



SENATE COMMITTEE ON CURRICULAR AFFAIRS
COURSE SUBMISSION AND CONSULTATION FORM

Principal Faculty Member(s) Proposing Course

Name	User ID	College	Department
Luciana Aronne	lxa9	Behrend College (BC)	Not Available
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AMY CARNEY	ABC13	Behrend College (BC)	Not Available

Academic Home: Behrend College (BC)

Type of Proposal: Add Change Drop

Message for Reviewers:

Course Designation

(STS 110N) Chemistry in World Wars I and II

Course Information

Cross-Listed Courses:

Prerequisites:

Corequisites:

Concurrents:

Recommended Preparations:

Abbreviated Title: Chemistry in World Wars
Discipline: General Education
Course Listing: Inter-Domain

Special categories for Undergraduate (001-499) courses

Foundations

- Writing/Speaking (GWS)
- Quantification (GQ)

Knowledge Domains

- Health & Wellness (GHW)
- Natural Sciences (GN)
- Arts (GA)
- Humanities (GH)
- Social and Behavioral Sciences (GS)

Additional Designations

- Bachelor of Arts
- International Cultures (IL)
- United States Cultures (US)
- Honors Course
- Common course number - x94, x95, x96, x97, x99
- Writing Across the Curriculum

First-Year Engagement Program

First-Year Seminar

Miscellaneous

Common Course

GE Learning Objectives

GenEd Learning Objective: Effective Communication

GenEd Learning Objective: Creative Thinking

GenEd Learning Objective: Crit & Analytical Think

GenEd Learning Objective: Global Learning

GenEd Learning Objective: Integrative Thinking

GenEd Learning Objective: Key Literacies

GenEd Learning Objective: Soc Resp & Ethic Reason

Bulletin Listing

Minimum Credits: 3
Maximum Credits: 3
Repeatable: NO
Department with Curricular Responsibility: Behrend College (Pre-Major) (ERBC_BCCOM)
Effective Semester: SP 2019
Travel Component: NO

Course Outline

A brief outline or overview of the course content:

Two devastating World Wars took place between 1914 and 1945. Many chemical discoveries were made during this time, and some of these inventions directly impacted the wars' outcomes, oftentimes by intensifying the destructive capacity of one or more of the belligerents. However, alongside these tragic outcomes, there were also scientific discoveries that proved beneficial to the soldiers' health, the economy, the environment, and society as a whole.

This course will examine the complex legacy of chemistry in wartime. It will assess the significant contributions that chemists on both sides made during each World War as well as the interwar period. Students will be introduced to the basic science, historical background, and legacy of each chemical innovation. They will also learn that chemistry itself is neither negative nor positive, but the choices made by politicians, military leaders, scientists, and even societies before, during, and after each war have directly impacted how each chemical discovery has shaped the world to the present day.

A listing of the major topics to be covered with an approximate length of time allotted for their discussion:

Week 1 – Introduction to the basics of chemistry
Week 2 – Introduction to the First World War
Week 3 – Gas in the war: chlorine
Week 4 – Gas in the war: chlorine continued; phosgene and mustard
Week 5 – Gas in the war: phosgene and mustard continued
Week 6 – Medicine in the war: quinine
Week 7 – Medicine in the war: quinine continued; the legacy of chemistry and WWI;
interwar: the discovery of penicillin
Week 8 – Interwar: penicillin continued; the creation of nylon
Week 9 – Interwar: nylon continued; the creation of teflon
Week 10 – Interwar nuclear science
Week 11 – Introduction to the Second World War
Week 12 – Medicine in the war: penicillin
Week 13 – Medicine: the advent of blood plasma; nuclear research by the Axis and Allied Powers
Week 14 – Nuclear chemistry and The Manhattan Project
Week 15 – War in the Pacific and the legacy of chemistry after the Second World War

Course Description:

The study and assessment of chemical developments during the First and Second World Wars will form the backbone of this course. As the course is historically focused on the period from 1914 to 1945, the students will develop a basic understanding of the significant historical events that led to the development of chemical innovations in materials, medicine, and weapons. To understand the scientific context of these developments, the students will also learn about the basics of chemistry, including recognizing the nature of the scientific process and discovery. In addition, the students will read, evaluate, and discuss primary and secondary sources to provide them with further insight into significant figures, events, and developments. These lectures, readings, and discussions (along with other assignments) will allow students to explore the ethical dimensions, the economic effects, the social consequences, and the public health impact that these scientific discoveries had on scientists, soldiers, and civilians. The students will also ascertain how many of the scientific discoveries made between 1914 and 1945 have had both beneficial applications and detrimental effects since 1945.

The name(s) of the faculty member(s) responsible for the development of the course:

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Fax:

Course Justification

Instructional, Educational, and Course Objectives:

This section should define what the student is expected to learn and what skills the student will develop.

Study and assessment of chemical developments (materials, medicines, and weapons) during the First World War, the interwar era, and the Second World War will form the backbone of the course. Students will learn not only the scientific consequences of discovering these materials, but also the economic, public health, and social effects these discoveries had on scientists, soldiers, and civilians during and after each war. For example, we will discuss nuclear chemistry, specifically the development, use, and legacy of the atomic bomb. Nuclear chemistry continues to have a profound impact today in areas including energy, medical applications, and weapons.

While the course is historically focused on the World Wars, students will develop an understanding of chemistry more generally, including recognizing the nature of the scientific process and discovery. The course will satisfy the GN domain requirement of being able to "identify societal or philosophical implications of discoveries" in this time period, "as well as their potential to address contemporary problems" by learning the fundamental basics of chemistry, including atomic and molecular structure, the role energy and electrons play in chemical processes, and the descriptive chemistry of reactions (change). They will integrate their technical understanding with an applied understanding of how wartime chemical developments influenced each war. The students will learn both the consequences of progress and scientific discovery.

Furthermore, the course will satisfy the GH domain requirement of "critically evaluating texts in the humanities" to "identify and explain moral or ethical dimensions within the disciplines of the humanities." We will explore the lives, ideologies, and decisions of the scientists who created the chemical materials, medicines, and weapons. We will also engage the ethical questions posed by wartime chemical discoveries by assessing their social, political, and environmental impact as well as the historical legacies of these innovations.

Evaluation Methods:

Include a statement that explains how the achievement of the educational objective identified above will be assessed. The procedures for determining students' grades should be specifically identified.

For the GN component, we would like our students to be able to meet the following learning criteria:

1. Have a general understanding of chemistry and chemical processes.
2. Explain the methods of inquiry in chemistry and describe how the contributions in chemistry complement history.
3. Be able to understand scientific claims and their applications.
4. Identify the societal implications of these chemical discoveries and their potential to address problems not only during each World War, but afterwards as well

For the GH component, we would like our students to be able to meet the following learning criteria:

1. Have a general understanding of the relevant historical events in the period from 1914 to 1945.
2. Think critically about topics in history and be able to communicate those thoughts through clear, concise, and thoughtful responses.

3. Assess and explain the ethical and moral concerns raised by the use of chemistry during and after the World Wars.
4. See the connections between the methods of inquiry in history and chemistry.

To assess these learning criteria, we will use a combination of quantitative and qualitative assessments.

1. Daily problems will be based on content covered in the chemistry lectures as well as material in Openstax readings. Understanding the molecular structure and function of a compound is key to understanding the impact of its historical application.
2. In-class discussions will be based on primary sources related to content covered in history lectures that students will read and assess in advance of the discussions. Many of the documents were written by scientists, while others come from soldiers and civilians who were affected by these advances in weapons, materials, and medicine.
3. One paper where students will trace the development of a specific postwar discovery in either poisonous gases (from any point after 1918) or antibiotics (from any point after 1945). Based on material from primary and secondary sources, the student will have to address the following questions:
 - a. What is the scientific discovery?
 - b. Who is responsible for this discovery?
 - c. What are the scientific and historic contexts of this discovery?
 - d. What is a specific application of this discovery?
 - e. What is the overall significance of this discovery?
4. Three exams based on the chemistry and history material covered in class lectures.

The breakdown of the assessment of the course is as follows:

- Three exams: 300 points
- Daily problems: 90 points
- Discussions: 90 points
- Paper and outline: 120 points

Relationship/Linkage of Course to Other Courses:

This statement should relate the course to existing or proposed new courses. It should provide a rationale for the level of instruction, for any prerequisites that may be specified, or for the course's role as a prerequisite for other courses.

This is a new course that is being developed for the Penn State integrated general education requirements. This course will be designated an inter-domain general education course combining chemistry (GN) and history (GH).

Relationship of Course to Major, Option, Minor, or General Education:

This statement should explain how the course will contribute to the major, option, or minor and indicate how it may function as a service course for other departments.

This is a general education course and will not affect any chemistry or history courses that are required for the major or minor in either of those disciplines. This course is an introduction to the basic chemistry covering different fields of chemistry and the history component is limited to World War I, the Interwar Period, and World War II

A description of any special facilities:

None.

Frequency of Offering and Enrollment:

At Behrend, every spring semester.

Alignment with General Education Objectives

- EFFECTIVE COMMUNICATION** – the ability to exchange information and ideas in oral, written, and visual form in ways that allow for informed and persuasive discourse that builds trust and respect among those engaged in that exchange, and helps create environments where creative ideas and problem-solving flourish.
- KEY LITERACIES** – the ability to identify, interpret, create, communicate and compute using materials in a variety of media and contexts. Literacy acquired in multiple areas, such as textual, quantitative, information/technology, health, intercultural, historical, aesthetic, linguistic (world languages), and scientific, enables individuals to achieve their goals, to develop their knowledge and potential, to lead healthy and productive lives, and to participate fully in their community and wider society.
- CRITICAL AND ANALYTICAL THINKING** – the habit of mind characterized by comprehensive exploration of issues, ideas, artifacts, and events before accepting or formulating a conclusion. It is the intellectually disciplined process of conceptualizing, applying, analyzing, synthesizing, and/or evaluating information gathered from, or generated by, observation, experience, reflection, reasoning, or communication, as a guide to belief and action.
- INTEGRATIVE THINKING** – the ability to synthesize knowledge across multiple domains, modes of inquiry, historical periods, and perspectives, as well as the ability to identify linkages between existing knowledge and new information. Individuals who engage in integrative thinking are able to transfer knowledge within and beyond their current contexts.
- CREATIVE THINKING** – the capacity to synthesize existing ideas, images, or expertise in original ways and the experience of performing, making, thinking, or acting in an imaginative way that may be characterized by innovation, divergent thinking, and intellectual risk taking.
- GLOBAL LEARNING** – the intellectually disciplined abilities to analyze similarities and differences among cultures;

evaluate natural, physical, social, cultural, historical, and economic legacies and hierarchies; and engage as community members and leaders who will continue to deal with the intricacies of an ever-changing world. Individuals should acquire the ability to analyze power; identify and critique interdependent global, regional, and local cultures and systems; and evaluate the implications for people's lives.

SOCIAL RESPONSIBILITY AND ETHICAL REASONING – the ability to assess one's own values within the social context of problems, recognize ethical issues in a variety of settings, describe how different perspectives might be applied to ethical dilemmas, and consider the ramifications of alternative actions. Individuals should acquire the self-knowledge and leadership skills needed to play a role in creating and maintaining healthy, civil, safe, and thriving communities.

What component(s) of the course will help students achieve the General Education Learning Objectives covered in the course? Provide evidence that students in the course have adequate opportunities to achieve the identified learning objectives.

Effective Communication: Students must be able to communicate relevant historic and scientific information clearly and concisely. They must also be able to listen to their peers and to engage with other points of view in a civil and respectful manner.

Integrative Thinking: While many class periods will be devoted solely to chemistry or history, the course is designed so that the students will be able to follow a narrative from one class to the next that explains the historic context of several significant developments in chemistry. For example, a basic overview of the First World War sets the groundwork to explain why belligerents on both sides turned to chemistry for a solution to their wartime problems (namely, the stalemate caused by trench warfare on the Western Front). The students will then learn the basic chemistry behind the first significant gas of the war: chlorine. This chemical knowledge, in turn, will provide the foundation for the students to understand the impact that chlorine gas had on the war (and later in the postwar era).

Social Responsibility and Ethical Reasoning: With scientific advancement comes great responsibility, both ethically and morally. Throughout this course, the students will not only learn about the historic development of several significant chemical innovations in materials, medicine, and weapons, but they will also learn about the consequences of these scientific advancements.

How will students be assessed to determine their attainment of the Learning Objective(s) of General Education covered in this course? This assessment must be included as a portion of the student's overall performance in this course.

Effective Communication: The daily problems will introduce the students to the basic language of chemistry, namely how chemical ideas are expressed through the language of mathematics. The discussions will be based on primary sources, which will allow the students to demonstrate how they have synthesized the material from the readings as well as explain how such sources help them better comprehend each topic. Every student will explain both the science and history of one topic in-depth in the paper, and the students will need to show mastery of the class content in the objective portions of the exams (i.e. short answer questions).

Integrative Thinking: Students will then gain a stronger appreciation through a discussion based on primary sources, all of which were written by the scientists who created the gas, the soldiers who came under attack with the gas, and the civilians who reported this new development on the home front. These readings and the in-class discussion will help the students further explore the relationship between a specific scientific discovery and the historical context that led to its creation and use. While the professors will lead the students through several examples and demonstrate the relationship between historical context and chemical innovation in class, each student will also have the opportunity to demonstrate mastery of both subjects in the paper assignment. Each student will choose a specific postwar innovation in either gas or antibiotics, and then, through research into relevant historical and scientific sources, the student will explore this chemical innovation in-depth and explain the historic and scientific development, application, and significance of this innovation.

Social Responsibility and Ethical Reasoning: Through the class discussions, and their individual papers, the students will address the following social and ethical questions: What are the ramifications of scientific advancement? What obligations does a scientist have to his profession, to his nation, and to society at large? How might those obligations differ during times of peace versus times of war? What roles should governments and military leaders as well as civilians have in the process of developing and using new materials, medicines, and weapons? Finally, how have these ramifications, obligations, and roles shifted over the course of the last century?

General Education Domain Criteria

General Education Designation: Inter-Domain

GH Criteria

Explain the methods of inquiry in humanities fields and describe how the contributions of these fields complement inquiry in other areas

Demonstrate competence in critical thinking about topics and texts in the humanities through clear and well-reasoned responses

Critically evaluate texts in the humanities— whether verbal, visual, or digital— and identify and explain moral or ethical dimensions within the disciplines of the humanities

Demonstrate knowledge of major cultural currents, issues, and developments through time, including evidence of exposure to unfamiliar material that challenges their curiosity and stretches their intellectual range

Become familiar with groups, individuals, ideas, or events that have influenced the experiences and values of different communities

What components of the course will help students achieve the domain criteria selected above?

Objectives 2 and 3: The students will read primary sources written not only by scientists, but by military leaders, soldiers, politicians, artists, journalists, and civilians too. This reading material will supplement the lectures in both chemistry and history by providing students with deeper insight into the individuals who influenced and/or were affected by different materials, medicines, and weapons. The students will evaluate these texts and explain their ethical dimensions during in-class discussions. They will also have the opportunity to delve in-depth into one example with their papers, which will require them to utilize primary and secondary sources in chemistry and history.

Objective 4: The students will learn about key scientific developments that took place from 1914 through 1945. They will gain knowledge of these developments through the lectures, daily problems, and discussions. Through researching and writing their papers, the students will delve into unfamiliar material that will allow them to assess a specific example of a chemical innovation

from the wartime and its continuing ramifications.

Objective 5: The major events that bookend this course are the World Wars. The students will gain a broad understanding of each war and its significance while at the same time learning about specific examples where chemistry played an important role in each conflict (as well as in the Interwar Period). They will be introduced to noteworthy people who shaped the development of each material, medicine, and weapon, and they will assess what events, values, and ideas served as catalysts for developments in chemistry in relation to the era of the World Wars.

GN Criteria

- Explain the methods of inquiry in the natural science fields and describe how the contributions of these fields complement inquiry in other areas**
- Construct evidence-based explanations of natural phenomena**
- Demonstrate informed understandings of scientific claims and their applications**
- Evaluate the quality of the data, methods, and inferences used to generate scientific knowledge**
- Identify societal or philosophical implications of discoveries in the natural sciences, as well as their potential to address contemporary problems**

What components of the course will help students achieve the domain criteria selected above?

Objective 1: The students will learn the basics of chemistry, including atomic and molecular structure, the role energy and electrons play in chemical processes, and the descriptive chemistry of reactions (change). They will learn this material through lectures, daily problems, and exams. This knowledge of chemistry will allow the students to understand the science behind each material, medicine, or weapon introduced throughout the semester.

Objective 3: With this scientific foundation, the students will be able to explore the application of each material, medicine, or weapon as well as see how this application influenced future developments. While the students will learn many examples in class, they will be able to use the paper assignment to delve in-depth into one example.

Objective 5: With a basic understanding of chemistry, the students will learn both the beneficial and detrimental consequences of scientific discovery. They will explore the societal, ethical, and moral implications of each material, medicine, and weapon. Some of this exploration will occur through class lectures, but the students will also assess the implications of chemistry through the in-class discussions and the paper.

Integrative Studies

Explain how the intellectual frameworks And methodologies of the two Knowledge Domains will be explicitly addressed in the course and practiced by the students.

The students are expected to learn the basics of chemistry, including atomic and molecular structure, the role energy and electrons play in chemical processes, and the descriptive chemistry of reactions (change). They are also expected to learn the major events during each World War. This knowledge from both chemistry and history lectures will serve as the foundation for the students to learn about a series of developments in materials, medicine, and weapons from 1914 through 1945. The students will furthermore integrate their technical understanding with an applied understanding of how wartime chemical developments impacted the politics of the day, as well as a broad understanding of the continuing ethical questions about the impact of chemical developments. The students will also learn both the beneficial and detrimental consequences of scientific discovery over the course of this specific historic period. Daily problems, discussion prompts, exams, and the paper will ensure that students will master both knowledge domains covered in this course.

Demonstrate that each Of the two domains will receive approximately equal attention, providing evidence from course topics, assignments, or other course components, and that students will integrate material from both domains.

Week 1 – Introduction to the basics of chemistry (3 GN lectures)
Week 2 – Introduction to the First World War (3 GH lectures)
Week 3 – Gas in the war: chlorine (2 GN lectures)
Week 4 – Battle of Ypres, Gas in the war: phosgene and mustard (3 GH lectures)
Week 5 – Gas in the war: phosgene and mustard continued (2 GN lectures, 1 GH lecture)
Week 6 – Discussion on gas and popular culture, Medicine in the war: quinine (1 GH lecture, 1 class exam)
Week 7 – Medicine in the war: quinine continued, The legacy of chemistry and WWI
Interwar: the discovery of penicillin (2 GN lecture, 1 GH lectures)
Week 8 – Interwar: the discovery of penicillin continued, discussion on penicillin,
Interwar: the creation of nylon (1 GN lecture, 1 GH lecture)
Week 9 spring break.
Week 10 – Interwar: the creation of nylon, Interwar: the creation of teflon (1 GN lecture, 2 GH lectures)
Week 11 – Interwar nuclear science, discussion on nuclear science during the interwar (1 GN lecture and 2 GH lectures)
Week 12 – Introduction to the Second World War (2 GH lectures and 1 exam class)
Week 13 – Medicine in the war: penicillin in the Second World War, discussion on Penicillin in WWII (1 GN lecture, 1 GH lecture)
Week 14 – Medicine: the advent of blood plasma, Nuclear research by the Axis and Allied Powers (2 GN lectures, 1 GH lecture)
Week 15 – Nuclear chemistry and The Manhattan Project (3 GN lectures)
Week 16 – War in the Pacific, discussion of the atomic bomb and The legacy of chemistry after the Second World War (1 GN lecture, 1 GH lecture)

Briefly explain the staffing plan. Given that each Inter-Domain course is approved for two Knowledge Domains, it will be taught by an instructor (or instructional team) with appropriate expertise in both domains.

To ensure a high-quality learning experience for the students, this course should be taught by one chemistry instructor and one history instructor with the appropriate subject expertise. This team-taught model will ensure that students will gain a solid foundation in each subject as well as a better understanding of how the two domains (GH and GN) relate to one another.

Describe the assessments that will be used to determine students' ability to apply integrative thinking.

The components of the course that will help students acquire the ability to apply integrative thinking are the daily problems, discussion prompts, and the paper. Students will have to learn the basics of each discipline and then be able to integrate that knowledge to defend their opinions during class discussions as well as support their arguments in their papers. By having a better understanding of chemistry, students will also be able to understand why certain events happened in the World Wars. By studying the people involved in chemical discoveries and applications, the students will have a better understanding of opposing points of view.

General Education Designation Requirements

Intercultural Requirements:

The purpose of this course is to explore the historical context of several key developments in chemistry from 1914 through 1945. Coming into this time period, science was a global endeavor, and scientific networks spanned across national boundaries. Chemistry was a key field in this international scientific culture, with several notable developments coming from Europe. Yet, the start of the First World War in 1914 caused a dramatic shift in the use of science not only by each belligerent nation, but also by the scientists themselves. As Fritz Haber, one of the chemists who will be covered in this class, is frequently quoted as saying, "A scientist belongs to his country in times of war and to all mankind in times of peace." Through each example during the First World War, the students will learn not only about the basic chemistry, but also the military, societal, and cultural contexts in which those scientific developments took place in multiple European countries. They will learn why and how chemists served their respective nations and militaries.

The use of science in the First World War had global ramifications following the war. For example, the traumatic experience of gas warfare led to the establishment of international regulations that sought to prevent such weapons from being used in future conflicts. Also, the notion of science as a global endeavor regained ground. International networks were re-established as scientists pursued new research, especially in Europe and the United States. Some of that research had applications in civilian life, while other research would soon have military value with the start of the Second World War in 1939. Here again, chemists contributed to the military efforts of both sides, although one of the key features of the Allied side was a multinational dimension: the chemists who worked on the Manhattan Project, for example, came from multiple nations, including nations in the Axis alliance. This divergence from the pattern of the First World War, where chemists served the nation of their origin, certainly influenced the development and use of materials, medicine, and weapons during this second conflict.

Overall, with a foundation in both chemistry and history, the students will learn how chemists contributed to their field in times of war and peace. They will furthermore be able to assess the moral ramifications of scientific developments over the timespan of half a century and to explore how the same scientists could shift from viewing chemistry as an international endeavor where ideas were more freely disseminated to a closed network where many of them put their nation first during times of war.

Different versions of this course may have different assessment criteria. Among the ways in which students will be able to achieve the educational objectives for IL credit are exams, quizzes and problems, discussions, and papers. Along with class lectures that will create an historic and scientific narrative of the relevant developments, these assignments will enable students to cultivate their knowledge of chemistry as both a science and a form of culture that was influenced by and in turn influenced military, political, and social affairs. They will learn how and why the needs of individual nations during both World Wars superseded the tradition of internationalism in science. They will also discover how much of the nation-based wartime research served as the foundation for postwar research with global ramifications, such as the use of nuclear technology both to create additional weapons as well as produce energy and the advancements in antibiotics since the discovery of penicillin.

Campuses That Have Offered () Over The Past 4 Years

semester	AB	AL	BK	BR	BW	CR	DS	ER	FE	GA	GV	HB	HN	HY	LV	MA	NK	PC	SH	SL	UP	WB	WC	WS	XC	XP	XS	YK
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Potential Impact

Pre-Requisites

is listed as a pre-requisite or concurrent course for the following courses:

Note: Not all courses may be listed here, due to lionpath requirement incompleteness.

No pre-requisites or concurrent courses found

STS 110N: Chemistry in the World Wars

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Office Hours:

Instructor: Dr. Alan Jircitano
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Office Hours:

Course Description: This course will examine the complex legacy of chemistry from the start of the First World War through the end of the Second World War. It will assess the significant contributions that chemists on both sides made during each World War as well as in the Interwar Period. Students will be introduced to the basic science, historical background, and legacy of each chemical innovation. They will also learn that chemistry itself is neither negative nor positive, but that the choices made by politicians, military leaders, scientists, and even societies have directly influenced how each chemical discovery has continued to shape the world.

Course Objectives:

1. Students will gain a basic understanding of the people, decisions, and events that shaped the development of chemistry during the First World War, the Interwar Period, and the Second World War.
2. Students will learn the basic chemistry behind each wartime or interwar scientific development in weapons, material, and medicine.
3. Students will examine the relationship between the developments in chemistry and the historical context of those developments.
4. Students will learn how to evaluate and discuss primary and secondary sources that are relevant to the history of chemistry.
5. Students will learn how to write effectively about topics relevant to the history of chemistry.

Texts: Chemistry textbook available via Openstax: <https://openstax.org/details/books/chemistry>. All other readings are located on Canvas under the module "CourseDocuments."

Attendance and Participation: Attending and participating in class are essential elements of the learning experience as is arriving to class every day on time. You are encouraged to participate in every class by taking notes, asking questions, and engaging in discussions. If you are lost or confused at any time, speak to one of us immediately. Do not wait until right before an exam or right before an assignment is due or to get clarification on the course material.

Exams: There will be three exams throughout the semester:

- Exam 1 – Wednesday, February 19
- Exam 2 – Monday, March 30
- Exam 3 (final exam) – TBA by the university

Each exam may consist of multiple choice questions (chemistry and history material), short answer questions (chemistry and history material), and problems (chemistry only). The final exam will not be cumulative.

Make-up Exams: If you miss an examination during the semester because of a legitimate excuse, you must contact both of us within one week of the test date in order to arrange a make-up exam. We reserve the right to give a different examination than the one offered in class, and this make-up exam may include essays. If you miss the final exam, you must contact us as soon as possible to schedule a make-up exam, which must be taken before the end of the final exam period for the university. If you need to arrange to take an examination early because of a legitimate excuse, you must contact both of us one week prior to the test date in order to arrange a time and day to take it. Vacations and travel arrangements to leave the university for spring break or at the end of the semester do not qualify as legitimate reasons to take an exam early.

Daily Problems: During each chemistry lecture, there will be one or more problems assigned. The specifics for this assignment are given below.

Writing Assignments: There will be two writing assignments: discussion questions and a paper. Specifics for each assignment are given below.

Late Submission: We will not accept daily problems, discussion questions, or the paper slid under our office doors or placed in our department mailboxes. Late assignments will lose 10 percent for every class period they are late. Late online submissions for the discussion questions and the paper will also result in a loss of points: 1 point for the questions and 5 points for the paper, and failure to submit an online draft will result in a 2 point deduction for the questions and a 10 point deduction for the paper.

If you miss turning in an assignment because of a legitimate excuse, you must contact both of us within one week of the due date. Conversely, if you have a legitimate reason and need to submit an assignment before the due date, you must receive permission in writing from one of us prior to submitting it. Failure to complete any assignment as assigned will result in a failing grade. If you have any questions about an assignment, make sure you see one of us before it is due.

Academic Integrity: No violation of the Penn State Behrend Academic Integrity Policy or the University Code of Conduct, which includes plagiarism, will be tolerated in this class. Plagiarism consists of presenting someone **else's** words or ideas as your own. Any failure to properly cite works from which you have borrowed words or ideas is plagiarism. If you plagiarize an assignment or violate the academic integrity policy in any way, you will receive academic and possibly disciplinary sanctions, including the possible awarding of an XF grade which is recorded on the transcript and states that failure of the course was due to an act of academic dishonesty. All acts of academic dishonesty are recorded so that repeat offenders can be sanctioned accordingly. If you do not understand what constitutes plagiarism or what may be a violation of the university academic integrity policy, please review the university policy at <http://psbehrend.psu.edu/intranet/faculty-resources/academic-integrity/academic-integrity>.

Assignments and Grading: Final grades will be based on a total of 600 possible points, calculated by a simple point totaling system. Grades for each assignment will be posted in the grade book on Canvas. If you have any questions regarding a specific grade, you must speak with the professor who assigned you the grade in person within one week of the grade being posted on Canvas. No point adjustments will be made after this one week period.

Grading (points):

Assignments	Point Value
Exam 1	100 points
Exam 2	100 points
Exam 3	100 points
Daily Problems	90 points
Discussions	90 points
Outline	20 points
Paper	100 points
Total	600 points

Grade Scale:

Total Points	Percentage*	Letter Grade
564-600	94-100	A
540-563	90-93	A-
522-539	87-89	B+
504-521	84-86	B
480-503	80-83	B-
462-479	77-79	C+
420-461	70-76	C
360-419	60-69	D
359 and below	59 and below	F

*Percentages are provided for your convenience, as this class (as noted above) is based on a point system.

E-mail and Canvas access: We may need to contact the entire class or an individual student via e-mail. The default e-mail address that we have is your PSU account. You are advised to check this account daily, although if you do not use your PSU account, you need to forward the e-mail from this account to an address that you do check on a regular basis. You will also need to use your PSU user name and password to access Canvas.

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 4701 College Drive Phone: 814-898-7101
 Erie, PA 16563 Fax: 814-898-6823

Bring a statement from the Office of Educational Equity and Diversity Programs the first week of class, indicating that you have registered with them. The statement should indicate the special accommodations you require.

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Financial Aid Satisfactory Academic Progress: Every semester Penn State is required by law to review your academic progress and determine your eligibility for financial aid for the future term. There are three components to making “satisfactory academic progress” for financial aid: degree status, completion rate of attempted credits, and time-to-degree limits. Degree Status: If you are dropped from degree status, which may occur if you do not maintain a “C” average, you are ineligible for state & federal student aid – including loans. Completion rate of attempted credits: You must earn a minimum of 67% of your cumulative attempted credits.

Time-to-degree: If you exceed 150 percent of the number of credits required for your degree program, you will have exceeded the time-to-degree limit. If you have questions about how your

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If you require additional information, contact:

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Course Schedule
(subject to change, if necessary)

Week:	Class Lectures and Assignments :
<i>Week 1:</i>	
M 1/13	Introduction
W 1/15	The Basics of Chemistry [C]
F 1/17	Chemistry Continued [C]
<i>Week 2:</i>	
M 1/20	No class; Martin Luther King Day
W 1/22	The Start of the Great War [H]
F 1/24	The First World War Continued [H]
<i>Week 3:</i>	
M 1/27	<i>Introduction to the paper; visit by a librarian</i>
W 1/29	The Chemistry of Chlorine [C]
F 1/31	Chlorine Continued [C]
<i>Week 4:</i>	
M 2/3	The Battle of Ypres [H]
W 2/5	<i>Primary source discussion on Chlorine / Ypres</i>
F 2/7	The Chemistry of Phosgene [C]
<i>Week 5:</i>	
M 2/10	The Use of Phosgene in the War; paper outline due [H]
W 2/12	The Chemistry of Mustard [C]
F 2/14	Mustard Gas in the War [H]
<i>Week 6:</i>	
M 2/17	<i>Primary source discussion on gas and popular culture</i>
W 2/19	Test #1
F 2/21	The Chemistry of Quinine [C]
<i>Week 7:</i>	
M 2/24	Quinine as a Medicine in Wartime [H]
W 2/26	The Legacy of Chemistry and WWI
F 2/28	The Discovery of Penicillin [H]
<i>Week 8:</i>	
M 3/2	The Chemistry of Penicillin [C]
W 3/4	<i>Primary source discussion on Penicillin</i>
F 3/6	The Discovery of Nylon [H]
<i>Week 9:</i>	March 9-13: No classes; Spring Break

|*Week 10:*

M 3/16 The Chemistry of Nylon [C]
W 3/18 The Discovery of Teflon [H]
F 3/20 The Chemistry of Teflon [C]

Week 11:

M 3/23 Nuclear Science in the Interwar Period; **paper due** [H]
W 3/25 The Chemistry of Interwar Nuclear Science [C]
F 3/27 *Primary source discussion on Interwar Nuclear Science*

Week 12:

M 3/30 **Test #2**
W 4/1 The Start of Second World War [H]
F 4/1 The Second World War Continued [H]

Week 13

M 4/6 Wartime Advancements in Penicillin [C]
W 4/8 Penicillin at War [H]
F 4/10 *Primary source discussion on penicillin in WWII*

Week 14:

M 4/13 The Development of Blood Plasma [C]
W 4/15 Blood Plasma at War [H]
F 4/17 Axis Nuclear Research [H]

Week 15:

M 4/20 Allied Nuclear Research [H]
W 4/22 Nuclear Chemistry [C]
F 4/24 Nuclear Chemistry Continued [C]

Week 16:

M 4/27 The War in the Pacific [H]
W 4/29 *Primary source discussion on the Atomic Bomb*
F 5/1 The Legacy of Chemistry and WWII

FINAL EXAM:

Finals are scheduled for the week of **May 4-8**. The university will provide the exact date and time around the fifth week of the semester.

STS 110N Daily Problems

During each chemistry lecture, you will be assigned one or more daily problems to complete. **These daily problems will be due at the beginning of the next lecture**. Please note: the next class period may be a history class; nonetheless, it is the next class period, and the daily problem will be collected at the beginning of that class period.

Each daily problem submission will consist of the original handout – do not forget to put your name and date at the top. A complete submission will also have the solution to each question; this solution is not simply just the answer to the problem, but it must also include each step of the process necessary to reach the solution. You must, however, also circle the numerical answer to each problem.

You may use your Openstax book as a reference, but unless otherwise stated, the internet is not to be used for any work pertaining to daily problems.

Each submission will be primarily graded by not only submitting the right answer(s), but by showing the correct figures and units necessary to determine each answer. Partial credit will be given for attempting, but failing to find the correct answer(s). You will not, however, receive any credit for the assignment for the following errors: not using the original handout, showing work that is inappropriate for the answer(s), including no work except the answer(s), submitting the assignment at the end of class, and/or showing minimal to no effort on the assignment.

If you have any questions regarding this assignment, feel free to visit Dr. Jircitano during his office hours or to send him an e-mail before the assignment is due.

STS 110N Discussions and Reading Questions

As noted in the course outline under “Discussion,” on six occasions throughout the semester, the class period will be spent discussing primary documents relevant to the material that we are examining in class. On those days, it is your responsibility to have read the assigned documents **prior** to the class meeting. The specific readings that you need to complete are posted on Canvas under “CourseDocuments.”

For each discussion, you must create a series of questions. You will need to write **one** question for **each** document assigned. The purpose of these questions is to demonstrate your understanding of the reading material. Therefore, it is advisable that you not simply write fact-based questions, but rather that you submit insightful and analytical queries. Each question should primarily relate to one text. However, it is permissible to relate your questions to the other texts assigned for that discussion, texts that have been assigned for prior discussions, and material that has been covered during class lectures.

Besides preparing the questions, for each submission, you must answer **one** of your questions. This answer must be approximately **two-three paragraphs** long, typed and double spaced, and it must demonstrate a mastery of the content of the document.

Each submission will be primarily graded on three criteria: one, the clarity and conciseness of your writing; two, the quality of your questions; and three, the quality of your answer.

Each set of questions is due at the beginning of class on the day of the class discussion of the assigned documents as noted in the course schedule. You must also submit an electronic copy of your questions and answer to Turnitin by midnight on the day of each respective discussion. If you have not created a user profile, you can do so at <http://www.turnitin.com>. Once you have created a profile, you will need to register for our class. The class ID is [TBA: will be set up later] and the password is **chemistry**. When you have successfully submitted a paper to Turnitin, you will receive a receipt. You must keep this receipt as it is **proof of your digital submission**.

If you have any questions regarding this assignment, feel free to visit Dr. Carney during her office hours or to send her an e-mail before the assignment is due.

STS 110N Paper

Among the topics we are learning about this semester are the development of poison gases (chlorine, phosgene, and mustard) and the discovery of penicillin. Part of the significance of each of these topics is not only their initial discovery and use, but continuing research after each respective World War. The purpose of this assignment is for you to trace the development of a specific postwar discovery in either poison gases or antibiotics. If you choose a gas, your topic must come from any point after 1918. If you choose an antibiotic, you must select a discovery since 1945.

There are two parts to this assignment, each with its own requirements and due date.

1. The first part of the assignment is an outline and a bibliography.

There is no specific format for the outline, but you must briefly address each of the following questions:

- a. What is the scientific discovery?
- b. Who is responsible for this discovery?
- c. What are the scientific and historic contexts of this discovery?
- d. What is one specific application of this discovery?
- e. What is the overall significance of this discovery?

The bibliography must have no fewer than 8 sources, with at least 4 sources from each discipline. It must be in MLA format. You can find information about MLA citation at Purdue OWL: <https://owl.english.purdue.edu/owl/resource/747/01/>.

When selecting sources, you are highly encouraged to use the resources available at Lilley Library, including its many online scholarly databases. You are also permitted to utilize online resources available from any legitimate educational, organization, or news media website. However, you must receive permission in writing in advance to use an online source; send us an e-mail with the link and a brief explanation as to why this is a suitable source. Note: it is highly advisable that you do not limit your research to either online research or encyclopedia articles. In addition to these required sources, you may utilize any assigned reading material from the Openstax chemistry book or on Canvas.

A hard copy of the outline and bibliography is due at the beginning of class on Monday, February 10. You must also submit an electronic copy to Turnitin by midnight on the day the assignment is due; please submit both the outline and the bibliography as one document. Again, do not forget to keep your Turnitin submission receipt.

The outline will be graded on the clarity of the answer to each question, and the bibliography will be graded for proper MLA format.

2. The **second part** of the assignment is a **paper**. The paper must be **between 6-8 pages** (this means a minimum of 6 full pages of text, not including the bibliography). It must also be double spaced, written in third person, in Times New Roman 12 font, stapled in the upper left corner, and have 1-inch margins.

Please note: it is possible that between the time you write the outline and the paper, your topic may have shifted, especially if you need to take into account feedback provided on the outline. Also, in the process of writing the paper, the sources on the bibliography that you submit with the outline may be different than the sources on the bibliography that you submit with the paper. This, too, is an acceptable change. Just make sure that you meet the source requirements on both bibliographies.

As you write your paper, keep in mind that to write a thorough analysis and to answer each of the required questions thoroughly, you will need to draw upon specific examples from your sources to support your argument. When discussing these examples within your paper, you will need to provide **proper citations in MLA format** for **all paraphrased and quoted material**, although quotes from your sources should be used **sparingly**. Any material from class lectures may be considered common knowledge and does not need to be cited.

As part of this assignment, you are **required** to make an appointment with a tutor in the Learning Resource Center (<http://psbehrend.psu.edu/academics/academic-services/lrc/tutoring>) to review a **complete rough draft and bibliography**. This appointment must be completed no later than Friday, March 20. On the tutor log that you will fill out during your session, there is an option for you to “send my professor a copy of this form.” You must select “yes” as otherwise we will not have a record of your visit with the tutor. Please note: if you submit an incomplete draft to the tutor, if you do not remain with the tutor during the appointment, or if the appointment is past the deadline, then you will lose 10 points from the paper. If you fail to review a draft with a tutor, then you will lose 20 points from the paper.

A hard copy of the paper is due at the beginning of class on Monday, March 23. You must also submit an electronic copy to Turnitin by midnight on the day the paper is due. Again, do not forget to keep your Turnitin submission receipt.

The paper will be primarily graded on two criteria: one, the clarity and quality of your writing; and two, the strength of your argument based on well-formulated examples from your resources.

If you have any questions regarding this assignment, make sure you ask us prior to the due dates. Either one of us is happy to review your ideas and drafts during our respective office hours or by appointment. Also, feel free to e-mail us with any questions, keeping in mind that even if you only need to contact one of us, please e-mail both of us.

STS 110N: Chemistry in the World Wars

Instructor: Dr. Amy Carney
Email: abc13@psu.edu
Phone: 814-898-6304
Office: 170 Kochel
Office Hours:

Instructor: Dr. Alan Jircitano
Email: a0j@psu.edu
Phone: 814-898-6400
Office: 33 Hammermill
Office Hours:

Course Description: This course will examine the complex legacy of chemistry from the start of the First World War through the end of the Second World War. It will assess the significant contributions that chemists on both sides made during each World War as well as in the Interwar Period. Students will be introduced to the basic science, historical background, and legacy of each chemical innovation. They will also learn that chemistry itself is neither negative nor positive, but that the choices made by politicians, military leaders, scientists, and even societies have directly influenced how each chemical discovery has continued to shape the world.

Course Objectives:

1. Students will gain a basic understanding of the people, decisions, and events that shaped the development of chemistry during the First World War, the Interwar Period, and the Second World War.
2. Students will learn the basic chemistry behind each wartime or interwar scientific development in weapons, material, and medicine.
3. Students will examine the relationship between the developments in chemistry and the historical context of those developments.
4. Students will learn how to evaluate and discuss primary and secondary sources that are relevant to the history of chemistry.
5. Students will learn how to write effectively about topics relevant to the history of chemistry.

Texts: Chemistry textbook available via Openstax: <https://openstax.org/details/books/chemistry>. All other readings are located on Canvas under the module "CourseDocuments."

Attendance and Participation: Attending and participating in class are essential elements of the learning experience as is arriving to class every day on time. You are encouraged to participate in every class by taking notes, asking questions, and engaging in discussions. If you are lost or confused at any time, speak to one of us immediately. Do not wait until right before an exam or right before an assignment is due or to get clarification on the course material.

Exams: There will be three exams throughout the semester:

- Exam 1 – Wednesday, February 19
- Exam 2 – Monday, March 30
- Exam 3 (final exam) – TBA by the university

Each exam may consist of multiple choice questions (chemistry and history material), short answer questions (chemistry and history material), and problems (chemistry only). The final exam will not be cumulative.

Make-up Exams: If you miss an examination during the semester because of a legitimate excuse, you must contact both of us within one week of the test date in order to arrange a make-up exam. We reserve the right to give a different examination than the one offered in class, and this make-up exam may include essays. If you miss the final exam, you must contact us as soon as possible to schedule a make-up exam, which must be taken before the end of the final exam period for the university. If you need to arrange to take an examination early because of a legitimate excuse, you must contact both of us one week prior to the test date in order to arrange a time and day to take it. Vacations and travel arrangements to leave the university for spring break or at the end of the semester do not qualify as legitimate reasons to take an exam early.

Daily Problems: During each chemistry lecture, there will be one or more problems assigned. The specifics for this assignment are given below.

Writing Assignments: There will be two writing assignments: discussion questions and a paper. Specifics for each assignment are given below.

Late Submission: We will not accept daily problems, discussion questions, or the paper slid under our office doors or placed in our department mailboxes. Late assignments will lose 10 percent for every class period they are late. Late online submissions for the discussion questions and the paper will also result in a loss of points: 1 point for the questions and 5 points for the paper, and failure to submit an online draft will result in a 2 point deduction for the questions and a 10 point deduction for the paper.

If you miss turning in an assignment because of a legitimate excuse, you must contact both of us within one week of the due date. Conversely, if you have a legitimate reason and need to submit an assignment before the due date, you must receive permission in writing from one of us prior to submitting it. Failure to complete any assignment as assigned will result in a failing grade. If you have any questions about an assignment, make sure you see one of us before it is due.

Academic Integrity: No violation of the Penn State Behrend Academic Integrity Policy or the University Code of Conduct, which includes plagiarism, will be tolerated in this class. Plagiarism consists of presenting someone **else's** words or ideas as your own. Any failure to properly cite works from which you have borrowed words or ideas is plagiarism. If you plagiarize an assignment or violate the academic integrity policy in any way, you will receive academic and possibly disciplinary sanctions, including the possible awarding of an XF grade which is recorded on the transcript and states that failure of the course was due to an act of academic dishonesty. All acts of academic dishonesty are recorded so that repeat offenders can be sanctioned accordingly. If you do not understand what constitutes plagiarism or what may be a violation of the university academic integrity policy, please review the university policy at <http://psbehrend.psu.edu/intranet/faculty-resources/academic-integrity/academic-integrity>.

Assignments and Grading: Final grades will be based on a total of 600 possible points, calculated by a simple point totaling system. Grades for each assignment will be posted in the grade book on Canvas. If you have any questions regarding a specific grade, you must speak with the professor who assigned you the grade in person within one week of the grade being posted on Canvas. No point adjustments will be made after this one week period.

Grading (points):

Assignments	Point Value
Exam 1	100 points
Exam 2	100 points
Exam 3	100 points
Daily Problems	90 points
Discussions	90 points
Outline	20 points
Paper	100 points
Total	600 points

Grade Scale:

Total Points	Percentage*	Letter Grade
564-600	94-100	A
540-563	90-93	A-
522-539	87-89	B+
504-521	84-86	B
480-503	80-83	B-
462-479	77-79	C+
420-461	70-76	C
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<i>Week 3:</i>	
M 1/27	<i>Introduction to the paper; visit by a librarian</i>
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F 1/31	Chlorine Continued [C]
<i>Week 4:</i>	
M 2/3	The Battle of Ypres [H]
W 2/5	<i>Primary source discussion on Chlorine / Ypres</i>
F 2/7	The Chemistry of Phosgene [C]
<i>Week 5:</i>	
M 2/10	The Use of Phosgene in the War; paper outline due [H]
W 2/12	The Chemistry of Mustard [C]
F 2/14	Mustard Gas in the War [H]
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M 2/17	<i>Primary source discussion on gas and popular culture</i>
W 2/19	Test #1
F 2/21	The Chemistry of Quinine [C]
<i>Week 7:</i>	
M 2/24	Quinine as a Medicine in Wartime [H]
W 2/26	The Legacy of Chemistry and WWI
F 2/28	The Discovery of Penicillin [H]
<i>Week 8:</i>	
M 3/2	The Chemistry of Penicillin [C]
W 3/4	<i>Primary source discussion on Penicillin</i>
F 3/6	The Discovery of Nylon [H]
<i>Week 9:</i>	March 9-13: No classes; Spring Break

|*Week 10:*

M 3/16 The Chemistry of Nylon [C]
W 3/18 The Discovery of Teflon [H]
F 3/20 The Chemistry of Teflon [C]

Week 11:

M 3/23 Nuclear Science in the Interwar Period; **paper due** [H]
W 3/25 The Chemistry of Interwar Nuclear Science [C]
F 3/27 *Primary source discussion on Interwar Nuclear Science*

Week 12:

M 3/30 **Test #2**
W 4/1 The Start of Second World War [H]
F 4/1 The Second World War Continued [H]

Week 13

M 4/6 Wartime Advancements in Penicillin [C]
W 4/8 Penicillin at War [H]
F 4/10 *Primary source discussion on penicillin in WWII*

Week 14:

M 4/13 The Development of Blood Plasma [C]
W 4/15 Blood Plasma at War [H]
F 4/17 Axis Nuclear Research [H]

Week 15:

M 4/20 Allied Nuclear Research [H]
W 4/22 Nuclear Chemistry [C]
F 4/24 Nuclear Chemistry Continued [C]

Week 16:

M 4/27 The War in the Pacific [H]
W 4/29 *Primary source discussion on the Atomic Bomb*
F 5/1 The Legacy of Chemistry and WWII

FINAL EXAM:

Finals are scheduled for the week of **May 4-8**. The university will provide the exact date and time around the fifth week of the semester.

STS 110N Daily Problems

During each chemistry lecture, you will be assigned one or more daily problems to complete. **These daily problems will be due at the beginning of the next lecture**. Please note: the next class period may be a history class; nonetheless, it is the next class period, and the daily problem will be collected at the beginning of that class period.

Each daily problem submission will consist of the original handout – do not forget to put your name and date at the top. A complete submission will also have the solution to each question; this solution is not simply just the answer to the problem, but it must also include each step of the process necessary to reach the solution. You must, however, also circle the numerical answer to each problem.

You may use your Openstax book as a reference, but unless otherwise stated, the internet is not to be used for any work pertaining to daily problems.

Each submission will be primarily graded by not only submitting the right answer(s), but by showing the correct figures and units necessary to determine each answer. Partial credit will be given for attempting, but failing to find the correct answer(s). You will not, however, receive any credit for the assignment for the following errors: not using the original handout, showing work that is inappropriate for the answer(s), including no work except the answer(s), submitting the assignment at the end of class, and/or showing minimal to no effort on the assignment.

If you have any questions regarding this assignment, feel free to visit Dr. Jircitano during his office hours or to send him an e-mail before the assignment is due.

STS 110N Discussions and Reading Questions

As noted in the course outline under “Discussion,” on six occasions throughout the semester, the class period will be spent discussing primary documents relevant to the material that we are examining in class. On those days, it is your responsibility to have read the assigned documents **prior** to the class meeting. The specific readings that you need to complete are posted on Canvas under “CourseDocuments.”

For each discussion, you must create a series of questions. You will need to write **one** question for **each** document assigned. The purpose of these questions is to demonstrate your understanding of the reading material. Therefore, it is advisable that you not simply write fact-based questions, but rather that you submit insightful and analytical queries. Each question should primarily relate to one text. However, it is permissible to relate your questions to the other texts assigned for that discussion, texts that have been assigned for prior discussions, and material that has been covered during class lectures.

Besides preparing the questions, for each submission, you must answer **one** of your questions. This answer must be approximately **two-three paragraphs** long, typed and double spaced, and it must demonstrate a mastery of the content of the document.

Each submission will be primarily graded on three criteria: one, the clarity and conciseness of your writing; two, the quality of your questions; and three, the quality of your answer.

Each set of questions is due at the beginning of class on the day of the class discussion of the assigned documents as noted in the course schedule. You must also submit an electronic copy of your questions and answer to Turnitin by midnight on the day of each respective discussion. If you have not created a user profile, you can do so at <http://www.turnitin.com>. Once you have created a profile, you will need to register for our class. The class ID is [TBA: will be set up later] and the password is **chemistry**. When you have successfully submitted a paper to Turnitin, you will receive a receipt. You must keep this receipt as it is **proof of your digital submission**.

If you have any questions regarding this assignment, feel free to visit Dr. Carney during her office hours or to send her an e-mail before the assignment is due.

STS 110N Paper

Among the topics we are learning about this semester are the development of poison gases (chlorine, phosgene, and mustard) and the discovery of penicillin. Part of the significance of each of these topics is not only their initial discovery and use, but continuing research after each respective World War. The purpose of this assignment is for you to trace the development of a specific postwar discovery in either poison gases or antibiotics. If you choose a gas, your topic must come from any point after 1918. If you choose an antibiotic, you must select a discovery since 1945.

There are two parts to this assignment, each with its own requirements and due date.

1. The first part of the assignment is an outline and a bibliography.

There is no specific format for the outline, but you must briefly address each of the following questions:

- a. What is the scientific discovery?
- b. Who is responsible for this discovery?
- c. What are the scientific and historic contexts of this discovery?
- d. What is one specific application of this discovery?
- e. What is the overall significance of this discovery?

The bibliography must have no fewer than 8 sources, with at least 4 sources from each discipline. It must be in MLA format. You can find information about MLA citation at Purdue OWL: <https://owl.english.purdue.edu/owl/resource/747/01/>.

When selecting sources, you are highly encouraged to use the resources available at Lilley Library, including its many online scholarly databases. You are also permitted to utilize online resources available from any legitimate educational, organization, or news media website. However, you must receive permission in writing in advance to use an online source; send us an e-mail with the link and a brief explanation as to why this is a suitable source. Note: it is highly advisable that you do not limit your research to either online research or encyclopedia articles. In addition to these required sources, you may utilize any assigned reading material from the Openstax chemistry book or on Canvas.

A hard copy of the outline and bibliography is due at the beginning of class on Monday, February 10. You must also submit an electronic copy to Turnitin by midnight on the day the assignment is due; please submit both the outline and the bibliography as one document. Again, do not forget to keep your Turnitin submission receipt.

The outline will be graded on the clarity of the answer to each question, and the bibliography will be graded for proper MLA format.

2. The **second part** of the assignment is a **paper**. The paper must be **between 6-8 pages** (this means a minimum of 6 full pages of text, not including the bibliography). It must also be double spaced, written in third person, in Times New Roman 12 font, stapled in the upper left corner, and have 1-inch margins.

Please note: it is possible that between the time you write the outline and the paper, your topic may have shifted, especially if you need to take into account feedback provided on the outline. Also, in the process of writing the paper, the sources on the bibliography that you submit with the outline may be different than the sources on the bibliography that you submit with the paper. This, too, is an acceptable change. Just make sure that you meet the source requirements on both bibliographies.

As you write your paper, keep in mind that to write a thorough analysis and to answer each of the required questions thoroughly, you will need to draw upon specific examples from your sources to support your argument. When discussing these examples within your paper, you will need to provide **proper citations in MLA format** for **all paraphrased and quoted material**, although quotes from your sources should be used **sparingly**. Any material from class lectures may be considered common knowledge and does not need to be cited.

As part of this assignment, you are **required** to make an appointment with a tutor in the Learning Resource Center (<http://psbehrend.psu.edu/academics/academic-services/lrc/tutoring>) to review a **complete rough draft and bibliography**. This appointment must be completed no later than Friday, March 20. On the tutor log that you will fill out during your session, there is an option for you to "send my professor a copy of this form." You must select "yes" as otherwise we will not have a record of your visit with the tutor. Please note: if you submit an incomplete draft to the tutor, if you do not remain with the tutor during the appointment, or if the appointment is past the deadline, then you will lose 10 points from the paper. If you fail to review a draft with a tutor, then you will lose 20 points from the paper.

A hard copy of the paper is due at the beginning of class on Monday, March 23. You must also submit an electronic copy to Turnitin by midnight on the day the paper is due. Again, do not forget to keep your Turnitin submission receipt.

The paper will be primarily graded on two criteria: one, the clarity and quality of your writing; and two, the strength of your argument based on well-formulated examples from your resources.

If you have any questions regarding this assignment, make sure you ask us prior to the due dates. Either one of us is happy to review your ideas and drafts during our respective office hours or by appointment. Also, feel free to e-mail us with any questions, keeping in mind that even if you only need to contact one of us, please e-mail both of us.

STS 110N: Chemistry in the World Wars

Instructor: Dr. Amy Carney
Email: abc13@psu.edu
Phone: 814-898-6304
Office: 170 Kocheł
Office Hours:

Instructor: Dr. Alan Jircitano
Email: a0j@psu.edu
Phone: 814-898-6400
Office: 33 Hammermill
Office Hours:

Course Description: This course will examine the complex legacy of chemistry from the start of the First World War through the end of the Second World War. It will assess the significant contributions that chemists on both sides made during each World War as well as in the Interwar Period. Students will be introduced to the basic science, historical background, and legacy of each chemical innovation. They will also learn that chemistry itself is neither negative nor positive, but that the choices made by politicians, military leaders, scientists, and even societies have directly influenced how each chemical discovery has continued to shape the world.

Course Learning Objectives:

1. Students will gain a basic understanding of the people, decisions, and events that shaped the development of chemistry during the First World War, the Interwar Period, and the Second World War.
2. Students will learn the basic chemistry behind each wartime or interwar scientific development in weapons, material, and medicine.
3. Students will examine the relationship between the developments in chemistry and the historical context of those developments.
4. Students will learn how to evaluate and discuss primary and secondary sources that are relevant to the history of chemistry.
5. Students will learn how to write effectively about topics relevant to the history of chemistry.

Credits: 3

Prerequisites: none

Course Attributes / Designations: GenEd, IL, N (Integrative)

Texts: Chemistry textbook available via Openstax: <https://openstax.org/details/books/chemistry>. All other readings are located on Canvas under the module “Course Documents.”

Attendance and Participation: Attending and participating in class are essential elements of the learning experience as is arriving to class every day on time. You are encouraged to participate in every class by taking notes, asking questions, and engaging in discussions. If you are lost or confused at any time, speak to one of us immediately. Do not wait until right before an exam or right before an assignment is due or to get clarification on the course material.

Exams: There will be three exams throughout the semester:

- Exam 1 – Wednesday, February 19
- Exam 2 – Monday, March 30
- Exam 3 (final exam) – TBA by the university

Each exam may consist of multiple choice questions (chemistry and history material), short answer questions (chemistry and history material), and problems (chemistry only). The final exam will not be cumulative.

Make-up Exams: If you miss an examination during the semester because of a legitimate excuse, you must contact both of us within one week of the test date in order to arrange a make-up exam. We reserve the right to give a different examination than the one offered in class, and this make-up exam may include essays. If you miss the final exam, you must contact us as soon as possible to schedule a make-up exam, which must be taken before the end of the final exam period for the university. If you need to arrange to take an examination early because of a legitimate excuse, you must contact both of us one week prior to the test date in order to arrange a time and day to take it. Vacations and travel arrangements to leave the university for spring break or at the end of the semester do not qualify as legitimate reasons to take an exam early.

Daily Problems: During each chemistry lecture, there will be one or more problems assigned. The specifics for this assignment are given below.

Writing Assignments: There will be two writing assignments: discussion questions and a paper. Specifics for each assignment are given below.

Late Submission: We will not accept daily problems, discussion questions, or the paper slid under our office doors or placed in our department mailboxes. Late assignments will lose 10 percent for every class period they are late. Late online submissions for the discussion questions and the paper will also result in a loss of points: 1 point for the questions and 5 points for the paper, and failure to submit an online draft will result in a 2 point deduction for the questions and a 10 point deduction for the paper.

If you miss turning in an assignment because of a legitimate excuse, you must contact both of us within one week of the due date. Conversely, if you have a legitimate reason and need to submit an assignment before the due date, you must receive permission in writing from one of us prior to submitting it. Failure to complete any assignment as assigned will result in a failing grade. If you have any questions about an assignment, make sure you see one of us before it is due.

Academic Integrity: No violation of the Penn State Behrend Academic Integrity Policy or the University Code of Conduct, which includes plagiarism, will be tolerated in this class. Plagiarism consists of presenting someone else's words or ideas as your own. Any failure to properly cite works from which you have borrowed words or ideas is plagiarism. If you plagiarize an assignment or violate the academic integrity policy in any way, you will receive academic and possibly disciplinary sanctions, including the possible awarding of an XF grade which is recorded on the transcript and states that failure of the course was due to an act of academic dishonesty. All acts of academic dishonesty are recorded so that repeat offenders can be

sanctioned accordingly. If you do not understand what constitutes plagiarism or what may be a violation of the university academic integrity policy, please review the university policy at <http://psbehrend.psu.edu/intranet/faculty-resources/academic-integrity/academic-integrity>.

Assignments and Grading: Final grades will be based on a total of 600 possible points, calculated by a simple point totaling system. Grades for each assignment will be posted in the grade book on Canvas. If you have any questions regarding a specific grade, you must speak with the professor who assigned you the grade in person within one week of the grade being posted on Canvas. No point adjustments will be made after this one week period.

Grading (points):

Assignments	Point Value
Exam 1	100 points
Exam 2	100 points
Exam 3	100 points
Daily Problems	90 points
Discussions	90 points
Outline	20 points
Paper	100 points
Total	600 points

Grade Scale:

Total Points	Percentage*	Letter Grade
564-600	94-100	A
540-563	90-93	A-
522-539	87-89	B+
504-521	84-86	B
480-503	80-83	B-
462-479	77-79	C+
420-461	70-76	C
360-419	60-69	D
359 and below	59 and below	F

*Percentages are provided for your convenience, as this class (as noted above) is based on a point system.

E-mail and Canvas access: We may need to contact the entire class or an individual student via e-mail. The default e-mail address that we have is your PSU account. You are advised to check this account daily, although if you do not use your PSU account, you need to forward the e-mail from this account to an address that you do check on a regular basis. You will also need to use your PSU user name and password to access Canvas.

Students with Disabilities: Students with disabilities covered by the Americans with Disabilities Act should follow these steps:

Provide documentation to the Office of Educational Equity and Diversity Programs
 Reed 1, First Floor, Reed Union Building
 4701 College Drive
 Erie, PA 16563
 Phone: 814-898-7101
 Fax: 814-898-6823

Bring a statement from the Office of Educational Equity and Diversity Programs the first week of class, indicating that you have registered with them. The statement should indicate the special accommodations you require.

Electronic Devices: Out of respect for fellow students, turn off all electronic devices during class. Laptops are permitted, but they should be used for note taking purposes only. No electronic device is permitted during exams.

Financial Aid Satisfactory Academic Progress: Every semester Penn State is required by law to review your academic progress and determine your eligibility for financial aid for the future term. There are three components to making “satisfactory academic progress” for financial aid: degree status, completion rate of attempted credits, and time-to-degree limits. Degree Status: If you are dropped from degree status, which may occur if you do not maintain a “C” average, you are ineligible for state & federal student aid – including loans. Completion rate of attempted credits: You must earn a minimum of 67% of your cumulative attempted credits. Time-to-degree: If you exceed 150 percent of the number of credits required for your degree program, you will have exceeded the time-to-degree limit. If you have questions about how your academic actions can affect your financial aid, contact the Financial Aid Office, located on the 2nd floor of the Metzgar Center, at 898-6162 or behrendfinaid@psu.edu.

Counseling and Psychological Services: Many students at Penn State face personal challenges or have psychological needs that may interfere with their academic progress, social development, or emotional wellbeing. The university offers a variety of confidential services to help you through difficult times, including individual and group counseling, crisis intervention, consultations, online chats, and mental health screenings. These services are provided by staff who welcome all students, embrace a philosophy respectful of clients’ cultural and religious backgrounds, and are sensitive to differences in race, ability, gender identity, and sexual orientation.

If you require additional information, contact:

The Behrend Personal Counseling Office: Reed 1, 814-898-6504 (Monday-Friday, 8am-5pm)

The Penn State Crisis Line: 877-229-6400 (24/7)

The Crisis Text Line: Text LIONS to 741741 (24/7)

Safe Harbor Behavioral Health: 814-456-2014 (24/7)

Educational Equity / Reporting Instances of Bias: Penn State takes great pride to foster a diverse and inclusive environment for students, faculty, and staff. Acts of intolerance, discrimination, or harassment due to age, ancestry, color, disability, gender, gender identity, national origin, race, religious belief, sexual orientation, or veteran status are not tolerated and can be reported to Educational Equity via the Report Bias webpage (<http://equity.psu.edu/reportbias/>).

Course Schedule
(subject to change, if necessary)

Week:	Class Lectures and Assignments:
<i>Week 1:</i>	
M 1/13	Introduction
W 1/15	The Basics of Chemistry [C]
F 1/17	Chemistry Continued [C]
<i>Week 2:</i>	
M 1/20	No class; Martin Luther King Day
W 1/22	The Start of the Great War [H]
F 1/24	The First World War Continued [H]
<i>Week 3:</i>	
M 1/27	<i>Introduction to the paper; visit by a librarian</i>
W 1/29	The Chemistry of Chlorine [C]
F 1/31	Chlorine Continued [C]
<i>Week 4:</i>	
M 2/3	The Battle of Ypres [H]
W 2/5	<i>Primary source discussion on Chlorine / Ypres</i>
F 2/7	The Chemistry of Phosgene [C]
<i>Week 5:</i>	
M 2/10	The Use of Phosgene in the War; paper outline due [H]
W 2/12	The Chemistry of Mustard [C]
F 2/14	Mustard Gas in the War [H]
<i>Week 6:</i>	
M 2/17	<i>Primary source discussion on gas and popular culture</i>
W 2/19	Test #1
F 2/21	The Chemistry of Quinine [C]
<i>Week 7:</i>	
M 2/24	Quinine as a Medicine in Wartime [H]
W 2/26	The Legacy of Chemistry and WWI
F 2/28	The Discovery of Penicillin [H]
<i>Week 8:</i>	
M 3/2	The Chemistry of Penicillin [C]
W 3/4	<i>Primary source discussion on Penicillin</i>
F 3/6	The Discovery of Nylon [H]
<i>Week 9:</i>	March 9-13: No classes; Spring Break

\Week 10:

M 3/16 The Chemistry of Nylon [C]
W 3/18 The Discovery of Teflon [H]
F 3/20 The Chemistry of Teflon [C]

Week 11:

M 3/23 Nuclear Science in the Interwar Period; **paper due** [H]
W 3/25 The Chemistry of Interwar Nuclear Science [C]
F 3/27 *Primary source discussion on Interwar Nuclear Science*

Week 12:

M 3/30 **Test #2**
W 4/1 The Start of Second World War [H]
F 4/1 The Second World War Continued [H]

Week 13

M 4/6 Wartime Advancements in Penicillin [C]
W 4/8 Penicillin at War [H]
F 4/10 *Primary source discussion on penicillin in WWII*

Week 14:

M 4/13 The Development of Blood Plasma [C]
W 4/15 Blood Plasma at War [H]
F 4/17 Axis Nuclear Research [H]

Week 15:

M 4/20 Allied Nuclear Research [H]
W 4/22 Nuclear Chemistry [C]
F 4/24 Nuclear Chemistry Continued [C]

Week 16:

M 4/27 The War in the Pacific [H]
W 4/29 *Primary source discussion on the Atomic Bomb*
F 5/1 The Legacy of Chemistry and WWII

FINAL EXAM: Finals are scheduled for the week of **May 4-8**. The university will provide the exact date and time around the fifth week of the semester.

STS 110N Daily Problems

During each chemistry lecture, you will be assigned one or more daily problems to complete. **These daily problems will be due at the beginning of the next lecture.** Please note: the next class period may be a history class; nonetheless, it is the next class period, and the daily problem will be collected at the beginning of that class period.

Each daily problem submission will consist of the original handout – do not forget to put your name and date at the top. A complete submission will also have the solution to each question; this solution is not simply just the answer to the problem, but it must also include each step of the process necessary to reach the solution. You must, however, also circle the numerical answer to each problem.

You may use your Openstax book as a reference, but unless otherwise stated, the internet is not to be used for any work pertaining to daily problems.

Each submission will be primarily graded by not only submitting the right answer(s), but by showing the correct figures and units necessary to determine each answer. Partial credit will be given for attempting, but failing to find the correct answer(s). You will not, however, receive any credit for the assignment for the following errors: not using the original handout, showing work that is inappropriate for the answer(s), including no work except the answer(s), submitting the assignment at the end of class, and/or showing minimal to no effort on the assignment.

If you have any questions regarding this assignment, feel free to visit Dr. Jircitano during his office hours or to send him an e-mail before the assignment is due.

STS 110N Discussions and Reading Questions

As noted in the course outline under “Discussion,” on six occasions throughout the semester, the class period will be spent discussing primary documents relevant to the material that we are examining in class. On those days, it is your responsibility to have read the assigned documents **prior** to the class meeting. The specific readings that you need to complete are posted on Canvas under “Course Documents.”

For each discussion, you must create a series of questions. You will need to write **one** question for **each** document assigned. The purpose of these questions is to demonstrate your understanding of the reading material. Therefore, it is advisable that you not simply write fact-based questions, but rather that you submit insightful and analytical queries. Each question should primarily relate to one text. However, it is permissible to relate your questions to the other texts assigned for that discussion, texts that have been assigned for prior discussions, and material that has been covered during class lectures.

Besides preparing the questions, for each submission, you must answer **one** of your questions. This answer must be approximately **two-three paragraphs** long, typed and double spaced, and it must demonstrate a mastery of the content of the document.

Each submission will be primarily graded on three criteria: one, the clarity and conciseness of your writing; two, the quality of your questions; and three, the quality of your answer.

Each set of questions is due at the beginning of class on the day of the class discussion of the assigned documents as noted in the course schedule. You must also submit an electronic copy of your questions and answer to Turnitin by midnight on the day of each respective discussion. If you have not created a user profile, you can do so at <http://www.turnitin.com>. Once you have created a profile, you will need to register for our class. The class ID is [TBA: will be set up later] and the password is **chemistry**. When you have successfully submitted a paper to Turnitin, **you will receive a receipt.** You must **keep this receipt** as it is **proof of your digital submission.**

If you have any questions regarding this assignment, feel free to visit Dr. Carney during her office hours or to send her an e-mail before the assignment is due.

STS 110N Paper

Among the topics we are learning about this semester are the development of poison gases (chlorine, phosgene, and mustard) and the discovery of penicillin. Part of the significance of each of these topics is not only their initial discovery and use, but continuing research after each respective World War. The purpose of this assignment is for you to trace the development of a specific postwar discovery in **either** poison gases or antibiotics. **If you choose a gas, your topic must come from any point after 1918. If you choose an antibiotic, you must select a discovery since 1945.**

There are **two parts to this assignment**, each with its own requirements and due date.

1. The **first part** of the assignment is **an outline and a bibliography**.

There is no specific format for the outline, but you must briefly address each of the following questions:

- a. What is the scientific discovery?
- b. Who is responsible for this discovery?
- c. What are the scientific and historic contexts of this discovery?
- d. What is one specific application of this discovery?
- e. What is the overall significance of this discovery?

The bibliography must have no fewer than **8 sources**, with at least 4 sources from each discipline. It must be in **MLA format**. You can find information about MLA citation at Purdue OWL: <https://owl.english.purdue.edu/owl/resource/747/01/>.

When selecting sources, you are highly encouraged to use the resources available at Lilley Library, including its many online scholarly databases. You are also permitted to utilize online resources available from any legitimate educational, organization, or news media website. However, you must receive permission in writing in advance to use an online source; send us an e-mail with the link and a brief explanation as to why this is a suitable source. Note: it is highly advisable that you do not limit your research to either online research or encyclopedia articles. In addition to these required sources, you may utilize any assigned reading material from the Openstax chemistry book or on Canvas.

A hard copy of the outline and bibliography is due at the beginning of class on **Monday, February 10**. You must also submit an electronic copy to Turnitin by midnight on the day the assignment is due; please submit both the outline and the bibliography as one document. Again, do not forget to keep your Turnitin submission receipt.

The outline will be graded on the clarity of the answer to each question, and the bibliography will be graded for proper MLA format.

2. The **second part** of the assignment is **a paper**. The paper must be **between 6-8 pages** (this means a minimum of 6 full pages of text, not including the bibliography). It must also be double spaced, written in third person, in Times New Roman 12 font, stapled in the upper left corner, and have 1-inch margins.

Please note: it is possible that between the time you write the outline and the paper, your topic may have shifted, especially if you need to take into account feedback provided on the outline. Also, in the process of writing the paper, the sources on the bibliography that you submit with the outline may be different than the sources on the bibliography that you submit with the paper. This, too, is an acceptable change. Just make sure that you meet the source requirements on both bibliographies.

As you write your paper, keep in mind that to write a thorough analysis and to answer each of the required questions thoroughly, you will need to draw upon specific examples from your sources to support your argument. When discussing these examples within your paper, you will need to provide **proper citations in MLA format** for **all paraphrased and quoted material**, although quotes from your sources should be used **sparingly**. Any material from class lectures may be considered common knowledge and does not need to be cited.

As part of this assignment, you are **required** to make an appointment with a tutor in the Learning Resource Center (<http://psbehrend.psu.edu/academics/academic-services/lrc/tutoring>) to review **a complete rough draft and bibliography**. This appointment must be completed **no later than Friday, March 20**. On the tutor log that you will fill out during your session, there is an option for you to “send my professor a copy of this form.” You must select “yes” as otherwise we will not have a record of your visit with the tutor. Please note: if you submit an incomplete draft to the tutor, if you do not remain with the tutor during the appointment, or if the appointment is past the deadline, then you will lose 10 points from the paper. If you fail to review a draft with a tutor, then you will lose 20 points from the paper.

A hard copy of the paper is due at the beginning of class on Monday, March 23. You must also submit an electronic copy to Turnitin by midnight on the day the paper is due. Again, do not forget to keep your Turnitin submission receipt.

The paper will be primarily graded on two criteria: one, the clarity and quality of your writing; and two, the strength of your argument based on well-formulated examples from your resources.

If you have any questions regarding this assignment, make sure you ask us prior to the due dates. Either one of us is happy to review your ideas and drafts during our respective office hours or by appointment. Also, feel free to e-mail us with any questions, keeping in mind that even if you only need to contact one of us, please e-mail both of us.