Term Information

Effective Term	Autumn 2025

General Information

Course Bulletin Listing/Subject Area	Chemistry
Fiscal Unit/Academic Org	Chemistry - D0628
College/Academic Group	Arts and Sciences
Level/Career	Undergraduate
Course Number/Catalog	3573
Course Title	Climate Science Chemistry, Education, and Citizenship
Transcript Abbreviation	ChemEduCitizenship
Course Description	This course explores epistemology, the Nature of Science, and informed citizenship through the lens of climate science, with a focus on chemical principles. By integrating chemical knowledge with scientific literacy, students will gain insight into how molecular interactions and chemical reactions drive global climate processes.
Semester Credit Hours/Units	Fixed: 4

Offering Information

Length Of Course	14 Week, 12 Week, 8 Week, 7 Week
Flexibly Scheduled Course	Never
Does any section of this course have a distance education component?	No
Grading Basis	Letter Grade
Repeatable	No
Course Components	Lecture, Recitation
Grade Roster Component	Lecture
Credit Available by Exam	No
Admission Condition Course	No
Off Campus	Never
Campus of Offering	Columbus

Prerequisites and Exclusions

Prerequisites/Corequisites	Chem 1110, 1208, 1210, 1610, 1910H, or equivalent coursework.
Exclusions	
Electronically Enforced	Yes

Cross-Listings

Cross-Listings

Subject/CIP Code

Subject/CIP Code	40.0501
Subsidy Level	Baccalaureate Course
Intended Rank	Sophomore, Junior, Senior

Requirement/Elective Designation

Citizenship for a Diverse and Just World; Interdisciplinary Seminar
The course is an elective (for this or other units) or is a service course for other units

Course Details

Course goals or learning objectives/outcomes

- Students will develop an advanced understanding of how chemical processes are central to citizenship and justice in the context of anthropogenic climate change and global citizenship.
- Students will evaluate the merits of climate denialism and climate skepticism with an understanding of the chemical phenomena underlying climate change and the epistemology of science, including the role of chemical models, uncertainty, and theories.
- Students will reflect on their understanding of chemical processes in climate science, epistemology, and citizenship, describe their growth in these areas, and develop a personal plan for future action rooted in chemistry-driven solutions

Content Topic List

- Engage in critical and logical thinking to connect issues of global citizenship with the chemical processes that contribute to or mitigate anthropogenic climate change, such as greenhouse gas emissions, energy production, and carbon sequestration.
- Identify and describe issues of climate justice for different communities across geographic, temporal, and socio-economic boundaries.
- Describe, analyze, and critically evaluate alternative claims counter to the scientific consensus on climate change by focusing on chemical principles.
- Explain how the scientific method includes models and theories to make predictions, construct arguments, and offer explanations for phenomena related to climate change, including molecular interactions and reaction mechanisms
- Engage in advanced, in-depth scholarly exploration that connects chemical aspects of climate science, such as greenhouse gas chemistry, energy storage, and pollution control, with issues of epistemology and citizenship.
- Reflect on and describe changes in one’s perspectives regarding the chemical mechanisms underlying climate science, as well as epistemology and citizenship.
- Synthesize and internalize ideas from the course into a coherent framework that emphasizes chemistry-based actions and informs future efforts to address climate issues.

Sought Concurrence

Yes

Attachments

- Chemistry 3573 Concurrence Emails.pdf: Concurrence Emails

  (Concurrence. Owner: Ramirez,Ana G)

- Interdisciplinary-integrated-collaborative-teaching.pdf: Collaborative Teaching Statement

  (Other Supporting Documentation. Owner: Ramirez,Ana G)

- submission-doc-citizenship GE Form Chem 3573.pdf: GE submission form

  (Other Supporting Documentation. Owner: Ramirez,Ana G)

- CHEM3573 response 12-11-2024.pdf: Chem3573 Response & additional Concurrence email

  (Other Supporting Documentation. Owner: Ramirez,Ana G)

- Syllabus Chem3573-CHEMISTRY-Ai-revision.pdf: Revised Syllabus

  (Syllabus. Owner: Ramirez,Ana G)

- CHEM3573 course resubmission 03-25-25 (002).pdf: Updated Cover Letter

  (Other Supporting Documentation. Owner: Ramirez,Ana G)

Comments

- Please see Subcommittee feedback email sent 02/17/2025. *(by Hilty,Michael on 02/17/2025 08:57 AM)*
- Please see Subcommittee feedback email sent 11/21/24. *(by Neff,Jennifer on 11/21/2024 02:56 PM)*
- need to update forms *(by Jackman,Jane E on 10/21/2024 01:33 PM)*
- Neither the GE form nor the form for the Interdisciplinary and Integrated Collaborative Teaching HIP have been uploaded. Also please check off the box for "Interdisciplinary and Integrated Collaborative Teaching" on the form in curriculum.osu.edu *(by Vankeerbergen,Bernadette Chantal on 10/20/2024 09:06 PM)*
- Concurrence sent via email. *(by Ramirez,Ana G on 09/30/2024 12:48 PM)*

Workflow Information

Status	User(s)	Date/Time	Step
Submitted	Ramirez,Ana G	10/01/2024 08:47 AM	Submitted for Approval
Approved	Jackman,Jane E	10/02/2024 07:09 AM	Unit Approval
Approved	Vankeerbergen,Bernadette Chantal	10/20/2024 09:03 PM	College Approval
Revision Requested	Vankeerbergen,Bernadette Chantal	10/20/2024 09:07 PM	ASCCAO Approval
Submitted	Ramirez,Ana G	10/21/2024 09:42 AM	Submitted for Approval
Revision Requested	Jackman,Jane E	10/21/2024 01:33 PM	Unit Approval
Submitted	Ramirez,Ana G	10/21/2024 01:35 PM	Submitted for Approval
Approved	Jackman,Jane E	10/21/2024 01:35 PM	Unit Approval
Approved	Vankeerbergen,Bernadette Chantal	11/01/2024 03:06 PM	College Approval
Revision Requested	Neff,Jennifer	11/21/2024 02:56 PM	ASCCAO Approval
Submitted	Ramirez,Ana G	12/12/2024 08:33 AM	Submitted for Approval
Approved	Jackman,Jane E	12/12/2024 08:51 AM	Unit Approval
Approved	Vankeerbergen,Bernadette Chantal	01/15/2025 04:37 AM	College Approval
Revision Requested	Hilty,Michael	02/17/2025 08:57 AM	ASCCAO Approval
Submitted	Ramirez,Ana G	03/26/2025 12:14 PM	Submitted for Approval
Approved	Jackman,Jane E	03/26/2025 12:24 PM	Unit Approval
Approved	Vankeerbergen,Bernadette Chantal	03/26/2025 03:47 PM	College Approval
Pending Approval	Jenkins,Mary Ellen Bigler Hanlin,Deborah Kay Hilty,Michael Neff,Jennifer Vankeerbergen,Bernadette Chantal Steele,Rachel Lea	03/26/2025 03:47 PM	ASCCAO Approval

THE OHIO STATE UNIVERSITY

College of Arts and Sciences

Department of Chemistry and Biochemistry
Undergraduate Studies Office

110 Celeste Laboratory
120 W 18th Avenue
Columbus, OH 43210-1106

(614) 292-1204 Telephone
(614) 292-2374 Fax

chemistry.osu.edu

March 26, 2025

Dear Members of the ASC Curriculum Committee,

We appreciate the reviewers' thoughtful feedback on our course proposal for Chemistry 3573. Their comments provided an opportunity to refine the syllabus, clarify key aspects of the course structure, and ensure alignment with both interdisciplinary high-impact practices and institutional requirements. The revisions noted below address specific reviewer concerns, particularly regarding the interdisciplinary and team-taught nature of the course, the role of high-impact educational practices, and the explicit connection between course assessments and the Expected Learning Outcomes (ELOs).

In addition to responding to reviewer feedback, this revision process also allowed us to think more deeply about the role of artificial intelligence (AI) in the course**.** We have refined the integration of AI tools **to** enhance structured inquiry, critical thinking, and metacognitive reflection, ensuring that AI serves as a resource for student learning rather than a passive or unquestioned source of information. These updates strengthen the course's emphasis on scientific literacy and epistemological reasoning, key components of both the chemistry and science education strands of the curriculum.

Furthermore, we recognize that General Education (GE) courses are uniquely well-suited to integrating themes found in Ohio SB1**,** and we have used this revision process as an opportunity to make this connection more explicit**.** The course has been refined to emphasize structured inquiry, independent reasoning, and the evaluation of multiple perspectives, ensuring that students critically engage with complex scientific and societal issues. Rather than simply aligning with SB1's requirements, this course demonstrates how a forward-thinking GE curriculum can naturally incorporate SB1's core principles while maintaining academic rigor and inquiry-driven exploration**.**

Key revisions include:

- **Clarifying Course Strands**: The syllabus now more explicitly defines the three core strands—chemistry, epistemology, and citizenship—and how they interact throughout the course. This ensures that students engage with interdisciplinary perspectives in a structured manner.
- **Clarifying the Team-Taught, Interdisciplinary Approach** – The syllabus now provides explicit details on how both instructors contribute their distinct disciplinary expertise throughout the course. Classroom discussions, recitations, and assessments are co-led, modeling interdisciplinary collaboration and ensuring students experience multiple perspectives in real time.

- **Strengthening Alignment of ELOs and Assessments**: Each ELO is now clearly linked to specific course assignments, ensuring students actively engage with the course themes through discussion, reflection, and analysis.
- **Refining the Role of the Personal Action Plan** – The Personal Action Plan has been revised to be more flexible and student-driven, allowing students to integrate their learning from different course strands in personally meaningful ways. Rather than prescribing specific outcomes, the assignment encourages students to develop informed, evidence-based approaches to real-world challenges that align with their own perspectives and disciplinary interests.
- **Refining Citizenship Discussions**: The syllabus now emphasizes that students will examine multiple perspectives on citizenship rather than adopting a prescriptive definition. This revision ensures alignment with structured inquiry and independent reasoning.
- **Enhancing the Role of AI in Learning**: AI is framed as a tool for critical engagement, structured inquiry, and metacognitive reflection, rather than a passive source of information. Students are trained to evaluate AI-generated content critically, reinforcing skills in scientific literacy and epistemology.
- **Addressing Scientific Skepticism vs. Denialism**: Language revisions clarify that the course investigates how scientific skepticism operates as a critical part of the scientific process**s**, distinguishing it from misinformation and denialism without making normative judgments.

We believe that the revisions outlined in this letter have strengthened Chemistry 3573 by making its interdisciplinary approach, team-taught structure, and high-impact educational practices more explicit while ensuring clear alignment between course assessments and Expected Learning Outcomes (ELOs). These refinements reinforce the course's emphasis on structured inquiry, independent reasoning, and the evaluation of multiple perspectives, positioning it as a forward-thinking and engaging General Education (GE) offering. By integrating chemistry, epistemology, and citizenship in a meaningful way, this course prepares students to critically analyze scientific and societal issues with depth and nuance. We look forward to having OSU students participate in this exciting and valuable course offering.

Sincerely,

Jane E. Jackman
Professor and Vice Chair for Undergraduate Studies

THE OHIO STATE UNIVERSITY

CHEMISTRY 3573 – Climate science chemistry, education, and citizenship

4 Credit hours: Two 80-minute classes + 55-minute recitation

Instructor Information

Instructor:	Dr. Ted M. Clark	Office:	120 Celeste Laboratory
Email:	Clark.789@osu.edu	Office Hours:	By arrangement
Instructor:	Dr. Sophia Jeong	Office:	283 Arps Hall
Email:	Jeong.387@osu.edu	Office Hours:	By arrangement

Course Description: This course explores epistemology, the Nature of Science, and informed citizenship through the lens of climate science, with a strong focus on chemical principles. It emphasizes the crucial role of chemistry in understanding key climate phenomena. By integrating chemical knowledge with scientific literacy, students will gain insight into how molecular interactions and chemical reactions drive global climate processes. The curriculum develops students' ability to critically evaluate scientific claims and understand the mechanisms of climate change at a molecular level. Through this knowledge, they will be empowered to make informed decisions and engage in active citizenship. The course also examines the responsibilities individuals hold within their communities, encouraging students to apply their understanding of chemistry in addressing real-world climate challenges and advocating for evidence-based solutions.

Prerequisites: One semester of General Chemistry: Chemistry 1110. Chemistry 1210, Chemistry 1250, Chemistry 1610, Chemistry 1910H, or equivalent coursework.

Course Contacts and Resources
Undergraduate Office: 614-292-6009, Celeste Laboratory, room 110 (CE 110). Stop by any time Monday–Friday, 8:00am–4:30pm for assistance.

Carmen: carmen.osu.edu: Carmen is the Learning Management System (LMS) used at Ohio State. It is the central hub from which your course will be conducted. Everything you need for the course is available in and communicated through Carmen, so daily engagement with it is crucial to your success in this course. It is important that you check your Carmen notification settings to ensure you receive course announcements in a timely manner. You can learn how to set up Carmen notifications by clicking Step 2 on this webpage.

Log in to Carmen to:

- Access course materials
- Read important announcements
- Complete assignments
- Take exams
- View your grades

A free Canvas app is available to download for both Android and iOS, making it easy to log in to your course from anywhere.

Required Materials

1. Readings: ***You do not need to purchase a textbook for the course.*** Required readings will be provided via Carmen.

2. Tablet or laptop: A tablet or laptop is required for exams. A device with digital inking capability is recommended for notetaking.

- Tablet for digital notetaking: If your computer does not have digital inking capability, then a secondary device is strongly recommended. A recent-model iPad or MS Surface are good options.
- If you do not already own a device, your device does not meet the minimum requirements for exams, or your device does not have digital inking capability, you may borrow a device from the university. Please follow the instructions on the Student Technology Loan Program webpage to borrow one.

3. Approved calculator: Some components of the course require a calculator. Only four calculator models are approved for use in this course. Please note that these are the only calculators permitted during exams:

- Texas Instruments TI-30XIIS
- Texas Instruments TI-30Xa
- Texas Instruments TI-83
- Texas Instruments TI-84
- *Plus* and *Plus CE* models of the above calculators are also permitted.

If you do not already own one of these calculators, the most cost-effective models are the TI30XIIS and the TI30Xa. You can purchase your calculator at the retailer of your choice.

Course Components

1. Lecture

(Two sessions per week, 1 hr 20 minutes each)

a. Your lecture schedule appears on pages 11-12.
b. Being present and engaged during lecture sessions is integral to your understanding of the course material.
c. The course instructors are your first point of contact for lecture.

2. Recitation

(One session per week, 55 minutes)

a. Assignments completed within recitation include the On-going reflection and Application activities.
b. Your first point of contact for lab is your Teaching Assistant (TA) who you will meet on the first day of class.

3. Exams

(Two 55-minute midterms)

a. Exams take place during two regularly scheduled recitations.
b. See the class schedule (pages 11-12) for exam dates.
c. The course instructors are your first point of contact for exams.

See pages 8-9 for details on class assignments.

Course Information and Policies

Communication: We will communicate important information to you throughout the term via Carmen announcements and your Buckeyemail email account. Please verify that your OSU email is set up appropriately on your electronic devices so we can keep in touch. We highly recommend that you check email and Carmen at least once per day.

Enrollment Information: In accordance with federal regulations (Title IV), we must report your attendance status to the University Registrar after the first week of classes.

Use of Artificial Intelligence: In this course, artificial intelligence (AI) tools are integrated to support structured inquiry and critical engagement with scientific information. AI tools, such as CoPilot, can assist with analyzing scientific claims, brainstorming ideas, solving chemistry problems, clarifying complex concepts, and supporting the writing process for designated assignments. However, AI is not a substitute for independent reasoning; rather, it is a resource that can enhance epistemological reflection and scientific literacy when used effectively. The instructor will model best practices for engaging with AI critically, such as how to ask precise, well-structured questions to elicit meaningful responses, evaluate the reliability and limitations of AI-generated information in scientific contexts, apply AI insights to problem-solving and written work while maintaining academic integrity. Students will be encouraged to interrogate AI-generated responses rather than accept them at face value, reinforcing the course's emphasis on evaluating evidence, distinguishing between competing perspectives, and developing independent reasoning skills.

Recitation sessions will include opportunities to share how you have used AI to support your learning and to defend your work in a low-stakes environment. These activities are designed to foster critical thinking, transparency, and metacognition, helping you reflect on how AI contributes to your understanding of course material. The instructor will specify which activities AI can be used to support, and the use of AI-generated content must be cited using an appropriate style guide. Submission of AI-generated content as your own work is considered a violation of Ohio State's Academic Integrity policy and Code of Student Conduct because the work is not your own. The use of unauthorized AI tools will result in referral to the Committee on Academic Misconduct. Please contact the instructors if you have questions regarding this course policy.

Goals and Expected Outcomes

Goal 1 (Scientific Reasoning and Citizenship) Successful students will develop an advanced understanding of how chemical processes are central to citizenship and justice in the context of anthropogenic climate change and global citizenship.

Expected Learning Outcomes:

- **Evaluate the role of chemistry in climate science**, connecting scientific principles to broader issues of citizenship, justice, and public decision-making.
- **Analyze scientific claims and misinformation** by assessing the chemical mechanisms driving climate change, including greenhouse gas emissions, energy transformations, and carbon sequestration.
- **Examine how different communities experience climate-related challenges**, using chemistry-based reasoning to evaluate potential solutions across geographic, temporal, and socio-economic boundaries.

Goal 2 (Evaluating Scientific Claims and Misinformation) Successful students will critically evaluate competing claims about climate science using chemical principles, scientific models, and epistemological reasoning to assess uncertainty, evidence, and the scientific process.

Expected Learning Outcomes:

- **Describe and analyze competing claims** about climate change by applying chemical principles to assess the validity of scientific arguments.

- **Explain the role of chemical models and theories** in predicting climate phenomena, recognizing how scientific knowledge evolves and how uncertainty is managed in scientific discourse.
- **Differentiate between scientific skepticism and misinformation**, using epistemological reasoning to assess the reliability of sources and evidence.

Goal 3 (Reflection and Real-World Application) Successful students will reflect on their learning in chemistry, climate science, and epistemology, evaluating how their understanding has developed and applying this knowledge to future decision-making and problem-solving.

Expected Learning Outcomes:

- **Synthesize chemistry-based insights** with epistemological principles to develop a structured framework for evaluating climate science claims.
- **Reflect on changes in their perspectives**, describing how their understanding of climate science, epistemology, and citizenship has evolved throughout the course.
- **Apply chemistry-driven reasoning to real-world decision-making**, identifying ways to engage with climate issues through evidence-based problem-solving.

Citizenship for a Just & Diverse World: Goals and Outcomes

This course fulfills the General Education (GE) requirement for "Citizenship for a Just & Diverse World" by examining scientific and societal issues through chemistry, epistemology, and structured inquiry. Students will explore how chemical principles inform one's understanding of environmental challenges and policy decisions**.** The course integrates three strands**:** chemistry content**,** which emphasizes the molecular mechanisms behind environmental processes; scientific literacy and epistemology**,** which develop students' ability to evaluate evidence, uncertainty, and competing claims; and citizenship and community**,** which explore how scientific knowledge informs justice considerations and decision-making at local and global levels. Together, these strands provide a foundation for critically engaging with scientific and civic issues. The goals and expected learning outcomes (ELOs) are listed below, along with how they are met through course activities.

Goal 1: Successful students will… analyze an important topic or idea at a more advanced and in-depth level than the foundations. In this context, "advanced" refers to courses that are e.g., synthetic, rely on research or cutting-edge findings, or deeply engage with the subject matter, among other possibilities.

Expected Learning Outcome (ELO 1.1) Engage in critical and logical thinking. Meeting ELO 1.1. This course emphasizes critical engagement with scientific claims rather than passive acceptance of information. By integrating chemistry, epistemology, and citizenship, students analyze diverse sources rather than relying on a single textbook. Classroom discussions, co-led by instructors, encourage structured debate and logical reasoning.
Assessments that support this ELO:

- **Course Readings & Discussions** – Students critique articles and assess logical inconsistencies in climate-related claims.
- **Exams** – Assess students' ability to apply logical reasoning in chemistry-based problem-solving.

Expected Learning Outcome (ELO 1.2) Engage in an advanced, in-depth, scholarly exploration of the topic or ideas within this theme. Meeting ELO 1.2. This course provides an advanced exploration of climate science through a chemistry-first approach, incorporating interdisciplinary discussions from STEM and non-STEM fields. The integration of epistemology and the Nature of Science allows students to critically analyze the evolution of scientific understanding and the role of uncertainty in climate-related debates.
Assessments that support this ELO:

- **Course Readings** – Students engage with, and critique, scholarly and popular science literature on chemical mechanisms related to atmospheric and environmental chemistry.
- **Student In-Class Presentations** – Students research and present on a chemistry-based climate issue, integrating epistemology and justice perspectives.

- **Classroom Discussions** – Students engage in guided discussions where they critically examine scientific models, interpret real-world data, and debate the implications of chemical findings in interdisciplinary contexts.
- **Exams** – Require synthesis of advanced chemical concepts in climate science.

Goal 2. Successful students will… integrate approaches to the theme by making connections to out-of-classroom experiences with academic knowledge or across disciplines and/or to work they have done in previous classes and that they anticipate doing in future.
Expected Learning Outcome (ELO 2.1) Identify, describe, and synthesize approaches or experiences.
Meeting ELO 2.1. Students and instructors act as co-investigators**,** valuing student prior knowledge and experiences. The course fosters inquiry-driven exploration, allowing students to identify real-world environmental challenges and connect them to fundamental chemical concepts.
Assessments that support this ELO:

- **Classroom Discussions** – Students contribute examples from personal experience, analyzing them through chemistry and epistemology.
- **Student In-Class Presentations** – Students research a climate-related issue and lead discussions on its chemistry, justice, and policy implications.
- **Self-Reflection Activities (Recitation)** – Students document personal learning progress and connections to prior knowledge.
- **Reflection Paper** – Students synthesize insights from course content and discussions.

Expected Learning Outcome (ELO 2.2) Demonstrate a developing sense of self as a learner through reflection, self- assessment, and creative work, building on prior experiences to respond to new and challenging contexts. Meeting ELO 2.2. The course places personal epistemology and scientific literacy at the core of student development**.** Students begin with a self-reflection on their understanding of science and knowledge construction**,** revisiting these themes throughout the semester. The focus on epistemological development and metacognition ensures students recognize their evolving understanding of climate science and decision-making.
Assessments that support this ELO:

- **Recitation Activities** – Regular self-reflection activities encourage students to track their intellectual growth.
- **Reflection Paper** – Students analyze their epistemological development and learning progress.
- **Personal Action Plan** – Students apply their knowledge to a structured plan for addressing a scientific or policy issue using chemistry-based reasoning.

Goal 3. Successful students will… explore and analyze a range of perspectives on local, national, or global citizenship, and apply the knowledge, skills, and dispositions that constitute citizenship.
Expected Learning Outcome (ELO 3.1) Describe and analyze a range of perspectives on what constitutes citizenship and how it differs across political, cultural, national, global, and/or historical communities.
Meeting ELO 3.1. This course introduces students to multiple perspectives on citizenship, challenging the common assumption that it is solely tied to nationality. Through structured inquiry, students will explore how citizenship can be understood at different levels—local, national, and global—and critically evaluate how scientific knowledge intersects with civic responsibilities and decision-making. Rather than prescribing a definition of citizenship, this course encourages students to analyze existing frameworks and consider how different perspectives shape discussions on justice, policy, and environmental challenges.
Assessments that support this ELO:

- **Class Readings & Discussions** – Students examine existing scholarship on citizenship and critically engage with different models of citizenship in relation to scientific and environmental issues.
- **Recitation Activities** – Students explore how citizenship is defined in different contexts and debate the implications of applying various definitions.
- **Reflection Paper** – Students synthesize perspectives on citizenship and critically evaluate how different frameworks align with their understanding.
- **Personal Action Plan** – Students apply their insights by considering how different conceptions of citizenship inform civic engagement at different scales.

Expected Learning Outcome (ELO 3.2) Identify, reflect on, and apply the knowledge, skills and dispositions required for intercultural competence as a global citizen. Meeting ELO 3.2. This course critically examines the concept of global citizenship, recognizing both its potential and its limitations. Students will explore how scientific knowledge intersects with international policy, economic systems, and cultural perspectives, shaping responses to environmental and societal challenges. Rather than promoting a singular vision of global citizenship, the course encourages students to evaluate existing frameworks, including critiques from multiple ideological standpoints, and consider how scientific reasoning can inform, but not dictate, civic responsibilities at a global scale.

Assessments that support this ELO:

- **Class Readings & Discussions** – Students examine diverse perspectives on global citizenship and its role in addressing environmental and policy challenges.
- **Recitation Activities** – Structured debates explore how scientific and policy decisions intersect in global contexts.
- **Reflection Paper** – Students reflect on their role as informed citizens engaging with scientific and policy discourse.

Goal 4. Successful students will… examine notions of justice amidst difference and analyze and critique how these interact with historically and socially constructed ideas of citizenship and membership within societies, both within the US and/or around the world.

Expected Learning Outcome (ELO 4.1) Examine, critique, and evaluate various expressions and implications of diversity, equity, inclusion, and explore a variety of lived experiences. Meeting ELO 4.1. This course engages students in a critical examination of how different societies address environmental and climate-related challenges, with a focus on how scientific understanding informs these discussions**.** Students will analyze multiple perspectives on issues like access to resources and energy production**,** considering both historical and contemporary debates. Rather than assuming a singular framework, students will explore how scientific data, economic interests, and political priorities interact in shaping responses to climate challenges**.** The course will emphasize how scientific knowledge of climate phenomena contributes to policy and decision-making across different contexts**,** ensuring that students engage with competing perspectives grounded in evidence-based reasoning.

Assessments that support this ELO:

- **Class Readings & Discussions** – Students engage with diverse viewpoints on environmental justice, critically evaluating how different groups conceptualize equity and inclusion in relation to scientific knowledge.
- **Recitation Activities** – Students explore how scientific understanding, economic considerations, and policy decisions interact in discussions of environmental equity.
- **Reflection Paper** – Students synthesize their understanding of how different perspectives on justice and inclusion are shaped by scientific, economic, and political factors.

Expected Learning Outcome (ELO 4.2) Analyze and critique the intersection of concepts of justice, difference, citizenship, and how these interact with cultural traditions, structures of power and/or advocacy for social change. Meeting ELO 4.2. In the second half of the course, students will apply their understanding of scientific reasoning and epistemology to critique different perspectives on environmental decision-making and justice. They will examine how scientific knowledge is used—or contested—in discussions about environmental policies and societal responses to climate-related challenges. Rather than assuming a single pathway forward, students will evaluate the strengths and limitations of competing viewpoints on environmental justice and power structures, drawing on scientific literacy and reasoning while recognizing how political and economic considerations shape real-world applications of science.

Assessments that support this ELO:

- **Class Readings & Discussions** – Students engage with diverse perspectives on power structures, justice, and environmental decision-making, critiquing the reasoning behind different frameworks.
- **Personal Action Plan** – Students develop a structured proposal for engaging with environmental issues, analyzing different strategies for change based on scientific evidence while considering broader societal contexts.

Interdisciplinary High-Impact Practices

What makes this an Interdisciplinary Team-Taught Course?
The two instructors for this course differ in many respects, including ethnicity, gender, and academic discipline. They are experts but have different areas of expertise. One instructor is in the Department of Chemistry and Biochemistry, and the other is in the School of Teaching and Learning. What they have in common is a passion for this subject and an eagerness to learn from each other and from students in the class. They will each be active participants throughout the course, bringing different perspectives to the topics, and encouraging students to do the same by sharing their experiences and views. Rather than dividing instruction by topic, the instructors will co-lead discussions, facilitate interdisciplinary debates, and jointly guide recitations to model how experts from different fields approach complex scientific and societal issues. Through active collaboration, the instructors will emphasize the intersection of chemistry and epistemology, ensuring that students see how scientific literacy informs decision-making and public discourse. This interdisciplinary integration is central to the course structure. Dual-instructor facilitated discussions will allow students to explore chemistry-based climate science while also analyzing the epistemological and societal implications of scientific claims. Assessments such as the Reflection Paper and Personal Action Plan are co-designed and co-evaluated, requiring students to synthesize scientific reasoning with broader societal and educational contexts. Recitations further support interdisciplinary learning by integrating scientific literacy with structured inquiry, helping students navigate competing claims in climate science and public discourse. By maintaining an ongoing interdisciplinary dialogue throughout the course, instructors model how scientific knowledge, epistemology, and citizenship intersect in real-world decision-making, reinforcing the course's broader themes.

Goal 1. Successful students will… analyze an important topic or idea at a more advanced and in-depth level than the foundations. In this context, "advanced" refers to courses that are e.g., synthetic, rely on research or cutting-edge findings, or deeply engage with the subject matter, among other possibilities.
Expected Learning Outcome (**ELO 1.1) Engage in critical and logical thinking.**

- **Specific Objective (1.1a). Critical Thinking.** Clearly state and comprehensively describe the issue or problem under consideration, delivering all relevant information necessary. **Meeting Objective 1.1a.** Students will critically evaluate diverse sources, engaging with perspectives from chemistry, epistemology, and science education to develop interdisciplinary arguments. Course readings, discussions, and exams require students to critique arguments, assess evidence, and articulate well-supported positions on scientific issues.
- **Specific Objective 1.1.b Analysis**: Interpret and evaluate information from multiple sources and multiple disciplinary perspectives to develop a comprehensive analysis or synthesis, and thoroughly question the viewpoints of experts and professionals. **Meeting Objective 1.1.b.** Class discussions, co-led by both instructors, will require students to integrate chemistry, epistemology, and science education perspectives into their analyses. Assignments will emphasize evaluating expert viewpoints, identifying assumptions, and synthesizing evidence across disciplines**.**
- **Specific Objective 1.1.c Critical thinking & analysis** Systematically and methodically analyze their own and others' assumptions using more than one disciplinary lens and carefully evaluate the relevance of contexts when representing a position. **Meeting Objective 1.1.c.** The epistemology strand of the course will guide students in questioning how scientific claims are constructed and validated**.** Students will evaluate assumptions in scientific and policy-based arguments, considering how disciplinary perspectives influence conclusions. AI tools may be used as a resource for analyzing claims, generating alternative viewpoints, and identifying biases, but students will critically assess their reliability and limitations. Through recitations, discussions, and writing assignments, students will develop meta-cognitive awareness, reflecting on how interdisciplinary perspectives shape reasoning.

Expected Learning Outcome (**ELO 1.2)** Engage in an advanced, in-depth, scholarly exploration of the topic or ideas within this theme.

- **Specific Objective (1.2a). Scholarly engagement:** Articulate a thorough and complex understanding of the factors and contexts, including natural, social, cultural and political, contributing to an integrative understanding of the issue. **Meeting Objective 1.2a.** Students will develop an interdisciplinary

understanding of environmental and scientific issues grounded in chemical principles and informed by epistemology, and societal perspectives. Course readings and discussions will challenge students to examine how scientific claims are shaped by social, cultural, and political contexts, fostering a nuanced approach to environmental decision-making. Through structured writing assignments, class presentations, and debates, students will integrate scientific reasoning with broader civic and ethical considerations, demonstrating advanced scholarly engagement.

Goal 2: Successful students will… integrate approaches to the theme by making connections to out-of-classroom experiences with academic knowledge or across disciplines and/or to work they have done in previous classes and that they anticipate doing in future.

Expected Learning Outcome (ELO 2.1) Identify, describe, and synthesize approaches or experiences.

- **Specific Objective 2.1.a Integration of knowledge:** Connect, analyze, and extend knowledge (facts, theories, etc.) from course content to integrate their insights through construction of a more comprehensive perspective. **Meeting Objective 2.1.a.** Students and instructors act as co-investigators, engaging in inquiry-driven discussions that integrate prior knowledge with new scientific and interdisciplinary insights. Rather than being directed toward specific conclusions, students will analyze diverse sources, evaluate competing perspectives, and construct their own reasoned positions. Through research, presentations, and class discussions, students will develop a deeper understanding of how chemistry, epistemology, and societal perspectives intersect.
- **Specific Objective 2.1.b Multiple perspectives:** Evaluate and apply diverse perspectives to complex subjects from multiple cultural and disciplinary lenses as appropriate. **Meeting Objective 2.1.b.** Students will engage with a broad spectrum of perspectives, including scientific, economic, political, historical, and ethical viewpoints on environmental and scientific issues. Course readings are intentionally curated to present competing and, at times, contradictory claims, challenging students to analyze evidence, assess reasoning, and determine credibility. Discussions will explicitly encourage students to question assumptions, critique reasoning, and consider how different disciplines and worldviews approach the same issue.

Expected Learning Outcome (ELO 2.2) Demonstrate a developing sense of self as a learner through reflection, self- assessment, and creative work, building on prior experiences to respond to new and challenging contexts.

- **Specific Objective 2.2.a Self-awareness:** Evaluates the impacts of cross disciplinary synthesis of the issue on themselves, the scholarly inquiry, the local and global systems and also considers the long-term impact of the work. **Meeting Objective 2.2.a.** Students will reflect on their evolving understanding of climate science, epistemology, and citizenship, examining how interdisciplinary engagement has shaped their perspectives. The Reflection Paper serves as a culminating assessment, encouraging students to analyze their intellectual growth and reassess their initial assumptions. The Personal Action Plan is an individualized assignment—it is not pre-defined, allowing students to determine their own takeaways and paths forward. Because students engage with the material in different ways, their Personal Action Plans will vary, reflecting different perspectives, priorities, and conclusions about how to apply their learning. By designing actionable steps rooted in scientific literacy and interdisciplinary awareness, students demonstrate an awareness of how their learning extends beyond the classroom.
- **Specific Objective 2.2.b. Empathy**: Interpret and explain the issue under consideration from the perspective other than their own and more than one worldview and demonstrates openness towards others in the academic community and their perspectives. **Meeting Objective 2.2.b.** This course emphasizes cognitive empathy as a foundation for informed citizenship, helping students understand the perspectives, knowledge systems, and lived experiences of others in local, national, and global contexts. Rather than simply acknowledging diverse perspectives, students will critically examine how different worldviews shape scientific, ethical, and policy debates, particularly in relation to environmental and societal challenges. Citizenship requires engagement beyond the individual, and empathy fosters the ability to navigate complex, often conflicting perspectives in science, policy, and public discourse. Through class discussions, the Reflection Paper, and the Personal Action Plan, students will explore how scientific reasoning, cultural perspectives, and policy priorities interact, developing a more informed and engaged approach to civic responsibility. The epistemology strand of the course provides students with tools to evaluate competing knowledge claims, reinforcing the idea that understanding different perspectives is a prerequisite for meaningful civic participation.

Assignments and Grading

Your performance in this course will be evaluated based on the components below. **There is no extra credit.** Sixty days after grades are posted, your grade in Carmen is considered final and all other records are destroyed. If you have a concern or question about a grade, please contact an instructor promptly and we will work to adjust any inconsistencies in a timely manner.

Assignments	%	Setting	Primary Strand(s)	Timing
Annotations to Course Readings	20%	Pre-Class	All	Every class
Discussion & Presentations	15%	In Class	Sci. Ed & Citizenship	Every class
On-going Reflection	10%	Recitation	Sci. Ed & Citizenship	Weeks 1, 5, 8, 10, 13
Applications	10%	Recitation	All	Weeks 4, 7, 9, 11
Exam 1	10%	Recitation	Chemistry	Week 6
Exam 2	10%	Recitation	Chemistry	Week 12
Reflection Paper	20%	End of Semester	Sci. Ed & Citizenship	Final week of class
Personal Action Plan	5%	End of Semester	Sci. Ed & Citizenship	Final week of class

Attendance and Late Assignments. Assignments that are completed in person during class or recitation include discussions and presentations, on-going reflection, applications, and Exams. Students must attend class or recitation to earn points from these assignments. Assignments to be completed outside of class time include annotations to course readings, the Reflection paper, and the Personal Action Plan, with a penalty of 2% per day used for late assignments.

Pre-Class Homework. To achieve the course's ambitious objectives, pre-class reading assignments will occur throughout the semester. Readings are drawn from a wide variety of sources and posted online using the program Hypothesis. Individual reading assignments include adding annotations to the text (approximately 4-8 per reading) as part of asynchronous discussions.

In-Class Discussions and Presentations. Some reading assignments will follow a jigsaw reading strategy**,** where students collaborate in groups to analyze key ideas, become topic experts, and lead subsequent discussions. These in-class discussions will be based on weekly readings**,** supplemented by lecture content that connects to the three strands of the course: chemistry, epistemology, and citizenship. Participation in these discussions is essential for engaging with course material, refining critical thinking skills, and making connections across disciplines. Students who attend class and actively contribute to discussions will receive full credit.

Exams. There are two exams in the course, both focused on chemistry content knowledge and its application to course themes. The exams will assess students' ability to apply scientific reasoning, perform calculations, construct scientific explanations, and interpret data presented in figures and tables. The exam format will include a combination of closed-response questions (e.g., multiple choice, short answer) and open-response questions that require deeper analysis and problem-solving. These assessments are designed to reinforce conceptual understanding and analytical skills rather than rote memorization.

Recitation. Recitation sessions provide opportunities for active engagement, reflection, and collaboration. Students will participate in on-going reflections and application activities designed to help synthesize course concepts and receive feedback from peers and the Teaching Assistant. Recitations also serve as a structured space for discussing the role of artificial intelligence (AI) in learning, emphasizing how AI can support—but not replace—critical thinking and scientific inquiry. A key component of these sessions is the low-stakes oral defense of AI-supported work. Students will articulate how they used AI, evaluate its contributions, and explain

how it shaped their understanding, critical thinking, and problem-solving. These discussions foster accountability, metacognition, and peer learning, helping students critically engage with AI-generated content while refining their reasoning skills. Recitation activities are designed to scaffold success on higher-stakes assessments, such as exams and the Reflection Paper. Through structured discussion and reflection, students will develop confidence in articulating their ideas, integrating feedback, and deepening their engagement with scientific and societal issues.

Self-Reflection paper. This cumulative assignment allows students to reflect on how their understanding of scientific reasoning, epistemology, and citizenship has evolved throughout the course. The reflection paper engages with multiple ELOs, particularly those focused on critical thinking, epistemological development, and perspectives on citizenship. Students will analyze their initial perspectives on scientific literacy and decision-making, examine how their ability to evaluate scientific claims, evidence, and uncertainty has changed, and critique different models of citizenship and civic responsibility in relation to environmental challenges. The paper will also require students to engage with competing viewpoints on justice, policy, and environmental decision-making, drawing on course readings and additional sources. Additionally, students will reflect on their use of artificial intelligence (AI) tools in the course, evaluating how AI-supported inquiry has influenced their learning process, ability to analyze scientific claims, and approach to evidence-based reasoning. A key aspect of the assignment is the use of supporting evidence to demonstrate engagement with scientific reasoning, structured inquiry, and interdisciplinary perspectives. Grading will emphasize depth of reflection, critical engagement with course themes, and the use of evidence to support arguments. The recommended length of the paper is 8–12 pages.

Personal Action plan. The issues examined in this course can be complex and challenging, often raising questions about how individuals can engage with scientific and societal problems in meaningful ways. The Personal Action Plan provides students with an opportunity to apply insights from the course to concrete, actionable steps that align with their values and areas of interest. This assignment supports several Expected Learning Outcomes (ELOs) by encouraging students to synthesize knowledge, reflect on their role as informed citizens, and develop a plan for engagement that is grounded in scientific reasoning. Students will outline specific short-term and long-term actions, providing a clear rationale for their choices based on their scientific understanding. The format is flexible, allowing students to design a plan that is personally meaningful, but it is expected to be at least two pages in length.

Course Letter Grade Assignment: Once your overall point total (final score) has been calculated using the weighting scheme shown above, your letter grade will be assigned based on the following scale:

Total Score (%)	Letter Grade
92.0 – 100	A
90.0 – 91.9	A−
88.0 – 88.9	B+
82.0 – 87.9	B
80.0 – 81.9	B−
78.0 – 79.9	C+
72.0 – 77.9	C
70.0 – 71.9	C−
68.0 – 68.9	D+
62.0 – 67.9	D
<62	E

Course Structure, Strands, and Schedule

This course meets three times a week. **Two meetings are 80-minute classes** and the other a **55-minute recitation**. In addition, there is a significant amount of outside of class reading assigned weekly. The readings support the weekly 80-minute classes and there are asynchronous reading assignments every week. Students will also learn how to find, analyze, and discuss readings aligned with their own discipline-specific interests. Recitations will have different objectives. Some recitation sessions are focused on chemistry applications. Other sessions include self-reflection activities in which students consolidate their evolving understanding of epistemology, the Nature of Science, and citizenship and community.

Course Strands

The course is structured around three interconnected strands: science education, citizenship and community, and chemistry content knowledge**.** Rather than existing in isolation, these strands intersect throughout the semester, allowing students to explore how insights from one area can deepen their understanding of another. Each week, course discussions and activities will integrate these perspectives, fostering a more comprehensive and interdisciplinary approach to the topics at hand.

The **science education strand** encompasses key aspects of the Nature of Science, scientific literacy, and epistemology. *Epistemology*—the study of knowledge, including its methods, validity, and scope—is a central theme in this course. The semester begins with an introduction to epistemology, prompting students to reflect on the sources of information they trust, how knowledge is constructed, what counts as evidence, and how arguments are formed. This strand provides a critical framework for evaluating and critiquing ideas encountered throughout the course. Students will explore the nature of scientific knowledge and the tools of science—its models, mechanisms, and theories—and examine how these intersect with scientific skepticism, competing claims, and the communication of uncertainty in climate science**.** Additionally, the relationship between epistemology and culture will be a recurring theme, emphasizing that scientific information alone is often insufficient to change perspectives, highlighting the broader social and cognitive factors that shape belief and decision-making.

The **citizenship and community strand** begins with a personal reflection on the relationship between citizenship and community, prompting students to consider the communities they identify with and the roles they play within them. Students will examine citizenship both as a political construct, with associated rights and responsibilities, and as a broader concept tied to identity, participation, and collective action. A central theme of the course is how citizenship operates at different scales across both time and space. The idea of *global citizenship* will be explored from multiple perspectives, addressing questions such as: *Is global citizenship a meaningful or achievable concept? What are its benefits and limitations? How do different interpretations of global citizenship shape responses to scientific and environmental challenges?* Throughout the semester, students will critically engage with the intersection of citizenship, scientific knowledge, and policy**,** examining how decisions about environmental and climate-related issues are shaped by power structures, political priorities, and community action. By connecting citizenship to the other course strands, students will evaluate who is most affected by policy decisions, how responsibility for action is framed, and what roles individuals and communities can play in shaping a sustainable future.

The **chemistry content knowledge strand** covers key topics that support a fundamental understanding of climate science and technologies to address climate change, such as atmospheric chemistry, mass spectrometry, combustion reactions, molecules and electromagnetic radiation, kinetics, electrochemistry of energy storage, chemical equilibrium, colligative properties. Chemical knowledge is essential for explaining the mechanisms behind climate phenomena. It also plays a central role in developing technological solutions like carbon capture and renewable energy systems. Beyond understanding climate mechanisms, chemistry fosters critical thinking and scientific literacy, enabling students to evaluate scientific claims and address climate misinformation. A deeper understanding of chemical principles better informs students as they engage with broader societal and policy discussions. Scientific knowledge does not dictate policy outcomes, but it provides a foundation for evaluating claims, weighing trade-offs, and considering the feasibility of different technological and policy approaches. This course encourages students to critically examine competing perspectives on environmental decision-making, recognizing both the strengths and limitations of various solutions.

Course Sequence

Week and Theme	Science Education	Citizenship and community	Chemistry content	Recitation activity
1. Initial views	Models of development	Citizenship vis-à-vis community.		Initial positioning and interests
2. Our planet			Atmospheric chemistry	Finding scientific information
3. Environmental change		Communities across time and space.	Mass spectrometry	Reading scientific information
4. Scientific knowing	Scientific models, Scientific theories Epistemology and identify	Citizenship, identity and Global challenges.		Applications
5. Science, culture, and public discourse	Epistemological change	Culture and community		Self-Reflection
6. Anthropocene		Communities across time and space.	Combustion reactions	EXAM
7. Humanity and the carbon-cycle			.	Applications
8. Scientific debate and competing claims.	Epistemological change		Molecules and light	Self-Reflection
9. A recent history of climate policy		Perspectives on global citizenship	Kinetics and reaction mechanisms	Application
10. Climate and society		Justice, citizenship, and decision-making	Electrochemistry	Self-reflection
11. Present day impacts			Le Chatelier's principle	Application
12. Future impacts		Perspectives on global citizenship	Colligative properties	EXAM
13. Paths forward				Self-reflection
14. Personal and Societal Responses	Epistemological change	Perspectives on global citizenship		

Important Resources and Policies for Academic Success

Disability Services: The university strives to maintain a healthy and accessible environment to support student learning in and out of the classroom. If you anticipate or experience academic barriers based on your disability (including mental health, chronic, or temporary medical conditions), please let us know immediately so that we can privately discuss options. To establish reasonable accommodations, we may request that you register with Student Life Disability Services. After registration, make arrangements with us as soon as possible to discuss your accommodations so that they may be implemented in a timely fashion.

If you are ill and need to miss class, including if you are staying home and away from others while experiencing symptoms of a viral infection or fever,

please let ud know immediately. In cases where illness interacts with an underlying medical condition, please consult with Student Life Disability Services to request reasonable accommodations. You can connect with them at slds@osu.edu; 614-292-3307; or slds.osu.edu.

Academic Misconduct: It is the responsibility of the Committee on Academic Misconduct (COAM) to investigate or establish procedures for the investigation of all reported cases of student academic misconduct. The term "academic misconduct" includes all forms of student academic misconduct wherever committed; illustrated by, but not limited to, cases of plagiarism and dishonest practices in connection with examinations. Instructors shall report all instances of alleged academic misconduct to the committee (Faculty Rule 3335-5-487). For additional information, see the Code of Student Conduct http://studentlife.osu.edu/csc/.

Violations of academic standards will be referred to the University Committee of Academic Misconduct (COAM) as required by Faculty Rules. It is the responsibility of COAM to investigate all reported cases of student academic misconduct; illustrated by, but not limited to, cases of plagiarism and any dishonest practices in connection with examinations, quizzes, and graded assignments. Instructors shall report all instances of alleged academic misconduct to the committee (Faculty Rule 3335-5-487). For additional information see the Code of Student Conduct: studentlife.osu.edu/csc

Student Responsibilities: *Any graded material must represent your own work.* Unauthorized group efforts by students, use of another student's course materials, or assistance from individuals who already have taken the course, could place you in jeopardy of violation of the standards for the course. In some courses, group work is acceptable on certain activities (as explicitly stated by your instructor). In these cases, it is important that you know and understand where authorized collaboration (working in a group) ends and collusion (working together in an unauthorized manner) begins. Identical answers indicate copying or unacceptable group efforts - always answer questions in your own unique words. It is important that you consult with your instructor for clarification on whether or not collaboration is appropriate on an activity. *You should not assist others in violating academic standards*. Students supplying materials for others to "look at" may be charged with academic misconduct.

Mental Health: As a student you may experience a range of issues that can cause barriers to learning, such as strained relationships, increased anxiety, alcohol/drug problems, feeling down, difficulty concentrating and/or lack of motivation. These mental health concerns or stressful events may lead to diminished academic performance or reduce a student's ability to participate in daily activities. The Ohio State University offers services to assist you with addressing these and other concerns you may be experiencing. If you or someone you know are suffering from any of the aforementioned conditions, you can learn more about the broad range of confidential mental health services available on campus via the Office of Student Life's Counseling and Consultation Service (CCS) by visiting ccs.osu.edu or calling 614-292-5766. CCS is located on the 4th Floor of the Younkin Success Center and 10th Floor of Lincoln Tower. You can reach an on call counselor when CCS is closed at 614-292-5766 and 24 hour emergency help is also available 24/7 by dialing 988 to reach the Suicide and Crisis Lifeline.

Commitment to Diversity: The Department of Chemistry and Biochemistry promotes a welcoming and inclusive environment for all students and staff, regardless of race, gender, ethnicity, national origin, disability or sexual orientation. There is no tolerance for hateful speech or actions. All violations of this policy should be reported to the OSU Bias Assessment and Response Team (BART,

studentaffairs.osu.edu/bias). The Department encourages diversity at all levels, particularly among the next generation of scientists. Students are encouraged to participate in organizations that provide support specifically for science and engineering students who are African-American, Asian, disabled, Hispanic, LGBTQ or women. These organizations are listed on the Colleges of Arts and Sciences (artsandsciences.osu.edu/stem-organizations) and Engineering (engineering.osu.edu/studentorgs) websites.

Religious Accommodations: Ohio State has had a longstanding practice of making reasonable academic accommodations for students' religious beliefs and practices in accordance with applicable law. In 2023, Ohio State updated its practice to align with new state legislation. Under this new provision, students must be in early communication with their instructors regarding any known accommodation requests for religious beliefs and practices, providing notice of specific dates for which they request alternative accommodations within 14 days after the first instructional day of the course. Instructors in turn shall not question the sincerity of a student's religious or spiritual belief system in reviewing such requests and shall keep requests for accommodations confidential.

With sufficient notice, instructors will provide students with reasonable alternative accommodations with regard to examinations and other academic requirements with respect to students' sincerely held religious beliefs and practices by allowing up to three absences each semester for the student to attend or participate in religious activities. Examples of religious accommodations can include, but are not limited to, rescheduling an exam, altering the time of a student's presentation, allowing make-up assignments to substitute for missed class work, or flexibility in due dates or research responsibilities. If concerns arise about a requested accommodation, instructors are to consult their tenure initiating unit head for assistance.

A student's request for time off shall be provided if the student's sincerely held religious belief or practice severely affects the student's ability to take an exam or meet an academic requirement and the student has notified their instructor, in writing during the first 14 days after the course begins, of the date of each absence. Although students are required to provide notice within the first 14 days after a course begins, instructors are strongly encouraged to work with the student to provide a reasonable accommodation if a request is made outside the notice period. A student may not be penalized for an absence approved under this policy.

If students have questions or disputes related to academic accommodations, they should contact their course instructor, and then their department or college office. For questions or to report discrimination or harassment based on religion, individuals should contact the Office of Institutional Equity. (Policy: Religious Holidays, Holy Days and Observances)

GE Theme course submission worksheet: Citizenship for a Diverse and Just World

Overview

Courses in the GE Themes aim to provide students with opportunities to explore big picture ideas and problems within the specific practice and expertise of a discipline or department. Although many Theme courses serve within disciplinary majors or minors, by requesting inclusion in the General Education, programs are committing to the incorporation of the goals of the focal theme and the success and participation of students from outside of their program.

Each category of the GE has specific learning goals and Expected Learning Outcomes (ELOs) that connect to the big picture goals of the program. ELOs describe the knowledge or skills students should have by the end of the course. Courses in the GE Themes must meet the ELOs common for **all** GE Themes and those specific to the Theme, in addition to any ELOs the instructor has developed specific to that course. All courses in the GE must indicate that they are part of the GE and include the Goals and ELOs of their GE category on their syllabus.

The prompts in this form elicit information about how this course meets the expectations of the GE Themes. The form will be reviewed by a group of content experts (the Theme Advisory) and by a group of curriculum experts (the Theme Panel), with the latter having responsibility for the ELOs and Goals common to all themes (those things that make a course appropriate for the GE Themes) and the former having responsibility for the ELOs and Goals specific to the topic of **this** Theme.

Briefly describe how this course connects to or exemplifies the concept of this Theme (Citizenship)

In a sentence or two, explain how this class "fits' within the focal Theme. This will help reviewers understand the intended frame of reference for the course-specific activities described below.

(enter text here)

This course explores epistemology, the Nature of Science, and informed citizenship through the lens of climate science, with a strong focus on chemical principles. It emphasizes the crucial role of chemistry in understanding key climate phenomena. By integrating chemical knowledge with scientific literacy, students will gain insight into how molecular interactions and chemical reactions drive global climate processes. The curriculum develops students' ability to critically evaluate scientific claims and understand the mechanisms of climate change at a molecular level. Through this knowledge, they will be empowered to make informed decisions and engage in active citizenship. The course also examines the responsibilities individuals hold within their communities, encouraging students to apply their understanding of chemistry in addressing real-world climate challenges and advocating for evidence-based solutions.

Connect this course to the Goals and ELOs shared by *all* Themes

Below are the Goals and ELOs common to all Themes. In the accompanying table, for each ELO, describe the activities (discussions, readings, lectures, assignments) that provide opportunities for students to achieve those outcomes. The answer should be concise and use language accessible to colleagues outside of the submitting department or discipline. The specifics of the activities matter—listing "readings" without a reference to the topic of those readings will not allow the reviewers to understand how the ELO will be met. However, the panel evaluating the fit of the course to the Theme will review this form in conjunction with the syllabus, so if readings, lecture/discussion topics, or other specifics are provided on the syllabus, it is not necessary to reiterate them within this form. The ELOs are expected to vary in their "coverage" in terms of number of activities or emphasis within the course. Examples from successful courses are shared on the next page.

Goal 1: Successful students will analyze an important topic or idea at a more advanced and in-depth level than the foundations. In this context, "advanced" refers to courses that are e.g., synthetic, rely on research or cutting-edge findings, or deeply engage with the subject matter, among other possibilities.

Goal 2: Successful students will integrate approaches to the theme by making connections to out-of-classroom experiences with academic knowledge or across disciplines and/or to work they have done in previous classes and that they anticipate doing in future.

	Course activities and assignments to meet these ELOs
ELO 1.1 Engage in critical and logical thinking.	The critical analysis of scientific readings, drawn from a variety of sources, is an important theme in the course. There is not a single textbook, but rather diverse sources that are meant to be critiqued rather than "accepted". This is one reason that epistemology is a named strand for the course. The critical analysis of readings is then extended with classroom discussion co-led by both instructors. Exams in the course (mid-term, final) also require critical and logical thinking in the context of scientific problem solving. All strands in the course require a high level of critical thinking skills. Specific assessments of this learning objective:
ELO 1.2 Engage in an advanced, in-depth, scholarly exploration of the topic or ideas within this theme.	This course is an advanced exploration of the interdisciplinary and complex topic of climate science, with a strong focus on chemistry. The range of disciplines brought into the conversation is noteworthy, including both STEM and non-STEM fields, but chemistry is central to understanding the scientific phenomena. The scholarly discussion on epistemological development, themes from the Nature of Science, and the examination of citizenship will be advanced and deeply grounded in real-world scientific contexts, particularly those related to fundamental chemistry topics. These include the molecular mechanisms driving climate change, the chemistry of greenhouse gases, and the chemical processes involved in energy production and environmental mitigation. Specific assessments of this learning objective: • Course readings. • Student in-class presentations. • Classroom discussion. • Exams.
ELO 2.1 Identify, describe, and synthesize approaches or experiences.	Students and the instructors are positioned as "co-investigators" of the topics in the course. Student prior knowledge, experiences, and expertise are highly valued. Working with the instructors, students will find and analyze information pertaining to weekly topics and then present this information and co-lead discussions for specific topics. The objective of "synthesizing approaches" will be informed by an epistemological understanding of how knowledge is constructed. The numerous activities on self-reflection are aligned with the goal of "identifying experiences." Specific assessments of this learning objective: • Classroom discussion. • Student in-class presentations.
ELO 2.2 Demonstrate a developing sense of self as a learner through reflection, self-assessment, and creative work, building on prior experiences to respond to new and challenging contexts.	This course emphasizes student growth and self-reflection. This growth will include content knowledge, but importantly personal epistemological development is also a priority. This is a reason why epistemology is a strand in the course. The course begins by a self-reflection that is informed by models of epistemological development. Science education, epistemology, and scientific ways of knowing are introduced to week 4, allowing connections to be made between one's personal epistemology and the epistemology for this discipline. In week 5, epistemological change will be examined; this will also have a personal component. At the end of the semester, the topic of epistemological change will be revisited as the class storyline concludes. These topics will be given continued attention with periodic activities in recitation culminating in a Reflection paper at the end of the course. Formative feedback will be provided for the recitation activities. The personal action plan also requires a high degree of reflection and self-assessment, but it goes beyond this by challenging the student to identify tangible actions they intend to implement. Specific assessments of this learning objective: • Recitation activities • Reflection paper. • Personal action plan

Example responses for proposals within "Citizenship" (from Sociology 3200, Comm 2850, French 2803):

***ELO 1.1** Engage in critical and logical thinking.*	*This course will build skills needed to engage in critical and logical thinking about immigration and immigration related policy through:* *Weekly reading response papers which require the students to synthesize and critically evaluate cutting-edge scholarship on immigration;* *Engagement in class-based discussion and debates on immigration-related topics using evidence-based logical reasoning to evaluate policy positions;* *Completion of an assignment which build skills in analyzing empirical data on immigration (Assignment #1)*

	Completion 3 assignments which build skills in connecting individual experiences with broader population-based patterns (Assignments #1, #2, #3) *Completion of 3 quizzes in which students demonstrate comprehension of the course readings and materials.*
***ELO 2.1** Identify, describe, and synthesize approaches or experiences.*	*Students engage in advanced exploration of each module topic through a combination of lectures, readings, and discussions.* *<u>Lecture</u>* *Course materials come from a variety of sources to help students engage in the relationship between media and citizenship at an advanced level. Each of the 12 modules has 3-4 lectures that contain information from both peer-reviewed and popular sources. Additionally, each module has at least one guest lecture from an expert in that topic to increase students' access to people with expertise in a variety of areas.* *<u>Reading</u>* *The textbook for this course provides background information on each topic and corresponds to the lectures. Students also take some control over their own learning by choosing at least one peer-reviewed article and at least one newspaper article from outside the class materials to read and include in their weekly discussion posts.* *<u>Discussions</u>* *Students do weekly discussions and are given flexibility in their topic choices in order to allow them to take some control over their education. They are also asked to provide* *information from sources they've found outside the lecture materials. In this way, they are able to* *explore areas of particular interest to them and practice the skills they will need to gather information* *about current events, analyze this information, and communicate it with others.* *Activity Example: Civility impacts citizenship behaviors in many ways. Students are asked to choose a TED talk from a provided list (or choose another speech of their interest) and summarize and evaluate what it says about the relationship between civility and citizenship. Examples of Ted Talks on the list include Steven Petrow on the difference between being polite and being civil, Chimamanda Ngozi Adichie's talk on how a single story can perpetuate stereotypes, and Claire Wardle's talk on how diversity can enhance citizenship.*
***ELO 2.2** Demonstrate a developing sense of self as a learner through reflection, self-assessment, and creative work, building on prior experiences to respond to new and challenging contexts.*	*Students will conduct research on a specific event or site in Paris not already discussed in depth in class. Students will submit a 300-word abstract of their topic and a bibliography of at least five reputable academic and mainstream sources. At the end of the semester they will submit a 5-page research paper and present their findings in a 10-minute oral and visual presentation in a small-group setting in Zoom.* *Some examples of events and sites:* *The Paris Commune, an 1871 socialist uprising violently squelched by conservative forces*

	Jazz-Age Montmartre, where a small community of African-Americans–including actress and singer Josephine Baker, who was just inducted into the French Pantheon–settled and worked after World War I. *The Vélodrome d'hiver Roundup, 16-17 July 1942, when 13,000 Jews were rounded up by Paris police before being sent to concentration camps* *The Marais, a vibrant Paris neighborhood inhabited over the centuries by aristocrats, then Jews, then the LGBTQ+ community, among other groups.*

Goals and ELOs unique to Citizenship for a Diverse and Just World

Below are the Goals and ELOs specific to this Theme. As above, in the accompanying Table, for each ELO, describe the activities (discussions, readings, lectures, assignments) that provide opportunities for students to achieve those outcomes. The answer should be concise and use language accessible to colleagues outside of the submitting department or discipline. The ELOs are expected to vary in their "coverage" in terms of number of activities or emphasis within the course. Examples from successful courses are shared on the next page.

GOAL 3: Successful students will explore and analyze a range of perspectives on local, national, or global citizenship, and apply the knowledge, skills, and dispositions that constitute citizenship.

GOAL 4: Successful students will examine notions of justice amidst difference and analyze and critique how these interact with historically and socially constructed ideas of citizenship and membership within societies, both within the US and/or around the world.

	Course activities and assignments to meet these ELOs
ELO 3.1 Describe and analyze a range of perspectives on what constitutes citizenship and how it differs across political, cultural, national, global, and/or historical communities.	Citizenship is a strand in the course that is returned to many times. Perspectives on what constitutes citizenship, and how it relates to community, is an early focus of the course. The scale at which communities can exist will be examined, with consideration of the smallest and largest communities we identify with. The question of scale will also include time. "Does a community exist for those living in the period between mass extinction events?" is a particularly provocative question. Communities based on culture and national identity will also be important when considering issues of climate justice. Specific assessments of this learning objective: • Class readings. • Class discussion. • Recitation activities • Reflection paper. • Personal action plan
ELO 3.2 Identify, reflect on, and apply the knowledge, skills and dispositions required for intercultural competence as a global citizen.	Climate justice and cannot be separated from the issue of global citizenship and quite often proposed paths forward include a role for "global citizens." This course includes an examination of how "global citizenship" has been conceptualized, if it is possible to be a global citizen, and if global citizenship helps or hinders efforts to address climate change. In addition, critiques of global citizenship from both ends of the political spectrum will be examined. Specific assessments of this learning objective: • Class readings. • Class discussion. • Recitation activities • Reflection paper.
ELO 4.1 Examine, critique, and evaluate various expressions and implications of diversity, equity, inclusion, and explore a variety of lived experiences.	Examining issues of equity and inclusion will be essential when discussing the topic of climate justice. For example, Issues of equity were central at the recent COP27 conference, and they are expected to remain salient, including financial and humanitarian measures to support nations of the Global South and mass migrations in response to climatic emergencies. In addition, displacement of workers from fossil-fuel industries in affluent countries or creation of new energy-related jobs with suspect working conditions, e.g. lithium-mining, are also issues of equity. Specific assessments of this learning objective: • Class readings. • Class discussion. • Recitation activities • Reflection paper.
ELO 4.2 Analyze and critique the intersection of concepts of justice, difference, citizenship, and how these interact with cultural traditions, structures of power and/or advocacy for social change.	A theme for the second half of this course is the role of political and economic power structures in establishing and maintaining practices that lead to climate change, and the relative "winners and losers" living on a planet in which these power structures persist. When discussing pathways forward and advocating change, diverse views are again introduced with some authors calling to upend the status quo as a prerequisite to saving the planet and others advocating for incremental timely change. Activism and advocacy for change are explicitly included in the course and lead to the Personal Action Plan assignment. Specific assessments of this learning objective: • Class readings. • Class discussion. • Personal Action Plan.

Example responses for proposals within "Citizenship" (Hist/Relig. Studies 3680, Music 3364; Soc 3200):

***ELO 3.1** Describe and analyze a range of perspectives on what constitutes citizenship and how it differs across political, cultural,*	*Citizenship could not be more central to a topic such as immigration/migration. As such, the course content, goals, and expected learning outcomes are all, almost by definition, engaged with a range of perspectives on local, national, and global citizenship.*

national, global, and/or historical communities.	*Throughout the class students will be required to engage with questions about what constitutes citizenship and how it differs across contexts.* *The course content addresses citizenship questions at the global (see weeks #3 and #15 on refugees and open border debates), national (see weeks #5, 7-#14 on the U.S. case), and the local level (see week #6 on Columbus). Specific activities addressing different perspectives on citizenship include Assignment #1, where students produce a demographic profile of a U.S-based immigrant group, including a profile of their citizenship statuses using U.S.-based regulatory definitions. In addition, Assignment #3, which has students connect their family origins to broader population-level immigration patterns, necessitates a discussion of citizenship. Finally, the critical reading responses have the students engage the literature on different perspectives of citizenship and reflect on what constitutes citizenship and how it varies across communities.*
ELO 3.2 *Identify, reflect on, and apply the knowledge, skills and dispositions required for intercultural competence as a global citizen.*	*This course supports the cultivation of "intercultural competence as a global citizen" through rigorous and sustained study of multiple forms of musical-political agency worldwide, from the grass-roots to the state-sponsored. Students identify varied cultural expressions of "musical citizenship" each week, through their reading and listening assignments, and reflect on them via online and in-class discussion. It is common for us to ask probing and programmatic questions about the musical-political subjects and cultures we study. What are the possibilities and constraints of this particular version of musical citizenship? What might we carry forward in our own lives and labors as musical citizens Further, students are encouraged to apply their emergent intercultural competencies as global, musical citizens in their midterm report and final project, in which weekly course topics inform student-led research and creative projects.*
ELO 4.1 *Examine, critique, and evaluate various expressions and implications of diversity, equity, inclusion, and explore a variety of lived experiences.*	*Through the historical and contemporary case studies students examine in HIST/RS 3680, they have numerous opportunities to examine, critique, and evaluate various expressions and implications of diversity, equity, and inclusion, as well as a variety of lived experiences. The cases highlight the challenges of living in religiously diverse societies, examining a range of issues and their implications. They also consider the intersections of religious difference with other categories of difference, including race and gender. For example, during the unit on US religious freedom, students consider how incarcerated Black Americans and Native Americans have experienced questions of freedom and equality in dramatically different ways than white Protestants. In a weekly reflection post, they address this question directly. In the unit on marriage and sexuality, they consider different ways that different social groups have experienced the regulation of marriage in Israel and Malaysia in ways that do not correspond simplistically to gender (e.g. different women's groups with very different perspectives on the issues).* *In their weekly reflection posts and other written assignments, students are invited to analyze the implications of different regulatory models for questions of diversity, equity, and inclusion. They do so not in a simplistic sense of assessing which model is*

	*"right" or "best" but in considering how different possible outcomes might shape the concrete lived experience of different social groups in different ways. The goal is not to determine which way of doing things is best, but to understand why different societies manage these questions in different ways and how their various expressions might lead to different outcomes in terms of diversity and inclusion. They also consider how the different social and demographic conditions of different societies shape their approaches (e.g. a historic Catholic majority in France committed to laicite confronting a growing Muslim minority, or how pluralism *within* Israeli Judaism led to a fragile and contested status quo arrangement). Again, these goals are met most directly through weekly reflection posts and students' final projects, including one prompt that invites students to consider Israel's status quo arrangement from the perspective of different social groups, including liberal feminists, Orthodox and Reform religious leaders, LGBTQ communities, interfaith couples, and others.*
***ELO 4.2** Analyze and critique the intersection of concepts of justice, difference, citizenship, and how these interact with cultural traditions, structures of power and/or advocacy for social change.*	*As students analyze specific case studies in HIST/RS 3680, they assess law's role in and capacity for enacting justice, managing difference, and constructing citizenship. This goal is met through lectures, course readings, discussion, and written assignments. For example, the unit on indigenous sovereignty and sacred space invites students to consider why liberal systems of law have rarely accommodated indigenous land claims and what this says about indigenous citizenship and justice. They also study examples of indigenous activism and resistance around these issues. At the conclusion of the unit, the neighborhood exploration assignment specifically asks students to take note of whether and how indigenous land claims are marked or acknowledged in the spaces they explore and what they learn from this about citizenship, difference, belonging, and power. In the unit on legal pluralism, marriage, and the law, students study the personal law systems in Israel and Malaysia. They consider the structures of power that privilege certain kinds of communities and identities and also encounter groups advocating for social change. In their final projects, students apply the insights they've gained to particular case studies. As they analyze their selected case studies, they are required to discuss how the cases reveal the different ways justice, difference, and citizenship intersect and how they are shaped by cultural traditions and structures of power in particular social contexts. They present their conclusions in an oral group presentation and in an individually written final paper. Finally, in their end of semester letter to professor, they reflect on how they issues might shape their own advocacy for social change in the future.*

Interdisciplinary and Integrated Collaborative Teaching Course Inventory

Overview

The GE allows students to take a single, 4+ credit course to satisfy a particular GE Theme requirement if that course includes key practices that are recognized as integrative and high impact. Courses seeking one of these designations need to provide a completed Integrative Practices Inventory at the time of course submission. This will be evaluated with the rest of the course materials (syllabus, Theme Course submission document, etc). Approved Integrative Practices courses will need to participate in assessment both for their Theme category and for their integrative practice.

Please enter text in the boxes below to describe how your class will meet the expectations of Interdisciplinary and Integrated Collaborative Teaching courses. It may be helpful to consult your Director of Undergraduate Studies or appropriate support staff person as you complete this Inventory and submit your course.

Please use language that is clear and concise and that colleagues outside of your discipline will be able to follow. You are encouraged to refer specifically to the syllabus submitted for the course, since the reviewers will also have that document. Because this document will be used in the course review and approval process, you should be *as specific as possible*, listing concrete activities, specific theories, names of scholars, titles of textbooks etc.

Accessibility

If you have a disability and have trouble accessing this document or need to receive it in another format, please reach out to Meg Daly at daly.66@osu.edu or call 614-247-8412.

Pedagogical Practices for Interdisciplinary and Integrated Collaborative Teaching Courses

Course subject & number | Chemistry 3573

Please answer the 3 questions below.

"Collaborative"
Meaning and context: Teaching partners are expected to collaborate on (1) defining the objectives for the course, (2) putting together the course materials, (3) conducting the formal instruction of students, and (4) evaluating student performance. Note that courses in which one faculty member of record convenes the course and invites one or more guest speakers to take part in the class are not considered courses taught collaboratively. (Those courses may, however, utilize outside speakers when appropriate *in addition to* the primary faculty members of record.)

In the box below, list which two or more faculty members from what departments/units within which college(s) will engage in the interdisciplinary and integrated collaborative teaching. (This information should also be readily visible on the syllabus.)

Dr. Ted M. Clark. Department of Chemistry and Biochemistry
Dr. Sophia Jeong Department of Teaching and Learning, College of Education and Human Ecology

"Interdisciplinary"
Meaning and context: Participating faculty must be from *demonstrably* different disciplines, programs, or departments. (Think along the lines of Art & Molecular Genetics, Pharmacy & History, Public Health & Music, etc.)

In the box below, explain what the distinct disciplines and contributions of each faculty member are. Furthermore, explain where and how these will show in/contribute to the course GEN Theme. (This information should also be readily visible on the syllabus.)

Statement on the Syllabus:

What makes this an Interdisciplinary Team-Taught Course?

The two instructors for this course differ in many respects, including ethnicity, gender, and academic discipline. They are experts but have different areas of expertise. What they have in common is a passion for this subject and an eagerness to learn from each other and from students in the class. They will each be active participants throughout the course, bringing different perspectives to the topics, and encouraging students to do the same by sharing their experiences and views. The course structure includes interdisciplinary high-impact pedagogical practices as specified below.

"Integrated"

Meaning and context: Interdisciplinary integrative teaching is different from multidisciplinary teaching where "faculty present their individual perspectives one after another, leaving differences in underlying assumptions unexamined and integration up to the students. In interdisciplinary courses […] faculty interact in designing a course, bringing to light and examining underlying assumptions and modifying their perspectives in the process. They also make a concerted effort to work with students in crafting an integrated synthesis of the separate parts that provides a larger, more holistic understanding of the question, problem, or issue at hand." (Klein & Newell, 12)

In the box below, explain how the faculty members will be teaching the course together by being both present during all or most course meetings (<u>at least</u> 50% of the meetings) and bringing their different disciplines and perspectives into dialogue to address the GEN Theme. Exactly where and in what manner will this happen? What kinds of assignments will the students produce that demonstrate their ability to integrate the different disciplinary questions, methods, or knowledge to address the GEN Theme at hand? Be specific. (This information should also be readily visible on the syllabus.)

As described on the syllabus, the course structure has three strands that run throughout the course: Climate science, epistemology and scientific literacy, and citizenship and community. These strands are interrelated and most weeks the strands will be "put into conversation with each other" to consider how insights in one area provide new ways to think about another area. Both instructors will be active participants throughout the semester and will each will attend all classes.

The integrated aspect of the course will go beyond the expertise of the two instructors and will include the expertise and interests of the students. In the first week of class information will be gathered about student interests and their areas of study. This is an interdisciplinary course that seeks to incorporate diverse ideas for a multifaceted topic. Connections between different disciplines and class content will be explicitly made and students will make presentations and lead in-class discussions in which they share their expertise. The "student interests" column of the Course Sequence table (see syllabus) lists a few areas where different disciplines will be integrated into the class discussion. Class discussions will be supported by two instructors who are, themselves, from different disciplines. Throughout the course it will be important to know the scientific underpinnings for the different topics and ideas we encounter. It is not sufficient to "trust the author" to get it right. In this course ideas from a host of STEM disciplines will be explored, including geology, geochemistry, atmospheric chemistry, biology, biochemistry, environmental chemistry, engineering, etc., and students will bring their own experiences and expertise into the course, be it from a STEM or a non-STEM discipline.

Two signficant assignments in the course that require integration of knowledge are the Refletction paper (20% of grade) and the Personal Action Plan (5%), which are cumulative assignments due at the end of the semester. On-going Reflection assignments (10%), which are found throughout the course, also require integration of knowledge.