

ENV 101: Chemistry and the Environment
Spring 2019, MTh: 10.00-11:15

Professor Brack W. Hale
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Office hours: *by appointment* OR
M: 14.30 – 16.30
W: 13.30 – 15.30

COURSE OVERVIEW AND GOALS

This course introduces fundamental concepts of chemistry through the lens of environmental problems. As such, it provides an important basis to understand challenges of environmental issues facing society. This is a lower-level environmental science course that counts as a Social Responsibility course in the core curriculum. It is also an elective foundational course in the Environmental Science and Studies majors and minor. Ideally, students interested in an environmental program should take this course in their first or second year. Other students may take this course at any point in their undergraduate career. The course description is available in Franklin's 2018-2020 Academic Catalog (<https://www.fus.edu/academics/academic-catalog>). Students must have taken MAT 103 (or the equivalent).

STUDENT LEARNING OBJECTIVES

By the end of the semester, you should be able to:

- Discuss the structure of an atom as a chemist would
- Use different models to demonstrate molecular structure
- Explain the different types of bonding that occur between atoms
- Balance chemical equations and use them to demonstrate different reactions
- Explain the laws of thermodynamics and the conservation of energy
- Describe gas behavior using the ideal gas and related gas laws
- Discuss reactions involving acids and bases and calculate pH values
- Use the chemical naming system to describe inorganic and organic compounds
- Use scientific units appropriately and convert among them
- Explain the chemistry behind combustion, climate change, ozone depletion, multiple types of air and water pollution, and nuclear energy
- Use the scientific method to test hypotheses
- Explain the concept of green chemistry and provide real world examples
- Present findings in professional written formats

REQUIRED TEXTS AND MATERIALS

- *Chemistry in Context*, 8th edition (ISBN: 9780073520582). see Moodle for instructions.
- Supplemental reader available at: <https://create.mcgraw-hill.com/shop> (ISBN: 9781307393606). See Moodle.
- Virtual lab website: <http://www.virtlab.com>
- Other readings as posted on Moodle: <http://moodle.fus.edu>

COURSE EXPECTATIONS AND STRATEGIES FOR SUCCESS

- Participation expectations are summarized in Table 1. Students should be in class on-time, every day. If you are late without good reason, it counts as an absence.
- Students come to class well prepared and participate actively. Students should expect readings and assignments for every class period.
- Classroom behavior reflects professional behavior expected in most job settings.

- Students may not use laptops, cell phones, tablets, or other electronic devices during in-class activities, unless so instructed; phones must be turned on vibrate or off during class.
- Students inform professor immediately of any circumstances that may affect their attendance or performance in class. Students seek out materials from any missed classes on their own. I do not hand out lecture notes or slides.
- Unless otherwise stated, students turn in all assignments on Moodle. Assignments submitted in other formats will not be considered. Assignments turned in late lose 50%.
- Students check their student.fus.edu account and Moodle page **DAILY**.

Table 1: Participation rubric

Grade	Attendance	General classroom behavior	Discussion behavior
Excellent	No absences	Acts professionally at all times; constructively interacts with others. Respects electronic device policy.	Readily engages in discussion, asks relevant questions, employs concrete examples, integrates previous material, and provides thoughtful insights. Does not dominate.
Good	1 absence	Often acts professionally, generally interacts with professor and classmates constructively.	Often engages in discussion, alludes to readings to support comments. Comments are less thoughtful and more spontaneous.
Satisfactory	2 absences	Needs to be occasionally reminded to behave appropriately.	Only engages when called upon, does not connect comments to readings, but provides appropriate insights.
Poor	3+ absences*	Student's behavior often disrupts/disrespects group. Ignores class policies.	Student silent, makes irrelevant comments, or is unable to engage in conversation about class topics OR attempts to dominate.

* Except in extraordinary circumstances, **after five absences, student fails course**. Exceptions made for documented illnesses or emergency situations.

MAJOR ASSIGNMENTS AND GRADING

Students will have quasi daily homework assignments related to in-class and lab activities. Furthermore, students will write a research paper on green chemistry that integrates course concepts with a real-world example (1500 words). I grade course activities on a letter scale (A-F). I use intermediate grades for coursework instead of +/- (i.e. AB, BC, CD). Final grades calculated per rubric (Table 2).

Table 2: Final grade rubric (+/- given for intermediate situations)

Grade level	Classroom	Homework completed	Graded activities*
A	Excellent	90+ %	A-average
B	Good	80+ %	B-average
C	Satisfactory	70+ %	C-average
D	Satisfactory	60+ %	D-average
F	Poor	< 60 %	F-average

* tests 70%, green chemistry report 15%, other labs 15%

TENTATIVE SCHEDULE

Specific reading and homework assignments, as well as any subsequent changes posted on Moodle.

Week	Topics	Chapters (SR: supplemental readings)
21-Jan	Atoms, molecules and chemical reactions	SR 1, Chap. 1
28-Jan	Atomic structure and bonding	Chap 1 & 2
4-Feb	Molecular structure and greenhouse gases	Chap. 2 & 3
11-Feb	Gases and gas laws (Quiz 11 Feb)	SR 2
18-Feb	The Ideal Gas Equation	SR 2
25-Feb	Energy and combustion	Chap. 4
4 March	Mid-term (7 March)	Chap. 4
	Academic Travel Period	
25-March	Bond energies and reactions	Chap 5
1-April	Chemistry of water	Chap 5 & 6
8-April	Solutions and solvents	Chap. 6
15-April	Acids and bases; nuclear chemistry	Chap 6 & 7
22-April	No class 22 April (Easter). Organic chemistry	Chap. 7, 9
29-April	Organic chemistry	Chap. 9
6-May	FINAL EXAM: 7 MAY at 14:00 or 9 MAY 16:00 (NB: date change)	

ACADEMIC INTEGRITY

Please refer to Franklin's *Statement on Cheating and Plagiarism* in the *Academic Catalog* for the full version, but to summarize here: **you are to do your own work.** Behaviors such as copying the work of others, using third-party services, or any other circumvention of doing your own work are dishonest and not acceptable in this class or at this institution. **For testing situations, this includes the use of unpermitted materials or copying off a classmate; for papers and presentations, this includes improper use of references and citations. Copying text without the use of quotations or paraphrasing the ideas of others without proper citations are both examples of plagiarism and thus unacceptable.** In cases of strong suspicion of the use of third-party services, the burden of proof is on the student to demonstrate s/he actually wrote the assignment.

The first case of academic dishonesty will result in an automatic grade of a zero on the assignment and a report to the Dean. The second case will result in immediate failure of the course and recommendation to the Dean for expulsion from the college.