QBIO 547: Ethics and Professional Conduct in Computational Biology
Syllabus

General Information
Time: Tuesday 12-12:50
Location: RRI 421
Instructor: Michael "Doc" Edge
Instructor email: edgem@usc.edu
Instructor office hours: Tuesday 11-12 or by appointment
Instructor office: RRI 403E
1 unit, credit/no credit

Welcome! I am looking forward to working with you this semester.

Course Description

This is an introductory graduate course for people entering computational biology and bioinformatics. The aim of the course is to impart certain professional standards, as well as to help students build a framework for thinking about ethical situations that they may face in their career as computational biologists. We will cover some topics that are relevant to professional conduct and ethics across many fields of science, such as mentor/mentee relationships, authorship, peer review, publication, research misconduct, and discrimination in science. We will also cover topics of special relevance to computational biologists, such as data privacy, algorithmic bias, and history of scientific racism and eugenics in genetic research. This is a primarily discussion-based course, with readings assigned each week.

Readings

There is no required textbook for the course, but each session is associated with one or more readings, which are drawn mainly from journal articles, popular press articles, and blog posts. We have done our best to keep the readings short each week. More material on each topic is available from the instructor.

Another recommended (not required) reading is
On Being a Scientist: A Guide to Responsible Conduct in Research, National Academy of Sciences.

Course Notes

In this course, we will take some time to think intentionally about the culture of scientific research and about our role in society as scientists. This course is about "professional conduct" and "ethics." There is perhaps no clear distinction between these areas, but one might think of "professional conduct" as shared expectations that allow our community of scientists to operate, some of which might have a clear moral or ethical dimension. For example, fabrication of data is a professional conduct issue that also runs into moral injunctions against lying. Other topics in the course are arguably more purely "ethical," and may concern how our work relates to society in general rather than our internal community standards. The goals of this course are to inculcate professional standards where they are clear, and to suggest frameworks for thinking about cases where different ethical perspectives might conflict. The topics we cover are far from exhaustive, and we will only barely broach each one. The hope is that the conversations we start in this class continue for the rest of your career.

Some of the questions we will discuss are relevant to all scientists, including the culture of graduate training and professional science. Others are more specific to computational biologists. This course is meant to be specific to computational biologists and not to satisfy "Responsible Conduct of Research" requirements that may be mandated by NSF or NIH grants, though some of the topics will overlap.

The course is based in reading and discussion. Each week, there will be a set of assigned materials to read, listen to, or view. You are expected to submit a brief written reaction to one or more of the readings to the instructor the day before class. In class, the instructor will provide some opening comments and ask guiding questions where appropriate, but the goal is for students to drive the discussion.

Some of the topics in the course can be hard to discuss, or may be personally painful for some students. All discussions are to be carried out with respect; please treat all your classmates with dignity, and remember that our varying experiences may lead us to different positions on some of these questions. Please inform the instructor if there are topics you would feel unsafe discussing in a seminar environment.

In general, we ask participants to follow the Chatham House Rule regarding in-class discussions. The rule is, "When a meeting, or part thereof, is held under the Chatham House Rule, participants are free to use the information received, but neither the identity nor the affiliation of the speaker(s), nor that of any other participant, may be revealed." Loosely, it is okay to discuss points that were brought up in class with people who are not in the class, but we will not share who said what with people outside of class.

Learning Goals

By course's end, you will be able to:

- Identify clear professional expectations (where they exist) regarding research misconduct, publication, peer review, authorship, and other topics.
- Consider and discuss ethical issues that arise in scientific work
- Identify the goals of diverse stakeholders in scientific work, and how those goals may conflict
- Describe some ways in which professional incentives in research either further or hamper the pursuit of scientific goals
- Discuss scientific practices with an eye toward the ways in which they may perpetuate inequities in science, and consider alternative practices

Prerequisites

This course is intended for PhD students in the computational biology and bioinformatics program, as well as master's students in the QBIO program. Undergraduates or students enrolled in other programs may join the course with the instructor's permission.

Grading Policy

Grading is on a credit/no credit basis. Credit is earned by regular participation in the course and submission of reflection assignments before class. Two sessions or readings may be missed

without penalty. Beyond that, please speak with the instructor. Make-up assignments will most likely involve responses to additional readings on the course topics.

Course Schedule (Subject to change)

Week 1, August 24th
Introductions and course policies. Some basic ethical principles.
Reading: The Belmont Report, Section B: Basic ethical principles
Internet Encyclopedia of Philosophy. Ethics. (Skip section 1 on Metaethics).

Week 2, August 31st
Mentor/mentee relationships and choosing a lab
Reading: Langin, K. (2019) What matters in a PhD advisor? Here's what the research says.
https://www.sciencemag.org/careers/2019/04/what-matters-phd-adviser-here-s-what-research-says
Huckins, F. (2021) As more women enter science, it's time to redefine mentorship.
https://www.wired.com/story/as-more-women-enter-science-its-time-to-redefine-mentorship/

Week 3, September 7th
Plagiarism and text recycling
Reading: Heathers, J. (2018) The unbearable heaviness of text recycling
https://medium.com/@jamesheathers/the-unbearable-heaviness-of-text-recycling-12389fe9850d
Retraction Watch (2017). Journals pull two papers after blogger shares plagiarism suspicions
http://retractionwatch.com/2017/02/01/journals-pull-two-papers-blogger-shares-plagiarism-suspicions/
USC Library Lesson: Avoiding Plagiarism https://usclibraries.usc.edu/tutorials/avoiding-plagiarism/story_html5.html

Week 4, September 14th
Data falsification and Questionable Research Practices (QRPs)
Reading: Fraser, H., Parker, T., Nakagawa, S., Barnett, A., & Fidler, F. (2018). Questionable research practices in ecology and evolution. *PloS one*, *13*(7), e0200303.
https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0200303
Laskowski, K. (2020) What to do when you don't trust your data anymore.
https://laskowskilab.faculty.ucdavis.edu/2020/01/29/retractions/
Titus, S., Wells, J. & Rhoades, L. Repairing research integrity. *Nature* **453,** 980–982 (2008).
https://doi.org/10.1038/453980a

Week 5, September 21st
Authorship and academic credit
Reading: Strange, K. (2008). Authorship: why not just toss a coin?. *American Journal of Physiology-Cell Physiology*, *295*(3), C567-C575.
Dance, A. (2012). Who's on first? *Nature*, *489*(7417), 591-593.

Week 6, September 28th
Peer review
Reading: Bourne, P. E., & Korngreen, A. (2006). Ten simple rules for reviewers. *PLoS Comput Biol*, *2*(9), e110.
Gowers, T. (2017). The End of an Error? *The Times Literary Supplement.*

Week 7, October 5th

Publication + Transparency and open practices
Reading: Broad, W. J. (1981). The publishing game: getting more for less. *Science*, *211*(4487), 1137-1139.
Düwell, M. (2019). Open Science and Ethics. *Ethical Theory and Moral Practice*, *22*(5), 1051-1053.
Edge, M.D. & Matthews, J.N. Open practices in our science and our courtrooms.
Sandve, G. K., Nekrutenko, A., Taylor, J., & Hovig, E. (2013). Ten simple rules for reproducible computational research. *PLoS Comput Biol*, *9*(10), e1003285.
https://journals.plos.org/ploscompbiol/article?id=10.1371/journal.pcbi.1003285

Week 8, October 12th
Eugenics: history and modern echoes
Reading: Paul, D. B., & Spencer, H. G. (1995). The hidden science of eugenics. *Nature*, *374*(6520), 302-304.
Zhang, S. (2017). A long-lost data trove uncovers California's sterilization program. *Atlantic, Jan* 3.

Week 9, October 19th
Diversity and representation in academic science
Reading: Smart, A (2020). After years of gains, Black STEM representation is falling: Why? *Undark*. https://undark.org/2020/09/11/after-years-of-gains-black-stem-representation-is-falling-why/
Williams, J. C. (2015). The 5 biases pushing women out of STEM. *Harvard Business Review*, *24.*

Week 10, October 26th
Bias, discrimination, and microaggressions in science
Reading: Finley, S. (2020) A personal perspective on being Black in America and academia: A call to address racial injustice as a community. http://blog.mathematical-oncology.org/black-in-america-and-academia.html
Ogbunu, C. B. (2019) The liberation of RNA. *Story Collider* (a podcast; transcript also available) https://www.storycollider.org/stories/2019/12/3/justice-stories-about-righteous-determination
Also available on youtube: https://www.youtube.com/watch?v=ARVlnsuL6zg
Ramírez-Castañeda, V. (2020). Disadvantages in preparing and publishing scientific papers caused by the dominance of the English language in science: The case of Colombian researchers in biological sciences. *PloS one*, *15*(9), e0238372.

Week 11, November 2nd
Consent for archival data and data ownership
Reading: Caulfield, T., & Murdoch, B. (2017). Genes, cells, and biobanks: Yes, there's still a consent problem. *PLoS biology*, *15*(7), e2002654.
Fullerton, S. M., & Lee, S. S. (2011). Secondary uses and the governance of de-identified data: lessons from the human genome diversity panel. *BMC Medical Ethics*, *12*(1).
Greene, C. S., Garmire, L. X., Gilbert, J. A., Ritchie, M. D., & Hunter, L. E. (2017). Celebrating parasites. *Nature Genetics*, *49*(4), 483-484.
Longo, D. L., & Drazen, J. M. (2016). Data sharing. *New England Journal of Medicine*, 374,276-277.

Week 12, November 9th
Data privacy

Reading: Lunshof, J. E., Chadwick, R., Vorhaus, D. B., & Church, G. M. (2008). From genetic privacy to open consent. *Nature Reviews Genetics*, *9*(5), 406-411.

Molteni, M. (2019). The US Urgently Needs New Genetic Privacy Laws. *Wired*.

Zhang, S. (2018). Most people of European ancestry can be identified from a relative's DNA. *The Atlantic*, Oct. 11.

Week 13, November 16th
Algorithmic bias
Reading: Hatoum, A. S., Wendt, F., Galimberti, M., Polimanti, R., Neale, B., Kranzler, H., ... & Agrawal, A. (2020). Genetic Data Can Lead to Medical Discrimination: Cautionary tale of Opioid Use Disorder. *medRxiv*.

Kusner, M. J. & Loftus, J. (2020). The long road to fairer algorithms. *Nature*, 578, 34-37.

Lum, K., & Isaac, W. (2016). To predict and serve? *Significance*, *13*(5), 14-19.

Week 14, November 23rd
Scientific advocacy and activism
Reading: Kaiser, J. (2000). Ecologists on a mission to save the world. *Science*, *287*(5456), 1188-1192.

Henderson, G., & Turner, R. (2018). When Should Scientists Become Public Activists? The Oxygen Depletion Crisis. *Case Studies in the Environment*, *2*, 1-6.

Week 15, November 30th
Work/life balance, avoiding burnout, and happiness in graduate school
Reading: Lurie, S. (2015) Happiness in grad school.
https://www.insidehighered.com/blogs/gradhacker/happiness-grad-school
Custer, S (2018) Hundreds of academics give advice to their younger selves
https://www.timeshighereducation.com/blog/hundreds-academics-give-advice-their-younger-selves
Kaushik, K (2019). Becoming a parent in graduate school shaped my approach to work-life balance https://www.nature.com/articles/d41586-019-03162-7

Statement on Academic Conduct and Support Systems

Academic Conduct:

Plagiarism – presenting someone else's ideas as your own, either verbatim or recast in your own words – is a serious academic offense with serious consequences. Please familiarize yourself with the discussion of plagiarism in SCampus in Part B, Section 11, "Behavior Violating University Standards" policy.usc.edu/scampus-part-b. Other forms of academic dishonesty are equally unacceptable. See additional information in SCampus and university policies on scientific misconduct, policy.usc.edu/scientific-misconduct.

Support Systems:

Counseling and Mental Health - (213) 740-9355 – 24/7 on call
studenthealth.usc.edu/counseling
Free and confidential mental health treatment for students, including short-term psychotherapy, group counseling, stress fitness workshops, and crisis intervention.

National Suicide Prevention Lifeline - 1 (800) 273-8255 – 24/7 on call

suicidepreventionlifeline.org
Free and confidential emotional support to people in suicidal crisis or emotional distress 24 hours a day, 7 days a week.

Relationship and Sexual Violence Prevention and Services (RSVP) - (213) 740-9355(WELL), press "0" after hours – 24/7 on call
studenthealth.usc.edu/sexual-assault
Free and confidential therapy services, workshops, and training for situations related to gender-based harm.

Office of Equity and Diversity (OED)- (213) 740-5086 | Title IX – (213) 821-8298
equity.usc.edu, titleix.usc.edu
Information about how to get help or help someone affected by harassment or discrimination, rights of protected classes, reporting options, and additional resources for students, faculty, staff, visitors, and applicants. The university prohibits discrimination or harassment based on the following *protected characteristics*: race, color, national origin, ancestry, religion, sex, gender, gender identity, gender expression, sexual orientation, age, physical disability, medical condition, mental disability, marital status, pregnancy, veteran status, genetic information, and any other characteristic which may be specified in applicable laws and governmental regulations. The university also prohibits sexual assault, non-consensual sexual contact, sexual misconduct, intimate partner violence, stalking, malicious dissuasion, retaliation, and violation of interim measures.

Reporting Incidents of Bias or Harassment - (213) 740-5086 or (213) 821-8298
usc-advocate.symplicity.com/care_report
Avenue to report incidents of bias, hate crimes, and microaggressions to the Office of Equity and Diversity |Title IX for appropriate investigation, supportive measures, and response.

The Office of Disability Services and Programs - (213) 740-0776
dsp.usc.edu
Support and accommodations for students with disabilities. Services include assistance in providing readers/notetakers/interpreters, special accommodations for test taking needs, assistance with architectural barriers, assistive technology, and support for individual needs.

USC Support and Advocacy - (213) 821-4710
uscsa.usc.edu
Assists students and families in resolving complex personal, financial, and academic issues adversely affecting their success as a student.

Diversity at USC - (213) 740-2101
diversity.usc.edu
Information on events, programs and training, the Provost's Diversity and Inclusion Council, Diversity Liaisons for each academic school, chronology, participation, and various resources for students.

USC Emergency - UPC: (213) 740-4321, HSC: (323) 442-1000 – 24/7 on call
dps.usc.edu, emergency.usc.edu
Emergency assistance and avenue to report a crime. Latest updates regarding safety, including ways in which instruction will be continued if an officially declared emergency makes travel to campus infeasible.

USC Department of Public Safety - UPC: (213) 740-6000, HSC: (323) 442-120 – 24/7 on call
[dps.usc.edu](dps.usc.edu)
Non-emergency assistance or information.