

**CHEM 5776**  
**Responsible Conduct of Research (1 cr)**  
**Fall Semester 2020: November 18 – December 2**  
**9:30 -11:30 am**

**Instructors:**

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**Content:** This course provides an introduction to scientific ethics and standards of behavior for the conduct of research. You should prepare for each class by carrying out assigned readings and videos. Each session will consist of 2 hour class discussions on questions and case studies from the books: “Responsible Conduct of Research” by Shamoo and Resnik, and “On Being a Scientist: A Guide to Responsible Conduct in Research” by the National Academy of Sciences, as well as other articles and materials.

BCHM 5776 is normally team-taught in weekly 1 hour sessions throughout the Fall semester in parallel with CORE. However, due to COVID-19 constraints, this year we will follow a different schedule. In Fall 2020, BCHM 5771/CORE will be taught during in-class sessions scheduled for 08/24/2020 - 11/16/2020. All courses will go fully remote starting 11/18/2020, at which time BCHM 5776 will be taught for 2 hours every day until the end of the semester, with class discussions led by the CORE instructors.

**Resources:**

**Course website:** [Canvas.colorado.edu/courses/68321](https://Canvas.colorado.edu/courses/68321)

University of Colorado “Guidelines and Procedures for Responding to Allegations of Research Misconduct” (May 11, 2020)

Adil E. Shamoo and David B. Resnik “Responsible Conduct of Research”, Oxford University Press, 2003.

National Academy of Sciences “On Being a Scientist: A Guide to Responsible Conduct in Research”

J.R. Taylor “Introduction to Error Analysis” Chapter 6 “Rejection of Data”

## Schedule of Classes

### 11/18/2020 Research Misconduct

Assignments before class:

Read “ORI Findings and Consequences of Research Misconduct”

[https://ori.hhs.gov/education/products/RIandImages/misconduct\\_cases/findings\\_of\\_misconduct.pdf](https://ori.hhs.gov/education/products/RIandImages/misconduct_cases/findings_of_misconduct.pdf)

Watch the videos on this page:

[https://ori.hhs.gov/education/products/RIandImages/case\\_study/short\\_case\\_study/default.html](https://ori.hhs.gov/education/products/RIandImages/case_study/short_case_study/default.html)

For class discussion:

Shamoo and Resnik: Research Misconduct, Questions for Discussion, Cases for Discussion (misconductchaptercasesquestions.pdf)

### 11/20/2020 (1) Mentoring and (2) Data Acquisition/Management

#### (1) Mentoring

Assignments before class:

Readings and Videos:

<https://www.evidencebasedmentoring.org/top-25-mentoring-relationships-in-history/>

<http://ijobs.rutgers.edu/wordpress/2017/09/21/principal-investigators-the-good-the-bad-and-the-ugly/#sthash.P4gNug6Y.sK4igMk9.dpbs>

<https://www.nextscientist.com/communicating-effectively-phd-supervisor/>

7 Steps to a Positive Relationship with your PhD Supervisor,

<https://www.youtube.com/watch?v=0pGyjMaZgQ0>

Not required reading (but may be useful in the future)

[https://www.training.nih.gov/evaluating\\_potential\\_mentors](https://www.training.nih.gov/evaluating_potential_mentors)

<https://www.colorado.edu/graduateschool/five-traits-avoid-academic-advisor>Links to an external site.

For class discussion:

Shamoo and Resnik: Mentoring Questions and Cases (download MentoringCases.pdf)

#### (2) Data Acquisition/Management

Assignments before class:

Readings and Videos: Data Acquisition/Management

Lab Notebooks: [https://ori.hhs.gov/education/products/wsu/data\\_lab.html](https://ori.hhs.gov/education/products/wsu/data_lab.html)

Negative Controls: <https://www.youtube.com/watch?v=ESVv46J4pn0&list=PLkfbg8ML-gIksZn5suMsE37qMqBh-RqBd&index=10>

Positive Controls: <https://www.youtube.com/watch?v=99VL6bXCDx8&index=11&list=PLkfbg8ML-gIksZn5suMsE37qMqBh-RqBd>

Recording data: <https://www.youtube.com/watch?v=BDErB2Yxt4M&index=18&list=PLkfbg8ML-gIksZn5suMsE37qMqBh-RqBd>

Blinding: <https://www.youtube.com/watch?v=jaRXn9zO2Ds&list=PLkfbg8ML-gIksZn5suMsE37qMqBh-RqBd&index=16>

Analysis and Reporting: <https://www.youtube.com/watch?v=r8gwsbTrTFY&list=PLkfbg8ML-gIm4PsDBIplBONoyMon2p9k->

Sample Size: <https://www.youtube.com/watch?v=3yBZoEFFmH0&list=PLkfbg8ML-gIm4PsDBIplBONoyMon2p9k-&index=2>

For class discussion:

Shamoo and Resnik: Data Acquisition – Cases (download DataAcquisitionCases.pdf)

## **11/23/2020 (1) Data Reproducibility and (2) Intellectual Property**

### **(1) Data Reproducibility**

Assignments before class:

NIH Rigor and Reproducibility Training Modules:

<https://www.nigms.nih.gov/training/pages/clearinghouse-for-training-modules-to-enhance-data-reproducibility.aspx>

Lack of Transparency: <https://www.youtube.com/watch?v=U4A-ZSTUEUo>

Blinding and Randomization: <https://www.youtube.com/watch?v=NEcErxoOvm0>

Biological and Technical Replicates: <https://www.youtube.com/watch?v=wSWunBYzl8c>

Sample Size, Outliers and Exclusion Criteria: <https://www.youtube.com/watch?v=Pc0h-GOcBLE>

Introduction to Experimental Design:

<https://www.youtube.com/watch?v=M4aur37958k&t=2s&list=PLkfbg8ML-gIksZn5suMsE37qMqBh-RqBd&index=2>

<https://www.youtube.com/watch?v=ODxYik9ZGGE&index=2&list=PLkfbg8ML-gIksZn5suMsE37qMqBh-RqBd>

For class discussion:

Download QuestionsforDiscussion\_DataReproducibility.pdf

## **(2) Intellectual Property**

Assignments before class:

What is Intellectual Property? <https://www.youtube.com/watch?v=EQsZf2G4Sdc>

About Technology Transfer: <https://www.youtube.com/watch?v=ygX5zcU5vdg>

<https://www.colorado.edu/venturepartners/innovators/protecting-your-innovation>

What the Heck is a Patent and Why Every Engineer Needs One:

<https://www.youtube.com/watch?v=FIKkvx2M1mk>

CRISPR Patent Dispute: <https://www.sciencemag.org/news/2018/04/federal-appeals-court-hears-crispr-patent-dispute>

Chou vs Chicago: Download Chou-vs-Chicago.pdf

Download IP\_cases.pdf

For class discussion:

Shamoo and Resnik: Intellectual Property – Questions for Discussion and Case Studies (Download IP\_cases.pdf)

## **11/25/2020 (1) Authorship/Publication/Peer review and (2) Lab Safety**

### **(1) Authorship/Publication/Peer review**

Assignments before class:

What Constitutes Authorship? <https://www.youtube.com/watch?v=-H8RyCWrDuI&feature=youtu.be>

[https://www.nature.com/articles/d41586-018-05280-0?utm\\_source=tw\\_t\\_nnc&utm\\_medium=social&utm\\_campaign=naturenews&sf190816776=1](https://www.nature.com/articles/d41586-018-05280-0?utm_source=tw_t_nnc&utm_medium=social&utm_campaign=naturenews&sf190816776=1)

Peer Review in 3 Minutes: <https://www.youtube.com/watch?v=rOCQZ7QnoN0>

<http://www.painphysicianjournal.com/current/pdf?article=MjIzMQ%3D%3D&journal=86>

<http://annals.org/aim/fullarticle/2592773>

<https://academic.oup.com/bioinformatics/advance-article/doi/10.1093/bioinformatics/btz071/5304360>

For class discussion:

Shamoo and Resnik: Authorship/Publication/Peer review Cases and Questions (Download [author and peer review cases and questions.pdf](#))

### **(2) Lab Safety** Assignments before class:

Texas Tech Lab Explosion: [https://www.youtube.com/watch?v=sjDdl\\_d8br8](https://www.youtube.com/watch?v=sjDdl_d8br8)

University of Hawaii at Manoa: <https://cen.acs.org/articles/94/web/2016/09/University-Hawaii-fined-115500-lab.html>

<https://www.sciencemag.org/careers/2016/07/report-uh-lab-explosion-reveals-deep-systemic-safety-failures>

These are things you should know about lab safety even if you just walk around in research labs: <https://www.acs.org/content/acs/en/chemical-safety/basics/nfpa-hazard-identification.html>

Lab Rules – Dua Lipa “New Rules” Parody: <https://www.youtube.com/watch?v=BRDApYgvDqQ>

University of Colorado EHS Lab Safety Guidelines: [https://ehs.colorado.edu/resources/laboratory-safety-guidelines/Links to an external site.](https://ehs.colorado.edu/resources/laboratory-safety-guidelines/Links%20to%20an%20external%20site)

These documents are not required reading but might be useful if you have questions:

[report-1-university-of-hawaii.pdf](#) 

[Report-2-University-of-Hawaii.pdf](#) 

<https://www.hawaii.edu/news/2016/07/01/independent-investigation-of-lab-accident-complete/>

For class discussion:

Shamoo and Resnik: Lab Safety Questions and Cases. Download [CCall-miscommunication-MD.pdf](#)

## **11/30/2020 (1) Conflicts of Interest and (2) Collaborative Research**

### **(1) Conflicts of Interest**

Assignments before class:

Beware Conflicts of Interests: <https://www.youtube.com/watch?v=n8Y8FK8gonc>

Conflicts of Interests for Engineers: <https://www.youtube.com/watch?v=7fCh7HDhwrY>

Relevant articles:

“Nature journals tighten rules on non-financial conflicts.” *Nature*, 2018 Jan 31.

<https://www.nature.com/articles/d41586-018-01420-8>

Vasconcelos, S.M.R., Cassimiro, M.C., Martins, M.F.M., Palacios, M. “Addressing conflicts of interest in the research paper: a societal demand in contemporary science?” *Braz J Med Biol Res*, 2013 Dec; 46(12): 1007–1013. [http://www.scielo.br/scielo.php?script=sci\\_arttext&pid=S0100-879X2013001201007&lng=en&tlng=en](http://www.scielo.br/scielo.php?script=sci_arttext&pid=S0100-879X2013001201007&lng=en&tlng=en)

Majumder, Kakoli. “Publication ethics: Failure to disclose potential conflict of interest lands author in trouble: A case study.” *Editage Insights*, 2016, Jul 2. <https://www.editage.com/insights/failure-to->

[disclose-potential-conflict-of-interest-lands-author-in-trouble-a-case-study?%20](#) (Links to an external site.)

Shaw, David M., Etter, Jean-Francois, Elger, Bernice S. “Should academic journals publish e-cigarette research linked to tobacco companies?” *Addiction*, 2015, Sept 28. *Wiley Online Library*, <https://onlinelibrary-wiley-com.colorado.idm.oclc.org/doi/full/10.1111/add.13067>

CU Policy: Disclosure and Reporting Requirements Related to Foreign Support of Research  
<https://www.colorado.edu/researchinnovation/disclosure-and-reporting-requirements-related-foreign-support-research>


For class discussion:

Shamoo & Resnik: Conflicts of Interest – Cases and Questions (Download ConflictsofInterestCases.pdf and COI\_from\_shamoo.pdf)

## **(2) Collaborative Research**

Assignments before class:

How Collaboration Leads to Great Ideas: [https://www.youtube.com/watch?v=ga1\\_a4qw-As&feature=youtu.be](https://www.youtube.com/watch?v=ga1_a4qw-As&feature=youtu.be)

Vicens Q, Bourne PE (2007) Ten simple rules for a successful collaboration. *PLoS Comput Biol* 3(3): e44. doi:10.1371/[journal.pcbi.0030044](https://doi.org/10.1371/journal.pcbi.0030044).PDF 

For class discussion:

Shamoo & Resnik: Collaboration Questions and Cases (Download CollaborationQuestionsAndCases.pdf)

## **12/02/2020 (1) Scientists in Society and (2) Animal Research Issues**

### **(1) Scientists in Society**

Assignments before class:

Science in Service to the Public Good: <https://www.youtube.com/watch?v=ALTvG9MIR64>

[https://www.sciencemag.org/news/2019/09/turkish-scientist-gets-15-month-sentence-publishing-environmental-study?utm\\_campaign=SciMag&utm\\_source=JHubbard&utm\\_medium=Facebook](https://www.sciencemag.org/news/2019/09/turkish-scientist-gets-15-month-sentence-publishing-environmental-study?utm_campaign=SciMag&utm_source=JHubbard&utm_medium=Facebook) (Links to an external site.)

<https://www.nationalgeographic.com/news/2015/09/150910-data-points-science-knowledge-public-society/> (Links to an external site.)

<https://www.sciencemag.org/careers/2013/02/social-responsibilities-scientists> (Links to an external site.)

Optional Reading:

<https://www.americanscientist.org/blog/from-the-staff/8-myths-about-public-understanding-of-science> (Links to an external site.)

<https://www.chronicle.com/article/How-to-Overcome-Impostor/244700> (Links to an external site.)

For class discussion:

Shamoo & Resnik: Scientists in Society – Cases (download Case studies-Scientists and Society.pdf)

## **(2) Animal Research Issues**

Assignments before class:

The Evolving Role of Animals in Research: Innovation and Ethics:

<https://www.youtube.com/watch?v=gkNS86O6kDE>

Pros and Cons of Animal Testing: <https://www.youtube.com/watch?v=qw6fQeuMveg>

IACUC PSA Video: <https://www.youtube.com/watch?v=LU51IVzSI24>

For class discussion:

Shamoo & Resnik: Animal Research – Cases (download AnimalResearch-Cases.pdf)