

BIOL 301.3 T1 – CRITICAL ISSUES IN BIOLOGY 2013-14

Lecturers:	Dr. Susan Kaminskyj, Co-ordinator, Biology Rm. 169 e-address: susan.kaminskyj@usask.ca Dr. Dennis Lehmkuhl, Biology Rm. 241 e-address: dennis.lehmkuhl@usask.ca Dr. Karen Wiebe, Biology Rm. 121 e-address: karen.wiebe@usask.ca
Instructor:	Marlene Mahoney e-address: marlene.mahoney@usask.ca
Teaching Assistants:	Mike LaForge (mike.laforge@usask.ca) Tim Repas (tim.repas@usask.ca)
Lectures:	Tu/Th 10:00-11:30 a.m., 146 ARTS
Tutorials:	Mon-Tues-Wed-Thur 1.30 pm – 4.20 pm. Biology Rms. 123/124.

COURSE DESCRIPTION

An ability to think critically is essential for individuals to function effectively in society. Critical thinking allows us to make rational decisions about what to do and what to believe, and to present ideas forcefully. The purpose of this course is to hone your ability to understand high-level biological concepts, to give you an introduction to critical global issues that will affect the world in your adult life time, to stimulate your ability to develop logical opinions, and to improve your written and oral communication skills.

ANTICIPATED LEARNING OUTCOMES

This capstone course is intended for you to learn about issues of global importance that will affect all of our lives in the next few decades, and to develop the tools to be an advocate for rational responses to those issues. The course is designed with both lecture and tutorial components. The tutorials provide a variety of opportunities to practise thinking critically and writing scientifically, through receive feedback at multiple points as you develop your skills.

TEXTBOOK Writing Papers in the Biological Sciences, Victoria McMillan

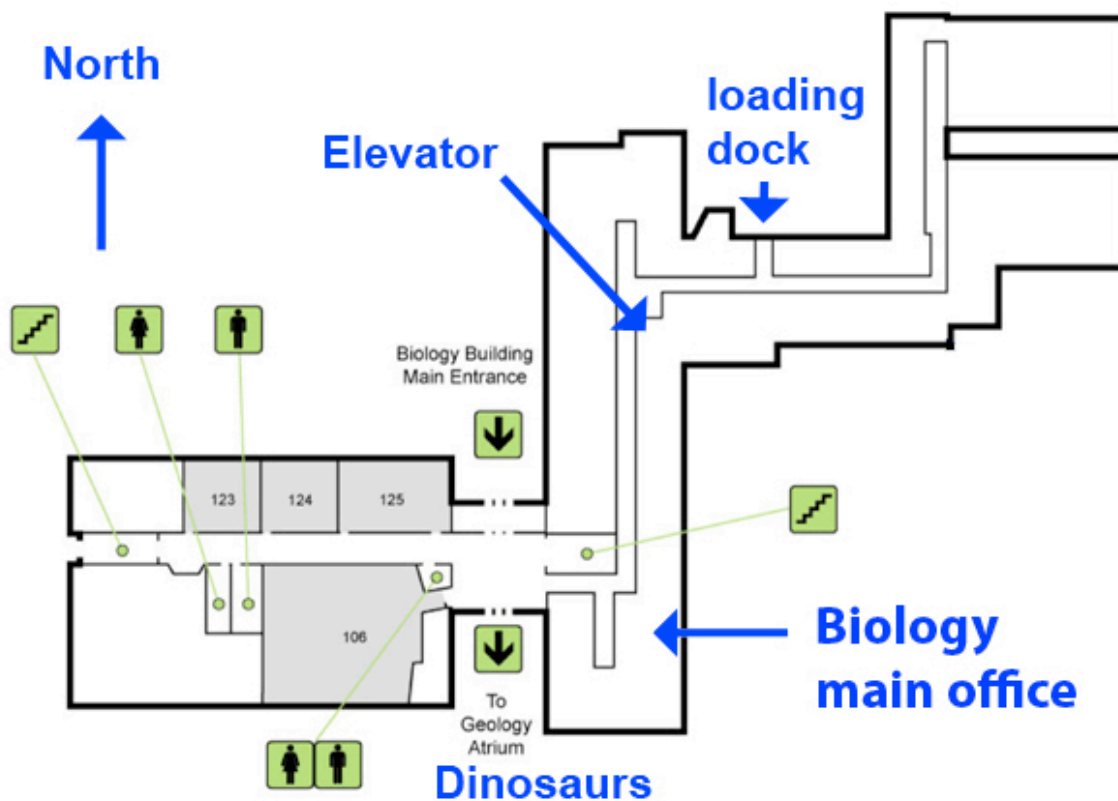
TOTAL CLASS EVALUATION (TOTAL =100%)

→ **Required course work: All components listed below**

(KW) Part 1 – 2 written assignments	12%
(KW) Data analysis with SPSS (written/computer assignment):	6%
(KW) Midterm (Part 1)	15%
(DL) Part 2 - Participation in discussion	4%
(DL) Part 2 - Written report, Assignment 1	5%
(DL) Part 2 - PPT presentation, Assignment 2	5%
(SKj) Press release	5%
(SKj) PowerPoint	8%
Final Examination (Part 1, Lehmkuhl – 20% & Part 2, Kaminskyj – 20%)	40 %
TOTAL	100%

DEFERRED EXAMS AND ACADEMIC HONESTY

A student missing an exam must contact the instructor within three working days of the scheduled exam in order to provide documentation explaining their absence from the exam, and to initiate the discussion of a possible deferred exam. Students must follow the U of S Guidelines for Academic Honesty and are required to read the following document: http://www.usask.ca/university_secretary/pdf/dishonesty_info_sheet.pdf Plagiarism is considered a very serious breach of academic honesty and will not be tolerated. Cases of plagiarism will be reported to the College Student Academic Affairs, Dishonesty Subcommittee.



DR. WIEBE'S SECTION (September 6 to October 3, 2013) (= 33 points out of 100)

Week 1:

Lecture 1: (5 Sept) - Class introduction, scope of course, meeting schedule etc.

Week 2:

Lecture 2: (10 Sept) – Literature searches and use of library resources (readings: chapter 1 & 6 of McMillan)

Lecture 3 – (12 Sept) - Science and the scientific method

Tutorial: NONE: students may work on writing their "protocol" during this time

Week 3:

Lecture 4: (17 Sept) – Reading and writing a scientific paper (reading: Ch. 4 McMillan)

Lecture 5: (19 Sept) – Writing tips continued (Ch. 7 McMillan)

Tutorial 1 – Week 3: Sea lion case study: generating hypotheses and predictions.

Week 4:

Lecture 6: (24 Sept) - Methods and experimental design (Reading: Ch. 2 McMillan)

Lecture 7: (26 Sept) – Stats/ Numeracy Lecture #1

Tutorial 2 Week 4: Deconstruction of scientific papers. The FOG index

Week 5:

Lecture 8: (1 Oct) – Stats/Numeracy Lecture #2 (Readings from Ch.2 &3 McMillan)

Lecture 9: (3 Oct) - **MIDTERM EXAM** - Run and marked by Dr. Wiebe

Tutorial 3 Week 5: hands-on stats exercise with SPSS computer lab.

Class Evaluation* For Part 1 (Total = 33%)

Protocol (written assignment):	6%	Due date: 17 Sept 2013
Abstract (written assignment):	6%	Due date: 1 Oct 2013
Data analysis with SPSS (written/computer assignment):	6%	Due date: 10 Oct 2013
Midterm Exam:	15%	3 October, 2013
TOTAL	33%	

DR. LEHMKUHL'S SECTION (October 8 to October 31, 2013) (= 34 points out of 100)

INTRODUCTION: Science constantly impacts modern life. Media reports attempt to entertain or inform us. Practical applications improve our lives. Politically or socially motivated studies attempt to affect our behaviour or get our votes. Science students are expected to be familiar enough with the scientific method that they can design good research projects or detect good results, but strangely, they usually get very little training in this regard, and seem to be expected to “just know”. Also, we sometimes forget that science is a relatively new development, the modern version having developed mostly in the last century, with some aspects dating back to Newton in the 17th century or the classical Greeks. The objective of this section is to go more deeply into the origins, history, philosophy and also the limitations and pitfalls of science.

LECTURES - Eight lecture periods -- to provide information for use by students in the assignments and discussions in tutorials. Also you will be responsible for material from lectures for the final exam.

Week 6-9:

Lecture 10 & 11: (8 & 10 Oct)

Topic 1- Restate the scientific method and the definition of science

Lecture 12, 13 & 14: (15, 17 & 22 Oct)

Topic 2- Most of human history had no science. What existed before science?
Where, when, why?

- Middle East, China and Japan- impact of Buddhism and Confucianism on society.
- Greek foundations in philosophy; math and engineering
- Modern roots- Newton, classical and quantum physics,
- Kuhn, Popper, paradigms, falsifiability, Capra, Science and the web of life.

Lecture 15, 16 & 17: (24, 29, 31 Oct)

Topic 3- dealing with science- some issues

1. Capra, Deep Science, Shallow science, Confirmation Bias (mysideism). Impact on sponsors, funders, doers, consumers.
2. High points, Greeks to present- form and pattern, Pythagorans, mechanism, romanticism, vitalism
3. Reductionism- holism; assumptions pitfalls strengths limitations
4. The historical factor imminent and configuration of George Gaylord Simpson.
5. Correlation does not imply causation-abuses assumptions examples
6. Proof –legal, logical, mathematical, and scientific meanings, examples and abuses
7. Laws, theories, hypotheses
8. The role of popular opinion in scientific” truth”, expert opinion and science, consensus, truth by majority opinion, science and social justice , examples, abuses.

Tutorials- (15-29 October): There will be two tutorial assignments. You may wish to read the material below and begin preparation now so you will have plenty of time to search and prepare (**See timeline summary below**)

Assignment 1: (15 Oct) (Total value 4 + 5 points) I will provide you with two or three studies and reports. You may use the material I provide, and in addition go to public media sources such as TV, radio, University websites and print media. Look for reports of scientific

results or scientific studies that are being presented to the public in an easy to understand fashion (this is in contrast to hard science that is reported in scientific journals). This will be dealt with later. From the reports you find and/or that I provide to you, select **three** and, using skills that you have been learning in this course, evaluate the reports, rating them from best to worst. At the tutorial scheduled the week of Oct. 15, be prepared to discuss your best and worst reports, and to join in the discussion on the best of worst that others discuss. Your participation will be evaluated (**4 points**). Also write a report on the **three** you selected, explaining why you ranked them the best and the worst. Be concise, one or two pages should be long enough, and will be handed in the week of Oct. 22 in your tutorial (**5 points**).

Assignment 2: (22 or 29 Oct – half of the class each week) (Value 5 points) Go to hard science, that is, at the library find published research papers that have been subject to peer review and that are original research and primary literature. Select **six** papers or research reports; and rank from best to worst. Prepare a six-slide PowerPoint presentation. You will give a presentation in your tutorial period in either the week October 22 or 29 (half of the class each week).

Summary Timeline of Dates and Content for Lehmkuhl section

Oct. 9	No tutorial - Thanksgiving	
Oct.15	Group Discussion - best and worst of Assignment 1	4 points for participation;
Oct. 22	Hand in 1 page critique- best and worst- Assignment 1.	Paper due Oct. 22
	Half of the class will present a six slide PowerPoint on best and worst of Assignment 2	5 points; due Oct. 22
Oct. 29	Remaining half of the class will present a six slide PPT of best and worst of Assignment 2	5 points; due Oct. 29
		5 points

Class Evaluation* For Part 2 (Total = 34%)

Participation in discussion, Oct. 15	4%
Written report, Assignment 1	5%
PPT presentation, Assignment 2	5%
Final Examination	<u>20%</u>
	34%

DR. KAMINSKYJ'S SECTION (November 5 to 28, 2013) (= 33 points out of 100)

INTRODUCTION: This section will apply your of skills in writing and verbal communication.

1) Each student will choose a critical issue that interests them. (First come, first choice: We will compile a list of topics as they are submitted, so that overlap between will be minimized.) Students will use the scientific literature to inform themselves about their topic. **2)** Each student will identify a paper on their topic that has been published within the last 24 months.

Each student will use their paper as the subject for a press-release (one-pager, 5% of final grade) and a powerpoint presentation (6 minutes, 8% of final grade). This topic will also be used for the source material for a final essay in exam time (20% of final grade) that will be typed in an Arts and Science computer lab. Students will supply an electronic and a printed version at the end of the final exam.

Week 1:

Lecture 1 (Nov 5) – Susan Kaminskyj – introduction and selection of a critical issue and relevant article

Lecture 2 (Nov 7) – Dr. Pat Gober (Global Institute of Water Security) *Wicked* problems – water security and related issues.

To be scheduled this week for later in the course: timing for 6-minute powerpoint presentations (half of class in week 3, second half in week 4). Presentations will have a *maximum* of 6 slides. The POWERPOINT will present a key facet of the paper for which the student has written a PRESS RELEASE. Grading for the powerpoint presentations will be by the TA, faculty, *and* students. A grading key will be provided. A small fraction will be student assessments of each other.

Week 2:

Lecture 3 (Nov 12) – Michael Robin (UofS Research Communications). Some resource material is available from Kaminskyj website (www.usask.ca/biology/kaminskyj/) 'Resources' page, documents on presentations.

Lecture 4 (Nov 14) – S Kaminskyj, Website and powerpoint usability.

→ Assignment for *end of next week* – PRESS RELEASE to be marked by TA

Week 3:

Lecture 5 (Nov 19) – 'Reading' your audience. The 'elevator' question.

Lecture 6 (Nov 21) - Applications and interviews.

Tutorial week 3: POWERPOINT presentations PART 1 (half of class in week 3, second half in week 4) maximum 6 slides. Each student will present a key facet of the paper for which they have written a press release. Grading by TA, faculty, students. A grading key will be provided. Students will be assessed on their critique of each other (1 % of the total).

→ Assignment due – PRESS RELEASE to be marked by TA

Week 4:

Lecture 7 (Nov 26) – S Kaminskyj's critical issues – overview

Lecture 8 (Nov 28) – Dr. Adrian Johnston (Potash and Phosphate Inst., Canada)

Tutorial week 4: POWERPOINT presentations PART 2

Class Evaluation For Kaminskyj Part 3 (total = 33%):

Essay (in final exam period) 20% of final grade will be on Kaminskyj section. This will be an essay written in a computer lab, which will present the student's critical issue in the broad sense, including background and recent key developments in the area. If possible, the essay will include a suggestion for reducing impact of this particular issue.

Grading scheme: (percent of total grade for Kaminskyj section)

Press release 5%; Powerpoint 8%; Final essay in exam time 20%