
Geol 580 Contaminant Transport Geochemistry

Spring 2019: Tuesday & Thursday, 10-1115 PM, 305 Brooks Hall

Instructor: Dr. Dorothy Vesper

Email: djvesper@mail.wvu.edu

Office: G37 Brooks Hall

Office Hours: Tuesdays 430-530 & by
appointment

Web: eCampus

Purpose of Course: This course will focus on the fundamental chemical properties of organic contaminants that control their fate and transport in the environment. Hence we will not spend our time memorizing the structures of compounds, but in learning how different structures control functionality. Natural organic compounds and inorganic phases will also be discussed as they relate to contaminant mobility.

Student Outcomes: Upon completion of this course students will:

- Be familiar with a wide range of organic contaminants and their environmental behaviors
- Recognize the critical chemical and structural properties that control contaminant fate; and be able to predict the likely fate of an unknown compound
- Be able to calculate estimated environmental characteristics, e.g., octanol-water partitioning coefficients or solubility
- Understand the regulatory framework and the history of how it came to be

Method of Instruction include lecture, short small-group discussions over figures and problems, written literature critiques, group discussions of course readings, problem solving, and group projects with presentations.

TEXT AND READING MATERIALS

- Schwarzenbach RP, Gschwend PM and Imboden DM (2017) Environmental Organic Chemistry, 3rd Ed. John Wiley & Sons, Inc., New York, 1005 p.

Although for many classes the choice of textbook edition isn't critical, it is in this case. This is a rapidly changing field and the 2003 2nd Ed. is outdated on some topics. The 3rd Ed. has been edited to make it better organized and manageable too.

- Additional selected readings. These will be placed on the web page on eCampus.

GRADE DISTRIBUTION

Percent	Assignment Type & Details
(required)	Plagiarism Avoidance tutorial on the library website – must get 100% on the quiz. Due with first lit critique (email Vesper as instructor)
30	2 Problem sets (15% each)
20	2 Literature Critiques (10% each)
30	2 Exams (15% each)
20	Final Project – as selected by the class
100	TOTAL

Grade assignments:

90-100%	A
80-89%	B
70-79%	C
60-69%	D
<60%	F

Final Project. Each year we complete the class with a final project designed to integrate over the various topics of the semester. Here are some projects done by previous classes:

- Contaminant type – each student or team selects a contaminant type (e.g., “petroleum hydrocarbons” or “pesticides”). The project includes developing reference materials for that topic and giving a class lecture on it.
- Superfund sites – each student or team selects a Superfund site, reviews the available information, and presents it to class. Each student also selects a related journal article and leads a class discussion on that.
- The class selects a single Superfund site and investigates different issues related to the site – for example, contaminant distributions, geology, hydrogeology, etc. A related journal article discussion was also included.

The class will decide on a project by voting later in the semester. All class members are expected to contribute to the project design. My role will be as facilitator.

Deadlines for assignments

- Problem sets are due on the due date – this means you can turn them in any time before I arrive the next morning. The penalty for late assignments is 10% per day. No credit will be given for problem sets handed in after the graded assignments are returned.
- Literature critiques are due at the beginning of the discussion class. Late critiques will not be graded and will be assigned 0 points.

THE FINE PRINT

Academic Integrity. Some projects will be joint efforts – in which case you are encouraged to work with your classmates. Other assignments are to be completed as individuals – in which case receiving or giving help is forbidden. The detailed sheet for each assignment will specify what type of project it is so that we are absolutely clear. In accordance with University policy, students who violate the course standards on independent work or engage in other dishonest practices will be penalized. Keep in mind that copying from web sites is considered plagiarism and is a dishonest practice. Guilty students may receive an "unforgivable F." For more information, see the University's website at on Academic Integrity/Dishonesty at <http://catalog.wvu.edu/undergraduate/coursecredittermsclassification/#academicintegritytext>. If you have any questions regarding these rules or specific issues, please come talk to me.

Social Justice. The Department of Geology and Geography supports the University's commitment to social justice and will strive to maintain a positive learning environment based on open communication and mutual respect among students and faculty. If you have questions, please contact either me or our department chair, Steve Kite.

Sexual Harassment. Sexual harassment may take the form of unwanted sexual attention from someone in a position to affect your academic advancement, or it may be persistent, sexually related behavior that creates an inappropriately hostile, intimidating environment that negatively affects your ability to do course work. For additional information, consult the Social Justice website: http://diversity.wvu.edu/policies/syllabus_statement

Days of Special Concern. WVU recognizes the diversity of students and understands that some may need to be absent from class to participate in religious observances. In line with university policy, you must notify your instructor by the end of the third class meeting of the semester regarding religious observances that will affect you.

Students with a Disability. If you are a person with a disability and anticipate needing any type of accommodation to participate in this class, please make appropriate arrangements with Disability Services (tel. 293-6700) and advise me as soon as possible.

TENTATIVE Schedule and List of Topics (updated and revised as we go)**INTRODUCTION**

Syllabus, compartment approach, important properties, structures of organic molecules Chapters 1, 2

Types of compounds Chapter 3

CHEMICAL PROPERTIES & PARTITIONING

Energetics, intermolecular and intramolecular forces, partitioning, acid-base properties Chapter 4

Partitioning between bulk phases, LFER Chapter 7

Vapor pressures, phase diagrams, homologous series, volatility Chapter 8

Solubility in water – temp, salts, co-solvents Chapter 9

Organic-air & Organic-water partitioning Chapter 10

Sorption Processes (and a little about Natural Organic Matter) Chapters 11-14

APPLICATIONS & REMEDIATION (AS TIME PERMITS)

Issues with NAPL Chapters 21-26

Transformation reactions, types of reactions, microbial influences, rates of reactions eCampus

STUDENT PROJECT REPORTS