Critical Thinking in Science  
Summer 2019  
9:30-11:00 AM Tuesday, GSBS Schissler Library (S3.8351)

Faculty:  
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Course Goals:  
Encourage a constructively critical approach to the evaluation of science research papers, proposals and other presentations.  
Familiarize students with the peer review process and its importance.  
Improve student understanding of the how to design rigorous and reproducible experimental studies.  
Provide an opportunity to add elements of rigor to the student’s research projects and receive peer feedback.

Format:  
Class discussion of assigned reading and writing assignments. Some sessions will include lecture material from the instructors.
Grading: (Pass/Fail)

Because the success of this class depends on active student participation, the grading system is intended to encourage students to regularly contribute to discussions and to complete in-class exercises.

Preparation for and participation in class discussions (11 points total)
In class participation at each session is worth 1 point. Active participation requires that the student complete any pre-class assignments and meaningfully participate in discussions.

Written exercises and assignments (12 points total)
Three short written assignments and one oral presentation are planned for the class. The course instructors will grade each these exercises on a 0-3 pt scale. In general, full credit will be given in all cases where students complete these assignments in a thoughtful manner directed at the intended objective.

Final Grade: A passing grade requires that students earn at least 20 points total during the semester.

Missed Classes: Students who are unable to attend one class can earn credit for one missed session during the semester by contacting the instructor and satisfactorily completing a short written assignment. Make up credit will not be given for additional missed sessions.

Canvas Access: All registered students should regularly check the course website on Canvas where assignments will be posted.
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May 21  Course Orientation/What is "Critical Thinking" - Mattox

May 28  Hypothesis, Bias and Dogma - Mattox
Reading assignment - Scientific Summary - 2012 Nobel Prize in Physiology and Medicine
“Mature Cells can be reprogrammed to become pluripotent” John Gurdon and Shinya Yamanaka

June 4  Rigor and Reproducibility - Mattox
Reading assignment to be discussed in class:
Begley and Ellis, Nature 2012 – “Raise Standards for Preclinical Cancer Research”

June 11  Evaluating data and conclusions - Mattox
Written assignment #1 due in class: Identifying assumptions

June 18  The Peer-Review Process - Krahe
Reading for discussion at this class: Manuscript preprint from Dr. Krahe

June 25  Discussion of Student Manuscript Reviews - Krahe
Written assignment #2 due in class: Review of assigned article

July 2  No Class

July 9  Origins and impact of a science controversy - Krahe
Reading Assignment to be discussed in class:

July 16  Q&A with a scientific editor - Krahe
Guest: Dr. Sara Cullinan, Deputy Editor, American Journal of Human Genetics

July 23  Project planning - Adopting a rigorous approach- Mattox

July 30  Discussion of mini-project plans
Written Assignment #3 – Draft mini project outline due in class

Aug 6  Student mini-project plan presentations #1
Assignment #4 - Oral presentations by students A-K

Aug 13  Student mini-project plan presentations #2
Assignment #4 continued - Oral presentations by students L-Z