## Course Description
This course provides an overview of the processes that determine the fate of organic substances in the environment. It covers pathways, mechanisms, and kinetics of volatilization, sorption, hydrolysis, oxidation, reduction, elimination, and conjugation; and the application of all these topics to understanding the environmental fate and remediation of organic chemicals. Media represented include reactor fluids, groundwater, surface water, rain, and fog. Both chemical (abiotic) and microbially-mediated (biotic) processes are included.

### Credit hours
4

### Prerequisites or Concurrent Enrollment Requirements
Required: General Chemistry (undergraduate level)
Recommended: Organic Chemistry, Aquatic Chemistry (EBS 510/610)

### Term, Year, and Campus
TBD. Usually Winter Quarter, Marquam Hill

### Faculty Information
Name: Paul Tratnyek  
E-mail: tratnyek@ohsu.edu  
Phone: 503-346-3421  
Address and Office Number: HRC-3, Room 356  
Office Hours: TBD

### General Course Meeting Day and Time
TBD

### Course Objectives, Competencies, or Outcomes
The lasting benefit that you should gain from this course will be an intuition for the fate of organic chemicals that are of environmental importance. This should allow you to look at the structure of an organic compound—about which you know little or nothing—and make some general predictions about where it will end up, how it might be degraded, how fast, and to what products. In addition, you will know how to go about making a quantitative characterization of these properties, and to access their applicability to remediation of contaminated sites. After completing this course students will be able to:

1. Relate names and structures of the major legacy, priority, and emerging contaminants.
2. Evaluate the availability and potential for transport of contaminants in terms of physic-chemical processes of volatilization, partitioning, and sorption.
3. Evaluate the kinetics of contaminant transformation
4. Evaluate potential contaminant transformation by hydrolysis, including kinetics and products.
5. Evaluate potential contaminant transformation by reduction, including kinetics
6. Evaluate potential contaminant transformation by oxidation, including kinetics and products.
7. Predict contaminant fate determining properties using quantitative structure-activity relationships.
8. Assess the suitability of treatment/remediation process for contaminant sites.

Required Texts or Readings


Supplemental or Suggested Readings or Reference Materials


Attendance Requirements

All scheduled class times

Grading Criteria, Academic Standards, & Release of Final Grades

Final course grades will be posted with the OHSU Registrar the Monday following the last day of the term. OHSU’s grading system for official grade reports includes:

4.0 = Exceptional, 3.0 = Superior, 2.0 = Average, 0.0 = Failure

Grading: Recitations: 60%, Final Paper: 40%

Copyright Information

Every reasonable effort has been made to protect the copyright requirements of materials used in this course. Class participants are warned not to copy, audio, or videotape in violation of copyright laws. Journal articles will be kept on reserve at the library or online for student access. Copyright law does allow for making one personal copy of each article from the original article. This limit also applies to electronic sources.

Syllabus Changes and Retention

This syllabus is not to be considered a contract between the student and Graduate Studies. It is recognized that changes may be made as the need arises. Students are responsible for keeping a copy of the course syllabus for their records.

Accommodations

Our program is committed to all students achieving their potential. If you have a disability or think you may have a disability (physical, learning, hearing, vision, psychological) which may need a reasonable accommodation, please contact Student Access at 503-494-0082 to discuss your needs. Because accommodations can take time to implement, it is important to have this discussion as soon as possible. All information regarding a student’s disability is kept in accordance with relevant state and federal laws.

You may also visit http://www.ohsu.edu/academic/acad/osahome.html to identify your Program Accommodation Liaison (PAL). Click Access Services.
## COURSE OUTLINE

<table>
<thead>
<tr>
<th>Week</th>
<th>Topic</th>
<th>Reading</th>
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| 1    | 1) Introduction I: Organic chemical structure and nomenclature  
2) Introduction II: Basic concepts in contaminant fate | SGI, Ch. 1  
L&W, Ch. 1 |
| 2    | 1) Recitation 1  
2) Recitation 1 | |
| 3    | 1) Phase Transfer I: (G/L, L/L) Partitioning, solubility, volatilization  
2) Phase Transfer II: (G/S, L/S) Sorption to organic matter and mineral surfaces | SGI, Ch. 4-8  
SGI, Ch. 9-11 |
| 4    | 1) Recitations 2 and 3  
2) Kinetics: Zero-order to Michealis-Menton | SGI, Ch. 12 |
| 5    | 1) Recitations 4  
2) Hydrolysis: Substitutions, Eliminations | SGI, Ch. 13 |
| 6    | 1) Recitations 5  
2) Reductions: Nitro reduction, Dechlorination | SGI, Ch. 14 |
| 7    | 1) Recitations 6  
2) Oxidations I: Sunlight, Photooxidations | SGI, Ch. 15-16 |
| 8    | 1) Recitations 7  
2) Oxidations II: Other chemical and Biological | SGI, Ch. 17 |
| 9    | 1) Recitations 8  
2) Correlation Analysis: Chemical property predictions with QSARs | Tratnyek 1998 |
| 10   | 1) Recitations 9  
2) Remediation Technology: Chemical and biological | TBD |
| 11   | 1) Final Assignment  
2) No class, Final Paper | |