
REM 610-5

GRADUATE COURSE

APPLIED ENVIRONMENTAL TOXICOLOGY

Dr. Frank Gobas
School of Resource & Environmental Management

Fall 2016

OBJECTIVE

The objective of this course is to examine the theory and practical application of environmental chemistry and toxicology for the purpose of assessing the environmental behaviour, toxicity and human health risks of chemical contaminants in the environment. The goals of the course are to achieve **integration** (i.e. of the various topics/subdisciplines in environmental toxicology), **application** (i.e. to management problems) and awareness of the **legislative framework** in which environmental toxicology is conducted.

This course is directed towards students who are pursuing Master and Ph.D. level research in environmental toxicology and professionals (e.g. private consultants and government officials) in the area of environmental management.

CONTENTS

1. **environmental pathways of chemicals & contaminants**:
   environmental partitioning, dynamics of environmental distribution, mass-balance, mechanisms of transport & transformation, fugacity, activity, environmental modelling

2. **exposure assessment**:
   mechanisms of chemical uptake & elimination in biological organisms, toxicokinetics, bioaccumulation, trophodynamics, structure-activity relationships

3. **hazard and risk assessment:**
   toxicity of chemical pollutants in biological organisms, dose-response relationships, toxicity of single & mixtures of chemicals, ecotoxicity, carcinogenesis

4. **ecological and human health risk assessment of contaminants**:
   methods for ecological risk & human health assessment, cancer potency factors, reference dose, quantitative risk assessment

5. **legislation & management** :
   students examine the application of scientific principles in current environmental management practices and regulations in Canada. This includes a discussion of the various legislative frameworks applying to pollutants, the development of standards & human consumption guidelines & environmental quality criteria, contaminated sites assessment, monitoring, risk assessment, effluent regulations and others.

Class Times & Location: Wednesdays from 2:30 until 4:20 pm and Fridays from 2:30 until 4:20 pm. The first class is on September 7. A number of classes will be held in the computer lab (see details in the course agenda).

EVALUATION

Students are evaluated based on assignment #1 (25% of the final mark), assignment #2 (30%), 1 student paper & oral presentation (35%) and class contributions (10%).

FORMAT

Classes consist of lectures, exercises and group discussions. A teaching assistant will be available throughout the course for student support.

READINGS

All readings will be handed out on the first day of classes. All class overheads will be made available in electronic format on the first day of classes.

OFFICE HOURS: Set up meetings by e-mail at gobas@sfu.ca

FOR MORE INFORMATION CALL: 778-782-5928 or e-mail at gobas@sfu.ca. If you encounter any problems registering for the course, please let me know.

Tentative REM-610 Class Schedule

Class times:

Wednesday from 2:30 pm to 4:20 pm in AQ 5020 and Friday 2:30 pm to 4:20 pm in AQ3148.1
This schedule will be revised and updated throughout the course.

Date	Tentative Topic to be Discussed	Preparation for this class/Practicum	Location & Format
Sep 7	Introduction: Course Outline & rationale Course Content, Marking, logistics Slides: lecture-1a.pdf		AQ5020, lecture
Sep 9	Global Environmental Pollutants: Problems and Solutions Slides: History of DDT Part 1,2,3, lecture-1b.pdf	UNEP-POPS-COP-CONVTEXT.En.pdf	AQ3148.1, Lecture
Sep 14	Canadian Environmental Protection Act Toxic Substances Management Policy. Management of Contaminants Slides: lecture-2.pdf	http://www.ec.gc.ca/CEPARegistry/default.cfm CEPA act.pdf	AQ5020, lecture
Sep 16	Chemicals & their environmental properties Slides: lecture-3.pdf	Multi-Media: 2.1, 2.2, 3.1-3.4,	AQ3148.1, Practicum
Sep 21	Multi-media environmental fate Slides: lecture-4.pdf	Multi-Media: 2.3, 2.4, 4.1-4.7, 5.1, 5.2, 5.3.1, 5.3.3, 5.3.4, 5.4-5.6.2, 5.6.6-5.9	AQ5020, lecture
Sep 23	Chemicals & their environmental properties: Practicum • Demonstration Environmental Fate DataBase • Start Hazard Evaluation Exercise 1 • Questions Answers: exercise-1.pdf	Multi-Media: 2.1, 2.2, 3.1-3.3,	AQ3148.1, Practicum
Sep 28	Reaction & Transport Slides: lecture-5.pdf **Handout assignment #1**	Multi-Media: 2.4.2-2.8, 6.1-6.9	AQ5020, lecture

Sep 30	Environmental Fate : Practicum • Questions • Discuss Results Exercise 1 • Start Exercise 2 Answers: exercise-2.pdf	Complete Exercise 1	AQ3148.1,Practicum
Oct 5	Environmental fate models Slides: lecture-6.pdf	Multi Media:7.1-7.3, 7.8-7.12,8.1-8.3, 8.5-8.8 Websterpersistence.pdf	AQ5020, lecture
Oct 7	Reaction & Transport: Practicum • Questions • Discuss MM2,7 &2.12 • Discuss exercise 2 • Start Exercise 3 • Paper Discussion Answers: exercise-3.pdf **Handout assignment #1**	Complete exercise 2	AQ3148.1,Practicum
Oct 12	Chemical Toxicity Slides: lecture-7.pdf	**Project Proposal DUE (12:30 pm)** McCarty.pdf Review of pharmacological concepts.pdf SETACglobe.pdf	AQ5020, lecture
Oct 14	Environmental Fate models: Practicum • Questions • Demonstration of ChemCan3 • Discuss Exercise 3 • Websterpersistence.pdf Paper Discussion Answers: exercise-3.pdf	Complete exercise 3	AQ3148.1, Practicum
Oct 19	Hazard Assessment & Risk Assessment Slides: lecture-8.pdf	Fish Consumption.pdf (EPA-503/8-89-002)	AQ5020, lecture
Oct 21	Chemical Toxicity : Practicum • Questions • Start Exercise 4 • McCarty.pdf Paper Discussion Answers: exercise-4.pdf		AQ3148.1 Practicum

Oct 26	Discuss assignment #1 Bioaccumulation & Food-chain transfer Slides: lecture-9.pdf Hand out Credit Assignment #2	**Assignment #1 DUE (4:30pm)** Woodwell.pdf Connell.pdf (voluntary) Gobas.pdf (voluntary) Mackay 1982.pdf Pedersen & Connolly.pdf Gobas Zhang Wells.pdf or Gobas Wilcockson.pdf	AQ5020, lecture
Oct 28	Hazard & Risk Assessment: Practicum • Questions • Start exercise 4b & 7 Answers: exercise-4.pdf	Complete Exercise 4	AQ3148.1, Practicum
Nov 2	Environmental Criteria Slides:	tba	AQ5020, lecture
Nov 4	Bioaccumulation: Practicum • Questions • Discuss Exercise 5 • Start Exercise 6 Answers: exercise-5.pdf	Complete Exercise 5	AQ3148.1, Practicum
Nov 9	Ecological Risk Assessment Slides: lecture-10.pdf	Ecorisk.pdf Assignment #2 due	AQ5020, lecture
Nov 11	NO Class Remembrance Day		
Nov 16	Ecological Risk Assessment: Practicum • Questions • Discuss Exercise 6 • Start Exercise 7 Answers: exercise-6.pdf	Complete Exercise 5	AQ5020, lecture
Nov 18	Activity Based Risk Assessment Slides: lecture-10.pdf	Ecorisk.pdf **Assignment #2 due**	AQ3148.1, Practicum
Nov 23	Ecological Risk Assessment: Practicum • Questions • Discuss Exercise 6 • Start Exercise 7 Answers: exercise-6.pdf		AQ5020, lecture
Nov 25	Discuss Credit Assignment #2 • Final Questions • Wrap up + evaluation	Final Questions	AQ3148.1
Nov 30-Dec2	Presentations: Double Class		tba