

University of Manitoba
Faculty of Environment, Earth and Resources
Department of Environment and Geography

ENVR 3180 Methods in Ecotoxicology (3 Credit hours) A01
Term 2, 2018-2019

Instructor: Mark Hanson, Ph.D.
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Office Hours: By appointment

Course Times:

Class: Monday, Wednesday and Fridays, 11:30am-12:20pm, Rm 243 Wallace

Laboratory: Friday, 2:30-5:15pm, Rm 318 J.H. Ellis Building

TA:

Your TA is Tyler Black and he can be reached at <blackt3@myumanitoba.ca> to book an appointment.

Prerequisites:

Introductory Toxicology: Faculty of Environment, Biological Sciences or Agriculture 2180 and a 2nd year course in the Faculty of Environment, Earth and Resources, Science or Agriculture that has a science laboratory component.

Course Materials:

Required

Laboratory manuals and other readings will be distributed in class or via UM Learn.

Outline:

This is a laboratory-based course grounded in the science behind the development, validation, conduction, and application of bioassays as well as biomarkers, bioindicators and biomonitors in ecotoxicology.

Objectives:

The student will be expected to be able to:

- Conduct standard bioassays, including:
 - Duckweed (*Lemna gibba*)
 - Invertebrate (*Eisenia fetida*)
 - Seedling germination
- Use standard statistical techniques to model and interpret their results
- Present data in the format of a scientific journal
- Understand how to critique laboratory bioassays and the data they generate; both their own and in the peer reviewed literature
- Understand how to conduct preliminary ecological risk assessments

Subject materials to be presented:

- Current bioassays methodologies
- The rationale behind the development of bioassays
- The difference between biomarkers and bioindicators
- What constitutes data high quality
- Extrapolating laboratory data to field-level situations
- The process of validating a bioassay, a biomarker, a bioindicator, or a biomonitor
- The statistics to model and interpret the concentration-response

Grading Scheme:

Laboratory Reports	40% (8 reports worth 5% each)
Statistics Assignment	10%
Lecture Midterm	20%
Lecture Final Exam	30%
Total	100%

Comments:

Policy regarding late assignments: Every student is required to submit all of the laboratory reports. Failure to submit a report will result in a mark of zero on that report; reports submitted late will not be accepted without special permission.

Midterm Tests: Failure to write the scheduled midterm examination without a valid medical certificate or compassionate reason (e.g., death of an immediate family member) will normally result in a mark of zero on that examination. The course instructor reserves the right to reschedule a deferred test for those students who have a valid reason for not writing. Make-up tests will not necessarily follow the same format as the original exam.

Final Examination: All students must write the 3 hour final examination. Failure to write the final examination without a valid medical certificate or compassionate reason (e.g., death of an immediate family member) will result in a mark of zero on the final examination. The student's home faculty can only give deferral of a final examination – the instructor cannot reschedule a final examination.

Computer Lab: All students will need to use the statistical software SigmaPlot and other programs to complete their assignments and laboratories. The programs are available in the computer lab in 321 Wallace and you will be given a password to access the machines when they are not scheduled for regular teaching.

Evaluative Feedback: Will be provided in the form of a midterm exam and laboratory reports prior to the voluntary withdrawal deadline date for this course.

Final Grade: A total mark of less than 50% in the course will result in a grade of **F**. Marks between 50% and 100% will be graded from **D** to **A+** according to the Department of Environment and Geography grading scheme below:

Letter Grade	Percentage
A+	90-100
A	80-89
B+	75-79
B	70-74
C+	65-69
C	60-64
D	50-59
F	<49.9

Academic Dishonesty: Students should acquaint themselves with the University's policy on plagiarism and cheating and examination impersonation (see University of Manitoba General Calendar). The copying of another student's assignment (or an instructor's answer sheet from a previous year) or the submission of the same material for two or more courses is plagiarism. Plagiarism and other forms of cheating are prohibited. The full definition of plagiarism and the possible penalties associated with it are outlined in the General Calendar. If your submitted assignment contains material you have copied from another source (e.g., from a textbook, web page, or from the published literature) you must give proper credit to that source.

Schedule and order of material to be covered:

Date	Instructor	Lecture Material	Labs
Jan. 7 th	Hanson	Introduction-What are bioassays?	
Jan. 9 th	Hanson	What are bioassays?	
Jan. 11 th	Hanson	Statistics of bioassays I	No lab
Jan. 14 th	Hanson	Statistics of bioassays II	
Jan. 16 th	Hanson	Statistics of bioassays III	
Jan. 18 th	Hanson	Ecological risk assessment	Statistics*
Jan. 21 st	Hanson	Critiquing toxicity tests	
Jan. 23 rd	Hanson	Acute/chronic and structure/function	
Jan. 25 th	Hanson	What bioassays don't tell you I	Seedling Bioassay*
Jan. 28 th	Hanson	What bioassays don't tell you II	
Jan. 30 th	Hanson	Earthworm testing	
Feb. 1 st	Hanson	Algal tests	Earthworm Bioassay*
Feb. 4 th	Hanson	<i>Lemna</i> and macrophyte methods	
Feb. 6 th	Hanson	Terrestrial plant tests	
Feb. 8 th	Hanson	Periphyton	Mycorrhizal Testing*
Feb. 11 th	Hanson	Models	
Feb. 13th	Hanson	Zooplankton	
Feb. 15 th	Hanson	Midterm Exam	No Lab
Feb. 18 th		<i>Reading Week</i>	
Feb. 20 th		<i>Reading Week</i>	
Feb. 22 nd		<i>Reading Week</i>	
Feb. 25 th	Hanson	Parasites and bioassays	
Feb. 27 th	Hanson	Field-level testing	
March 1 st	Hanson	Microcosms I	Computer Modeling*
March 4 th	Hanson	Microcosms II	
March 6 th	Hanson	Amphibian testing	
March 8 th	Hanson	Biomonitoring	Duckweed Bioassay*
March 11 th	Hanson	Insect testing	
March 13 th	Hanson	EEM	
March 15 th	Hanson	Biomarkers I	Sewage Worms*
March 18 th	Hanson	Biomarkers II	
March 20 th	Hanson	Histopathology	
March 22 nd	Hanson	Non-lethal methods	Snails*
March 25 th	Hanson	Fish testing I	

Date	Instructor	Lecture Material	Labs
March 27 th	Hanson	Fish testing II	
March 29 th	Hanson	Toxicogenomics	Critiquing Papers*
April 1 st	Hanson	Avian toxicology	
April 3 rd	Hanson	Wildlife toxicology	
April 5 th	Hanson	Bioassays & emerging contaminants	No Lab
April 8 th	Hanson	Review	

Labs with an asterisk have a report component.

April 11th-April 26th Final exam will be held and is set by Students Records Office

The voluntary withdrawal deadline date for this course is March 20th 2019.