QBIO 547: Ethics and Professional Conduct in Computational Biology
Syllabus

General Information
Time: Tuesday 11-11:50
Location: RRI 421
Instructor: Michael "Doc" Edge
Instructor email: edgem@usc.edu
Instructor office hours: 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. I have done my best to keep the readings short each week, at the cost of leaving out many excellent pieces. More material on each topic, and on topics not covered in the course, 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 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 in which 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**. To be clear, it is fine to disagree with points in the reading—in fact, several sets of readings disagree with each other, making it impossible to agree with all of them in full and remain consistent. 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. (**Weekly reflections are due the night before class at 11:59 pm**.) 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 27th
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, September 3rd
Mentor/mentee relationships and choosing a lab
Reading: 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/
Jabre L, Bannon C, McCain JSP, Eglit Y (2021) Ten simple rules for choosing a PhD supervisor. PLOS Computational Biology 17(9):
e1009330. https://doi.org/10.1371/journal.pcbi.1009330
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

Week 3, September 10th
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/
Note: this is an online resource and not in the folder of readings USC Library Lesson:
Avoiding Plagiarism https://usclibraries.usc.edu/tutorials/avoiding-plagiarism/story_html5.html

Week 4, September 17th
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
Kozlov, M. (2023). What the Stanford president's resignation can teach lab leaders. *Nature*.
https://doi.org/10.1038/d41586-023-02438-3

Week 5, September 24th
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, October 1st
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 8th
Publication + Transparency and open practices
Reading: Broad, W. J. (1981). The publishing game: getting more for less. *Science*, *211*(4487), 1137-1139.
Edge, M.D. & Matthews, J.N. Open practices in our science and our courtrooms. *Trends in Genetics*. doi.org/10.1016/j.tig.2021.09.010
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 15th
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 22nd
Diversity and representation in academic science
Reading: Amano T, Ramírez-Castañeda V, Berdejo-Espinola V, Borokini I, Chowdhury S, et al. (2023) The manifold costs of being a non-native English speaker in science. PLOS Biology 21(7): e3002184. https://doi.org/10.1371/journal.pbio.3002184
Arif S, Massey MDB, Klinard N, Charbonneau J, Jabre L, et al. (2021) Ten simple rules for supporting historically underrepresented students in science. *PLoS Comput Biol* 17(9): e1009313. https://doi.org/10.1371/journal.pcbi.1009313
Powell, K. (2018). These labs are remarkably diverse-here's why they're winning at science. *Nature*, *558*(7708), 19-22.

Week 10, October 29th
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
Gosztyla ML, Kwong L, Murray NA, Williams CE, Behnke N, et al. (2021) Responses to 10 common criticisms of anti-racism action in STEMM. *PLoS Comput Biol* 17(7): e1009141. https://doi.org/10.1371/journal.pcbi.1009141
Williams, J. C. (2015). The 5 biases pushing women out of STEM. *Harvard Business Review*, *24*.

Week 11, November 5th
Consent for archival data, data ownership, data privacy
Reading: Caulfield, T., & Murdoch, B. (2017). Genes, cells, and biobanks: Yes, there's still a consent problem. *PLoS biology*, *15*(7), e2002654.

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*.

Week 12, November 12th
Algorithmic bias and algorithmic fairness
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 13, November 19th
Gattaca as a lens on contemporary ethical issues in genetics
Reading: Watch *Gattaca* (we will hold a screening, but you can also watch on your own)

Week 14, November 26th
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, December 3rd
Work/life balance, avoiding burnout, and happiness in graduate school
Reading: Gu, J., & Bourne, P. E. (2007). Ten simple rules for graduate students. *PLoS Comput Biol*, *3*(11), e229.
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

Academic Integrity

The University of Southern California is foremost a learning community committed to fostering successful scholars and researchers dedicated to the pursuit of knowledge and the transmission of ideas. Academic misconduct is in contrast to the university's mission to educate students through a broad array of first-rank academic, professional, and extracurricular programs and includes any act of dishonesty in the submission of academic work (either in draft or final form).

This course will follow the expectations for academic integrity as stated in the USC Student Handbook. All students are expected to submit assignments that are original work and prepared specifically for the course/section in this academic term. You may not submit work written by others or "recycle" work prepared for other courses without obtaining written permission from the instructor(s). Students suspected of engaging in academic misconduct will be reported to the Office of Academic Integrity.

Other violations of academic misconduct include, but are not limited to, cheating, plagiarism, fabrication (e.g., falsifying data), knowingly assisting others in acts of academic dishonesty, and any act that gains or is intended to gain an unfair academic advantage.

Academic dishonesty has a far-reaching impact and is considered a serious offense against the university. Violations will result in a grade penalty, such as a failing grade on the assignment or in the course, and disciplinary action from the university itself, such as suspension or even expulsion.

For more information about academic integrity see the student handbook or the Office of Academic Integrity's website, and university policies on Research and Scholarship Misconduct.

Please ask your instructor if you are unsure what constitutes unauthorized assistance on an exam or assignment or what information requires citation and/or attribution.

Statement on University Academic and Support Systems

Students and Disability Accommodations:
USC welcomes students with disabilities into all of the University's educational programs. The Office of Student Accessibility Services (OSAS) is responsible for the determination of appropriate accommodations for students who encounter disability-related barriers. Once a student has completed the OSAS process (registration, initial appointment, and submitted documentation) and accommodations are determined to be reasonable and appropriate, a Letter of Accommodation (LOA) will be available to generate for each course. The LOA must be given to each course instructor by the student and followed up with a discussion. This should be done as early in the semester as possible as accommodations are not retroactive. More information can be found at osas.usc.edu. You may contact OSAS at (213) 740-0776 or via email at osasfrontdesk@usc.edu.

Student Financial Aid and Satisfactory Academic Progress:
To be eligible for certain kinds of financial aid, students are required to maintain Satisfactory Academic Progress (SAP) toward their degree objectives. Visit the Financial Aid Office webpage for undergraduate- and graduate-level SAP eligibility requirements and the appeals process.

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

988 Suicide and Crisis Lifeline - *988 for both calls and text messages – 24/7 on call*
The 988 Suicide and Crisis Lifeline (formerly known as the National Suicide Prevention Lifeline) provides free and confidential emotional support to people in suicidal crisis or emotional distress 24 hours a day, 7 days a week, across the United States. The Lifeline consists of a national network of over 200 local crisis centers, combining custom local care and resources with national standards and best practices. The new, shorter phone number makes it easier for people to remember and access mental health crisis services (though the previous 1 (800) 273-8255 number will continue to function indefinitely) and represents a continued commitment to those in crisis.

Relationship and Sexual Violence Prevention Services (RSVP) - *(213) 740-9355(WELL) – 24/7 on call*
Free and confidential therapy services, workshops, and training for situations related to gender- and power-based harm (including sexual assault, intimate partner violence, and stalking).

Office for Equity, Equal Opportunity, and Title IX (EEO-TIX) - *(213) 740-5086*

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.

Reporting Incidents of Bias or Harassment - *(213) 740-2500*
Avenue to report incidents of bias, hate crimes, and microaggressions to the Office for Equity, Equal Opportunity, and Title for appropriate investigation, supportive measures, and response.

The Office of Student Accessibility Services (OSAS) - *(213) 740-0776*
OSAS ensures equal access for students with disabilities through providing academic accommodations and auxiliary aids in accordance with federal laws and university policy.

USC Campus Support and Intervention - *(213) 740-0411*
Assists students and families in resolving complex personal, financial, and academic issues adversely affecting their success as a student.

Diversity, Equity and Inclusion - *(213) 740-2101*
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*
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) 442-1200 – 24/7 on call*
Non-emergency assistance or information.

Office of the Ombuds - *(213) 821-9556 (UPC) / (323-442-0382 (HSC)*
A safe and confidential place to share your USC-related issues with a University Ombuds who will work with you to explore options or paths to manage your concern.

Occupational Therapy Faculty Practice - *(323) 442-2850 or* otfp@med.usc.edu
Confidential Lifestyle Redesign services for USC students to support health promoting habits and routines that enhance quality of life and academic performance.