

EHSC 8610: Aquatic Toxicology

Course Syllabus: Spring 2007

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Class location/time: 207 Environmental Health Science Bldg./TR 12:30-1:45 pm
Office hours: By appointment. Please contact Dr. Black or Aaron by email.

Course Description: Toxicological effects of aquatic pollution focusing on fate and transport of xenobiotics; accumulation, dynamics and toxicity of xenobiotics in aquatic organisms; analysis and modeling of the effects of aquatic pollution on organisms and aquatic communities; and the determination of related risks to aquatic ecosystems.

Course Objectives:

- To review the basic toxicological principles of uptake, elimination, and accumulation, emphasizing processes and circumstances unique to aquatic organisms.
- To learn the relationships between abiotic and biotic processes of aquatic environments and their effects on contaminant distribution and subsequent exposure, accumulation, and toxicity of xenobiotics in aquatic environments.
- To explore current methods of assessing and modeling toxic responses of individuals, communities and ecosystems in the aquatic environment.
- To become familiar with the concept of risk assessment and to extend its use to assess ecological risks resulting from aquatic pollution.
- To develop the ability to read and critically evaluate the aquatic toxicology literature.

Prerequisites: Organic chemistry and an introductory course in toxicology

Text/Readings:

- 1) Readings will be from the current literature. Required journal articles will be available in class as handouts or emailed to students as pdf files.
- 2) Recommended texts for additional background reading: *Fundamentals of Aquatic Toxicology, Second Edition* (1995), G.M. Rand (ed); *Handbook of Ecotoxicology, Second Edition* (2003), D.J. Hoffman, B.A. Rattner, G.A. Burton, Jr., J. Cairns, Jr. (eds.).

Course Requirements:

- 1) **Student presentations:** Each student will present five 20 minute conference-style seminars on topics given to the student. A short handout (2-4 pp) on the topic will be provided to all

members of the class by the student. The handout should give an overview of the topic (bulleted text, figures, tables, etc.) and should contain a bibliography of all sources used and ones suggested for extra reading. Please note that copies of PowerPoint slides are not acceptable handouts. Students should be prepared to answer questions on their topics.

- 2) **Paper discussions:** On selected days (identified in the course schedule) we will discuss two papers from the literature concerning the previous and/or current topic. Each discussion day will be led jointly by 2 students. I will assign one paper for discussion and the second paper (on a topic reinforcing or related to my chosen paper) will be chosen by the students. Both papers will be made available to the class during the class prior to the discussion period. Fifty points will be earned for participation in discussion sessions. *Please note that “participation” includes both leading and participating in discussions.*

- 3) **Research Pre-proposal:** Each student will develop and submit a 4-page (double spaced; 12 point font) *original* research pre-proposal. Format guidelines for the pre-proposal are detailed in a separate handout. Proposal concepts are due to the instructor by **March 6** to determine the proposed project’s feasibility and appropriateness. The finished proposal is due on Tuesday, **April 10*** and is worth 200 points. On **April 26** (last day of class) each group will present their proposal to the class (10-15 min presentation + discussion). The class will act as a peer-review panel and will select the proposal to be funded based on these presentations. **Late papers will be penalized 10 points per day. No papers will be accepted after April 13, 2007**

- 4) **Attendance Policy:** Attendance is expected on all days with student presentations or paper discussions. Unexcused absences on these days will lower your overall “participation” score by 5 points per absence.

- 5) **Make-up Policy:** Students are expected to attend all required classes and to take exams on the scheduled dates. Makeup exams are given only under emergency circumstances. Please inform the instructor prior to the exam or required class of the emergency circumstance by email (preferred) or phone and provide a formal doctor’s excuse or written notification of the family emergency at the next class meeting.

- 6) **Grades:** Points will be accumulated as described above. Maximum points possible are:

Presentations (5 @ 50 points/presentation)	250
Participation in class discussions	50
Research proposal (incl. final presentation)	<u>100</u>
Total	400

Grading scale: A (90 - 100%); B (80 - 89%); C (70 - 79%); D (60 - 69%); F (\leq 59%)

Academic Honesty Policy: All academic work must meet the standards contained in “A Culture of Honesty.” Students are responsible for informing themselves about those standards before performing any academic work. Students are advised to consult the UGA Policy on Academic

Honesty and to pay particular attention to the section on plagiarism. The policy is located at: <http://www.uga.edu/ovpi/honesty/acadhon.htm>.

Students with Disabilities: Students with disabilities who require reasonable accommodations in order to participate in course activities or meet course requirements should contact the instructor or designate during regular office hours or by appointment.

General Disclaimer: Please note that this course syllabus is a general plan for the course. Deviations announced to the class by the instructor may be necessary.

EHSC (FORS; ECOL) 8610: Aquatic Toxicology
Spring 2007: Tentative Lecture Schedule

Dates	Topic(s)
9 January	Syllabus, course expectations, introductions
11 January	Overview of aquatic toxicology
16 January.	Uptake, kinetics
18 January	Biotransformation, elimination
23 January	Paper discussion 1
25 January	Bioaccumulation of organic compounds
30 January	Biotic ligand model (Wilson)
1 February	Bioaccumulation of inorganics and metals (Wilson)
6 February	Student presentations (Biomagnification of organics; Trophic transfer of metals in animals (stable isotopes); plant uptake of xenobiotics and metals and their use in bioremediation)
8 February	Contaminant fate (abiotic processes)
13 February	Paper discussion 2
15 February	Bioavailability: organics and inorganics
20 February	Contaminant fate (biotic processes)
22 February	Student presentations: Physicochemical properties and global distribution of contaminants; Water body source/type effects on contaminant fate and transport; Climate change and effects on contaminant distribution
27 February	Whole organism, physiological and biochemical responses
1 March	Paper discussion 3
6 March	Biomarkers (<i>Proposal concepts due</i>)
8 March	Student presentations: CYP1A1 and other P450s as biomarkers; Oxidative stress biomarkers; Metallothionein and other metal binding proteins as biomarkers)
13 March	Spring Break – No class
15 March	Spring Break – No class
20 March	Paper discussion 4
22 March	Behavioral toxicology
27 March	Toxicity testing: water and sediments
29 March	Microcosms; Mesocosms and whole lake studies
3 April	Paper discussion 5
5 April	Ecotoxicology: measuring effects on populations, communities and ecosystems

- 10 April **Student presentations:** Monitoring aquatic communities to assess effects of environmental contamination (e.g., IBI; diversity indices, etc); Determining landscape to global effects of aquatic contamination; Use of GIS in ecotoxicological studies. (*Proposals due*)
- 12 April Ecological risk assessment
- 17 April EcoRisk game
- 18 April **Student presentations:** Emerging issues in aquatic toxicology I, II and III
- 24 April **Paper discussion 6**
- 26 April Pre-proposal presentations, peer review and awarding of funding.