



## BIOL 301.3 COURSE SYLLABUS

<b>COURSE TITLE:</b>	Critical Issues in Biology	<b>TERM:</b>	Fall 2015
<b>COURSE CODE:</b>	BIOL 301 (CRN 87155)	<b>DELIVERY:</b>	Lectures/Tutorials
<b>COURSE CREDITS:</b>	3 cu	<b>START DATE:</b>	September 3, 2015
<b>CLASS SECTION:</b>	01	<b>TUTORIALS:</b>	Rm 123/124 Biology Bldg
<b>CLASS LOCATION:</b>	Rm 124 Thorvaldson Bldg	<b>TUT. TIME:</b>	1:30 – 4:30 p.m. (M, W, TH)
<b>CLASS TIME:</b>	10:00 – 11:20 a.m., Tuesday/Thursday		
<b>WEBSITE:</b>	further information accessed through Course Tools		

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**LECTURERS:** **D.M. Lehmkuhl, Co-ordinator**  
Rm. 214 Biology, 306-966-4408  
dennis.lehmkuhl@usask.ca

**H. Cota-Sanchez**  
Rm. 141 Biology, 306-966-4405  
hugo.cota@usask.ca

**A.R. Davis**  
Rm. 225 Biology, 306-966-4484  
art.davis@usask.ca

**LABS:** **Marlene Mahoney**  
Rm. 150 Biology, 306-966-4415  
marlene.mahoney@usask.ca

**Teaching Assistants:**  
TBA

### 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, 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 course is intended for you to learn about issues of importance that will affect all of our lives, and to develop the tools for rational responses to those issues. The course is designed with both lecture and tutorial components. The tutorials provide a variety of opportunities to practice thinking critically and writing scientifically through feedback received at multiple points as you develop your skills.

## Important Dates – 2015

- September 3, 2015 First Day of Classes (Thursday)
- September 7, 2015 Labour Day Public Holiday (Monday) – No tutorial
- October 12, 2015 Thanksgiving Day Public Holiday (Monday) – No tutorial
- November 9 -13, 2015 MIDTERM BREAK (No lectures or tutorials)
- December 8, 2015 Last Day of Classes (Tuesday)

**Textbook:** Writing Papers in the Biological Sciences, 5<sup>th</sup> Ed., Victoria McMillan  
(Bedford, Boston)

## OVERALL EVALUATION (Total = 100%) – Required course-work: All components listed:

Part 1 - Two (2) written assignments (obituary; abstract) (AD)	12 %
- Database search for a biological organism (AD)	6 %
- Midterm Exam (AD)	15 %
Part 2 - Participation in Discussion (DL), Assignment 1	4 %
- PPT presentation (DL), Assignment 2	10 %
Part 3 - Media Release (HCS)	5 %
- PowerPoint Presentation (HCS)	8 %
Final Examination (Lehmkuhl – 20%, Cota-Sanchez – 20%)	<u>40 %</u>
<b>Total</b>	<b>100 %</b>

**Policy for submission of late assignments - 10% of the assignment's final grade will be deducted for each day that has passed since the assignment's due date.**

**PART I - DR. DAVIS' SECTION** (September 3 to October 1, 2015) (= 33 points out of 100)

**Week 1** (Sept 3 – 4; No tutorial this week)

Lecture 1 (3 Sept) – Class introduction - Course schedule; Scope of the course; Policy about assignments and their deadlines. Explanation of Assignment 1 (Writing an obituary).  
(*Reading: Chapter 1 of McMillan*).

**Week 2** (Sept 7 – 11; No tutorial this week)

Lecture 2 (8 Sept) – Handling the scientific literature; Sources – primary and secondary;  
How biological science gets published in scholarly journals.

Lecture 3 (10 Sept) – *Guest speaker*: Li Zhang, Science Librarian at the Sciences Library, U of S  
– Searching databases; ordering interlibrary loans. Explanation of Assignment 2  
(Database search of an organism based on its scientific name).

**Week 3** (Sept 14 – 18; Tutorial held on Mon, Wed and Thurs afternoons this week)

Lecture 4 (15 Sept) – Science and critical thinking; Understanding the scientific method.

Due date for receipt of Assignment 1 (Obituary). (*Reading: Chapters 5-8 of McMillan*).

Lecture 5 (17 Sept) – Setting a hypothesis; Testing hypotheses using experimentation; Structure of a scientific article; Tips for reading and interpreting the primary literature. Explanation of Assignment 3 (Writing an abstract of a scientific manuscript).

**Week 4** (Sept 21 – 25; Tutorial held on Mon, Wed and Thurs afternoons this week)

Lecture 6 (22 Sept) – Writing style, including some tips for effective scientific writing.

Due date for receipt of Assignment 2 (Database search for assigned organism).  
(*Reading: Chapters 2 and 3 of McMillan*).

Lecture 7 (24 Sept) – Referencing the work of others; Introduction to numerical literacy;  
Evaluating and interpreting data; Calculation of elementary statistics.

**Week 5** (Sept 28 – Oct 2; No tutorial this week)

Lecture 8 (29 Sept) – Performing basic tests to check for statistical significance; Data presentation in graphs, tables; Discussion of format of Mid-Term Exam.

Due date for receipt of Assignment 3 (Abstract of a scientific manuscript).

Class 9 (1 Oct) – **LECTURE MID-TERM EXAM**

**STUDENT EVALUATION FOR PART I:**

	Percent of <u>final course grade</u>	<u>Due date</u>
Assignment 1 (Writing an obituary):	6	15 Sept 2015
Assignment 2 (Database search for an organism assigned):	6	22 Sept 2015
Assignment 3 (Writing an abstract of a scientific manuscript):	6	29 Sept 2015
Mid-Term Exam:	<u>15</u>	1 Oct 2015
TOTAL:	33	

## **PART 2 - DR. LEHMKUHL'S SECTION** (Oct. 5 to Oct. 29, 2015) (= 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 17<sup>th</sup> 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.

**Lecture and Tutorial/Lecture/Discussions:** 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.

The lecture periods (T/TH 10:00 – 11:20) and tutorial period discussions (1:30 – 4:30 MWTH) will be used to cover the topics below. Not all scheduled XXXX will be used. See schedule next page

**Lecture Topic 1** - The scientific method and the definition of science

**Lecture 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 Topic 3** - dealing with science- some issues

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

**Tutorials (6 -30 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: (Week of 6 October)** (Total value 4 points) Tutorial to prepare for group discussion of 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 by sources to the public. From the reports you find, select **one** and, using information and skills that you have been learning in this course, evaluate the reports. Be specific and include “falsification”; “correlation”, positivism, indirection, etc., in your discussion. Your participation will be evaluated. **(4 points)**.

**Assignment 2:** (Value 10 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 in the primary literature. Select **one** paper or research report. Prepare a six-slide PowerPoint presentation. Evaluate the science again, using concepts such as falsifiability, correlation, positivism and deduction.

### **Summary Tutorials and Lectures for Lehmkuhl section**

1. Week of Oct. 5 Group Lecture Discussion – M, W, TH 1:30-4:30
2. Week of Oct. 12 *Thanksgiving [Oct. 12] No tutorial*, Lecture Oct 15
3. Week of Oct. 19 Tutorial assignment; Lectures Oct. 20, 22 .
4. Week of Oct. 26 Tutorial assignments #2, M, W, TH 1:30 – 4:30

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

Participation in discussion, Assignment #1	4%
PPT presentation, Assignment 2	10%
Final Examination	<u>20%</u>
	34%

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## **PART 3 - DR. COTA-SÁNCHEZ'** (November 3 to December 5, 2014) (33 points out of 100)

INTRODUCTION: This section will apply your skills in analyzing scientific literature, and writing and verbal communications.

- 1) Each student will choose a critical issue that interests him or her. (First come, first choice: We will compile a list of topics as they are submitted, so that overlap between topics is minimum. Get approval for your topic from your instructor and/or Marlene). Students will use the scientific literature to inform themselves about their topic.
- 2) Each student will identify a paper on his or her topic that has been published within the last 24 months (papers published earlier than Sept. 2013 will not be acceptable).
- 3) Each student will use their paper as the subject for a media release and a PowerPoint presentation. This topic will also be used for the source material for an essay in the Final Exam. Students will supply an electronic and a printed version at the end of the final exam.

### **Week 1:** [Nov. 2 - 6]

**Lecture 1** (Nov. 3) – Introduction and selection of a critical issue and relevant article.

**Lecture 2** (Nov. 5) – Global environmental and biodiversity issues and implications – “the perfect storm and vanishing of species”?

**Tutorial:** Informal drop-in tutorials this week for discussion and selection of your critical issue topic.

### **Week 2:** [Nov. 9 - 13] – **Fall Midterm Break – NO CLASSES**

### **Week 3:** [Nov. 16 - 20]

**Lecture 3** (Nov. 17) – Guest lecture –Use of Synchrotron Technology in Biological Sciences

**Lecture 4** (Nov. 19) – Preparing and delivering PowerPoint presentations, and Website usability in communicating science to the public.

**Tutorial week 3:** Preparing PowerPoint presentations and discussion

### **Week 4:** [Nov. 23 - 27]

**Lecture 5** (Nov. 24) – Applications and interviews.

**Lecture 6** (Nov. 26) – Critical analysis of biological news reports, and writing critiques.

**Tutorial week 4:** POWERPOINT presentations PART 1 (half of class in week 4, second half in week 5) maximum 7 slides, including title slide. Each student will present a key facet of the paper for which they have written a media release. Grading by TA, faculty, and students. A grading key will be provided. Students will be assessed on their critique of each other (1% of the total). All students will attend both presentation tutorials.

Due date for receipt of Media Release assignment: Nov. 27.

### **Week 5:** [Nov. 30 – Dec. 4]

**Lecture 7** (Dec. 1) – Science vs. religion, and role of science in society.

**Lecture 8** (Dec. 3) – Critical issues – Review.

**Tutorial week 5:** POWERPOINT Presentations PART 2. All students will attend both presentation tutorials.

### **Class Evaluation for Dr. Cota-Sánchez' Part 3 (Total 33 points)**

Essay (in final exam period) 20% of final grade will be on Dr. Cota-Sánchez's section. This will be an essay written (one-page, single space, max. - use font size 12) 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 Dr. Cota-Sánchez's section)

Media release	5%
PowerPoint presentation	8%
Final essay (in exam period)	<u>20%</u>
<b>Total</b>	<b>33%</b>

### **ACADEMIC HONESTY**

Academic honesty is a matter that the University and the Department of Biology take very seriously. Students must familiarize themselves with the rules regarding academic honesty. Ignorance of the rules regarding or the nature of academic dishonesty is not a defense against a charge. Potential punishments include expulsion from the University or revocation of a degree or diploma.

Many cases of plagiarism result from confusion or ignorance rather than from genuine intent to deceive. **Note, however, that these are not excuses:** "The critical consideration is the impression created in the mind of the others, not the subjective intent of the student. This determination involves an objective evaluation of the manuscript. No intent to deceive is required to establish plagiarism." (University Council policy on Student Academic Misconduct)

The University Guidelines for Academic Conduct describes the University's expectations for both student and faculty conduct.

The definition of academic dishonesty that follows is copied from the University of Saskatchewan Council's policy document on Student Academic Misconduct. **Note especially the definition of plagiarism.**

### **EXAMINATIONS WITH DISABILITY SERVICES FOR STUDENTS (DSS):**

Students who have disabilities (learning, medical, physical, or mental health) are strongly encouraged to register with Disability Services for Students (DSS) if they have not already done so. Students who suspect they may have disabilities should contact DSS for advice and referrals. In order to access DSS programs and supports, students must follow DSS policy and procedures. For more information, check <http://www.students.usask.ca/disability/> or contact DSS at 306-966-7273 or [dss@usask.ca](mailto:dss@usask.ca)

Students registered with DSS may request alternative arrangements for mid-term and final examinations. Students must arrange such accommodations through DSS by the stated deadlines. Instructors shall provide the examinations for students who are being accommodated by the deadlines established by DSS.