1 Course Details

1.1 Calendar Description

This course discusses the chemical processes that influence organic compounds in the air, water, and soil. The relationships between anthropogenic compounds (pollutants, pesticides, etc.), natural organic matter (humic materials, dissolved organic matter, biomolecules) and environmental quality will be discussed. Topics include: the persistence and degradation of contaminants in the environment, environmental analysis, environmental forensics, organic aerosols, aquatic dissolved organic matter, and soil organic matter.

Pre-Requisites: 1 of CHEM*3360, ENVS*3020, ENVS*3220, TOX*3360

1.2 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).

Topics to be discussed will include:

1) The occurrence of natural and anthropogenic compounds in the environment;

2) The analysis of soil, water, and air samples.
3) The transformation of compounds in the environment

1.3 Timetable

Monday, Wednesday, Friday
11:30AM-12:20PM
ALEX 259

1.4 Final Exam

Take Home Exam

2 Instructional Support

2.1 Instructional Support Team

Instructor: James Longstaffe
Email: jlongsta@uoguelph.ca
Office: Alexander Hall 307
Office Hours: By appointment (please email)

3 Learning Resources

3.1 Additional Resources

CourseLink (Website)
https://courselink.uoguelph.ca

4 Learning Outcomes

4.1 Course Learning Outcomes
By the end of this course, you should be able to:

1. Identify environmentally important chemical compounds by their molecular structure and explain their functionality and environmental role/consequences through independent analysis.
2. Predict the fate of environmental contaminants by applying an understanding of the relationships between environmental attenuation processes and molecular properties.
3. Design solutions to environmental contamination by applying decision-making trees in case study exercises.
4. Demonstrate a familiarity with the application of advanced molecular-level tools for understanding the structure and behaviour of organic compounds in the environment, including NMR, fluorescence spectroscopy, stable isotope analysis, and biomarker analysis.
5. 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.

5 Teaching and Learning Activities

5.1 Lecture

Topic 1 (weeks 1 & 2): The Murchison Meteorite

Topics: We will discuss the origins and analysis of the Murchison Meteorite - a relic from the era of abiotic chemical synthesis. This will include a review of functional groups and bonding, a discussion of chemical analysis, photochemical reactions, and the origin of organic life on Earth.

Topic 2 (Weeks 3 & 4): Petroleum Hydrocarbons

Topics: We will discuss the occurrence, impact, and treatment of petroleum hydrocarbon pollution in the environment using case studies from the Deep Water Horizon accident and Ogoniland.

Topic 3 (Weeks 5 & 6): The Chemistry of Microplastics

Topics: We will discuss the fate and impact of microplastics in the environment from an environmental chemistry
perspective.

**Topic 4 (Weeks 7 & 8) Natural Organic Matter**

**Topics:**
We will discuss the occurrence and reactivity of natural organic matter in soils, sediments, and aquatic systems and the role that these compounds play in the fate and transformation of pollutants such as pesticides, and mercury.

**Topic 5 (Weeks 9 & 10): Persistent Organic Pollutants and Emerging Contaminants**

**Topics:**
We will discuss the occurrence, measurement, and treatment of persistent organic pollutants and emerging contaminants including polychlorinated biphenyls, brominated flame retardants, and perfluoroalkyl substances.

**Topic 6 (Weeks 11 & 12): Groundwater contamination**

**Topics:**
We will discuss the transport, fate, and remediation of groundwater contaminants, including, biodegradation, in situ chemical remediation methods, and stable isotope environmental forensics.

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### 6 Assessments

#### 6.1 Assessment Details

**Assignment 1: Review (10%)**
- **Date:** Fri, Jan 21
- **Learning Outcome:** 1

**Assignment 2: Cradle to Grave (20%)**
- **Date:** Fri, Feb 11
- **Learning Outcome:** 1, 2, 5

**Assignment 3: Assessment and Remediation (20%)**
- **Date:** Fri, Mar 25
- **Learning Outcome:** 1, 2, 3, 4, 5

**Midterm Exam (20%)**
- **Date:** Fri, Feb 18, Take Home
Learning Outcome: 1, 2, 3

Final Exam (30%)
  Date: Week 12, Take Home
  Learning Outcome: 1, 2, 4, 5

7 Course Statements

7.1 Grading Policies
  Assignments 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.

7.2 Group Work Policy
  Students are expected to complete all assignments on their own unless otherwise instructed.

8 University Statements

8.1 Email Communication
  As per university regulations, all students are required to check their e-mail account regularly: e-mail is the official route of communication between the University and its students.

8.2 When You Cannot Meet a Course Requirement
  When you find yourself unable to meet an in-course requirement because of illness or compassionate reasons please advise the course instructor (or designated person, such as a teaching assistant) in writing, with your name, id#, and e-mail contact. The grounds for Academic Consideration are detailed in the Undergraduate and Graduate Calendars.

Undergraduate Calendar - Academic Consideration and Appeals
https://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-ac.shtml

Graduate Calendar - Grounds for Academic Consideration
https://www.uoguelph.ca/registrar/calendars/graduate/current/genreg/index.shtml

Associate Diploma Calendar - Academic Consideration, Appeals and Petitions
https://www.uoguelph.ca/registrar/calendars/diploma/current/index.shtml

8.3 Drop Date
  Students will have until the last day of classes to drop courses without academic penalty. The deadline to drop two-semester courses will be the last day of classes in the second semester. This applies to all students (undergraduate, graduate and diploma) except for Doctor of Veterinary Medicine and Associate Diploma in Veterinary Technology (conventional and alternative delivery) students. The regulations and procedures for course registration are
available in their respective Academic Calendars.

Undergraduate Calendar - Dropping Courses
https://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-drop.shtml

Graduate Calendar - Registration Changes
https://www.uoguelph.ca/registrar/calendars/graduate/current/genreg/genreg-regregchg.shtml

Associate Diploma Calendar - Dropping Courses
https://www.uoguelph.ca/registrar/calendars/diploma/current/c08/c08-drop.shtml

8.4 Copies of Out-of-class Assignments

Keep paper and/or other reliable back-up copies of all out-of-class assignments: you may be asked to resubmit work at any time.

8.5 Accessibility

The University promotes the full participation of students who experience disabilities in their academic programs. To that end, the provision of academic accommodation is a shared responsibility between the University and the student.

When accommodations are needed, the student is required to first register with Student Accessibility Services (SAS). Documentation to substantiate the existence of a disability is required; however, interim accommodations may be possible while that process is underway.

Accommodations are available for both permanent and temporary disabilities. It should be noted that common illnesses such as a cold or the flu do not constitute a disability.

Use of the SAS Exam Centre requires students to make a booking at least 14 days in advance, and no later than November 1 (fall), March 1 (winter) or July 1 (summer). Similarly, new or changed accommodations for online quizzes, tests and exams must be approved at least a week ahead of time.

For Guelph students, information can be found on the SAS website
https://www.uoguelph.ca/sas

For Ridgetown students, information can be found on the Ridgetown SAS website
https://www.ridgetownc.com/services/accessibilityservices.cfm

8.6 Academic Integrity

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 encourages academic integrity. 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.

Undergraduate Calendar - Academic Misconduct
https://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-amisconduct.shtml

Graduate Calendar - Academic Misconduct
https://www.uoguelph.ca/registrar/calendars/graduate/current/genreg/index.shtml

8.7 Recording of Materials

Presentations that are made in relation to course work - including lectures - cannot be recorded or copied without the permission of the presenter, whether the instructor, a student, or guest lecturer. Material recorded with permission is restricted to use for that course unless further permission is granted.

8.8 Resources

The Academic Calendars are the source of information about the University of Guelph’s procedures, policies, and regulations that apply to undergraduate, graduate, and diploma programs.

Academic Calendars
https://www.uoguelph.ca/academics/calendars

8.9 Disclaimer

Please note that the ongoing COVID-19 pandemic may necessitate a revision of the format of course offerings, changes in classroom protocols, and academic schedules. Any such changes will be announced via CourseLink and/or class email.

This includes on-campus scheduling during the semester, mid-terms and final examination schedules. All University-wide decisions will be posted on the COVID-19 website (https://news.uoguelph.ca/2019-novel-coronavirus-information/) and circulated by email.

8.10 Illness

Medical notes will not normally be required for singular instances of academic consideration, although students may be required to provide supporting documentation for multiple missed assessments or when involving a large part of a course (e.g., final exam or major assignment).
8.11 Covid-19 Safety Protocols

For information on current safety protocols, follow these links:

- https://news.uoguelph.ca/return-to-campuses/how-u-of-g-is-preparing-for-your-safe-return/
- https://news.uoguelph.ca/return-to-campuses/spaces/#ClassroomSpaces

Please note, these guidelines may be updated as required in response to evolving University, Public Health or government directives.