

# CHEM 150

## Culprit or Cure: Environmental Impacts of Chemistry

### Spring 2018 Syllabus

**Instructor: Nathanael M. Kidwell**

*Office:* ISC 1287, (757)221-1701

*Email:* nmkidwell@wm.edu

(include CHEM 150 in subject line)

*Office Hours:* TR: 11-12pm; or by appointment

Please email times when you are  
available to meet

**Course Information**

*Class Meetings:* TR 9:30 - 10:50 am

*Class Location:* ISC 0248

*Website:* Course information will be  
posted on Blackboard

## Course Description and Goals

This course will explore the chemical principles related to the issues and solutions of environmental and energy science. In particular, we will develop an understanding of the composition of the atmosphere, the chemistry of global warming, and the protection of the ozone layer. Furthermore, we will study traditional fuels and energy utilization, water supply and acid rain, and renewable energy sources. As this course satisfies the writing requirement, students will develop critical thinking, analytical writing, and presentation skills by evaluating course-relevant scientific literature and media sources. In a broader context, students will improve their ability to better assess the risks and benefits of socially-relevant issues and to make informed decisions about technology-based matters.

## Writing Requirement

This course will satisfy the College writing proficiency requirement for students receiving a grade of C- or better. There will be frequent opportunities to write. There will also be frequent opportunities to receive feedback on one's writing, both from other students and from the instructor.

## Required Texts

*Scientific Writing and Communication: Papers, Proposals, and Presentations* by Angelika Hoffman; Oxford University Press, 2016. ISBN: 0190278544.

*Chemistry in Context: Applying Chemistry to Society, 8<sup>th</sup> Edition* by Catherine H. Middlecamp; McGraw-Hill Education, 2015. ISBN: 007352297X.

*Environmental Success Stories: Solving Major Ecological Problems and Confronting Climate Change* by Frank M. Dunnivant; Columbia University Press, 2017. ISBN: 0231179197.

*Alternative Energy: Political, Economic, and Social Feasibility* by Christopher A. Simon; Rowman & Littlefield Publishers, Inc., 2007. ISBN: 0742549089.

# Course Objectives

During this course, students will be able to:

1. Develop a foundation of college-level writing and oral communication skills in order to be successful in future courses and your career.
2. Understand the role of communication in different aspects of science, and examine best practices for targeting one's writing to particular audiences and contexts in order to effectively communicate in numerous scenarios.
3. Analyze course-relevant literature and resources to examine their validity and assess the arguments used to support their hypothesis.
4. Investigate in detail a topic within the scope of environmental and energy science in order to demonstrate mastery of writing mechanics/style and to critically evaluate evidence-based sources.

*Please let me know if you have documented disabilities that might affect your performance in this class.*

## Student Course Responsibilities and Course Policies

**Time commitment:** Excelling in college level coursework typically requires on average three to four hours per credit per week. Since this is a four credit course, in addition to the time we meet as class each week, you should expect to spend nine to twelve hours on average reading, writing or otherwise preparing for this class on a weekly basis.

**Attendance:** A good class discussion depends on the participation of all students; therefore your presence in class is essential. Two unexcused absences (or four late arrivals) will lower your **final** grade by one-third letter grade (e.g. A- to B+). Excused absences include those arranged with me beforehand. You should have completed all assigned reading before class and bring relevant texts to class.

**Classroom Behavior:** Please remain civil during discussions to promote the open exchange of ideas and foster a culture of open dialogue. Please bear in mind that all students are entitled to their own opinion. You are expected to listen attentively to each person speaking. Please refrain from eating during class.

Breaking News: New information relevant to this seminar appears every day.

Relatively reliable sources for this information include:

- National newspapers (e.g., *The New York Times*, *The Washington Post*, *USA Today*, etc.)
- National news magazines (e.g., *Time*, *Newsweek*, *U.S. News and World Report*)
- Scientific news magazines (e.g., *Science News*, *Scientific American*, *Discovery*)

The first ten minutes of each class session will be spent discussing news items *relevant to the class*. Contributions of breaking news items will be used as a partial basis for the class contribution grade. Two to three students will be the assigned “News Anchors” at each class meeting. These students will provide an overview of the two most significant/interesting class-related news stories since our last class meeting and coordinate news discussion.

Preparation for class discussions: Unlike most chemistry classes, this will be a seminar class based on informal discussion of the reading assignments. For this reason, it is essential that students come to class prepared to discuss the reading. Students will be expected to bring a **printed** list of *discussion points* (NOT questions) to be used during class. These lists will be collected and used as a partial basis for the class participation grade.

Journal Club: Each student will be responsible for presenting an overview of an instructor-approved research article to the rest of the class in a scientific journal club format.

The presenting student will have the responsibility for giving a general overview of the significance of the article; for discussing background material and answering questions; and for directing class discussion of the article. Preparation for this talk will include at least one practice talk to be given beforehand to a small group of classmates. Presentations will be expected to take approximately fifteen to twenty minutes; focus and clarity will be rewarded. Articles will be chosen by the student *with approval of the instructor at least **one week** prior to the presentation!*

All other students must read the article in advance and write a short summary of the article's take-home message; the summaries will count towards the class participation grade. Audience members should be prepared to ask questions at the end of the presentation. *These questions will count toward the class participation grade.*

Writing Assignments: Courses used to satisfy the Lower Division Writing Requirement are required to assign a **minimum of 25 pages** of writing. Instructors are expected to formally evaluate at least 50% of the submitted writing and provide opportunities for students to revise some papers based on instructor feedback. To meet these requirements, writing assignments will be distributed as follows:

*Informal writing assignments:* These assignments are one paragraph to one page in length. They include written class participation assignments such as the one paragraph overviews of journal club articles and peer feedback of the major paper. They will be graded for content and style on a high pass/pass/low pass/fail basis, with these grades factoring into the class participation grade.

*One introductory personal paper* of **not more** than two pages in length to serve as an introduction of your personal, informal, writing style, composition, grammar, spelling, etc. to the instructor. Details for this assignment will be given on the first day of class, and will be due in one week.

*One introductory letter to a Congressional Representative* of **not more** than two pages in length regarding a recent news topic and/or area of legislation. Details for this assignment will be given two weeks before the due date.

*One formal persuasive briefing document* (four - five pages in length) for a Senator should be a compact and focused discussion of a specific topic. Assignment details will be distributed at least two weeks in advance of due date. This paper will receive a letter grade and may be rewritten as described under grading policies.

*Term paper:* Students will choose a topic relevant to the class, research it, and write an eight-to-ten page term paper in review article format. Topics must be approved in advance by the instructor. A schedule for term paper research and development is given below. Suggestions to guide your choice of a term paper topic can be found at the end of this syllabus.

Peer feedback: (a) Each student must have one other student read and comment upon a draft of their term paper; each student must read and provide one page (250 words) of comments for one other student's term paper draft in return. Feedback should take the form of a letter to the author addressing the *content* of the paper. Your comments may argue with the writer, add to what she or he is saying, point out weaknesses in the argument, etc. Written copies of the feedback will count towards the class contribution grade. Additional comments of an editorial nature (need transition, spell check, sentence fragment, etc.) should be noted on the manuscript. (b) Each student must give a practice talk before giving their journal club presentation. The audience should include at least one classmate. Audience members must provide substantive written comments on the talk to the presenter. Presenters should turn in these written comments at the conclusion of their journal club talk. Each student must be an audience member for at least one practice talk.

Manuscript Preparation: All papers should be written individually, computer-generated (including rough drafts), double-spaced, with left justified one-inch margins (**NOTE:** The default in Microsoft Word is 1.25" unless you change it!) and using 12-point Times New Roman font. Follow guidelines in Hofmann for formatting of APA citations. Citations should be provided as a bibliography at the end of your document, and this portion of the paper will not count towards the page limit. Direct quotes from sources should not be used. Extensive paraphrasing of sources and failure to cite sources are unacceptable and possible causes for Honor Council deliberation of plagiarism. Papers which do not fulfill the stated requirements of the assignment will not receive a grade higher than a C. Papers should always be submitted with the **pages numbered**. Proofread carefully before submitting your work! Place your name, the date, and the title of the paper at the top of the first page.

Manuscript/Assignment Submission Procedures:

- The two introductory papers, persuasive paper, and the term paper should be submitted to me as **hardcopy printouts**. A PDF or Word version will also be uploaded to Blackboard.
- The Journal Club Summaries, Readings/Discussion Points, and Peer Feedback of term papers should be submitted to me as computer-generated **hardcopy printouts** formatted as outlined above.

## Grading Policies

Grading: Your grade will be calculated as follows:

- One formal eight to ten page term paper and associated assignments: 35%
  - Tuesday, March 13: Last day to submit ideas for the paper
  - Tuesday, April 10: One paragraph abstract, outline & preliminary bibliography (at least 5 sources)
  - Thursday, April 19: Polished draft to be given to peer reviewer.
  - Thursday, May 3: Final version of term paper due by 4:30 pm in ISC 1039 and uploaded to Blackboard.
- One formal four to five page persuasive briefing document for a Senator (see course calendar for due date): 20%
- Journal club presentation: 15%
- Class contributions: 15%
- Introductory letter to Congressional Representative two-page paper: 10%
- Introductory personal two-page paper: 5%

There is no final exam, but a final term paper is due on the final exam date, May 3.

Deadlines: Assignments must be turned in on time. The following policies apply:

- 1) Daily lists of discussion points and journal club article summaries will be turned in at the *end of the class period*. Late assignments will receive no credit. Assignments must be completed **before** you come to class.

2) All other assignments are due on the designated day as a hardcopy by 5:00 pm in the chemistry main office (ISC 1039) and electronically as PDF files on Blackboard by 11:59 pm. These assignments are subject to the following rule: for every day they are late, they will be worth 25% less. Note that weekend days and non-class days do count. This policy will only be waived in extreme circumstances.

3) Students will have one week from the distribution of graded written work to resubmit for re-evaluation. Students MUST schedule a conference with me before revising any assignment. Re-submissions will be done as a hardcopy with the original, graded paper attached. Up to one letter grade improvement may be earned by *substantial improvement* of the paper (e.g. review of a revised C+ paper may result in no change in grade or an improved grade of B-, B or B+). The term paper will be treated as an exam and there will not be an opportunity for a rewrite of the term paper after submission.

## Field Trips

Scheduled into the course calendar are class field trips (either real or virtual) to locations that are relevant to environmental issues and alternative energy. We will visit the Surry Nuclear Power Plant, tentatively scheduled for April 5. Furthermore, the class will be using Google Expeditions/Cardboard, which is a virtual-reality (VR) platform to explore virtual sites/topics that we will cover during the course. The instructor will facilitate discussion as a guide and students will explore the site to experience “first-hand” the impacts and solutions of chemistry in a variety of settings. Google Cardboard headsets – to be paired with your smartphone – are fairly cheap, and can be found on Amazon.

## Class Climate, Culture and the Honor System

This is a COLL 150 course, designed to give students a chance to explore an academic area of interest through intensive reading, writing, and discussion. Accordingly, most class periods will be filled by discussion of the assigned reading, with frequent opportunities to write. In order for discussions to be productive, all students need to feel comfortable participating. We will create and maintain an atmosphere of mutual respect in which everyone's ideas can be heard.

Scientists always seek feedback from their colleagues when preparing papers and oral presentations. I encourage students to collaborate in this way as well; thus, peer feedback will be required for all major course assignments.

I require that students work *independently* when:

- Doing short, informal writing assignments, including discussion points
- Writing the early drafts of the term paper
- Preparing the outline and slides for the journal club presentation

Students *must seek the feedback of other students* when:

- Revising and editing the rough drafts of the term paper
- Giving the practice talk for the journal club presentation

Note that feedback includes comments and critiques; it does NOT include doing the work for someone else. You will be asked to describe feedback given to you by other students when you turn in your work; they will receive credit for their work, which will count as a part of their class participation grade.

Since the College of William and Mary has an honor system, I feel comfortable encouraging collaboration between students under the rules described above. Please see me if you have any questions about how the Honor System applies to your responsibilities in this course.

## Resources to Improve Writing and Oral Communication

I strongly encourage you to use these resources. Even bench scientists need to be able to write and to speak in public. Practice over time with good feedback is the best way to develop these skills.

### A. The Writing Resources Center:

Located on the main floor of Swem Library, the Writing Resources Center serves students, faculty, and staff. Writing consultants (students trained by the Writing Resources Center staff) will give individual assistance with writing assignments at any stage of the writing process. Expect to work: they will not do the writing for you, but they can give you feedback that will improve your writing skills and result in a better final product. Consultations are free, but must be scheduled in advance.

### B. The Purdue Online Writing Lab – OWL (<https://owl.english.purdue.edu/>):

This site provides some exercises and general rules for word use, spelling of similar sounding words, etc.

### C. Oral Communication Studios:

The Oral Communications Studios, located with Writing Resources, are staffed by oral communications consultants (students trained by the staff of the Oral Communications Studio) who can critique and advise students (as well as faculty and staff) who are preparing oral presentations.

## Choosing a Term Paper Topic

Choosing an appropriate term paper topic takes time. Plan to:

1) Spend time brainstorming; use news sources, your discussion points, and your textbooks to come up with a short list of topics that interest you. A Google search can help you find a wide selection of information sources, some of which will be reliable: use the results with care!

2) Discuss possible topics with the instructor, either by e-mail, during an appointment, or before/after class.

3) Do preliminary literature searches using the databases available through the Swem home page to see if the topics you have found can be covered effectively in a ten-page term paper. To search the scientific literature for information on your possible topic, be sure to use the Summon Discovery search engine in Swem's web research pages.

\*\*\*Talk to Ms. Kristy Borda, reference librarian in Swem, if you need help finding information on your topic.

A good term paper topic will have the following characteristics:

1) The topic should be current: Be sure that most of your references for this paper were published in the last five years; papers from 2013 – 2018 should **dominate** your reference list for maximum credit!

2) The topic should be focused: be sure that you can discuss details rather than generalizations.

3) The topic should be understandable. Be sure that the references you find when you do your initial search for key sources are reasonably easy for you to understand. If all of your references appear to require an intimate knowledge of chemistry and you are planning to be English major, it may be sensible to choose a less scientifically demanding topic.

4) The topic should be interesting to you. By the end of the semester, you will have spent a great deal of time with your topic. If it started out seeming boring but appropriate, you will hate it by the time the paper is finished.

## Course Calendar (tentative)

Date	Readings	Assignments	News Anchors
Jan. 18	Course introduction - Review of syllabus, policies, etc.		
Jan. 23	Hofmann Ch. 1, 7, 8		
Jan. 25	<b>Swem Library Workshop (Cox Classroom on the ground floor in the Reeder Media Center)</b>		
Jan. 30	BB reading; Middlecamp Ch. 0.1-0.7		Melina Cienski/Clint Marshall
Feb. 1	Dunnivant Ch. 1; Middlecamp Ch. 5.3-5.4, 5.10; VR Field Trip (Water Treatment Plant)	Introductory Personal Paper due today	
Feb. 6	Dunnivant Ch. 2; Middlecamp Ch. 5.11-5.12; Guest Speaker (Geoff Brock, Philadelphia Water Co.)		Davis Coffey/Angelica Johnson
Feb. 8	Dunnivant Ch. 3; Middlecamp Ch. 4.1,4.3, 4.4		
Feb. 13	Dunnivant Ch. 4; BB reading; Guest Speaker (Sandra Prior, Director of EH&S)	Journal Club #1	Aidan Connor/Lanson Ly
Feb. 15	Dunnivant Ch. 5; Middlecamp Ch. 6.11-6.13; VR Field Trip (Coral Bleaching)	Journal Club #2	
Feb. 20	Dunnivant Ch. 6; Middlecamp Ch. 1.3-1.5, 1.10-1.13, 2.1, 2.6-2.11; VR Field Trip (Stratospheric Ozone)	Journal Club #3; Introductory Letter to Congressional Representative due today	Sophia Hernandez/Lizzy Salata
Feb. 22	<b>NO CLASS</b>		
Feb. 27	Dunnivant Ch. 7; BB reading	Journal Club #4	Maria Herrle/Courtney Miles
Mar. 1	Dunnivant Ch. 8-9; Middlecamp Ch. 3.1, 3.2, 3.5, 3.8-3.11; VR Field Trip (Carbon Capture Lab)	Journal Club #5	
<b>Spring Break</b>			
Mar. 13	Simon Ch. 1; Middlecamp Ch. 4.7-4.9, 4.11 Guest Speaker (Matt Hurt, Chevron)	Journal Club #6; Last day to submit term paper ideas	Josh Hobbs/Nolan Smith
Mar. 15	Simon Ch. 2; BB reading; Guest Speaker (Prof. Pereira, W&M)	Journal Club #7	

<b>Date</b>	<b>Readings</b>	<b>Assignments</b>	<b>News Anchors</b>
Mar. 20	Simon Ch. 3; Middlecamp Ch. 7.1, 7.3, 7.5, 7.6, 7.9-7.11; VR Field Trip (Hydrogen Burning)	Journal Club #8	John Smailys/Teresa Tackett/Alex Tan
Mar. 22	Simon Ch. 4; BB reading	Journal Club #9; Formal Persuasive Briefing hardcopy due by 4:30pm, and uploaded to BB by 11:59pm	
Mar. 27	Simon Ch. 5; Middlecamp Ch. 8.7, 8.8; VR Field Trip (Solar Plant); Guest Speaker (Prof. McNamara, W&M)		Melina Cienski/Davis Coffey/Aidan Connor
Mar. 29	Simon Ch. 6; BB reading; VR Field Trip (Wind Energy Center)	Journal Club #10	
Apr. 3	Simon Ch. 7; BB reading	Journal Club #11	Clint Marshall/Angelica Johnson/Lanson Ly
Apr. 5	<b>Nuclear Power Plant Field Trip</b>		
Apr. 10	Simon Ch. 8; BB reading	Journal Club #12; Outline, Abstract, & Preliminary Bibliography (at least 5 sources) of term paper	Sophia Hernandez/Maria Herrle/John Smailys
Apr. 12	Simon Ch. 9; BB reading	Journal Club #13	
Apr. 17	Simon Ch. 10; BB reading	Journal Club #14	Lizzy Salata/Nolan Smith/Teresa Tackett
Apr. 19	Simon Ch. 11 & Conclusion; BB reading	Polished draft of term paper due today	
Apr. 24	BB reading		Josh Hobbs/Courtney Miles/Alex Tan
Apr. 26	Reflections on the Course	Peer feedback of term paper due	
<b>Final Exam Period Begins</b>			
May. 3		Final version of term paper due at 11:59 pm as a PDF file uploaded to BB.	