

**UI Course Title: Professional Development and Ethics**

Start of course: **Spring 2022**

Course designation: **BIOL 504 Special Topics (ST)**

Credit hours: **3**

Grade: Letter graded (see below)

Meeting time: Once a week (Wednesday ~8AM–11AM unless otherwise indicated).

**UW Instructor/Organizer**

David S. Fay, PhD

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Office hours: Flexible and arranged as needed with individual students

**UW Associate Instructor and Course Coordinator**

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**UI Course Coordinator**

James J. Nagler, PhD

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Office hours: by appointment

**Course Goals and Purpose:**

The purpose of the course is to provide practical skills and information to graduate Ph.D. students working in the broad area of biomedical research. Although students at all stages are welcome, it may particularly benefit students at early-to-mid career stages (years 1–3). Many of the critical skills required to be successful in the field of biomedical research are not explicitly or systematically taught through traditional curriculums. This course aims to fill such gaps and to position students for success during their Ph.D. and beyond. Classes will be structured as a series of complementary workshops.

Students receiving 2-year INBRE GA awards will generally be required to take the course in the first year of their INBRE support, although second-year INBRE GAs may be permitted in some cases. Non-INBRE-supported students may take the course as an elective as space allows. We anticipate approximately 10 INBRE-supported students to be enrolled each year and these students will receive enrollment priority. If students have already taken the course as an elective prior to receiving INBRE GA support, they will not be required to repeat the course.

Spring 2022 Schedule: 1/19, 1/26, 2/2, 2/9, 2/16, 2/23, 3/2, 3/9, 3/23, 3/30, 4/6, 4/13, 4/20, 4/27, 5/4, 5/11. Total 16 classes.

**Course Topics: (16 weeks)**

1) Scientific Principles. (1 week; 1/19). We will cover key foundational principles of conducting scientific research. Topics will include the importance of controls, repetition, reproducibility, complementary approaches, and the removal of bias. We will discuss concepts including necessary versus sufficient and correlation versus causation. In addition, the value of hypothesis versus needs-based studies will be addressed. [D. Fay]

2) Scientific ethics and conduct. (1 week; 1/26). We will address several categories of scientific misconduct including recent high-profile cases involving plagiarism, misrepresentation, and fabrication. What patterns are apparent in cases of scientific misconduct and how can these situations be avoided? What responsibilities do scientists have for reporting suspected cases of fraud? [C. Brandt, K. Shimkus]

3) Scientific resiliency. (1 week; 2/2). Navigating school, the career exploration process, research environments, and the stress of life can seem overwhelming and lead us to doubt ourselves just when we need confidence the most. We will discuss and practice cultivating select resilience skills from the NIH series on 'Becoming a Resilient Scientist'. These skills will help you to realize resilience and identify and deal with obstacles that get in the way of academic success and thriving in research careers. [A. Bergman]

4) Using R to analyze data and make figures. (3 weeks; 2/9, 2/16, 2/23). Students will be instructed in the use of R for handling and organizing datasets, carrying out statistical analyses, and generating publication-quality figure panels. R will be taught by members of the INBRE Bioinformatics Core. Assignments will include graphing and analyzing different types of datasets and making high-quality figure panels suitable for publication purposes. [\*UI students – B. Robison]

5) How to use and represent statistics. (2 weeks; 3/2, 3/9). This section will cover key concepts in biomedical statistics, emphasizing critical areas and pit falls. Topics will include standard tests, non-classical approaches, best practices, and interpretation. Prior to the class, students will be assigned reading to re-familiarize themselves with core statistical concepts. Students can also bring relevant questions to class for discussion. Note that this session is not intended as a replacement for in-depth field-specific training in statistics. [K. Gerow, D. Fay] \*\*\*NOTE: This class will meet from 11 AM – 1 PM.

6) Making publication quality figures. (3 weeks; 3/23, 3/30, 4/6). Students will gain experience in using Adobe Illustrator and Prism GraphPad for making professional diagrams for papers, presentations, and grants. This will include self-assigned drawing projects relevant to each student, which will help refine use of the software. Outcomes will be discussed by the group to gain input. [Toby Thompson, Coe Studio, D. Fay]

7) How to get a paper. (1 week; 4/13). One of the biggest hurdles in graduate school is learning how to generate and publish a paper. More than a skill, it's a mindset that goes well beyond working hard and being technically proficient. This class will cover essential strategies for being scientifically productive including how to "see the paper" from an early stage and how to be both flexible and efficient in getting across the finish line. [D. Fay and D. Levy]

8) How to give a presentation. (1 week; 4/20). Communicating science is one of the most important skills any scientist can develop. Every presentation you give, whether to others in your lab or to hundreds of colleagues at an international meeting, is an opportunity to create a favorable impression. It is also the foundation of teaching itself, as well as scientific discourse. This class will cover key elements that are essential for giving a good talk and will include pitfalls to be avoided at all costs. [D. Fay and X]

9) Scientific decorum: guidelines, expectations, and unwritten rules. (1 week; 4/27). What are the expected codes of behavior and conduct in science? How will following or not following these protocols impact your scientific careers? How does one navigate through complex cultural and gender expectations? [C. Bohach, D. Fay]

10) Career goals and development (2 weeks; 5/4, 5/11). What are the options in your field? How do you decide which career paths you are most suited for? How do you go about pursuing specific career options? Discussions will mostly include career options in academics and the private sector. Students will hear directly from Ph.Ds. working in industry and academics about how their careers unfolded and what they've learned along the way. [5/4 A. Spencer, R. Mukherjee, L. Vuković; 5/11 T. Schoborg, D. Bruns, J. Powel]

**Grading policy.**

- Students can obtain 10 points per week for a total of 160 points.
- Points will be awarded for attendance (5 pts), along with participation and/or the completion of session-specific assignments (5 pts).
- For session-specific points to be awarded, attendance at the session is mandatory unless otherwise notified and cleared in advance with the professor. Valid excuses may include reasons of health, prior professional obligations, or compelling personal issues.
- UI Grading: A = 144-160 points; B = 128-143 points; C = < 127 points.

**Materials:**

Students should have access to a personal laptop computer. All other materials will be provided.

**Disabilities.** Students with disabilities are urged to contact the professor prior to the start of the academic year so that any necessary accommodations can be made.

**Academic Dishonesty.** Cheating, in any form, will not be tolerated in this course. Any student caught cheating will be dismissed from the course.