

## **IBIO\*6630: SCIENTIFIC COMMUNICATION**

### **Course Syllabus and Schedule**

#### **I. General Course and Instructor Information**

Course number: IBIO\*6630 SCIENTIFIC COMMUNICATION - 0.50 unit  
Semester offered: Fall 2014  
Course instructor: Christina (Chris) Caruso, 1471 SCIE, carusoc@uoguelph.ca  
Office hours: By appointment, carusoc@uoguelph.ca  
**First class meeting: Tuesday September 16th, 10:00 AM**  
**Room 3317 Science Complex**

Scheduled classes: Tuesday, 10:00 AM-12:50 PM, Room 3317 Science Complex  
Attendance the Department of Integrative Biology Seminar Speaker Series is required. Seminars are every Tuesday from 3:30-4:30 in Room 2315 of the Science Complex. The seminar schedule will be posted on the Department of Integrative Biology Website in the first week of September.

#### **II. Course Rationale & Description**

IBIO\*6630 is required for all incoming MSc students (and also is available to all new PhD students) in the Department of Integrative Biology. This course is designed to assist Thesis Advisory Committees in preparing new students for successful research at the graduate level.

Many students initially think of the development of a “thesis” as the product of their successful graduate education, rather than a key part of its genesis. A thesis is a conjecture, or a proposition supported by evidence. But how do you get started? What makes one thesis more successful than others? What are the relationships among a thesis, a hypothesis, and a research question? Knowing early on what research questions and hypotheses will guide the development of the proposed research is the key to efficient literature searching, organizing background material, and generating hypotheses.

This course will explore scientific philosophy, critical thinking, and the use of the Web of Science and other tools to search literature. Developing communication skills also will be emphasized, so that students can become proficient in the language of science. Course objectives will be met by discussions of assigned reading each week, practicing scientific writing and critiquing peer reviewed literature, oral presentations, and students’ own work. Students will practice discussion skills through frequent interaction with peers and faculty. The final product is a Draft Thesis Research Proposal that can be used as a starting point for the proposal you will circulate to your Thesis Advisory Committee.

**Learning outcomes:**

1. Develop and refine skills in communication of scientific knowledge (broadly defined to include the ability to be conversant in scientific philosophy), and competency in oral presentation and technical writing of reviews and proposals;
2. Give, receive and value criticism in the form of peer review; and
3. Share in the wide diversity of ongoing research topics across the breadth of biological study represented in the Department of Integrative Biology.

**To meet these learning outcomes, students will:**

- Attend all class and writing group meetings
- Attend all departmental seminars, for purposes of learning to critique content and style. Departmental seminars are listed at <http://www.uoguelph.ca/ib/seminars.shtml>. In the case of conflict with teaching assignments, students may attend any other scientific seminars offered at the university. See the full write-up of the 'Seminar Assignment' for more details.
- Read all assigned articles prior to each class meeting
- Participate regularly in class discussions
- Be respectful of others' opinions and work, and work towards building a rigorous, challenging, but always courteous atmosphere in and out of the classroom

**III. General Course Topics – Course topics are subject to change and modification as the course evolves. See section IV below for more detailed information on course topics and assignments.**

September 16	Course introduction and discussion of where research ideas come from
September 23	All about hypothesis testing
September 30	Hypothesis testing continued (Assignment 1 is due)
October 7	Hypothesis testing and experiments (Assignment 2 is due)
October 14	Thanksgiving; No class meeting
October 21	Proposal writing – how to get started
October 28	Publishing and peer review: the good, the bad, the ugly Ethics in Biological Research (Assignment 3 is due)
November 4	No class meeting, work on development, peer review and revision of Thesis Proposal Draft 1
November 11	No class meeting, continue to work on Thesis Proposal
November 18	No class meeting, continue to work on Thesis Proposal (Assignment 4 is due)
November 25	No class meeting, continue to work on Thesis Proposal

Friday November 28: Thesis Proposal Draft 2 submitted to Instructor and Thesis Advisor.

**IV. Detailed Schedule and Reading List** – *As indicated above, course topics are subject to change and modification as the course evolves. However, the grade breakdown (see section V) will remain the same. Refer to write-ups on individual assignments for more details. **Please read all assigned articles prior to class and come to each class meeting prepared to engage in discussion about the readings.***

These readings (available on Courselink) have been put together over the years to help mentor and often inspire graduate students. The list may seem long, but each reading is short, and you will find them useful to re-read as you progress through this course and your graduate degree. **Please read them before our first class.**

1. Stearns, S. 1987. Some modest advice to graduate students. *British Ecological Society Bulletin* 8: 82-89.
2. Huey, R.B. undated. Reply to Stearns: some acynical advice for graduate students.
3. Thompson, J.N. 2013. On being a successful graduate student in the sciences.
4. Weinberg, S. 2003. Four golden lessons. *Nature* 426: 389.
5. Gosling, P. and B. Noordam. 2006. Mastering your PhD: Setting goals for success. Published by AAAS on [sciencecareers.org](http://sciencecareers.org)
6. Wolff, J.O. 2000. Reassessing research approaches in the wildlife sciences. *Wildlife Society Bulletin* 28: 744-750.

**September 16 Course introduction and overview**

**Discussion of creativity, research ideas and where to find them**

**Readings:**

1. Schwartz, M.A. 2008. The importance of stupidity in scientific research. *Journal of Cell Science*. p. 1771.
2. Loehle, C. 1990. A guide to increased creativity in research – inspiration or perspiration? *Bioscience* 40: 123-129.
3. Lanyon, S. 1995. How to design a dissertation project. *Bioscience* 45: 40-42.
4. Koshland, D. 2007. Cha cha cha theory of scientific discovery. *Science* 317: 761-762.

**Assignment 1:**

Use Web of Science and/or other tools, accessible through the UG library webpage, to search for papers using key words related to your thesis topic. Identify key journals, and journal impact factors, and discuss findings with your advisor. See full write-up on this assignment for more details. These articles can form the basis of your literature library. You may wish to use reference manager software to maintain your library. Mendeley (<http://www.mendeley.com/>) is one example of such a management system. **Due at the beginning of class on September 23.**

**September 23 All about hypothesis testing**

**Readings:**

1. Platt, J.R. 1964. Strong inference. *Science* 146: 347-353.
2. Quinn, J. and A. Dunham. 1983. On hypothesis testing in ecology and evolution. *The American Naturalist* 122: 602-617.
3. Lipton, P. 2005. Testing hypotheses: prediction and prejudice. *Science* 2005 307: 219-221.
4. Niiniluoto, I. 1999. Defending abduction. *Philosophy of Science* 66 (Supplement): S436-S451.

**Introduction to Assignment 2: “Follow the smoke”.** Identify a key uncertainty in your field of research (ideally, one that relates to your thesis topic). This can and should be done through communications with your advisor. Prepare a brief report for presentation to the class for **September 30**. See assignment instruction sheet, which is posted to the course website, for more details.

**September 30 Assignment 1 is due**  
**Continuation of hypothesis testing**

**Readings:**

1. Jewett, D.L. 2005. What’s wrong with single hypotheses? *The Scientist* 19: 10.
2. Chamberlin, T.C. 1890. The method of multiple working hypotheses. *Science* 15: 92 (Reprinted 1897, *J. Geol.* 5: 837-48, and 1965, *Science* 148: 754-759).

**Resources for giving presentations (consult for your seminar assignment and prior to giving your oral presentation next week):**

1. Feibelman, P.J. 2011. *Giving Talks*. Excerpted from: *A PhD is Not Enough! A Guide to Survival in Science*. Basic Books. New York.

**October 7 Assignment 2 is due**  
**More on hypothesis testing and experimental design**

No readings this week! Class presentations will take place instead of discussion. Take the time to make sure you understand principles and practices of the scientific method.

**Introduction to Assignment 3:** Reflect on the readings from September 9, September 16 and September 23 and report on your research philosophy. See full write-up on this assignment for the details on this assignment. Due at the beginning of class on **October 21**.

**October 21 Proposal writing and components of sound technical writing**

**Organization of writing groups****Readings:**

1. Sand-Jensen, K. 2007. How to write consistently boring scientific literature. *Oikos* 116: 723-727.
2. Gopen, G.D. and J.A. Swan. 1990. The science of scientific writing. *American Scientist* 78: 550-558.  
The material contained in this article has been used by Duke University to develop a free online workshop for teaching scientific writing to graduate students. You may take the self-guided workshop at: <https://cgi.duke.edu/web/sciwriting/index.php>
3. Toor, R. 2010. Bad Writing and Bad Thinking. *Chronicle of Higher Education*. Published April 16, 2010.
4. Toor, R. 2011. Shame in Academic Writing. *Chronicle of Higher Education*. Published August 3, 2011.
5. Toor, R. 2010. A Writing Group of Two. *Chronicle of Higher Education*. Published December 17, 2010.

**Useful Resources**

<https://cgi.duke.edu/web/sciwriting/index.php>  
[http://www.ldeo.columbia.edu/~martins/sen\\_res/how\\_to\\_thesis\\_proposal.html](http://www.ldeo.columbia.edu/~martins/sen_res/how_to_thesis_proposal.html)  
<http://www.learnerassociates.net/dissthes/>  
[http://www.meaning.ca/articles/writing\\_research\\_proposal\\_may02.htm](http://www.meaning.ca/articles/writing_research_proposal_may02.htm)  
[http://www.indiana.edu/~wts/pamphlets/thesis\\_statement.shtml](http://www.indiana.edu/~wts/pamphlets/thesis_statement.shtml)

**Assignment:** Work towards completing a draft of your Thesis Research Proposal!

**October 28 Assignment 3 is due**

**Publishing and peer review: the good, the bad, the ugly**

**Readings:**

1. Clapham, P. 2005. Publish or perish. *Bioscience* 55: 390-391.
2. Rosenzweig, M.L., J.I. Davis, and J.H. Brown. 1988. How to write an influential review. *Bulletin of the Ecological Society of America* 69: 152-155
3. British Ecological Society. A guide to peer review in ecology and evolution.

An example of a peer review for a published paper will also be provided.

Assignment: Continue to work towards completing a draft of your Thesis Research Proposal!

**Ethics in the Biological Sciences**

For today's meeting, come to class with all of the questions you might have about what's appropriate and not appropriate in research. Questions might relate to authorship, ownership of data, citing articles in your own writing, and bias in peer review, among other issues.

**Readings:**

1. Swazey, J.P. et al. 1993. Ethical problems in academic research. *American Scientist* 81: 542-553.
2. Kitcher, P. 2004. Responsible biology. *Bioscience* 54:331-336.
3. Weltzin et al. 2006. Authorship in ecology: attribution, accountability, and responsibility. *Frontiers in Ecology and the Environment* 4: 435-441.

**November 4-28**

**Schedule reciprocal peer reviews of Draft Thesis Research Proposals and Meetings of individual writing groups**

By November 11, submit the first draft of your Draft Thesis Research Proposal. **Provide a hard copy to the instructor.** This draft will be used for the peer review assignment (Assignment 4), but you should keep working on revising your proposal over the next few weeks.

Assignment 4: By **November 18**, return completed peer reviews of Draft Thesis Research Proposals. More details will be provided on this assignment mid-semester.

Assignment 5: By **November 28**, submit revised Draft Thesis Research Proposals to Thesis Advisor and course instructor. **Provide a hard copy to the instructor.**

**V. Breakdown of Graded Assignments**

Assignment	Due Date*	Total points
------------	-----------	--------------

**UNIVERSITY OF GUELPH****DEPARTMENT OF INTEGRATIVE BIOLOGY**

Ongoing Seminar Assignment	<b>Each evaluation is due 1 week post-seminar</b>	20 (4 evaluations submitted, 5 points each)
Assignment 1: Literature searching	<b>September 30</b>	10
Assignment 2: Identifying key uncertainties in research	<b>October 7</b>	10
Assignment 3: Reflections on personal research philosophy	<b>October 28</b>	10
Draft Research Proposal	<b>November 11</b>	Must submit a proposal to be eligible to complete Assignment 4
Assignment 4: Peer review of draft thesis proposals	<b>November 18</b>	25
Assignment 5: Completion of your Thesis Research Proposal	<b>November 28</b>	25
<b>Total</b>		<b>100 points</b>

\*Except where otherwise noted, all assignments are due at the beginning of class.

**Other important policies and procedures****E-mail Communication**

As per university regulations, all students are required to check their <uoguelph.ca> email account regularly. E-mail is the official route of communication between the University and its students.

**When You Cannot Meet a Course Requirement**

When you find yourself unable to meet an in-course requirement because of illness or compassionate reasons, please advise the course instructor (or designated person, such as a teaching assistant) in writing, with your name, id#, and e-mail contact. See the graduate calendar for information on regulations and procedures for Academic Consideration:

[http://www.uoguelph.ca/registrar/calendars/graduate/2013-2014/genreg/sec\\_d0e1400.shtml](http://www.uoguelph.ca/registrar/calendars/graduate/2013-2014/genreg/sec_d0e1400.shtml)

**Drop Date**

The last date to drop one-semester courses, without academic penalty, is October 30 2014. For regulations and procedures for dropping courses, see the Graduate Calendar.

**Copies of out-of-class assignments**

Keep paper and/or other reliable back-up copies of all out-of class assignments. You may be asked to resubmit work at any time.

**Accessibility**

The University of Guelph is committed to creating a barrier-free environment. Providing services for students is a shared responsibility among students, faculty and administrators. This relationship is based on respect of individual rights, the dignity of the individual and the University community's shared commitment to an open and supportive learning environment. Students requiring service or accommodation, whether due to an identified, ongoing disability or a short-term disability should contact the Centre for Students with Disabilities as soon as possible.

For more information, contact CSD at 519-824-4120 ext. 562008 or email [csd@uoguelph.ca](mailto:csd@uoguelph.ca) or see the website: <http://www.uoguelph.ca/csd/>.

**Academic Misconduct**

The University of Guelph is committed to upholding the highest standards of academic integrity and it is the responsibility of all members of the University community – faculty, staff, and students – to be aware of what constitutes academic misconduct and to do as much as possible to prevent academic offences from occurring. University of Guelph students have the responsibility of abiding by the University's policy on academic misconduct regardless of their location of study; faculty, staff and students have the responsibility of supporting an environment that discourages misconduct. Students need to remain aware that instructors have access to and the right to use electronic and other means of detection.



**Please Note:** Whether or not a student intended to commit academic misconduct is not relevant for a finding of guilt. Hurried or careless submission of assignments does not excuse students from responsibility for verifying the academic integrity of their work before submitting it. Students who are in any doubt as to whether an action on their part could be construed as an academic offence should consult with a faculty member or faculty advisor.

The Academic Misconduct Policy is detailed in the Graduate Calendar:

<http://www.uoguelph.ca/registrar/calendars/graduate/current/index.shtml>

### **Recording of Materials**

Presentations which are made in relation to course work – including lectures – cannot be recorded or copied without the permission of the presenter, whether the instructor, a classmate or guest lecturer. Material recorded with permission is restricted to use for that course unless further permission is granted.

### **Resources**

The Academic Calendars are the source of information about the University of Guelph's procedures, policies and regulations that apply to undergraduate, graduate and diploma programs: <http://www.uoguelph.ca/registrar/calendars/graduate/current/index.shtml>.

### **Course Evaluation information** (from the CCS website)

CCS now provides the U of G Online Course Evaluation System in a secure, online environment. End of semester course and instructor evaluations provide students the opportunity to have their comments and opinions form part of the information used by Promotion and Tenure Committees in evaluating the faculty member's contributions in the area of teaching.

Course evaluations are now conducted through this web site:

[https://courseeval.uoguelph.ca/CEVAL\\_LOGIN.php](https://courseeval.uoguelph.ca/CEVAL_LOGIN.php). Login with your central email account login ID and password.

Occasionally course evaluations are conducted in class.

Instructors do **not** receive evaluations until the end of exam period. Furthermore, evaluations are anonymous, unless you specifically indicate you want to acknowledge your comments