclusion Statement

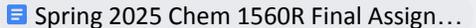
It is my intent that students from diverse backgrounds and perspectives are well-served by this course, that students' learning needs are addressed both in and out of class, and that the diversity that students bring to this class be viewed as a resource, strength and benefit. Your suggestions are ALWAYS encouraged and appreciated. Please let me know ways to improve the effectiveness of the course for you personally or for other students or student groups. In addition, if any of our class meetings conflict with your religious events, please let me know so that we can make arrangements.

Distribution of Materials

Lectures and other course materials are copyrighted. Students are prohibited from reproducing, making copies, publicly displaying, selling, or otherwise distributing the recordings or transcripts of the materials. The only exception is that students with disabilities may have the right to record for their private use if that method is determined to be a reasonable accommodation by Student Accessibility Services. Disregarding the University's copyright policy and federal copyright law is a Student Code of Conduct violation.

Detailed Course Schedule

Class	Topic	Reading	Assignments
1	Community Building and Expectations Chemistry in Our World		Survey
2	Social Contract Chemicals in White Space	Ethics of Chemistry - Love Canal https://journal.culanth.org/index.php/ca/article/view/ca32.4.02	Love Canal/Alterlife and Dec...
3	Epistemology and the Scientific Method	Good Chemistry - Chapter 2	Good Chemistry Chapter 2 ...
4	Antiracism and Storytelling	Black, Brown, Bruised: how racialized STEM education stifles innovation	Discussion assignment due before class
5	Storytelling Assignment Indigeneity and Anticolonialism in STEM	https://jps.library.utoronto.ca/index.php/des/article/view/18630 Braiding Sweetgrass pg 21-47 Chapter 1 of Pollution is Colonialism How US corporations poisoned this In...	Discussion assignment due before class
6	Guest: Prof. Xan Chacko from STS (https://www.xanchacko.com/) Feminism in STEM Discussion Facilitation Assig...	Pages 1-6 of https://catalystjournal.org/index.php/catalyst/article/view/28792/html_12 pages 30-31 of https://www.businesschemistry.org/article/gender-an-essential-substance-for-sustainable-chemistry/	Feminist Science and Gende...
7	Gender and Chemistry Project idea brainstorming	No required reading	Storytelling Assignments due
8	L07 - The Olin Chemical Superfund *Visitors from MIT Superfund Research Program - guest speaker Barath Baskaran Superfund Assignment	These slides will be used in place of a reading assignment. Introduction to Superfund - The Olin C... Also watch this video: https://www.youtube.com/watch?v=oP5NxhMelpM	Discussion assignment due before class Storytelling peer review due
9	Funding of Research and Prioritization		
10	Storytelling show and tell Spring 2025 Chem 1560R M...		Storytelling Final Drafts Due

11	Alchemy	https://www.forbiddenhistories.com/2018/08/hasok-anti-chemist/ https://youtu.be/maQ_Gd7TapI?si=9SvUxvO9MPIjnzHV https://youtu.be/7ealYU2ICnU?si=IChFTZAbx9QLYMI9	<p>Discussion assignment due before class</p> <p>Problem Definition Assignment Due (groups)</p>
12	Chemistry and Medicine - Medical Research Ethics: History of Birth Control Development	https://www.history.com/articles/birth-control-pill-history-puerto-rico-enovid	<p>Superfund assignments due</p> <p>Draft Interview Questions Due</p>
13	Chemistry and Medicine - Drug Safety: Thalidomide and Ranitidine	https://pubmed.ncbi.nlm.nih.gov/21507989/ https://www.nature.com/articles/s41598-018-35457-6	<p>Reading assignment due before class</p>
14	Chemistry and Medicine - Pain		
15	Project Presentations		<p>Presentation feedback due</p>
16	Project Presentations		<p>Presentation feedback due</p>
17	Agriculture and the Chemical Industry	https://www.frontiersin.org/journals/energy-research/articles/10.3389/fenrg.2021.580808/full 	<p>Reflection Due</p> <p>Reading assignment due before class</p>
18	Chemistry and Agriculture	https://emergencemagazine.org/feature/coron-tastes-better/	<p>Project plan assignment due</p> <p>Reading assignment due before class</p>
19	Military Chemistry	<p>Read one of the three readings below, and comment on the discussion posts before class:</p> <p>Ethics of Chemistry - Ch 3</p> <p>Ethics of Chemistry - Ch 4</p> <p>https://muse.jhu.edu/article/871662/summary</p>	<p>Reading assignment due before class</p>
20	Flavor and Fragrance Chemistry	https://cen.acs.org/business/specialty-chemicals/flavor-fragrance-industry-embracing-bio-technology/99/i5 https://chemistry-europe.onlinelibrary.wiley.com/doi/epdf/10.1002/ejoc.202300900	<p>Reading assignment due before class</p>
21	Green Chemistry	https://www.nature.com/articles/s41893-022-01050-z https://pubs.rsc.org/en/content/articlelanding/2021/gc/d0gc03316b	<p>Reading assignment due before class</p>
22	Green Chemistry	https://www.science.org/doi/epdf/10.1126/science.aay3060	<p>Reading assignment due before class</p>

23	Chemical Research Responsibility	https://pmc.ncbi.nlm.nih.gov/articles/PMC4714239/	Reading assignment due before class
24	Project presentations and celebrations	Student Presentations (15-20 min each, 3-4 groups)	Project materials due for each group presenting, and peer evaluation
25			
26			

Storytelling Assignment (100 pts)

Educational Objectives:

- Build a strong, diverse foundation of critical frameworks.
- Develop an understanding of the history of modern chemistry.
- Apply critical lenses to discuss examples of chemical harms and benefits.
- Analyze the strength and limitations of the scientific method.
- Research a topic of interest using critical frameworks and the scientific literature.
- Demonstrate proper citation format (ACS style) when citing the literature.

Goal: Find and share untold/undertold stories of chemists with identities historically marginalized in STEM

Format: There are many possible formats for this assignment. Some ideas include:

- Slides with a narrated voiceover (video)
- Comic book
- Newspaper article written for a particular audience
- Infographic or brochure
- Series of tik toks back and forth
- Narrated drawing (video)
- Slides
- Poster to hang up in Geochem/Macmillan
- Large format (48x36) poster to hang in the teaching labs profiling >1 chemist (with each person working on one)

There are many other possible formats you could choose. If you have an idea not listed here, please run it by me. What I am looking for is a creative way to tell the story of a chemist we haven't heard about before. See here for examples from last year: [📄 Storytelling Examples](#)

Required Components:

- Story
- Chemistry

Critical frameworks (anti-racism, anti-colonialism, epistemology)

Due Dates:

2/14 First Draft

2/20 for Peer Review

2/25 or 2/27 for Final Version

Rubric:

Criterion	Exemplary (5)	Proficient (4)	In progress (3-2)	Not Meeting (1-0)
Storytelling	The story was told in a way that was very compelling and made the audience want to learn more. The organization flowed naturally.	The story was told in a way that was accurate and interesting. It was mostly well organized.	The story was told in a way that was factually accurate, but limited to just fact. It was poorly organized, but not so much that it hindered understanding.	The story was told in a way that was factually inaccurate. It was poorly organized, so much that it hindered understanding.
Accuracy and thoroughness of chemistry	The chemistry presented was totally accurate and very clearly explained.	There were either minor errors in the chemistry presented or a lack of clarity.	The chemistry presented was inaccurate and unclear.	The chemistry was not presented, or only very superficially so.
Application of critical frameworks	More than one critical framework (anti-racism, anti-colonialism, epistemology) was discussed in a way that added to the story.	At least one critical framework (anti-racism, anti-colonialism, epistemology) was discussed in a way that added to the story.	A critical framework was discussed, but in a way that did not add to the story.	No critical frameworks were discussed.
Citations	All citations were in correct ACS format .		Most citations were in correct ACS format.	Citations were not in correct ACS format.
Work quality	The work had no errors and was	The work only had minor	The work had major errors or its	The work had major errors and

	pleasing to consume.	errors or was not pleasing to consume (ex - poor video or audio quality, not aesthetically pleasing, etc).	“appearance” detracted from the story.	its “appearance” detracted from the story.
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Superfund Case Study Assignment (100 pts)

Educational Objectives:

- Build a strong, diverse foundation of critical frameworks.
- Apply critical lenses to discuss examples of chemical harms and benefits.
- Explain fundamental chemical concepts as they relate to case studies.
- Research a topic of interest using critical frameworks and the scientific literature.
- Communicate complex ideas clearly in writing and oral presentations.
- Evaluate a problem from multiple perspectives.
- Demonstrate proper citation format when citing the literature.

Goal: Research and present a Superfund site of interest to you in the format of your choice. Acceptable formats include narrated slides, a youtube-style video, a news story with images, or other multimedia formats that you need to clear with me first. I am hoping to make a collection of these that can be shared with other students in other courses, including Sp26 Chem 1560R. See below for requirements:

1. History of the site
 - a. What was this site used for?
 - b. What was the nature of the contamination?
 - c. When did it occur?
 - d. How was it discovered?
 - e. Who are the PRPs?
2. What is the toxicology of the contaminants? What effects do they have on human health?
3. What is the current status of the Superfund site?
4. Application of critical frameworks, whether it is to the location, history, or current status of the Superfund site.

Rubric:

Criterion	Exemplary (5)	Proficient (4)	In progress (3-2)	Not Meeting (1-0)
Storytelling	The story was told in a way that was very compelling and made the audience want to learn more. The organization flowed naturally.	The story was told in a way that was accurate and interesting. It was mostly well organized.	The story was told in a way that was factually accurate, but limited to just fact. It was poorly organized, but not so much that it hindered understanding.	The story was told in a way that was factually inaccurate. It was poorly organized, so much that it hindered understanding.
Accuracy and thoroughness of chemistry	The chemistry presented was totally accurate and very clearly explained.	There were either minor errors in the chemistry presented or a lack of clarity.	The chemistry presented was inaccurate and unclear.	The chemistry was not presented, or only very superficially so.
Application of critical frameworks	More than one critical framework (anti-racism, anti-colonialism, epistemology, feminism) was discussed in a way that added to the story.	At least one critical framework (anti-racism, anti-colonialism, epistemology, feminism) was discussed in a way that added to the story.	A critical framework was discussed, but in a way that did not add to the story.	No critical frameworks were discussed.
Citations	All citations were in correct ACS format .		Most citations were in correct ACS format.	Citations were not in correct ACS format.
Work quality	The work had no	The work only	The work had	The work had

	errors and was pleasing to consume.	had minor errors or was not pleasing to consume (ex - poor video or audio quality, not aesthetically pleasing, etc).	major errors or its "appearance" detracted from the story.	major errors and its "appearance" detracted from the story.
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Discussion Facilitation Assignment (100 pts)

Educational Objectives:

- Build a strong, diverse foundation of critical frameworks.
- Apply critical lenses to discuss examples of chemical harms and benefits.
- Explain fundamental chemical concepts as they relate to case studies.
- Research a topic of interest using critical frameworks and the scientific literature.
- Communicate complex ideas clearly in writing and oral presentations.
- Evaluate a problem from multiple perspectives.

Goal: Facilitate a discussion in class

Required Components:

- Discussion Plan
 - Activity with questions/prompts
 - Timing (should be 45 minutes)
- Discussion Questions
- Discussion
- Reflection

Due Dates:

- Plan and Questions due two days before the class period you are facilitating
- Reflection is due within one week of your discussion.

Rubric:

Criterion	Exemplary (5)	Proficient (4)	In progress (3-2)	Not Meeting (1-0)
Questions	Questions are open-ended and designed to engage students with diverse perspectives.	Questions are mostly open-ended, but might be leading or easy to answer superficially.	Questions are not sufficient to foster a meaningful discussion.	Questions were not designed.
Plan	Plan is detailed, clear, and well designed to foster discussion.	Plan lacks some detail or has some elements that are not well designed.	Plan lacks major details and is not well designed.	Plan was not presented.
Application of critical frameworks	More than one critical framework (anti-racism, anti-colonialism, epistemology) was discussed in a way that added to the story.	At least one critical framework (anti-racism, anti-colonialism, epistemology) was discussed in a way that added to the story.	A critical framework was discussed, but in a way that did not add to the story.	No critical frameworks were discussed.
Discussion Quality	There was a robust discussion in class, with a variety of points raised and issues addressed.	Students were engaged in discussion, but superficially at times.	Students were not engaged in the discussion meaningfully for most of the time.	Discussion did not occur.
Reflection	The reflection was thoughtful and addressed both things that went well and areas for improvement.	The reflection addressed things that went well and areas for improvement, but did not have much detail.	The reflection was superficial and not detailed. May have only addressed problems or things that went well, but not both.	Reflection was not completed.

Midterm Assignment: Meaningfully Engaging with Chemistry at Brown (200 pts)

Educational Objectives:

- Apply critical lenses to discuss examples of chemical harms and benefits.
- Research a topic of interest using critical frameworks and the scientific literature.
- Explain fundamental chemical concepts as they relate to case studies.
- Communicate complex ideas clearly in writing and oral presentations.
- Evaluate a problem from multiple perspectives.
- Demonstrate proper citation format when citing the literature.

Goal: Meaningfully Engaging with Chemistry at Brown or in Providence

- Investigate a chemistry-related problem/issue on campus
- Research and meet with a chemistry community member (professor, postdoc, graduate student, Chemistry Department staff member) about their work, teaching, or the specific problem
- Interview a friend/classmate outside of this class about chemistry

Format: Oral presentation and interview summaries/reflections

Required Components and deadlines:

- Problem definition (groups) - 3/4 at 11:59 pm, 25 pts
- Draft interview questions (individual) - 3/9 at 11:59 pm, 25 pts
- Presentation (groups) - 3/17 or 3/20 in class, 100 pts
- Overall reflection (individual) - 3/21 at 11:59 pm, 50 pts

Problem Definition:

In groups of up to 4 (ask me if you think you have a valid reason to have a larger group), submit to me a one paragraph or less description of the problem/issue you'd like to address on campus. This should be submitted as a shared google doc (with editing/suggesting privileges) on Canvas so that I can leave you comments on there and everyone in your group can see them. You are not bound to this idea for your final project, or even for the whole rest of this assignment if you want to change directions. There is no rubric for this part of the assignment, as it is either complete or not. No bad ideas in a brainstorm!

Draft Interview Questions:

Submit a google doc (again with editing/suggesting privileges) on Canvas with questions you are planning to ask a member of the chemistry community and an outsider. The questions can be the same, or different, or some combination. You should have at least 10 questions, although you might not end up asking all of them. Most of the questions should be open-ended and not yes/no questions. Each member of your group should submit their own questions, although they could be the same as your other group member's questions.

Presentation:

This presentation will be done in groups and should discuss the following:

- The problem/issue you are addressing
- Your motivation for addressing it
- A summary of things you learned in your interviews
- You don't have to propose a solution to the problem, but if you want to foreshadow, you can do this.

Presentations should be 10-15 minutes long. You will submit your slides on Canvas, and I will also grade your presentation in class using the rubric below:

	Exemplary	Proficient	In Progress	Not Meeting
Slide Quality	The slides are very well laid out and have an appropriate balance of images and text. They are exceptionally clear. The overall appearance enhances the content being presented. There are no spelling/grammar errors.	The slides are well laid out. They are clear and easy to read. The overall appearance is not distracting from the content being presented. There are only minor spelling/grammar errors.	The slides are distracting, difficult to read, or detract from the content in some other way (including spelling/grammar errors).	The slides are not useful in presenting the information they contain due to their appearance.
Organization	The presentation flows logically from one topic to the next.	The presentation moves from one topic to the next reasonably well.	The presentation is disorganized and unclear.	The presentation has no discernable organization.
Content	The required information is included and accurate, and the presentation contains other relevant information.	All of the required information is included, and there are only minor factual errors.	The presentation is missing some required information and/or contains several errors.	The presentation was not submitted or is missing the majority of the required information.

Presentation Skills	The presenters had all of the following: confidence, good pacing, appropriate volume, eye contact, enthusiasm, and were comfortable engaging with the audience.	The presenters had most of the following: confidence, good pacing, appropriate volume, eye contact, enthusiasm, and were comfortable engaging with the audience.	The presenters were missing a few of the following: confidence, good pacing, appropriate volume, eye contact, enthusiasm, and were comfortable engaging with the audience.	The presenters were missing most of the following: confidence, good pacing, appropriate volume, eye contact, enthusiasm, and were comfortable engaging with the audience.
Group Flow	The presentation transitioned seamlessly from group member to group member.	The presentation was mostly smooth between group members.	There were not smooth transitions between group members most of the time.	The group clearly had not discussed who was going to present each part.

Overall Reflection:

This should be a 1 page (double paced) written reflection where you reflect on the following:

- What did you learn in this process about the problem?
- Was there anything surprising about the interviews? This could be in terms of responses, your interaction, or just conducting the interviews.
- What did you learn that will inform your future project?
- Are there ties to anything we have discussed in class that came up during this process?
- How was it working in a group on this assignment? Is there anything you'd like to change for the future assignment in terms of how you approached the group work?

Final Assignment: Reimagining Chemistry at Brown (250 pts)

Educational Objectives:

- Apply critical lenses to discuss examples of chemical harms and benefits.
- Research a topic of interest using critical frameworks and the scientific literature.
- Explain fundamental chemical concepts as they relate to case studies.
- Communicate complex ideas clearly in writing and oral presentations.
- Evaluate a problem from multiple perspectives.
- Demonstrate proper citation format when citing the literature.
- Reimagine one aspect of the field of chemistry that would contribute to a more just and beneficial chemistry.

Goal: Reimagine one Aspect of Chemistry at Brown

- Continue your research about a chemistry-related problem/issue on campus or in the community
- Develop a plan to address chemistry-related problem/issue on campus
- Implement your plan
- Communicate your project's results to the class (note that your projects could be the jumping off points for next year's projects)

Format: Written project plan, project materials (various formats), oral presentation

Required Components and deadlines:

- Project plan - This should lay out what you plan to do and your timeline for doing it. The sooner you get this approved, the sooner you can start. Due on 4/3. Must meet with Jesse, Steve, or Mya to get full approval (see Canvas for calendar links). (50 pts)
- Project materials - Due by your presentation date, this is anything that you created as part of your project. Different groups will have different materials they are generating. (4/24, 4/29, or 5/1) (50 pts)
- Presentation in groups (4/24, 4/29, or 5/1) (100 pts)
- Peer feedback (during presentations - you will complete forms for each group on Google Forms after their presentations) (50 pts)

Presentation: In groups (15-20 minutes) and should discuss the following:

- The problem/issue you are addressing and motivation to address it (quick recap)
- Your project plan and summary of results
- Lessons learned/future directions

Presentations will be graded using the rubric below:

	Exemplary	Proficient	In Progress	Not Meeting
Slide Quality	The slides are very well laid out and have an appropriate balance of images and text. They are exceptionally clear. The overall appearance enhances the content being presented. There are no spelling/grammar errors.	The slides are well laid out. They are clear and easy to read. The overall appearance is not distracting from the content being presented. There are only minor spelling/grammar errors.	The slides are distracting, difficult to read, or detract from the content in some other way (including spelling/grammar errors).	The slides are not useful in presenting the information they contain due to their appearance.
Organization	The presentation flows logically from one topic to the next.	The presentation moves from one topic to the next reasonably well.	The presentation is disorganized and unclear.	The presentation has no discernable organization.
Content	The required information is included and accurate, and the presentation contains other relevant information.	All of the required information is included, and there are only minor factual errors.	The presentation is missing some required information and/or contains several errors.	The report was not submitted or is missing the majority of the required information.
Presentation Skills	The presenters had all of the following: confidence, good pacing, appropriate volume, eye contact, enthusiasm, and were comfortable engaging with the audience.	The presenters had most of the following: confidence, good pacing, appropriate volume, eye contact, enthusiasm, and were comfortable engaging with the audience.	The presenters were missing a few of the following: confidence, good pacing, appropriate volume, eye contact, enthusiasm, and were comfortable engaging with the audience.	The presenters were missing most of the following: confidence, good pacing, appropriate volume, eye contact, enthusiasm, and were comfortable engaging with the audience.
Group Flow	The presentation transitioned seamlessly from group member to group member.	The presentation was mostly smooth between group members.	There were not smooth transitions between group members most of the time.	The group clearly had not discussed who was going to present each part.

Student Project Summaries

Year	Project Title	Issue Addressed	Product(s)
1	Addressing Minority Challenges with Pre-Med and Chemistry Courses at Brown	Chemistry Education, DEI	Conducted interviews and provided recommendations for an improved group tutoring experience, with a focus on supporting students from backgrounds minoritized in STEM
1	Sparking Change: Revolutionizing Diversity in Brown's Chemistry Department	Chemistry Education, DEI	Educational resources showcasing scientists with diverse backgrounds in STEM, including infographics and assignments for introductory chemistry courses
1	Reimagining Organic Chemistry at Brown	Chemistry Education	Alternative problem sets that teach students how to read the literature and develop problem solving skills using examples that contextualize chemistry
1	Chemical Outreach: Clearly Communicating Resources	Chemistry Education	Chemistry student peer mentoring program, a series of infographics to support beginning students in introductory courses and help guide them through finding research opportunities on campus and pursuing careers in chemistry
1	Equity-Minded Resources for Introductory Chemistry	Chemistry Education, DEI	Peer-led workshop on how to navigate group problem solving sessions in introductory chemistry, Resources highlighting current researchers in chemistry with diverse backgrounds and research interests for introductory chemistry courses

1	STEM Engagement for Refugee Students in the Providence Area	Outreach, DEI	STEM outreach activity resources for tutors through the Brown Refugee Youth Tutoring Program, Resources for to support refugee youth in applying to college and in pursuing STEM careers, Training materials for other tutors
1	STEM Enrichment Opportunities in Child Interpersonal Violence Survivors	Outreach	Resources for STEM outreach activities for local youth affected by interpersonal violence, STEM outreach provided to local youth throughout the spring of 2024
1	Navigating Chemistry Pathways: Creating a Comprehensive Digital Repository	Career preparation	A comprehensive career resource to help students at different career stages and from different backgrounds learn more about and access resources to help them pursue chemistry and related careers
1	Target of Opportunity: Hiring, Retention and Community	DEI	Resources to highlight the research of faculty of color at Brown, the Black STEM Collective: a monthly gathering for professors, lecturers, and postdocs to build community
1	Providence Area Pollution	Environmental justice	Interactive educational resources for local residents to understand the major effects of common local pollutants and how to minimize exposure and risk
1	Increasing Green Chemistry Awareness @ Brown	Green Chemistry	Brown signed onto Beyond Benign's Green Chemistry Commitment, Green chemistry infographic flyers for teaching laboratories

2	Chemistry Research @ Brown	Chemistry Education	Developed a website containing resources for students looking for undergraduate research opportunities, including a video tutorial and cold emailing templates
2	Enhancing Traincaster	Chemistry Education, Environmental Justice	Developed case studies to highlight the importance of proper waste management and indigenous communities for use in campus-wide waste management training
2	Desalination Education Resources for Chem 0330	Chemistry Education, Environmental Justice	Designed resources to discuss the chemistry of water desalination in introductory chemistry lab with a case study on Cape Verde, including interviews with members of the Providence community who are Cape Verdean immigrants
2	Providence Public Library STEM Day	Outreach, DEI	Designed and implemented a STEM day for local children ages 6-12 in the Providence Public Library that included experiments and demonstrations and discussed careers in STEM
2	Ethics, Social Responsibility and Contextualization in Chem & Bio at Brown	Chemistry Education, Green Chemistry	Developed reading materials and case studies for discussion and other assignments for Organic Chemistry, Organic Chemistry Lab, Introductory Biology, and Biochemistry courses
2	Resources for Chinese PhD Students	DEI	Assessed the unique needs of Chinese National PhD students and provided recommendations to the Office of International Student Services to distribute

			resources and support Chinese PhD students
2	Research Transparency in the PVD Community	Outreach	Developed a website highlighting research projects on the Brown campus of relevance to the Providence community that encourages community members to connect with research faculty and hung flyers to distribute the website in local businesses

Reflection Questions for Instructors, UTAs, and Year 1 Students.

Answer the questions that you would like to answer. I encourage you to approach this as more of a free-writing exercise, and not to be worried about the written product that you are producing. Feel free to use full sentences or bullet points, and focus on getting out your thoughts, even if it's in a raw form.

1. What was your role in this course, as you saw it?
2. What (experiences, beliefs, thoughts, desires) drew you to participate in this course, in whatever role(s)?
3. Describe your overall experiences in undergraduate STEM courses. This could be regarding how the courses were run, your interactions with peers/instructors, the content covered, how they made you feel, your ability to be successful, etc.
4. Reflect on your experience in the course, whether it was designing it, running it, participating in it as a learner, etc. Were there specific moments that stand out to you? How did this compare to your experiences in/teaching other courses? What did you like? What are areas for further development/improvement?
5. How do you see chemistry or other STEM fields as integrating with your personal life? Did you have this view before the course? Did this course change anything about your relationship to STEM?
6. What was your experience like completing the Storytelling assignment and the quizzes?
7. What course topic(s) stuck with you the most after taking the course? Why? How do these topic(s) arise in contexts outside of this class
8. A major component of this course was the project. What did you learn from investigating the problem you chose, working with your group, and talking to people on campus about your project during interviews?
9. Were there any major roadblocks in carrying out your project? What were they? How did you navigate this?
10. If you had to redo your project, what would you do differently, if anything?
11. How do you see this course evolving over time? Is there anything specific that you'd be excited to see continue or change for the next time around?
12. What do you think about how running this course at Brown might be a different experience than at other institutions or in other geographic areas? How would you talk with someone at a different place about the important considerations when getting a course like this up and running?
13. Anything else we should know?

Sample Mirboard Template for In-class Discussion

https://miro.com/app/board/uXjVG5XI0JE=?share_link_id=349017242962

In this template, there are questions to prompt discussion, and then empty frames for each group to record the main ideas from their discussion into. When sharing out at the end of small group discussions, groups would refer to their frames. Groups could also leave comments on each other's frames.

Table S1. Course Feedback Data

This course:		Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
had assignments that helped me learn.	Year 1	76.93	15.38	3.85	3.85	0
	Year 2	73.33	26.67	0	0	0
helped me develop a better understanding of the principles, theories, content, and/or facts in this area.	Year 1	84.62	7.69	3.85	3.85	0
	Year 2	86.67	13.33	0	0	0
challenged me to develop new skills, ideas, concepts, or ways of thinking.	Year 1	92.31	0	3.85	3.85	0
	Year 2	86.67	13.33	0	0	0
effectively engaged students in class (e.g. elicited student interest in the topic; encouraged student participation; was responsive to questions; offered opportunities for discussion in pairs or small groups).	Year 1	88.46	7.69	3.85		
	Year 2	93.33	6.67	0	0	0

Table S2. Project Topic Distribution

Topic	Year 1	Year 2
Chemistry Education	45	57
Outreach	18	29
Environmental Justice	9	29
Diversity, Equity, and Inclusion	45	29
Green Chemistry	9	14