Spring 2022
Professional Development and Critical Thinking
ENT 522

Instructors:

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Office hours for all instructors are by appointment

Time: M, W 11:15A - 01:10P
Friday Seminar required for all. See Assignments page on Canvas for Engaging a Seminar Speaker assignment.

Location: Canvas Zoom

Course web site: Emails, readings, and assignments will be posted on Canvas.

Course Description:

This 6 credit course for graduate students will focus on developing the professional skills needed for success in graduate school and beyond. The course will have six major components:

1. **"Emotional Intelligence" of Graduate School (Patch)**
We will discuss the goals and expectations of graduate school, the difference between qualitative and quantitative achievement, the time line for graduate school, the variety of activities graduate students can engage in, time management and prioritization. We will discuss strategies for success in teaching, outreach and presentations. We will also highlight and discuss the numerous possible career paths for students obtaining an MSc or PhD in Entomology.

2. **Scientific Writing (Patch & Grozinger)**
Students will develop skills in scientific writing for (1) the public and (2) research proposals.

Students will identify and review key primary and secondary literature in their specific field of interest. These reviews will allow the students to identify overarching conceptual questions, understand the historical development of the field, identify conceptual links to larger issues in biology, and develop important questions for further research. Students will also discuss effective strategies for teaching to different audiences and visually displaying data.
For project 1, students will interview each other. Each student will develop a short (3-5 paragraph) article describing the field of interest and research of their partner. Articles will be developed for online publication, with the general public as a target audience.
For project 2, students will develop a research proposal. An initial summary of the proposal will be in a form appropriate for a Sigma Xi Grant-in-Aid of Research and will be submitted prior to the Sigma Xi deadline

http://www.sigmaxi.org/programs/giar/index.shtml

3. **Experimental Design and Statistical Analysis (Amsalem)**
In this section, students will learn approaches and requirements for designing experiments and statistically analyzing their data to generate interpretable and meaningful results.

4. **Scientific Thinking and Critical Analysis (Amsalem)**
Students will read and discuss selected papers from the literature. Teams of students will present and critique selected papers in class during mock qualifying exams. Emphasis will be placed on critical analysis and the identification of important research questions.

5. **Grant Proposal Workshop (Amsalem)**
Sources of funding for scientific research and graduate fellowships will be discussed. Techniques for writing effective proposals will be presented by the instructors. Students will participate in a mock grant panel and will critique actual proposals. This process will provide an opportunity for students to learn what makes a grant fundable and is intended to help them develop their own grant writing skills.

6. **Leadership and Ethics (Patch)**
Students will work in teams with rotating chair and scribe roles while addressing problems of ethical dimensions in the biological sciences. Individual role playing and self and team evaluations will be used to further clarify individual values, philosophies, and skills development. Problem resolution, effective communication, team dynamics, problem solving, conflict resolution, leadership and mentoring skills, and ethical values will be stressed.

Grading: Your grade is based on completion of assignments (and submission of any written materials by the deadline) and the quality of your engagement with class material, group interactions, and what insights you bring to the class community. The breakdown by module is below. Mid-way through the semester, the course instructors will provide you with written feedback about your performance in the course with respect to these criteria. Students will be assigned a letter grade in accordance with the Penn State graduate grading system (http://www.registrar.psu.edu/grades/grading_system.cfm). Achievement in Professional Development is considered in light of the scholarly and professional goals for all graduate degree students. They are as follows:

- Demonstrate appropriate breadth and depth of disciplinary knowledge, and

comprehension of the major issues of their discipline.
- Use disciplinary methods and techniques to apply knowledge, and – if appropriate to the degree – create new knowledge or achieve advanced creative accomplishment.
- Communicate the major issues of their discipline effectively.
- Demonstrate analytical and critical thinking within their discipline, and, where appropriate, across disciplines.
- Know and conduct themselves in accordance with the highest ethical standards, values, and, where these are defined, the best practices of their discipline.

We expect all students admitted to the Entomology graduate program to demonstrate personal growth and be able to show "exceptional achievement" (A or A-) in this course if they apply themselves. Grades are considered by assessing participation in class discussion and attendance, teamwork, quality and timeliness of submissions (be on time!).

Course grades will be assigned using this scale.

A	94-100	B+	87-89	C	75-79
A-	90-94	B	84-86	D	71-74
		B-	80-83	F	< 70

Required Text:
Writing Science: How to Write Papers That Get Cited and Proposals That Get Funded
Joshua Schimel. Oxford University Press

Suggested Reading
Scientific Writing = Thinking in Words, David Lindsay, CSIRO Publishing

Class Participation and Attendance
Attend class each week. If you cannot attend, tell one of the instructors well in advance.

Guidelines for Scientific Conversation
Scientific knowledge is produced by a community of specialists that base their opinions in analysis, evaluation, rigorous reasoning (often with math and statistics) and fidelity to the verifiable facts. Peer review of papers and grant proposals are formal manifestations of the scientific "conversation". Part of your training is to become highly skilled at discriminating, selecting, and parsing research, techniques, theories, and hypothesis into their constituent parts to understand their overall structure or purpose. This enables another key skill required of every scientist- the ability to integrate, judge, and critique evidence, experiments and arguments.
To sharpen your "conversation" skills it is the responsibility of all discussants to contribute to the quality of conversation and our collective understanding of the material. Students are encouraged to listen closely to what is being said by other discussants, to evaluate their statements for their logical and factual soundness, and to understand the structure and purpose of their arguments. This is essentially detecting inconsistencies or fallacies. In addition, every discussant should think about other (even alternative) hypothesis, designs or logical conclusions.

Discussion Procedure
When a paper, video, lecture, or topic is assigned for discussion all discussants need to bring

written notes to support their discussion. The notes should reflect understanding, analysis and evaluation as described in Blooms Taxonomy. All notes should be in sentences and complete thoughts or at least in a form that we can easily understand. Notes will be collected at the end of class, or uploaded into Canvas and used for evaluation.

It is best practice to prepare at least three questions for each discussion. These can, and often should, include questions for the group about things you did not understand. In addition use Bloom's Taxonomy to better understand how well you AND your co-discussants are analyzing and evaluating the material.

Ethics Training
All graduate students at Penn State are required to have ethics training (Scholarship and Research Integrity Requirement (SARI)). By participating in the ethics portion of Professional Development you will fulfill the ethics requirement. If you miss any part of the ethics classes, even for a legitimate reason, you will have to make up what you missed with additional ethics training. This will occur outside of class in special SARI workshops. The number of workshops you will have to attend depends on how much you miss in class.

Disability Statement
Penn State welcomes students with disabilities into the University's educational programs. Every Penn State campus has an office for students with disabilities. For further information, please visit the Office for Disability Services Web site: http://equity.psu.edu/ods.
In order to receive consideration for reasonable accommodations, you must contact the appropriate disability services office at the campus where you are officially enrolled, participate in an intake interview, and provide documentation: http://equity.psu.edu/ods/ guidelines.
If the documentation supports your request for reasonable accommodations, your campus's disability services office will provide you with an accommodation letter. Please share this letter with your instructors and discuss the accommodations with them as early in your courses as possible. You must follow this process for every semester that you request accommodations.

Academic Integrity Statement
Penn State and the College of Agricultural Sciences take violations of academic integrity very seriously. Faculty, alumni, staff and fellow students expect each student to uphold the University's standards of academic integrity both in and outside of the classroom. Academic integrity is the pursuit of scholarly activity in an open, honest and responsible manner. Academic integrity is a basic guiding principle for all academic activity at The Pennsylvania State University, and all members of the University community are expected to act in accordance with this principle. Consistent with this expectation, students should act with personal integrity, respect other students' dignity, rights and property, and help create and maintain an environment in which all can succeed through the fruits of their efforts. Academic integrity includes a commitment not to engage in or tolerate acts of falsification, plagiarism, misrepresentation or deception. Such acts of dishonesty violate the fundamental ethical principles of the University community and compromise the worth of work completed by others (see Faculty Senate Policy 49-20 and G-9 Procedures, http://studentaffairs.psu.edu/conduct/codeofconduct). Academic Integrity Guidelines for the College of Agricultural Sciences can be found at
http://agsci.psu.edu/students/resources/academic-integrity
A lack of knowledge or understanding of the University's Academic Integrity policy and the types

of actions it prohibits and/or requires does not excuse one from complying with the policy.

Course Schedule:

Date	Topic	Instructor	Class goals/Student responsibilities
10-Jan	Intro, EI of grad school	Patch	Assignments 1, What is Science?
12-Jan	"EI" of grad school	Patch	Assignment 2 Bloom's Taxonomy, Priorities in Learning
17-Jan	no class		
19-Jan	Science writing for the public	Grozinger	Highlights from "Sense of Structure"
24-Jan	Science writing for the public	Grozinger	Review Joshua Schimel book
26-Jan	Science writing for the public	Grozinger	Interview partner in class
31-Jan	Science writing for the public	Grozinger	Bring first draft of essay to class
2-Feb	Science writing for the public	Grozinger	Bring second draft of essay to class
7-Feb	Professional writing (Sigma Xi grants)	Patch	Have read previous Sigma Xi grants and Sigma Xi website
9-Feb	Experimental design #1	Amsalem	Outline your first experiment by Feb 6 (submit to Canvas)
14-Feb	Professional writing (Sigma Xi grants)	Grozinger	Bring hypothesis, 'so what', aims (should have worked on this with your advisor)
16-Feb	Experimental design #2	Amsalem	Revise your draft by Feb 18 (submit to Canvas) and use for Sigma Xi
21-Feb	Professional writing (Sigma Xi grants)	Grozinger	Bring Sigma Xi draft 1
23-Feb	Data analysis and management	Amsalem	Cognitive biases in data analysis, resources for data management
28-Feb	Professional writing (Sigma Xi grants)	Grozinger	Bring Sigma Xi draft 2
2-Mar	Discuss EGSA Student Handbook	Patch	Have read Handbook (may be changed)
7-Mar	no class		
9-Mar	no class		
14-Mar	Critical reading of scientific literature	Amsalem	Discuss reading strategies
16-Mar	Critical thinking and overview of the qualifying exam	Amsalem	
21-Mar	Critical thinking	Amsalem	Students present mock exam questions in class
23-Mar	Strategies for data presentation	Patch	Visual Design Intro
28-Mar	Strategies for data presentation	Patch	Present Projects
30-Mar	Careers in STEM fields	Patch	Report on assignment, "finding a job"
4-Apr	Careers in STEM fields	Patch	Report on assignment, "finding a job"
6-Apr	Careers in STEM fields	Patch	Report on assignment, "finding a job"
11-Apr	Ethics I Scientific Knowledge in the Public Sphere	Patch	Reading and Discussion
13-Apr	Ethics I Scientific Knowledge in the Public Sphere	Patch	Reading and Discussion
18-Apr	Ethics II The ethical conduct of scientific research	Patch	Reading and Discussion
20-Apr	Ethics II The ethical conduct of scientific research	Patch	Reading and Discussion
25-Apr	Student funding	Amsalem	
27-Apr	Student grant proposal reviews	Amsalem	Submit assessment of two proposals by Apr 25 (submit to Canvas)