

SCIENTIFIC COMMUNICATION (BIOL 670/423)

Fall 2021 (sept 9-dec 2)

INSTRUCTOR Dr. Dylan Fraser; email: dylan.fraser@concordia.ca; x8729

COURSE HOURS All classes occur between 13h15-16h00, Thursdays, room# CJ 1.121. Due to ongoing COVID-19, the course will be conducted as a 'blended-synchronous' course. This means that, provided it is safe to do so, some weeks will be in-person where the material will benefit students most (specified below), whereas in other weeks where this is less important, we will carry out course material/discussions/lectures online remotely. Recordings of lecture material are not posted online, i.e. there are no asynchronous classes. In-person classes are subject to changes depending on how the COVID-19 situation unfolds.

COURSE OUTLINE

This is a "learning-by-doing" course designed to help students improve the clarity, fluency and accuracy of their written and oral scientific work. It will consist of a combination of short lessons, discussions, and course exercises and assignments. The course assignments and lessons are designed to develop and improve the following scientific communication skills: (i) writing scientific papers and thesis proposals; (ii) presenting orally; (iii) making effective scientific posters; (iv) providing constructive feedback to peers; and (v) summarising science to the public.

COURSE INFORMATION AND COMMUNICATION This course will use SLACK and ZOOM for course communications (and Twitter for one course assignment); we do not use Moodle, and I ask that email be used for emergencies only.

The course's SLACK workspace is scicommviol670423.slack.com, password = scicomm. All course material (lectures, handouts, cumulative grade data etc.) will be posted there on the '#course-material-2021' channel, as will any new course updates on the '#general-2021' channel. Students are asked to post general questions on the '#general' channel so as not to duplicate questions. Students will submit their own respective assignments (or links to their group video assignment), and any private concerns relating to the course, via direct messaging to me on SLACK.

If we are not meeting in-person for a given week during regular course hours, we will use ZOOM for synchronous, weekly remote-based lectures, discussions, oral presentations and poster presentations, during the regular course hours (Thursdays, 13h15-16h00). Usually, the full course hours will be used each week. Commonly, the last 15-20 minutes of class are dedicated to individual-focused questions that students may have which do not necessarily relate to the course material for that given week. Students can also contact me directly through SLACK with questions. The link to the course's ZOOM each week is: <https://concordia-ca.zoom.us/j/5981975162> (no password required). Meeting ID: 598 197 5162 One tap mobile +16475580588, 5981975162# Canada +17789072071, 5981975162# Canada

GRADING COMPONENTS (more details on assignments are further down and will be discussed in class discussions)

Writing assignments (32% of total):

Introduction assignment #1, setting the stage: 8%
Introduction assignment #2, clear and concise: 6%
^Peer-buddy review of draft thesis proposal: 6%
Thesis proposal assignment: 12%

Oral communication assignments (24% of total):

Paper critique (presented orally to class): 6%
^Constructive feedback on peers' draft oral/final presentations: 6% (two classes)

Final oral presentation: 12%

Poster-related assignments (22% of total)

^Constructive feedback on peers' draft posters: 6% (two classes)

Final poster (TBD if a poster symposium will take place): 10%

^Peer-buddy review of peers' final posters: 6%

Scicomm to the public assignments (22% of total)

Group SciComm educational awareness video: 12%

And one of the following individual assignments:

- (i) Social media tweets on scientific communication: 10%
- (ii) Graphical abstract or 'graphical art summary' of your work: 10%
- (iii) A personal, research-based website with educational material: 10%
- (iv) Rap, dance or sing your research to a beat with video (1-2 min): 10%
- (v) Other? Pitch your idea to me: 10%

^Peer-buddy reviews and constructive feedback exercises are a key part of this course.

Attendance is NOT counted as participation in any part of the grade. Your grade on peer-buddy reviews is based on the written evaluations you will provide to fellow students on their draft thesis proposals and final posters. Your 'constructive feedback' grade will be assessed based on your level of contribution to ongoing course discussions, specifically the number of times you provide constructive comments to other students across the two classes for the (i) draft oral presentation and (ii) draft poster viewing. The focus of constructive feedback should be on how to improve core mechanics of the scicomm of oral presentations and posters. Aesthetics are also important, but this feedback is considered secondary and if time permits.

COURSE MATERIALS AND RECOMMENDED READINGS

Have a laptop computer for the course; it will be essential to carry out any in-course assignments/exercises. The laptop should have Microsoft Word and PowerPoint or analogous programs with tracked changes for editing.

For course exercises and assignments (e.g. writing exercises, oral presentations, and posters), students will use material that they are currently working on as part of their graduate studies or BIOL490 projects. For graduate students, this work might be a thesis chapter or a research proposal. The same material will be used throughout the course for all exercises. For students just starting theses, it is essential that core thesis objectives be arranged with their supervisors VERY EARLY in the term.

Costs for printing one final poster (see schedule below)* will be covered by the student (usually between \$50 and \$70). The onus will be on the student to ensure that their poster is printed and ready to present during the poster symposium. *TBD if a poster symposium will take place in-person and hence if poster printing will be required – due to COVID, we may do the symposium virtually.

There are no mandatory text books for this course. Nevertheless, in addition to information provided in course handouts, the following reading materials and website links are recommended to facilitate student learning (much of the material therein is included in the course). These links are by no means an exhaustive list, and I strongly recommend that students initiate their own searches on these topics:

Scientific writing and communicating to the public (and through social media):

The Scientist's Guide to Writing: how to write more easily and effectively throughout your scientific career, by SB Heard (2016) (book)

How to write and publish scientific papers, 6th edition, by RA Day and B Gastel (2006). There is a copy of this book available on the reserve desk at the downtown Webster Library.

Practical science communication strategies for graduate students. Conservation Biology 28: 1225-1235.

Want to make your science matter to the public? Here's a good read:

<https://www.scribd.com/book/252760249/Escape-from-the-Ivory-Tower-A-Guide-to-Making-Your-Science-Matter>

English communication for scientists:

<https://www.nature.com/scitable/ebooks/english-communication-for-scientists-14053993/118519407>

A simple writing guide for university students:

<http://biology.acadiau.ca/biology-scientific-writing-guide.html>

Communicating science in new media environments:

<http://journals.sagepub.com/doi/abs/10.1177/1077699014550092>

Elements of writing style:

<http://www.bartleby.com/141/index.html>

How to publish a scientific paper:

http://biology-assets.anu.edu.au/hosted_sites/Scott/how-to-publish-a-paper.html

How to write a MSc/PhD thesis:

<http://www.sce.carleton.ca/faculty/chinneck/thesis.html>

<http://newt.phys.unsw.edu.au/~jw/thesis.html>

An example of a successful scientific communication study:

<https://arstechnica.com/science/2010/06/successful-science-communication-a-case-study/>

A scientist's guide to talking with the media, by R Hayes and D Grossman (2006). There is a copy of this book available in the Vanier Library. Other blog articles are included in the course handouts.

How to tweet, from an evolutionary biologist:

<http://ecoevoeco.blogspot.ca/2017/06/how-to-tweet.html>

Scientific posters:

<http://colinpurrington.com/tips/poster-design>

<http://phdposters.com/gallery.php>

<http://www.eposters.net/>

Oral presentations:

http://tos.org/resources/publications/sci_speaking.html

<http://www.biogeek.com/pages/presentation%20hints&tips.html>

<http://www.casca.ca/ecass/issues/2002-js/features/dirobertis/talk.html>

<http://www.catalysis.nl/links/presentations/index.php>

http://learning.concordia.ca/Help/handouts/Oral%20Presentations/How_to_Prepere.shtml

How to give a bad talk (as useful as how to give a good one):

<http://www.cs.tufts.edu/~nr/misc/badtalks.html>

Great tips for writing cover letters that stand out to prospective professors or employers

http://sciencecareers.sciencemag.org/career_magazine/previous_issues/articles/2015_05_06/career.a1500118

TENTATIVE COURSE SCHEDULE*

Week 1-September 9 (In person)

- Introduction to scientific communication*
- how the course is set up: aims, objectives, assignments
- Scientific writing part 1*

Weeks 2,3-September 16, September 23

- Scientific writing part 1 continued*
- Student critiques of their two papers
- Constructing and presenting oral presentations*

Week 4-September 30 (In person)

- Practice oral presentations, first half of students (8 minutes each)*
- Students will provide feedback on each other's practice oral presentations
- Being concise in scientific writing
- Student critiques of their two papers....continues

Week 5-October 7 (In person)

- Practice oral presentations, second half of students (8 minutes each)*
- Students will provide feedback on each other's practice oral presentations

Weeks 6,7-October 14, October 21

- Scientific writing part 2*
- Student critiques of their two papers....continues

Week 8-October 28 (In person)

- Final oral presentations (8 minutes each)*
- Students will assess each other on individual presentations, based on progress
- Constructing scientific posters*
- Speaking to the media*

Week 9-Nov 4

- Draft poster surveying and screening – first half*
- Students will provide feedback on each other's draft posters

Week 10-November 11

- Draft poster surveying and screening – second half*
- Students will provide feedback on each other's draft posters
- Feedback/discussion on draft group videos

Week 11-November 18

No class – students will work on their final posters, and *SciComm* video in groups

Week 12-November 22-26 (Exact timeslot and format to be determined)(In person)

Final poster and SciComm video symposium in the Department of Biology

Departmental staff and faculty, and students enrolled in the course, will assess individual posters and educational awareness videos. The students' assessments will be based on progress since the draft poster session, or overall *SciComm* principles, educational awareness and general creativity.

Week 13-Dec 2

Course marks returned to students, time for one-on-one meetings

*In the event of extraordinary circumstances beyond the University's control, the content and/or evaluation scheme in this course is subject to change

IMPORTANT NOTE: This course (like all other courses offered at Concordia University), follows the university's 'Academic Integrity and the Academic Code of Conduct'. We strongly encourage students to take a moment to read over this code:

<http://registrar.concordia.ca/calendar/17/17.10.html>.

ASSIGNMENT DETAILS (unless otherwise stated, each assignment is submitted to me via direct messaging on SLACK).

Introduction assignment #1, setting the stage: 8% Due Friday, Sept 24, by 20h00. The purpose of this assignment is to develop an effective introduction that applies a 'funnel' approach and includes distinguishing statements that permit a reader to assess the significance and originality of the work relative to previous works.

Paper critique (presented orally to class): 6% Dates will be assigned to each student and posted on SLACK. The purpose of this assignment is to (i) warm up each student to public speaking; (ii) compare, contrast, and summarize the scicomm qualities within two papers in your research subdiscipline; (iii) stay within the time allotted. As a class, several students will present each week (either in-person or remotely depending on the week and what COVID-19 permits), and we will use these presentations to stimulate short discussions on what makes strong attributes of scientific writing. It is not the expectation that you will report on all aspects of the two papers you compare. Rather, you will be assigned a topic to focus on, and then must report on 2-3 (minimum) take home messages concerning scicomm qualities – you may choose whatever papers you wish to critique to illustrate your points. Each student has **3 minutes** to present (deductions will occur for any presentations beyond 3 minutes; students will be stopped at 5min). Please note that the critique should not focus on the science in the chosen papers (results, analysis) per se, it should focus on the *scicomm* in the papers (how the papers convey their work/results). Students should prepare a few presentation slides to convey their main points.

Peer-buddy review of draft thesis proposal: 6% Due Friday, Oct 8, by 20h00. The purpose of this assignment is to work at providing constructive written feedback to your peers and to establish a good peer-review ethic. By the end of Monday, Oct 4, you and your assigned peer-buddy will submit your respective draft thesis proposals to each other for peer-review. This draft should include any refinements you make to your introduction based on feedback from introduction assignment #1 – please keep these edits/modifications using 'track changes'. By Oct 8th at 20h00, you will then submit to both me and your peer-buddy via SLACK your assessment of their draft thesis proposal. This assessment will include (i) a general summary of your assessment as a SLACK message (No more than ½ page), and it will append (ii) the draft thesis proposal with track changes that indicate your comments and other suggested edits you put into your peer-buddy's work ('track changes' will designate different colours between your own edits and those of your peer-buddy's).

Introduction assignment #2, clear and concise: 6% Due Friday, Oct 22, by 20h00. The purpose of this assignment is to focus on developing clear and concise scientific writing by adopting 'a

revising mindset'. More discussion on this topic will take place in class on Oct 1 and 8th. Your final submission should include the track changes that you made in parsing/clarifying your introduction from assignment #1 (it is OK if at this point there are a lot of track changes ☺).

Thesis proposal assignment: 12% Due Nov 5, by 20h00.

You will submit your final, complete thesis proposal (or paper, whichever applies) to me via direct messaging on SLACK, accounting for past feedback from your peer buddy and I (and others who you might wish to seek out for feedback). This proposal will apply course writing principles for its different sections and adhere to specifications detailed in the lecture notes.

Final oral presentation: 12% Dates for each student's practice and final oral presentation will be posted on SLACK. The purpose of this assignment is to help students improve their oral scicomm. Each student will prepare an 8-minute talk of their thesis proposal/research project. They will then receive feedback from their peers, as well as a grade notation from me. Depending on the feedback and grade a student receives, they have the option to keep the practice presentation grade as the final oral presentation mark, or they can hone their presentation and give the presentation again on the specified date. If a student chooses to present a second time, the grade on the second presentation stands as the final grade. In past courses, most of the time when students present a second time, their oral communication (and grade) improved. Students need to notify me within a few days after the practice oral presentation if they would like to give their talk a second time the following week.

Final poster (TBD if a poster symposium will take place): 10% (Date due TBD). The purpose of this assignment is to help students improve their written scicomm using scientific poster format. Each student will prepare a draft poster of their thesis proposal/research project. They will then share it with the class, and receive feedback for improvement. TBD if we will have some form of in-person poster symposium, or another alternative.

Peer-buddy review of peers' final posters: 6% (Date due TBD, will relate to poster symposium timing). The purpose of this assignment is to work at providing constructive written feedback to your peers and to establish a good peer-review ethic. Each student will evaluate the final posters of two other students in the course based on a number of criteria discussed in class (one related and unrelated subdiscipline).

Group SciComm educational awareness video: 12% (Date due TBD, will depend on symposium timing). The purpose of this assignment is to help develop skills towards communicating science to the general public via educative awareness. Groups of four students will produce an educative video of natural science research being conducted at Concordia; this video can be about their own research projects, their labs' research projects, or the focus of their research subdiscipline at Concordia.

General content:

- Video length: 2-2.5 minutes MAX.
- 4K or greater resolution is preferred, cell phone video acceptable
- Should use Windows Movie Maker preferably
- Should include subtitles/captions THROUGHOUT
- Audio (speaking and/or music) is welcome and recommended but keep in mind the venue...
- Should be non-political
- Can include weblinks for more information (e.g. links to specific lab or research centre website)
- Not your video footage? Include author/copyright acknowledgments

Social media in scientific communication: 10% (Date due Nov 19 by 20h00). The purpose of this assignment is to help develop skills towards communicating science to the general public in clear, concise ways.

A. If doing tweets: (10%)

Each student will produce four tweets (to generate these, students will need to have an account in Twitter and do a basic review on how Twitter works). Tweets must be directed to @Scicommdylan to ensure that they are submitted properly by the specified deadline – ALL three tweets must be submitted at the same time. My advice would be to draft out your tweets and consider doing a practice one on your Twitter feed before you submit final tweets to me for grading. Please refer to a selection of past student tweets on SciCommConcordia for examples but note that this assignment evolves each year.

Tweet #1: The first tweet will be about other researchers' works in your subdiscipline. It can relate to a peer-reviewed paper or a departmental seminar, or both, but not popular science articles or other scientist/science blogs. The focus of this tweet should be on how the scicomm is presented in the paper/seminar (whether it is done well, or what could be improved, but in general a positive tone will go over better), NOT on the actual science itself. This is similar to the focus of the paper critiques assignment above.

Tweet #2: The second tweet is about promoting Concordia's natural science research. This tweet can focus on the science itself, but it should be conveyed in an educative way to communicate key findings, avenues of inquiry, and why these are relevant to e.g. society, industry, human health, environment, conservation etc.

Tweet #3: The third tweet is about promoting one's own research project or research lab. This tweet can focus on the science itself, but it should be conveyed in an educative way to communicate key findings, avenues of inquiry, and why these are relevant to e.g. society, industry, human health, environment, conservation etc.

Tweet #4: The fourth tweet is about promoting EDI in science (equity, diversity, inclusion). It can be done in different ways, such as (i) reporting findings from research studies that pay it forward for improving EDI in the natural sciences, (ii) informing the public on organizations that support EDI initiatives in their research practices, etc.

Each tweet must include a minimum of one graphic/photo/image and #hashtags, and it should be apolitical; it is also encouraged that tweets be directed to key twitter feeds to help with their promotion (e.g. @Concordia, @biologyatCU). Grading will be based not only on how the scicomm concerning the paper/research is presented, but on creativity and how the tweet draws audience attention.

B. If doing a Graphical abstract or 'graphical art summary' of your work: 10%

The focus should be on promoting educational awareness through artistic elements. Classic (or 'true' graphical abstracts or graphical art summaries (which include more wording than 'true' graphical abstracts) are welcome. Grading assessment: 50% quality of scientific awareness (e.g. content, communication); 50% overall creativity

Some ideas for graphical abstracts:

<https://mindthegraph.com/blog/create-effective-graphical-abstract/>

<https://www.youtube.com/watch?v=7FdTgFi3QTg>

<https://crastina.se/lucy-poley/>

C. If doing a personal, research-based website with educational material: 10%

The focus should be on educational awareness, promoting your research background and skills, creativity, retaining viewer attention, and it should be for a general audience (get your name out there!). Aesthetics are important, such as photos or use of other visuals. Grading assessment: 35% quality of scientific awareness; 30% promotion of research background; 35% overall creativity

D. If doing a rap, dance or sing your research to a beat with video (1-2 min): 10%

The focus should be on educational awareness, creativity and retaining audience attention, for a general audience. Aesthetics are important, such as editing, effective pace, informative captions, video stabilization, use of audio etc. Grading assessment is the same as the Group Video (detailed below).

Examples:

<https://www.youtube.com/watch?v=Luu7k6RU5Ug> (in fact check out any of Baba Brinkman's!)

<https://www.youtube.com/watch?v=qH4WUUQ5pOI>

<https://www.youtube.com/watch?v=eLjYL8d7uGU> (a Concordia example 😊)

Notes on grading assessments for writing assignments:

Marks are deducted in relation to whether a student is satisfactorily applying course principles in their writing (up to -0.5 to -2% of the total course grade per deduction). This list is not intended to be exhaustive but to give the student a very clear sense of what their writing is expected to include:

Scope of the investigation and principle objectives is not introduced (-1%)

General methods employed are not described (-1%)

Main results, if applicable, are not described (-1%)

Principle conclusions and implications are not described (-1%)

The nature/scope of the problem investigated is not clearly stated (-1%)

The review of relevant literature is insufficient to orient readers (-1%)

The general method of investigation is not introduced (-1%)

Definitions of key terms or abbreviations are not introduced (may not apply) (-0.5%)

There are no distinguishing statements that permit a reader to assess the significance and originality of the work relative to previous works (-2%)

The introduction does not have good flow (e.g. linking sentences between paragraphs are used, funnel approach is applied) (-1%)

Title too long (-0.5%)

Repetition in results of what is already present in Tables/Figures (-1%)

Improper Table/Figure formatting or referencing (-1%)

Non-standardized literature reference style (-1%)

Discussion does not link well with the Introduction (-1%)

Implications of the work are not brought put in the end of the discussion

Table contents read across, not down (-1%)

Word count exceeds that allotted for the project (-2%)

Other: improper structural order (-0.5%)

Other: improper tense used depending on the section (-0.5%)

Other: long sentences (-0.5%)

Other: incorrect grammar/spelling/excess jargon or verbiage (-0.5%)

Other: late submissions (10% of the proportion of each assignment per day of lateness).

Notes on grading assessments for final posters and oral presentations:

Again, this is not an exhaustive list, it is meant as a guide:

Too much text (-2%)

Too small a font (-2%)

Overload of figures/photos (-1%)
Poor spelling/grammar (-1%)
Misalignment of boxes in a poster, overall lack of neatness in layout (-2%)
Missing sections (-1%)
Background (e.g. not dark on light, distracting photo background etc.) (-1%)
Presentation assumes audience already has background information (-1%)
Imbalances in presentation components (e.g. too much time on introduction) (-2%)
Overtime (-1% for every 1minute after the 8 minute mark)
Insufficient eye contact with audience (-1%)
Mannerisms that do not follow presentation etiquette (-1%)
Use of cue cards (-1%)

Notes on grading assessments for paper critiques:

Paper critiques must use powerpoint slides (cap to 2-3 minutes per presentation) to help convey main points

Notes on grading assessments for group SciComm video assignment:

Focus should be on educational awareness, creativity, retaining audience attention, general audience. Aesthetics are important, such as editing, effective pace, informative captions, video stabilization, use of audio etc.

Grading assessment:

- Quality of scientific awareness promoted (35%)
- Adhering to general content requested and editing (30%)
- Overall creativity (35%) – have fun!