# Course Outline Form: Winter 2016

## General Information

**Course Title:** ENVS\*4370 Environmental Organic Chemistry

**Course Description:**

This course discusses the chemical processes that influence organic compounds in the environment, including both anthropogenic organic compounds (pollutants, pesticides, etc...) and natural organic matter (humic materials and biomolecules). Potential topics include: the occurrence of organic contamination in the environment, emerging classes of organic contaminants, the relationship between molecular structure and environmental fate, persistent organic pollutants, the transformation of organic molecules in the environment, and the origins and functionality of natural organic matter in terrestrial and aquatic environments.

**Credit Weight:** 0.5

**Academic Department (or campus):** School of Environmental Sciences

**Campus:** Guelph

**Semester Offering:** Winter

**Class Schedule and Location:** MWF, 11:30 – 12:20 MKN 231

## Instructor Information

Instructor Name: James Longstaffe

Instructor Email: [jlongsta@uoguelph.ca](mailto:jlongsta@uoguelph.ca)

Office location and office hours: Alexander Hall 307, Wednesday 1-4

## GTA Information

GTA Name: None

GTA Email:

GTA office location and office hours:

## Course Content

### Specific Learning Outcomes:

Students should be able to:

i) Identify environmentally important chemical compounds by their molecular structure and explain their functionality and environmental role/consequences through independent analysis.

ii) Predict the fate of environmental contaminants by applying an understanding of the relationships between environmental attenuation processes and molecular properties.

iii) Design solutions to environmental contamination by applying decision-making trees in case study exercises.

iv) Critique proposed remedial solutions to environmental contamination through in-class discussion and independent analysis.

v) Demonstrate the importance of a molecular-level understanding of natural environmental systems as a basis from which to address contemporary environmental issues through oral and written communications to the class.

### Lecture Content:

**Approximate Schedule of Lectures**

Class # Topic

**Section 1: Course Introduction**

1 Organic Chemistry in the Environment: Part 1

2 Organic Chemistry in the Environment: Part 2

**Section 2: Chemical and Physical Properties of Organic Compounds**

3 Chemical Bonding

4 Molecular structure

5 Molecular structure

6 Molecular structure

7 Molecular electrostatics

8 Intermolecular Interactions

9 Chemical behaviour in water

10 Chemical behaviour in air

**Section 3: Important Organic Pollutants**

11 Chlorinated solvents

12 Organobromine & organofluorine

13 PCBs & PAHs

14 Pesticides

15 Emerging Contaminants

16 Organometallics

**Section 4: Environmental Behaviour of Organic Compounds**

17 Air-Water partitioning

18 Water-Soil partitioning

19 Bio-accumulation & bio-magnification

20 Environmental Persistence

21 Case studies & review

22 Mid-Term Examination (Covers sections 1 to 4)

**Section 5: Transformation in the Environment**

23 Abiotic degradation (substitution, elimination, & hydrolysis)

24 Abiotic degradation (oxidation/ reduction)

25 Abiotic degradation (photolysis)

26 Biotic degradation (aerobic)

27 Biotic degradation (anaerobic)

28 Remediation

**Section 6: Organic Geochemistry**

29 The Carbon cycle

30 Biopolymers in the environment

31 Biomarkers as environmental tracers

32 Natural Organic Matter (Soils)

33 Natural Organic Matter (Aquatic)

34 The importance of NOM in environmental quality

35 Analytical methods (spectroscopy)

36 Analytical methods (Mass spectrometry)

37 Review

### Labs: None

### Seminars: None

### Course Assignments and Tests:

| **Assignment or Test** | **Due Date** | **Contribution to Final Mark (%)** | **Learning Outcomes Assessed** |
| --- | --- | --- | --- |
| Assignment 1 | Jan 18 | 2 | i |
| Assignment 2 | Jan 25 | 2 | i |
| Assignment 3 | Feb 1 | 2 | ii |
| Assignment 4 | Feb 8 | 2 | ii |
| Assignment 5 | Feb 22 | 2 | iii |
| Draft of ISP | Feb 29 | 10 | v |
| Mid-term Exam | Mar 4 | 20 | i,ii,iii |
| Assignment 6 | Mar 7 | 2 | iii |
| Assignment 7 | Mar 14 | 2 | iv,v |
| Assignment 8 | Mar 21 | 2 | iv |
| Assignment 9 | Mar 28 | 2 | v |
| Final ISP | Mar 28 | 20 | v |
| Assignment 10 | April 4 | 2 | i,ii |
| Final Exam | April 22 | 30 | i,ii,iii,iv,v |

Additional Notes (if required):

### Final examination date and time: April 22, 8:30 -10:30

### Final exam weighting: 30%

## Course Resources

### Required Texts: None

### Recommended Texts: None

### Lab Manual: None

### Other Resources: To be provided through Courselink

### Field Trips:

### Additional Costs:

## Course Policies

### Grading Policies:

Assignments and ISP are reduced by 20% of their evaluated grade when over 24 hours late unless prior permission is granted by instructor. A grade of 0% is assigned for any assignment not received by the final exam.

### Course Policy on Group Work:

Students are expected to complete all assignments and the ISP on their own unless otherwise instructed.

### Course Policy regarding use of electronic devices and recording of lectures:

Electronic recording of classes is expressly forbidden without consent of the instructor. When recordings are permitted they are solely for the use of the authorized student and may not be reproduced, or transmitted to others, without the express written consent of the instructor.

## University Policies

### Academic Consideration:

The University of Guelph is committed to supporting students in their learning experiences and responding to their individual needs and is aware that a variety of situations or events beyond the student's control may affect academic performance. Support is provided to accommodate academic needs in the face of personal difficulties or unforeseen events in the form of Academic Consideration.

Information on regulations and procedures for Academic Consideration, Appeals and Petitions, including categories, grounds, timelines and appeals can be found in [Section VIII (Undergraduate Degree Regulations and Procedures) of the Undergraduate Calendar](https://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-ac.shtml).

### Academic Misconduct:

The University of Guelph is committed to upholding the highest standards of academic integrity and it is the responsibility of all members of the University community, faculty, staff, and students to be aware of what constitutes academic misconduct and to do as much as possible to prevent academic offences from occurring.

University of Guelph students have the responsibility of abiding by the University's policy on academic misconduct regardless of their location of study; faculty, staff and students have the responsibility of supporting an environment that discourages misconduct. Students need to remain aware that instructors have access to and the right to use electronic and other means of detection. Please note: Whether or not a student intended to commit academic misconduct is not relevant for a finding of guilt. Hurried or careless submission of assignments does not excuse students from responsibility for verifying the academic integrity of their work before submitting it. Students who are in any doubt as to whether an action on their part could be construed as an academic offence should consult with a faculty member or faculty advisor.

Detailed information regarding the Academic Misconduct policy is available in [Section VIII (Undergraduate Degree Regulations and Procedures) of the Undergraduate Calendar](https://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-amisconduct.shtml).

### Accessibility:

The University of Guelph is committed to creating a barrier-free environment. Providing services for students is a shared responsibility among students, faculty and administrators. This relationship is based on respect of individual rights, the dignity of the individual and the University community's shared commitment to an open and supportive learning environment. Students requiring service or accommodation, whether due to an identified, ongoing disability or a short-term disability should contact the Student Accessibility Services (SAS), formerly Centre for Students with Disabilities (CSD), as soon as possible.

For more information, contact SAS at 519-824-4120 ext. 56208 or email sas@uoguelph.ca or visit the [Student Accessibility Services website (http://www.uoguelph.ca/csd/)](http://www.uoguelph.ca/csd/).

### Course Evaluation Information:

End of semester course and instructor evaluations provide students the opportunity to have their comments and opinions used as an important component in the Faculty Tenure and Promotion process, and as valuable feedback to help instructors enhance the quality of their teaching effectiveness and course delivery.

While many course evaluations are conducted in class others are now conducted online. Please refer to the [Course and Instructor Evaluation Website](https://courseeval.uoguelph.ca/) **for more information.**

### Drop period:

The drop period for single semester courses starts at the beginning of the add period and extends to the Fortieth (40th) class day of the current semester (the last date to drop a single semester courses without academic penalty) which is listed in [Section III (Schedule of Dates) of the Undergraduate Calendar](https://www.uoguelph.ca/registrar/calendars/).

The drop period for two semester courses starts at the beginning of the add period in the first semester and extends to the last day of the add period in the second semester.

Information about Dropping Courses can be found in [Section VIII (Undergraduate Degree Regulations and Procedures) of the Undergraduate Calendar](https://www.uoguelph.ca/registrar/calendars/undergraduate/current/).

## Additional Course Information

None