Biochemistry/BMC 701: Fall 2014

A course in Professional Development, or How to be a responsible Biochemist

Instructors:
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David Brow (dabrow@wisc.edu)

Required for and limited to students in the combined Biochemistry graduate program
1 credit 1 hour + (lecture + discussion) each week
Thursdays at 3:30 PM Room 175 Biochemistry Addition

Schedule:

1. September 4 **Lead: Michael Cox**
Science, scientists, and the scientific method(s). What are they?
- Science.
- Scientific method and its variants
- Definition of a scientist
- Definition of a scientific idea.
- Definitions of hypotheses, theories, etc, in a scientific context.
- Responsibilities of a scientist.

2. September 11 **Lead: David Nelson**
Biochemistry, scope and brief history.
- Start with Buchner.
- UW contributions.

3. September 18 **Lead: Michael Cox**
Outlines of a research project.
- How to design an efficient and adequately controlled survey experiment.
- Given a lead from a survey or a prediction from other experiments (or a hunch), how to design a controlled experiment to ask and answer a more directed question.
- Once a solid result is obtained, obtaining the publishable results, reproducibility and quality.
- Desirability of corroboration by multiple independent methods.
- Many projects involve months of preparation and a few days of actual datagathering.
- How to gauge the importance of a problem or question
- Collaboration
  - How and why collaborations are developed
  - Responsibilities of collaborators

4. September 25 Lead: Robert Landick

The scientific literature: reading and contributing

- Research publications (the sections and how to tackle them)
- Reviews (what can and cannot go in; organization; dealing with unpublished data)
- Project reports in a commercial setting.
- Authorship; who is an author and who is not. Author responsibilities; authorship vs acknowledgement
- Responsibilities in the age of Photoshop – how to handle digital files
- Scientific Conflicts of Interest

5. October 2 Lead: Michael Cox

Communicating science to other scientists and the public

- Teaching, giving a science presentation. Presenting the conclusions up front. Summary slides.
- Designing effective slides. Importance of not overdoing the Powerpoint stuff. Addressing a broad audience. Not overdoing the data slides. Timing. Planning vs allotted time.
- Grant applications
  - Funding sources
  - Brief Intro to Grant Writing

6. October 9 Lead: Michael Cox

Research documentation

- What goes into a notebook
- Special documentation required for patents
- The central importance of honesty and reproducibility.
- Special problems associated with digital image files
- Data deposition in public databases

7. October 16 Lead: Thomas Martin

Peer review

- the process
- responsibilities
- conflicts of interest
- Papers, reviews, grants.
- The importance of the peer-reviewed literature in the advance of science, in the prosecution of science controversies, and in defining what is and what is not science.

8. October 23 Lead: Michael Cox/ possible guest

The interface between science and society

- Role of scientists, clergy, politics, public in defining how science is used.
- -How to deal with conflicts
  - evolution vs creationism
  - genetically modified organisms
  - stem cells, etc.

9. October 30 Lead: Christina Hull

Ethical obligations in laboratory practice

-human subjects in research

-live vertebrate animal subjects in research

-biosafety requirements

-safe laboratory practices

10. November 6 Lead: Lead: John Denu

Mentoring

responsibilities

goals

personal relationships;

personal conflicts of interest

11. November 13 Lead: James Dahlberg

The interface between academia and industry (Jim Dahlberg)

-start-up companies: how they happen

-putting innovation into practice from academia

-filing patents based on academic research

-filing patents in industry

-Financial conflicts of interest and how they are dealt with

12. November 20 Lead: Dave Brow

Fraud in science

-what it is

-what to do if you detect it

-how it impacts careers

Other forms of scientific misconduct

13. December 4 Lead: Christina Hull

Careers in science I. Navigating the process of becoming a scientist and developing a career.

-work-life balance topics

-goal/prioritization strategies

-personal development resources

-professional development resources

14. December 11 Lead: Jennifer Gottwald (WARF), Michael Cox,

Careers in science II.

-the academic track; the industrial track; academic side-tracks (journals, textbooks, start-up companies)

-business

-law

-science writing

Grade based on attendance, participation, and graded assignments.

Graded assignments

1. Week 4. Paper writing. Students will be given two poorly constructed abstracts taken from the literature. The full papers will also be made available. Students will be tasked with re-writing the abstracts based on principles covered in class. Their re-writes will be graded for conciseness, clarity, and grammar (due week 5).
2. Week 6. Students will compose a "Specific Aims" section for an NIH grant, based on the project they are working on in their first rotation. The format for this assignment will be based on principles covered in class (due week 7).
3. Week 8. Peer-review. Students will be assigned two papers to read and critique, and charged with writing a referee report on each as though the paper were just being submitted to a journal. One of the papers will be from the literature. Students will comment on features such as internal consistency of the data shown, grammar, experimental logic, completeness of experimental procedures, adequacy of controls, etc. Student critiques will be graded for style, tone, grammar, and ability to see the engineered shortcomings of the manufactured paper (due week 10).

Resources

On Being a Scientist: A Guide to Responsible Conduct in Research: Third Edition
Committee on Science, Engineering, and Public Policy, National Academy of Sciences, National Academy of Engineering, and Institute of Medicine. ISBN: 0-309-11971-5, 82 pages, (2009)
(Resource available for download on course website)

Protecting Human Research Participants (NIH course and Guide)
(Resource available for download on course website)

Lab Dynamics: Management Skills for Scientists
Carl M. Cohen, Suzanne L. Cohen - Science - 2008 - 177 pages ~$35
Cold Spring Harbor Laboratory Press

At the Helm, Leading your laboratory 2nd Edition
Kathy Barker 2010 372 pages $59
Cold Spring Harbor Laboratory Press

At the Bench, A laboratory navigator updated edition
Kathy Barker 2005 465 pages $59
Cold Spring Harbor Laboratory Press

Entering Mentoring
Jo Handelsman, Christine Pfund, Sarah Miller Lauffer, Christine Maidl Pribbenow
HHMI Free Resource (2005) (Distributed to all course participants)
Making the Right Moves: A Practical Guide to Scientific Management for Postdocs and New Faculty: HHMI resource (2006) (Resource available for download on course website)

A Career Development Plan for Postdocs
http://sciencecareers.sciencemag.org/career_development/previous_issues/articles/1960/a_career_development_plan_for_postdocs/

Individual Development Plan (IDP) Form: FASEB (Resource available for download on course website)
IDP Evaluation Form: FASEB (Resource available for download on course website)