Ecotoxicology and Risk Assessment
3 credits

INSTRUCTOR: Dr. Donna Kashian ***Winter semester, 2019***
Office: 3115 Biological Sciences **Office Phone: 313-577-8052**
Office Hours: By appointment **e-mail: dkashian@wayne.edu**

LECTURE: 12:30-1:20 Tue/Thur State Hall Room 0218
DISCUSSION: 1:20-2:10 Tue State Hall Room 0218

SUMMARY

The purpose of this course is to provide students with an overview of ecological and environmental aspects of toxicology and pollution biology. The course will emphasize population, community, and ecosystem responses to contaminants. General understanding of ecology, chemistry, and basic statistics is essential.

TEXT

Newman, M.C. and W.H. Clements. 2008. *Ecotoxicology: A Comprehensive Treatment*. CRC Press, Boca Raton, FL.

In addition, there are 2 books on reserve in the Undergraduate Library (see below).

The main objective of the course is to give the students knowledge and skills that allow an overall assessment of the fate of foreign chemicals in the environment and of their effects on different biological organization levels. On completion of the course, the student should be able to

- present and explain mechanisms for adverse effects of chemicals
- estimate the risk for adverse effects of a chemical on different biological organization levels based on knowledge about the toxicity, degradability, and bioavailability of the chemical
- retrieve and critically evaluate toxicological information from different sources (internet-based databases, hand books, scientific articles)
- independently carry out, and present orally and in writing, environmental risk assessment of chemicals
- describe typical ecotoxicological field investigation, lab testing/toxicity testing, and risk assessment methodologies and identify their applicability to example problems.
- describe the role of ecotoxicology in major environmental regulations/decision-making frameworks.
- identify key types of environmental toxicant, identify the major factors affecting their fate and transport.
- identify mechanisms of and solve basic problems related to bioaccumulation, biomagnification, and bioconcentration.
- define the principles of toxicology and the action of selected toxic materials at the cellular, physiological, organismal, population, community and ecosystem level.

- address issues of ecotoxicological concern using qualitative and quantitative arguments including risk assessments

GRADUATE STUDENT GRADING

Grades will be determined by the student's performance on one 50-min lecture exam (250 pts), a comprehensive take-home final exam (300pts), an Ecological Risk Assessment Project (200pts), participation in weekly discussions (100pts), class activities (50 pts), and a group class presentation (100pts).

Graduate students will be graded based on the following scale.

A 93.5 – 100%	B+ 85.5 –89.4%	B- 79.5 – 82.4%	C 72.5 – 75.4%
A- 89.5 – 93.4%	B 82.5 –85.4%	C+ 75.5 – 79.4%	C- 69.5– 72.4%

UNDER GRADUATE STUDENT GRADING

Grades will be determined by the student's performance on one 50-min lecture exam (250 pts), a comprehensive take-home final exam (250 pts), an Ecological Risk Assessment Project (200pts), participation in weekly discussions (150pts), class activities (100pts), and a group class presentation (50pts).

Undergraduates will be graded based on the following scale.

A 93.5 – 100%	B+ 85.5 –89.4%	C+ 75.5 – 79.4%	D+ 65.5 – 69.4%
A- 89.5 – 93.4%	B 82.5 –85.4%	C 72.5 – 75.4%	D 62.5 – 65.4%
	B- 79.5 – 82.4%	C- 69.5– 72.4%	D- 59.5 – 62.4%
			F ≤ 59.4%

MAKEUP EXAM POLICY:

There will be no makeup exams provided. If an unavoidable significant conflict arises prior to a scheduled exam, we will attempt to reschedule the exam for everyone for the next class meeting day (if there is sufficient lead time to do this fairly for the class). If this is not possible, and the student's absence from an exam is a legitimate documented emergency, then the student's score on the cumulative portion of the Final Exam may (at the discretion of the instructor) be pro-rated to cover the missed exam.

DISCUSSION

During the first week of class, students will select from a list of topics for the weekly discussion. Generally, 3 students will be responsible for leading the discussion each week. Papers for the weekly discussion (approx. 3 per week) have been selected by the instructor and are available through Blackboard.

Students leading the weekly discussion are responsible for preparing a list of study questions that address critical issues in the papers (e.g., Are the data sound and presented in a valid manner? Are the conclusions drawn correctly? Did the authors address the original hypothesis? What are the strong/weak points of the papers?). Group leaders will distribute study questions to the class during the lecture period prior to the discussion session (generally Wednesday morning).

Important Note: Discussion sections will emphasize evaluation and synthesis of papers rather than summarizing findings. It is expected that **all** students will carefully read the papers, examine the study questions, and participate in these discussion sessions. The thoughtfulness of your

study questions, attendance and provision of thoughtful and critical questions or comments during discussions and student presentations will be reflected in your discussion grade.

ECOLOGICAL RISK ASSESSMENT (20%). Each student will be required to provide an Ecological Risk Assessment (ERA) for a TBD site. Students will assemble teams of 3 - 4 individuals to work on the consulting project. Each consulting team will prepare an ERA using the *EPA Framework for Ecological Risk Assessment* guidelines. The ERA may not exceed 10 pages, including cover page, table of contents, figures, and tables (i.e., single-spacing, 12 point font, one-inch margins). Each consulting team will prepare a 15 – 20 min. **presentation** for their ERA. Multidisciplinary teams provide more comprehensive ERAs, so choose your consulting team carefully. **Your grade will be based on** accuracy and completeness; overall organization, neatness, and editorial accuracy; group participation; and meeting deadlines.

ADD/DROP POLICY:
Add forms will not be signed after the second week of class (Jan 18th). **Drop** forms must be signed by March 24, 2019 (Note: It is not a good idea to wait until the last day to drop). Please note that "**incomplete**" grades will not be issued to students in poor standing who are seeking an alternative to a late drop.

CHEATING POLICY:
Cheating is covered in detail in the Wayne State University Code of Conduct, found at http://www.doso.wayne.edu/judicial/academic-integrity.htm.

Students found to be cheating during an exam (using a "cheat sheet" in any form, looking at another's paper, or allowing another to look at yours), will receive a zero for that test with no opportunity to drop or replace that score. Students are expected to work independently on the take home exam and failure to do so will results in an E on that exam.
A second episode of cheating will result in a grade of F for the course and may also result in initiation of university disciplinary action.

No electronic devices (cell phones, blackberries, ipods, computers, cameras, etc.) are to be present at an exam. Those present will be confiscated until the exam is completed, and students using such devices to cheat on an exam will receive a zero on the exam.

In short, don't cheat. It rarely helps you with your final course grade, and the consequences are simply not worth the risk. Be aware that cheating is a very personal and disrespectful insult to instructors and your classmates, and the instructors will show no leniency in how it is handled.

Students with disabilities: If you have a documented disability that requires accommodations, you will need to register with Student Disability Services (SDS) for coordination of your academic accommodations. The Student Disability Services (SDS) office is located at 1600 David Adamany Undergraduate Library in the Student Academic Success Services department. SDS telephone number is 313-577-1851 or 313-577-3365 (TDD only). Once you have your accommodations in place, I will be glad to meet with you privately during my office hours to discuss your special needs. Student Disability Services' mission is to assist the university in creating an accessible community where students with disabilities have an equal opportunity to fully participate in their educational experience at Wayne State University.

Please be aware that a delay in getting SDS accommodation letters for the current semester may hinder the availability or facilitation of those accommodations in a timely manner. Therefore, it is in your best interest to get your accommodation letters as early in the semester as possible.

Academic disputes, including issues not specifically resolved or covered by this syllabus, will be resolved by following the guidelines for University Student Due Process.

LECTURE SCHEDULE*

	Topic(s)	**Reading**
1/8	Introduction	Newman & Clements Ch 1.
1/10	Basic Toxicology	Rand Ch. 1
1/15	Basic Toxicology	
1/17	Acute and Chronic Toxicity Testing	Newman & Clements 21
1/22	Factors That Modify Toxicity	Rand Ch. 1; Appendix C
1/24	Statistical Analyses	Newman & Clements 24
1/29	Population, Community, and Ecosystem Responses	Newman & Clements Ch. 12, 25, 29
1/31	Population, Community, and Ecosystem Responses	Newman & Clements Ch. 12, 25, 29
2/5	Chemodynamics and Bioaccumulation	Rand Ch. 16; Appendix D Newman & Clements 7, 20
2/7	Biomonitoring I: Biomarkers to Ecosystems	Newman & Clements Ch. 22, 24
2/12	Biomonitoring II: Design Considerations & Limitations	Newman & Clements Ch. 23
2/14	PAHs	Hoffman Ch 14
2/19	*Lab Exercise: PCB's in the Great Lakes-bring computers if you have one*	See Canvas
2/21	*******MIDTERM EXAM*******	
2/26	Pharmaceuticals in the Environment: *Dr. Pitts*	Posted in Canvas
2/28	Organic Pollutants: Pesticides, PCB's, and Dioxins *Tracie Baker*	Hoffman Ch. 12, 13
3/5	Organic Pollutants: per- and polyfluoroalkyl substances (PFAS)	
3/7	Experimental Approaches I: Microcosms & Mesocosms	Newman & Clements Ch., 31, 32
3/12 &3/15	*********SPRING BREAK!!!!!************	
3/19	Experimental Approaches I: Ecosystems	
3/21	Ecological Risk Assessment	Rand Ch. 28
3/26	Risk Assessment in class activity	
3/28	Heavy Metals	Hoffman Ch. 16
4/2	Global Pollution Problems	Newman & Clements Ch. 26, 35
4/4	Sediment Contaminants	Hoffman Ch. 5
4/9	Wildlife Toxicology	Hoffman Ch. 4
4/11	Emerging Contaminants	See Canvas
4/16	Environmental Justice	See Canvas
4/18	Class Presentations-Take home final exam handed out	
	**********TAKE-HOME FINAL EXAM DUE @ 2:30 P.M APRIL 25th**********	

* Instructor reserves the right to modify the schedule as necessary. Students will be informed of any changes to the schedule during class and via e-mail.

Bio 6190 ECOTOXICOLOGY

Bio 6190 ECOTOXICOLOGY

ABRIDGED LIST OF ECOTOXICOLOGY TEXTBOOKS

Baird, D.J., editor. 1996. Ecotoxicology : ecological dimensions. Chapman & Hall, New York, NY.

Boudou, A. and F. Ribeyre. 1987. Aquatic Ecotoxicology: Fundamental Concepts and Methodologies. CPC Press, Boca Raton, FL.

[1]Clements, W.H. and M.C. Newman. 2002. Community ecotoxicology. Wiley, Chichester, U.K.

Connell. D. et al. 1999. Introduction to ecotoxicology. Blackwell Science, Malden, MA

Calabrese, E.J. and L.A. Baldwin 1993. Performing Ecological Risk Assessments

Forbes, V.E. and T.L. Forbes. 1994. Ecotoxicology in Theory and Practice

[*]Hoffman, D. J, Barnett A. Rattner, G. Allen Burton Jr., and John Cairns Jr. (Eds) 2002. Handbook of Ecotoxicology.

Levin, S.A., M.A. Harwell, J.R. Kelly, and K.D. Kimball (eds.) 1988. Ecotoxicology: Problems and Approaches. Springer-Verlag, New York.

Mason, C. F. 1991 Biology of Freshwater Pollution. Wiley, New York.

Moriarty, F. 1999. Ecotoxicology: The Study of Pollutants in Ecosystems, 3rd Edition. Academic Press, New York.

Newman, M.C. 1995. Quantitative methods in aquatic ecotoxicology. Lewis Publ., Boca Raton, FL

Newman, M.C. Fundamentals of Ecotoxicology. Ann Arbor Press, Chelsea, MI

Peakall, D. B. 1992. Animal Biomarkers as Pollution Indicators. Chapman and Hall, New York.

[*]Rand, G.M. (ed.) 1995. Fundamentals of Aquatic Toxicology: Effects, Environmental Fate, and Risk Assessment (2nd ed). Taylor and Frances, Washington, DC

Römbke, J. and F. Moltmann. 1996. Applied ecotoxicology. Lewis Publishers, Boca Raton, Fla.

Schüürmann, G. and B. Markert, editors. 1998. Ecotoxicology : ecological fundamentals, chemical exposure, and biological effects. John Wiley, New York, NY

Suter, G.W. 1993. Ecological Risk Assessment.Lewis Publ.

Walker, C.H. et al. 2000. Principles of ecotoxicology. Taylor & Francis, London

*Books on reserve at the Undergraduate library