

## Department of Biology Course Outline

SC/BIOL 4720 3.00  
Environmental Contaminants: Impacts on Organisms and Ecosystems  
Fall, 2021

### Course Description

This course provides an overview of major environmental contaminants, and their sources, as well as their impacts on the atmospheric, terrestrial, and aquatic environments. The course emphasizes the mechanisms by which anthropogenic contaminants affect people, animals, and the ecosystems as a whole. Specifically, this course discusses the fundamental concepts regarding the physical and chemical changes induced in the environment by contaminants, their fate and transport in the environment, and their exposure pathways and biological effects. The impact of contaminants on environmental health and the long-term implications, the methods and recent advances in toxicological research, as well as the regulatory framework for environmental contaminants, are also discussed in this course.

### Prerequisites (strictly enforced)

This is a multidisciplinary course. It is expected that students should have basic knowledge in ecology and animal biology. SC/BIOL 2030 4.0, SC/BIOL 2050 4.0, and SC/BIOL 3070 4.0

### Course Instructor(s) and Contact Information

Raymond Kwong, Ph.D.  
[rwmkwong@yorku.ca](mailto:rwmkwong@yorku.ca)  
Office hours: by appointment on eClass  
Office location: Farq. 250

### Schedule/Course Format

*Synchronous (via Zoom)*  
Monday 8:30 am to 9:30 am  
Wednesday 8:30 am to 9:30 am  
Friday 8:30 am to 9:30 am

### Technology Requirements

High speed internet, camera, audio capability (microphone), ability to stream online lectures, ability to support video conferencing software.

## Evaluation

Midterm exam 1: 25%  
Midterm exam 2: 25%  
Writing assignment: 25%  
Student presentation: 15%  
Participation and summary of talks: 10%

Midterm exams (on eClass or Crowdmark) and student presentation (on Zoom) will occur during normal class time

*"Final course grades may be adjusted to conform to Program or Faculty grades distribution profiles."*

## Important Dates

Dates of Tests/Exams, Due Dates of Major Assignments, First class and last class will be announced through Moodle.

**Drop Deadline:** Nov. 12, 2021 (last day to drop without course on transcript)

**Course Withdrawal:** Nov. 13 to Dec. 7, 2021 (course still appears on transcript with 'W')

For additional important dates such as holidays, refer to the "Important Dates" section of the Registrar's Website: <https://registrar.yorku.ca/enrol/dates/fw21>

## Resources

No Textbook required. Lecture notes and selected papers will be posted on Moodle.

### Suggested reading materials:

Principles of ecotoxicology. Fourth edition. C.H. Walker, R.M. Sibly, S.P. Hopkin, D.B. Peakall (Eds). 2012. CRC Press.

Introduction to Environmental Toxicology: Impacts of Chemicals Upon Ecological Systems. Third edition. Wayne Landis, Ruth Sofield, Ming-Ho Yu, Wayne G. Landis, Ming-Ho Yu (Eds). 2003. CRC Press.

Both books are on reserve in library.

## Learning Outcomes

Upon successful completion of this course, students should be able to:

1. Explain the fundamental principles that govern the interactions among contaminants, environmental factors, and organisms.
2. Describe the sources and environmental fates of major classes of contaminants, as well as their biological effects, and mechanisms of their toxic action and tolerance.
3. Explain the approaches used by scientists in assessing the impacts of contaminants and in setting the regulatory framework. Apply concepts of toxicology to the analysis of ecological risk assessment and monitoring.
4. Evaluate primary literature, demonstrate critical thinking skills, and communicate effectively about current/emerging issues related to environmental pollution and its impacts, both orally and in writing, to peers.

## Course Content

Environmental Toxicology is the study of the effects of toxic chemicals on people, wildlife and ecosystems. This is a multidisciplinary and applied field involving environmental chemistry, ecology and animal biology. In this course, the following topics will be covered:

**1. Introduction of Environmental Toxicology:**

General introduction and definition of “Environmental Toxicology”; significance of this field to the understanding of the effects of environmental contaminants on ecological and public health.

**2. Fundamental concepts in Environmental Toxicology:**

Discussion of the fundamental principles that govern the interactions between contaminants and the environments/biota, including: i) environmental fate and transport of contaminants, ii) dose-response relationships, iii) toxicodynamics and toxicokinetics, iv) routes of exposure and effects, iv) bioavailability, bioaccumulation, and biomagnification, and v) biological fate and mechanisms in biotransformation/detoxification/elimination.

**3. Overview of major classes of environmental contaminants:**

Discussion of the toxicology of current/emerging environmental contaminants of concern, including metals and metalloids, hydrocarbons, persistent organic pollutants, pesticides, endocrine disruptors, air pollutants, radio-nuclides, engineered nano-particles, plastics, and pharmaceuticals, and personal care products. Overview of their major sources, effects on organisms, and the mode of action.

**4. Introduction of environmental risk assessment and regulation:**

Introduction of the approaches in toxicological testing, and recent advances in toxicological research. Discussion on the processes involved in ecological risk assessment and monitoring. Overview of the environmental policy and framework for the regulation of contaminants in Canada.

Specific topics will be posted on eClass.

**Other Information**

**Course Policies**

Missed exams:

- Contact course director and submit paperwork within 3 days

Online submission of medical statement:

<http://science.apps01.yorku.ca/machform/view.php?id=84113>

- Make-up exam will be at earliest possible date and may be in a different format (e.g., close book exam, essay questions, oral exam)

- Late assignment: -10% per day

**University Policies**

**Academic Honesty and Integrity**

York students are required to maintain the highest standards of academic honesty and they are subject to the Senate Policy on Academic Honesty (<http://secretariat-policies.info.yorku.ca/policies/academic-honesty-senate-policy-on/>). The Policy affirms the responsibility of faculty members to foster acceptable standards of academic conduct and of the student to abide by such standards.

There is also an academic integrity website with comprehensive information about academic honesty and how to find resources at York to help improve students' research and writing skills, and cope with University life. Students are expected to review the materials on the Academic Integrity website at - <http://www.yorku.ca/academicintegrity/>

**Important** A note from the Faculty of Science Committee on Examinations and Academic Standards:

Numerous students in Faculty of Science courses have been charged with academic misconduct when materials they uploaded to third party repository sites (e.g. Course Hero, One Class, etc.) were taken and used by unknown students in later offerings of the course. The Faculty's Committee on Examinations and Academic Standards (CEAS) found in these cases that the burden of proof in a charge of aiding and abetting had been met, since the uploading students had been found in all cases to be wilfully blind to the reasonable likelihood of supporting plagiarism in this manner. Accordingly, to avoid this risk, students are urged not to upload their work to these sites. Whenever a student submits work obtained through Course Hero or One Class, the submitting student will be charged with plagiarism and the uploading student will be charged with aiding and abetting.

Note also that exams, tests, and other assignments are the copyrighted works of the professor assigning them, whether copyright is overtly claimed or not (i.e. whether the © is used or not). Scanning these documents constitutes copying, which is a breach of Canadian copyright law, and the breach is aggravated when scans are shared or uploaded to third party repository sites.

### **Access/Disability**

York University is committed to principles of respect, inclusion and equality of all persons with disabilities across campus. The University provides services for students with disabilities (including physical, medical, learning and psychiatric disabilities) needing accommodation related to teaching and evaluation methods/materials. These services are made available to students in all Faculties and programs at York University.

Students in need of these services are asked to register with disability services as early as possible to ensure that appropriate academic accommodation can be provided with advance notice. You are encouraged to schedule a time early in the term to meet with each professor to discuss your accommodation needs. Please note that registering with disabilities services and discussing your needs with your professors is necessary to avoid any impediment to receiving the necessary academic accommodations to meet your needs.

Additional information is available at the following websites:

Counselling & Disability Services - <http://cds.info.yorku.ca/>

Counselling & Disability Services at Glendon - <https://www.glendon.yorku.ca/counselling/>

York Accessibility Hub - <http://accessibilityhub.info.yorku.ca/>

### **Religious Observance Accommodation**

York University is committed to respecting the religious beliefs and practices of all members of the community, and making accommodations for observances of special significance to adherents. Should any of the dates specified in this syllabus for an in-class test or examination pose such a conflict for you, contact the Course Director within the first three weeks of class. Similarly, should an assignment to be completed in a lab, practicum placement, workshop, etc., scheduled later in the term pose such a conflict, contact the Course director immediately. Please note that to arrange an alternative date or time for an examination scheduled in the formal examination periods (December and April/May), students must complete and submit an [Examination Accommodation Form](#) at least 3 weeks before the exam period begins. The form can be obtained from Student Client Services, Student Services Centre or online at [http://www.registrar.yorku.ca/pdf/exam\\_accommodation.pdf](http://www.registrar.yorku.ca/pdf/exam_accommodation.pdf)

### **Student Conduct in Academic Situations**

Students and instructors are expected to maintain a professional relationship characterized by courtesy and mutual respect. Moreover, it is the responsibility of the instructor to maintain an appropriate academic atmosphere in the classroom and other academic settings, and the responsibility of the student to cooperate in that endeavour. Further, the instructor is the best person to decide, in the first instance, whether such an atmosphere is present in the class. The policy and procedures governing disruptive and/or harassing behaviour by students in academic situations is available at - <http://secretariat-policies.info.yorku.ca/policies/disruptive-andor-harassing-behaviour-in-academic-situations-senate-policy/>