# Fall 2016: Chem 95 Environmental Risk

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**Abstract**

Our environment is a complex web of human development and natural beauty. How we interact with our technologies, food and each other may lead to chemical risks. However, gathering and understanding information related to the severity of risks due to natural or synthetic chemicals is complicated. Is it true that the chemicals in our soil, water, and air are making us sick, allergic, or prone to cancer? An introduction to basic chemical principles will be provided and then used to examine situations that are blatantly problematic. Other chemicals/reactions that are more ambiguous will provide the opportunity for healthy debates and discussions. The evolving knowledge will allow us look beyond the qualitative "chemicals are bad for you", and use quantifiable methods (epidemiology, pharmacokinetics, EPA and FDA guidelines) to value information from a variety of sources and maybe dismiss others.

**What is an acceptable risk for _____, a parent, employee, rescue worker, environmentalist, politician?**

**AIMS:** At the end of this course a successful student will be able to answer questions on the following themes:-

*I:- Be able to consider the likely fates of chemicals in our environment and hazards they pose.*

*II:- Begin to recognize the challenges and pressures from competing interests as they relate to environmental sustainability, economic viability, lifestyle and development.*

*III:- Think critically about the agenda of the source, the validity of their claims and how accurately scientific information has been presented.*

Students that can combine these skills will be most successful; as this skillset will allow them to communicate with scientists in many other fields.

**REQUIRED TEXTS: "Essentials of Toxic Chemical Risk Science and Society",**
Stephen Penningroth, CRC Press, ISBN 978-0-415-24851-8
**"Elements of Environmental Chemistry",**
Hites and Raff, published by Wiley, ISBN 97801-118-04155-0

**PROBLEM SETS:** To review quantitative concepts, skills and technology we will have three problem sets. These will be in-class tests (closed book) with a combination of short-answer, mechanisms, calculations and multiple choice questions.

**WRITING EXERCISES:** We will attempt to understand the tensions between differing viewpoints and intentions by discussing and reporting on the validity of competing interests.

**Pro/Con Discussion** You will work in small groups (2-3 students) for this exercise.
Initially, I will provide you with an article on a topic. The article will be sourced from a national newspaper, scientific/medical journal or the internet. You will be required to read the paper and consider your stance on the topic (pro/con).
Then, using this lead, you will need to find one other articles supporting or contradicting the proposal. Take this paper with you on our fieldtrip to the Library. We discuss the authority of your paper and investigate good strategies for find other papers. You will then select two good articles that you feel help your argument and give these to your teammates. You will be required to read your teammates' papers.
After debating the topic within your team, I will ask you to present the key concerns, raised by the authors, and your team's responses, to the class. Who was for/against and why?
Finally, you will each write a 2-3 page (cited) report on the topic, views held by the authors and the team's interpretations of the tension. This final piece will be an individually graded writing assignment.

**Compelling Letter** You will work individually on this topic.
Write a letter asking a company, person or public entity (city or state) to consider a change to a product or habit to be reduce environmental risk. Again this can build from either of the previous assignments or a new topic. 1-2 pages. Cite your references.

**Status Report** You will work individually on this topic.
This will be a formal essay (5-8 pages, double spaced, normal margins, font size 12), reporting on a topic from an assigned list of ten options, initially presented in the pro/con discussion. The report will delve into the conflicting stakeholders, science of the problem and possible solutions. Cite your references.

| **GRADES:** | | |
|---|---|---|
| | Problem Sets (3 x 15pts) = | 45pts |
| | Pro/Con Discussion/Paper = | 55pts (30pts paper/25pts presentation) |
| | Compelling Letter = | 80 pts |
| | Status Report = | 80 pts |
| | TOTAL = | 260 pts |

**COURSE ETIQUETTE:** As a first year student you are in a new system with many different expectations and demands. Please feel free to ask me questions in class or via email about this class, registrations, your challenges in other classes or anything else. If I don't know the answer I'll work with you to find the support you need.
Recommendations:-
1. Attend class with a clear and inquisitive attitude.
2. While in class focus on understanding the material. Do NOT text, check Facebook or emails. 3. Speak respectfully to your fellow students and me.
4. All students are expected to honor the UVM codes of conduct and academic integrity.
5. Work hard and have fun! A.W.

**LECTURE SCHEDULE**

| Week | Date | Topic | Notes |
|---|---|---|---|
| 1 | Aug-29 | Bonds, atoms, ions, radical, mechanisms | Chapter 1 ToxChemRisk, Appendix A EoEC, Thalidomide NYT, ***Writing Tutor Friday*** |
| 2 | Sep-5 (Labor Day) | Fate of chemicals, physical changes *Start Pro/Con* | Chapter 2 ToxChemRisk, Chapter 2,6 EoEC ***Andrea Pearce*** |
| 3 | Sep-12 | Dose/Effect | Chapter 3 ToxChemRisk, Chapter 7 EoEC, |
| 4 | Sep-19 | Human Populations at Risk **Visit to Bailey-Howe Rm123 Monday** *Pro/Con Presentations* | Chapter 4 ToxChemRisk, ***Literature Searches*** |
| 5 | Sep-26 | In vitro/vivo Toxicity *Pro/Con Report due* | Chapter 5 ToxChemRisk, ***Tom Ahern Monday*** |
| 6 | Oct-3 | Antioxidants, Biological Defenses, | Chapter 6 ToxChemRisk, |
| 7 | Oct-10 | Pharmacology ***Problem Set 1 Monday*** | Chapter 7 ToxChemRisk, Chapter 7 EoEC |
| 8 | Oct-17 | Chemical Disease | Chapter 7 ToxChemRisk, |
| 9 | Oct-24 | Risk of Disease *Compelling Letter due* | Chapter 8 ToxChemRisk ***John Tdesko, Wednesday Green Mountain Power*** |
| 10 | Oct-31 | Health Assessment | Chapter 8 ToxChemRisk |
| 11 | Nov-7 | Risk Calculations ***Problem Set 2 Monday*** | Chapter 8 ToxChemRisk ***Dana Christiansen Mon 7th Dean's Office Visit Class*** |
| 12 | Nov-14 | Cancer | Chapter 8 ToxChemRisk |
| | Nov-21 | THANKSGIVING VACATION WEEK | |
| 13 | Nov-28 | Environmental Impact Statement | Chapter 9 ToxChemRisk |
| 14 | Dec-5 | Managing Chemical Risk Concluding Topics *Status Report due* | Chapter 10 ToxChemRisk |
| 15 | Dec-12 | Final Exam (***Problem Set 3***) | 10:30AM Votey 223 |