Course Syllabus

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Welcome to EnvH 310, 2017 edition.

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Telephone Office hours: Thursdays, 4:30-5:30 and by email appointment

COURSE WEB SITE: https://canvas.uw.edu/courses/1117120

Who this course is for: This is a course about chemistry, but also about many other things related to the world we live in. It is intended for undergraduates, not necessarily science majors, who have had basic chemistry courses and who have interest in topics like environment and human health, sustainability, and greener materials, products, and processes.

Course Description and Aims

This course aims to present the ideas and approaches of green chemistry, in the context of social impact and public health. The over-arching theme will be the relationship between the science and application of chemistry, and the conditions of life that affect everyone, particularly in the developed world.

Throughout the industrial age and especially since WWII, commercial use of chemicals has grown expansively and affects everyone, everywhere. Historically, there are numerous examples of unintended consequences of chemical use resulting in environmental degradation, social and economic costs, and human suffering. Looking forward, we project even more extensive use of chemicals and more development and introduction into commerce of newly-synthesized or manufactured chemicals, with grave potential for more unintended adverse effects. Presently, many societies struggle with the legacy of pollution, the difficulties of making decisions regarding chemical uses, and issues of sustainable chemical uses.




Green Chemistry is an approach to technological development and industrial practice that aims to prevent or minimize unintended adverse consequences from chemical use, through implementation of specific principles that:

- Replace problematic chemicals with less toxic alternatives through molecular design and toxicity-driven

alternatives assessment
- Eliminate or minimize chemical waste generation in research, product development, manufacturing, marketing and distribution, and end-of-life management
- Seek improved sustainability through emphasis on renewable feedstocks, energy efficiency, and reuse/recycle design goals
- Avoid long term environmental impacts by emphasizing natural attenuation and breakdown, avoiding chemical persistence beyond that required for the intended chemical use

Course Instructional Objectives

This course aims to provide foundational information regarding the need for, purposes of, and elements of Green Chemistry as both a set of techniques and as a decision-guiding framework. As part of this content, attention will be given to:

- the current and historical practices for the design, use and management of chemical substances and effects of health and environmental quality
- environmental persistence and environmental fate and transport applied to chemical use and releases
- chemical toxicity and other types of hazards associated with chemical use
- lifecycle analysis and other waste minimization and management approaches
- formal alternatives assessment frameworks
- case studies representing successful and unsuccessful attempts to avoid adverse impacts from chemical use
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Overview of Course Topics

The attached schedule is draft and may change during the quarter - it will not automatically update as other components of the website do. However, this preliminary view will give you a sense of the topics and flow of the class.

(view 2016 class schedule; current class schedule is being revised)

Course Textbook

- Anne E. Marteel-Parrish and Martin A. Abraham, Green Chemistry and Engineering: A pathway to sustainability. Wiley, 2014. Abbreviated "GCE" in Schedule. Available as an e-text through UW library: **LINK** **(http://ebookcentral.proquest.com/lib/washington/reader.action?docID=1471916)**

  This text is sponsored by the American Institute of Chemical Engineers, and is a good overview for those with relatively little chemistry background. In addition to introducing chemical theory along with green Chemistry content, it puts a lot of emphasis on policy and other context issues, beyond chemical practice per se.

  Once you are on the publisher's site, click the link under the cover image - "Read Online (available)".

The page will reload with a view of the text on the right (5) and text content navigation in the left column (4). Recommendation is to leave the view as 'Image' (3) to allow scrolling through the text. You can change the size of the page at (1).

A second text that I will draw material from and that is recommended (a few will be ordered for this class by U bookstore) is: Green Chemistry: an introductory text, by Mike Lancaster (2010)

Other reading will be provided (linked in under "Modules"); for a review of texts and other books, go **HERE**. For a guideline to on-line resources relevant to this course, go **HERE**.

Assignments and Grading

Under the modules section of the website is a link for each class session. There you will find a page labeled "session "x" materials" for each session, containing a description of the focus for that session, reading assignments and questions to guide your reading. For some sessions there will be other materials for you to review (videos to watch, web pages to look at, supplemental articles. etc). Most class sessions will begin with class activities: discussions, or in-class exercises based on preparation assignments. These are often topics related to the main topic of the session or in some cases to the previous class session.

In addition, there will be a limited number of assignments made for you to complete outside of class and turn in. These are listed under the "assignments" tab of the website.

Your responsibilities are:

1. do assigned reading ahead of time
2. be prepared to respond to readings questions (in discussion or quiz)
3. review materials and preparation assignments for the in-class activities for that session
4. Complete and submit the "turn-in" assignments.
5. There will be a quarter-long project assignment, due by the last day of class, 12/7/17.

In addition, your grade will be based on exams and quizzes. These will be announced during the quarter.

The University of Washington and Academic Integrity

The University of Washington expects its students "to maintain the highest standards of academic conduct," as per its **Statement of Academic Responsibility** **(http://depts.washington.edu/grading/issue1/honesty.htm)** . Students who plagiarize are not only jeopardizing their grade and losing the opportunity to really learn, but they also are devaluing the work of their fellow classmates and diminishing the reputation of the University of Washington--which can make your degree less valuable.

University of Washington general policy statement:

“Admission to the University carries with it the presumption that students will conduct themselves as responsible members of the

academic community. As a condition of enrollment, all students assume responsibility to observe standards of conduct that will contribute to the pursuit of academic goals and to the welfare of the academic community. That responsibility includes, but is not limited to: practicing high standards of academic and professional honesty and integrity."

[Reference: WAC 478-120-020 Standards of Conduct (2a),http://www.washington.edu/students/handbook/conduct.html#020 (http://www.washington.edu/students/handbook/conduct.html#020)]

The UW School of Public Health (SPH) is committed to upholding standards of academic integrity consistent with the academic and professional communities of which it is a part. Plagiarism, cheating, and other misconduct are serious violations of the University of Washington Student Conduct Code (WAC 478-120). We expect you to know and follow the university's policies on cheating and plagiarism, and the **SPH Academic Integrity Policy** (http://sph.washington.edu/students/academicintegrity/) . Any suspected cases of academic misconduct will be handled according to University of Washington regulations. For more information, see the University of Washington Community Standards and Student Conduct website.

For web-resources on understanding and avoiding plagiarism, go to: http://courses.washington.edu/hsstudev/studev/plagiarism.htm

Accommodations for Students with Disabilities

The UW Disability Resources for Students office is the eMPH program's partner in identifying learning challenges and enabling access to our educational programs. We encourage students with concerns to consult with the office after matriculation to the program. If you have a letter from the office indicating you have a disability that requires academic accommodations, please contact the instructor as early as possible in order to discuss the accommodations you might need per the on-site classroom or distance-based delivery of the course content.

If you would like to request accommodations for this course due to a disability, please contact Disability Resources for Students, 448 Schmitz, (206) 543-8924 (Voice), 543-8925 (TTY) or **uwdss@u.washington.edu (mailto:uwdss@u.washington.edu)** .

Course Summary:

Date	Details	
Thu Sep 28, 2017	**Prep for session 1: origins of Green Chemistry and sustainability** (https://canvas.uw.edu/courses/1117120/assignments/3810997)	due by 11:30am
Tue Oct 3, 2017	**Prep for session 2: Chemistry fundamentals** (https://canvas.uw.edu/courses/1117120/assignments/3811002)	due by 11:30am
Thu Oct 5, 2017	**Prep for session 3: R&D as a process; Concept mapping** (https://canvas.uw.edu/courses/1117120/assignments/3811000)	due by 11:30am
Tue Oct 10, 2017	**Prep for session 4: GC principles** (https://canvas.uw.edu/courses/1117120/assignments/3811001)	due by 11:30am

Thu Oct 12, 2017	session 5 in-class activity assignment (https://canvas.uw.edu/courses/1117120/assignments/3811012)	due by 11:30am
	TURN-IN 1) Concept map: "Sustainable" Lattes (https://canvas.uw.edu/courses/1117120/assignments/3811013)	due by 11:30am
Tue Oct 17, 2017	Prep for session 6: waste generation, management, fate (https://canvas.uw.edu/courses/1117120/assignments/3811003)	due by 11:30am
Thu Oct 19, 2017	Prep for session 7: anthropogenic chemicals in the environment (https://canvas.uw.edu/courses/1117120/assignments/3811004)	due by 11:30am
	TURN-IN 2) calculating chemical reaction efficiency metrics (https://canvas.uw.edu/courses/1117120/assignments/3811014)	due by 11:30am
Tue Oct 24, 2017	Prep for session 8: understanding toxicity (https://canvas.uw.edu/courses/1117120/assignments/3811005)	due by 11:30am
Thu Oct 26, 2017	Prep for session 9: regulation of chemical hazards; community right to know (https://canvas.uw.edu/courses/1117120/assignments/3811006)	due by 11:30am
Tue Oct 31, 2017	session 10 in-class activity assignment (https://canvas.uw.edu/courses/1117120/assignments/3811010)	due by 11:30am
	TURN-IN 3) A deeper dive into concept mapping and Green Lattes (https://canvas.uw.edu/courses/1117120/assignments/3811016)	due by 11:30am
Thu Nov 2, 2017	Prep for session 11: Energy, sustainability, and functionality (https://canvas.uw.edu/courses/1117120/assignments/3810991)	due by 11:30am
Fri Nov 3, 2017	extra credit: reaction efficiency (https://canvas.uw.edu/courses/1117120/assignments/3810985)	due by 5pm
Tue Nov 7, 2017	Midterm (do at home) (https://canvas.uw.edu/courses/1117120/assignments/3810987)	due by 11:30am
	Prep for session 12 : synthesis, reaction chemistry, and sustainability; nail polish exercise (https://canvas.uw.edu/courses/1117120/assignments/3810992)	due by 11:30am
	midterm - 60 pts total (https://canvas.uw.edu/courses/1117120/assignments/3810976)	due by 11:59pm
Thu Nov 9, 2017	Prep for session 13: Alternatives Assessment (https://canvas.uw.edu/courses/1117120/assignments/3810989)	due by 11:30am
	Prep for session 14: Life Cycles and designing for	

Tue Nov 14, 2017	sustainability; Green Construction (https://canvas.uw.edu/courses/1117120/assignments/3810996)	due by 11:30am
Thu Nov 16, 2017	Prep for session 15 class activity: Bullitt Center Tour (https://canvas.uw.edu/courses/1117120/assignments/3810994)	due by 11am
	Progress report on Quarter Project Assignment (https://canvas.uw.edu/courses/1117120/assignments/3811007)	due by 11:30am
	(formerly TURN-IN 4) Exercise to post: Alternatives Assessment (https://canvas.uw.edu/courses/1117120/assignments/3811017)	due by 11:30pm
Tue Nov 21, 2017	TURN-IN 5) reflection: Green Building Design and Construction: the Bullitt Center (https://canvas.uw.edu/courses/1117120/assignments/3811018)	due by 11:30am
	Prep for session 16: renewable (bio-based) materials (https://canvas.uw.edu/courses/1117120/assignments/3938984)	due by 11:59pm
Tue Nov 28, 2017	Prep for session 17: GC and business considerations (https://canvas.uw.edu/courses/1117120/assignments/3810999)	due by 11:30am
Thu Nov 30, 2017	Prep for session 18 - Chemical synthesis in chemical manufacturing: making the processes greener (https://canvas.uw.edu/courses/1117120/assignments/3818171)	due by 11:30am
Fri Dec 1, 2017	Extra credit #2 (https://canvas.uw.edu/courses/1117120/assignments/3810984)	due by 11:30am
Tue Dec 5, 2017	Prep for session 19: Washington State GC efforts (https://canvas.uw.edu/courses/1117120/assignments/3810995)	due by 11:30am
Thu Dec 7, 2017	QUARTER PROJECT ASSIGNMENT (https://canvas.uw.edu/courses/1117120/assignments/3811009)	due by 11:30am
	session 20 in-class activity: quarter projects (https://canvas.uw.edu/courses/1117120/assignments/3811011)	due by 11:30am
Wed Dec 13, 2017	final file (https://canvas.uw.edu/courses/1117120/assignments/3810980)	due by 5pm
	FINAL EXAM (https://canvas.uw.edu/courses/1117120/assignments/3810986)	due by 11:59pm
	Assignment 1 due (https://canvas.uw.edu/courses/1117120/assignments/3810981)	
	Assignment 2 due	

(https://canvas.uw.edu/courses/1117120/assignments/3810982)

Assignment 3 due (https://canvas.uw.edu/courses/1117120/assignments/3810983)

practice quiz due! (https://canvas.uw.edu/courses/1117120/assignments/3810988)

Prep for session 133: Energy, sustainability, and functionality (https://canvas.uw.edu/courses/1117120/assignments/3810990)

Prep for session 1: What do we mean by “sustainability”? (https://canvas.uw.edu/courses/1117120/assignments/3810998)

Quiz 0 (https://canvas.uw.edu/courses/1117120/assignments/3810977)

Quiz 1: Module 1 (https://canvas.uw.edu/courses/1117120/assignments/3810975)

Quiz 2: module 2 (https://canvas.uw.edu/courses/1117120/assignments/3810979)

session 2' (https://canvas.uw.edu/courses/1117120/assignments/3914389)

skip this TURN-IN 3) Concept map b: Chemistry and Environmental Impact (https://canvas.uw.edu/courses/1117120/assignments/3811015)