

Foundations of Scientific Research

Instructor(s):

Grace Chow / grace.chow@duke.edu

Julia Lin / Julia.lin352@duke.edu

Faculty Sponsor: Bernard Fischer / Pediatrics / bernie.fischer@duke.edu

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Monday / 5:15pm-6:45pm

Course Description:

This class is designed to expose students to the academic side of research as they learn how to synthesize results, present them, and explore related topics. Students will analyze and discuss published research articles, engage in conversations with professors about different aspects of research, and design and present their own research. These professional development seminars are designed to complement the students' work in their research labs.

Objectives:

By the end of this course, students will be able to:

- Read, analyze, and write an academic research report.
- Design a research poster.
- Present research studies.

Required Texts: No texts are required.

Course Requirements:

A grade of satisfactory in this course requires satisfactory completion of all assignments of this course including written and oral assignments, attendance, and participation.

- Students are required to attend and actively participate while in class.
- Students may receive *only* one excused absence and must attend all mandatory classes. Students are required to attend at least 11 classes to receive a passing grade.
- Students must complete the required readings before each class, in order to be able to fully participate in the discussions. If no page numbers are specified on the syllabus, the entire article should be read.
- Students must demonstrate thoughtful insight in their written biweekly blog posts of around 250 words based on the prompt for that given week.
- Students will give a final presentation of 5-8 minutes on their final research project during the final week of classes and answer questions from the audience at the RSP Final Presentations Event.

Course Schedule:

Week 1 ***RSP Kickoff Event – MANDATORY – regular class time***

01/11

Faculty Sponsor attending (Bernard Fischer)

Activity/Discussion:

- Overview of Research Scholars Program & expectations.
- Overview of syllabus.

Assignments: None.

Week 2

01/16

No class – Martin Luther King Jr. Day

Assignments:

- E-mail your PI/mentor to ask for research paper to read
- Find and read a full journal article on your research topic and bring a hard copy to the class. (~10-15 pages).
 - Write a quick summary (1-2 paragraphs) of your chosen article to explain to the class

Week 3

01/23

Research at Duke

Guest Speaker -- Dr. Grunwald

Activity/Discussion:

- Guest speaker lecture on why research is important and various opportunities at Duke.

Assignments

- Blog post #1 in Discussions tab on Sakai.
 - Write a ~250 word post introducing yourself (year, major, interests, career aspirations), why you wanted to be a part of RSP, and what you are looking forward to this semester.

Week 4

01/30

Reading A Journal Article

Activity/Discussion:

- Lesson on the skeleton of a journal article & identify the parts of a journal article and their features.
- Identify key features of each section on the journal article that students found.

Assignments

- Blog post #1 due at 11:59pm in Discussions section on Sakai.

Readings

- Little, J. W., & Parker, R. (2010). How to Read a Scientific Paper. University of Arizona. - 8 pages
- Derntl, M. (2014). Basics of research paper writing and publishing. International Journal of Technology Enhanced Learning, 6(2), 105-123.
- 3 papers relating to your project or a project being conducted by your mentor
Total: 30-50 pages

Week 5
02/06

Natural Science Research

Guest speaker – Dr. John Bartlett

Activity/Discussion:

- Guest speaker lecture on natural science research.

Readings

- Deitsch, K. W. (2016). The Unifying Nature of Basic Science Research. *PLoS Pathogens*, 12(3), e1005329.
https://link.gale.com/apps/doc/A476896800/AONE?u=duke_perkins&sid=AONE&xid=5d83019d
- Schor N. F. (2013). Why our patients (and we) need basic science research. *Neurology*, 80(22), 2070–2075.
<https://doi.org/10.1212/WNL.0b013e318294b48a>
- Lee, C. Not so basic research: the unrecognized importance of scientific discoveries.
<http://sitn.hms.harvard.edu/flash/2019/not-so-basic-research-the-unrecognized-importance-of-fundamental-scientific-discoveries/>

Week 6
02/13

Writing an Introduction & Methods

Activity/Discussion:

- Lesson on parts of the introduction section.
- Create a concept chart/flowchart of methods to be used for a research project.
- Draft introduction & methods for written paper.
- Example research presentation and key parts.

Assignments:

- Finish Introduction & Methods concept chart

Readings:

- Read “Research Universities and Scientific Misconduct: History Policies and the Future” by Steneck. (311-326 pg).
- Coen, LK (2007). Global health research for America's vital interest. *The Journal of the American Dental Association (JADA)*, Volume 138, Issue 11, Pages 1446-1448.
- *Lancet*, 373, pp. 193-195. Turcotte-Tremblay, A. M., Fregonese, F., Kadio, K., Alam, N., & Merry, L. (2020). Global health is more than just ‘Public Health Somewhere Else’. *BMJ Global Health*, 5(5), e002545.

Total: 26 pages + interactive video (~1 hour)

Week 7
02/20

Global Health Research

Guest Speaker – Dr. Eric Green

Activity/Discussion:

- Guest speaker lecture on global health research.
- Discuss based on the readings.
- Peer edit concept chart & introductions in groups of three.
- Work on presentations

Assignments:

- Prepare for presentations next week.

- Blog post #2 due February 27 at 11:59 pm.
 - For your second blog post, write a ~250 word entry describing the research project you are working on, its significance, and a reflection of your time in the Research Scholars Program (both in lab & house course) so far. What new concepts (in class) and techniques (in lab) have you learned? Have you faced any challenges in lab?

Readings

- Lee, BL, Li, L, Morris, JF, et al. (2011). Detailed Knowledge of the Tuskegee Syphilis Study: Who Knows What? A Framework for Health Promotion Strategies. *Sage Journals*, 38, 6, 629-636.
- Emanuel, E., Wendler, D., Killen, J., & Grady, C. (2004). What Makes Clinical Research in Developing Countries Ethical? The Benchmarks of Ethical Research. *The Journal of Infectious Diseases*, 189(5), 930-937. Retrieved October 12, 2020, from <http://www.jstor.org/stable/30075913>

Week 8
02/27

First Presentations - MANDATORY
Faculty Sponsor attending (Bernard Fischer)

Activity/Discussion:

- Students will conduct a short 3-5 minute presentation on their introduction and methods.
- Classmates will provide feedback.

Assignments:

- Respond to at least three peers' presentations via Sakai forum (min. 100 words per response).

Week 9
03/06

Librarian Services
Guest Speaker – Dr. Lesly Skalla

Activity/Discussion:

- Guest speaker lecture on relevant library resources for researchers
- Class discussion on readings & lecture.

Assignments:

- Blog post #3 due March 13 at 11:59 pm. (Minimum of 250 words)
 - What has been the biggest challenge you have faced so far with your research this semester? What steps did you take/are taking to overcome this challenge? What lessons have you learned?
- Kastner, B., Behre, S., Lutz, N., Burger, F., Luntz, S., Hinderhofer, K., Bendszus, M., Hoffmann, G. F., & Ries, M. (2015). Clinical Research in Vulnerable Populations: Variability and Focus of Institutional Review Boards' Responses. *PLoS ONE*, 10(8).
https://link.gale.com/apps/doc/A425616466/AONE?u=duke_perkins&sid=AONE&xid=a808f76c
- Hoeyer, K., Dahlager, L., & Lynøe, N. (2005). Conflicting notions of research ethics: The mutually challenging traditions of social scientists and medical researchers. *Social science & medicine*, 61(8), 1741-1749.

Week 10
03/13

No class –Spring Break

Week 11
03/20

Scientific Integrity

Guest Speaker – Dr. Monica Lemmon

Activity/Discussion:

- Guest speaker lecture on ethics, her research, and her career path.
- Class discussion on readings & case studies.

Assignments:

- After extensive presentations on ethics in research, are you questioning the methods you are using? If so, why? Write 1-2 paragraphs about the ethical considerations you have made or will make when conducting your project.

Readings:

- Festing, S., & Wilkinson, R. (2007). The ethics of animal research. Talking Point on the use of animals in scientific research. *EMBO reports*, 8(6), 526–530. <https://doi.org/10.1038/sj.embor.7400993>
- Archibald, K., & Clotworthy, M. (2007). Comment on 'The ethics of animal research' by Festing & Wilkinson. *EMBO reports*, 8(9), 794–797. <https://doi.org/10.1038/sj.embor.7401057>
- AKHTAR, A. (2015). The flaws and human harms of animal experimentation: CQ. *Cambridge Quarterly of Healthcare Ethics*, 24(4), 407-419. doi: <http://dx.doi.org.proxy.lib.duke.edu/10.1017/S0963180115000079>

Week 12
03/27

Results & Discussion

Guest speaker – Dr. Raphael Valdivia

Activity/Discussion:

- Guest speaker lecture on natural science research.
- Review examples of good and bad papers.
- Lesson on how to write the Results & Discussion sections.
- Draft Results & Discussion for written paper.
- Draft Results & Discussion for poster and presentation.

Assignments:

- Blog post #4 due April 3 at 11:59 pm. (Minimum of 350 words)
 - Begin with a reflection of your time in RSP (what have you learned, how have you grown, what new skills have you learned, how beneficial was this experience, any constructive feedback).
 - How will RSP affect your future time at Duke (are you continuing with research, same lab?, same or different field of research?, any other programs/internships you will be participating in)
- “Writing Abstracts and Developing Posters for National Meetings” by Wood and Morrison (353 - 360 pg).
- Kelleher, C., & Wagener, T. (2011). Ten guidelines for effective data visualization in scientific publications. *Environmental Modelling & Software*, 26(6), 822-827.

Week 13
04/03

Peer Workshop

Guest speaker – Dr. Gary Bennett

Activity/Discussion:

- Guest speaker lecture on digital health research.
- Lesson on how to write an abstract.
- Students will peer edit posters and papers.

Assignments:

- Finalize PowerPoint presentation for next class.
- Smith, R. (2015). Educational research: The importance of the humanities. *Educational Theory*, 65(6), 739-754.
- Weiss, C. H. (1979). The many meanings of research utilization. *Public administration review*, 39(5), 426-431.

Week 14

04/10

First Week of Final Presentations – MANDATORY

Faculty Sponsor attending (Bernard Fischer)

Activity/Discussion:

- Students will give 7-10 minute final presentations.
- Students will answer questions from the class and receive feedback.
- Discussions on final thoughts, lessons learned.
- Evaluations.

Assignments: None.

Week 15

04/17

Second Week of Final Presentations – MANDATORY

Faculty Sponsor attending (Bernard Fischer)

Activity/Discussion:

- Students will give 7-10 minute final presentations.
- Students will answer questions from the class and receive feedback.
- Discussions on final thoughts, lessons learned.
- Evaluations.

Assignments: None.