BILD44: Scientific Perspectives for a Changing World
Course Information Spring 2021

Instructor:
Dr. Aspen Reese, areese@ucsd.edu

Class sessions: all asynchronous
Office Hours: held during scheduled class session TuTh 2-3:20

Description:
Science can help us define and solve problems of the modern world—from how to improve health and change people's behavior to how to protect the environment. This course will train students to assess scientific claims and their implications in today's complex information ecosystem, critically engaging from the scale of data analysis through to the social framework in which research is carried out and presented. The class with broadly cover three topics: (1) how to interpret scientific claims; (2) how scientific knowledge is produced; and (3) how scientific findings are communicated and interpreted in broader society. These topics will be tackled through the lens of contemporary issues invoking scientific research. Modern case studies (e.g., pandemics, climate change, tobacco's health risks, vaccination campaigns, nutrition) will be discussed and revisited throughout the semester to provide a holistic view of how scientific research is carried out and interpreted by researchers and the broader public. Students will become familiar with relevant research on issues of concern to their lives, but, more importantly, leave the course with the ability to continue to follow and engage with these issues as educated consumers of scientific research and citizens of the planet.

Objectives:
Citizens in our rapidly changing world need to be able to think critically about increasingly complex and data-rich problems. Individuals in a variety of careers need to be able to synthesize findings, evaluate competing claims, recognize conflicts of interest, and distinguish between science and pseudoscience before making decisions about personal actions and broader policy. This lecture course will introduce students to the skills necessary for interpreting scientific figures, tables, and statistical results; evaluating primary and secondary literature for experimental and logical flaws; and synthesizing current research to identify areas for future development. In addition, the class will discuss the human enterprise of science (funding, publishing, publicity, and policy) and engage with contemporary issues with a scientific bent. Drawing on a range of contemporary case studies, the course will provide students with ample opportunities to practice these skills in contexts relevant to their lives and their futures. The skills taught in this class, falling under the umbrellas of information literacy, quantitative reasoning, and critical thinking, could be applied by students in future natural science courses, but also would outfit them to be scientifically literate citizens regardless of their major.

Class Structure/Assignments:
To accommodate remote learning, the class will be taught in a fully asynchronous manner. Lecture material for each class day (Tuesday/Thursday) will be posted on canvas and can be watched at the student's convenience. Each lecture will be broken up into a series of short videos which will be interspersed with active-learning prompts (multiple choice and short answer questions) or will be followed by a quiz. These questions will address material in the lecture and the assigned readings. Students are required to complete these questions to progress through the lectures and will be graded check (completed), check plus (excellent), or check minus (not completed or <50% correct) for the set of questions associated with a class period. At least 18 class periods must have a check grade to get full participation credit; every check minus after the first two will result in a 5% reduction in your participation grade. Completion of the week's lecture questions is recommended on a weekly basis, but grading for the first nine classes will only occur at midterm and for the last 10 classes before the final.

Discussion section activities will be focused on readings or practice problems and can be completed synchronously or asynchronously. They are to be done in small groups (assigned based on discussion section enrollment/time-zones/residency on campus) via google docs, but each individual will receive their own grade. As such, all students in a group must contribute to the google doc to receive credit for that week's activity. Contributions must be added to the end of your section period (Pacific time) to receive credit, but can obviously be done earlier. No late contributions will be accepted. Assignments will be graded check (completed), check plus (excellent contribution), check minus (not completed) and together will constitute your section grade.

IAs will be available during section periods to answer questions you may have about readings, the discussion activity, problem sets, or exams. This time can also be used if your group wishes to work through their discussion in real time together via zoom. You will still need to fill out the google doc, but you may find it easier or more natural to actually discuss the prompts in real time.

Additional assignments will include 4 problem sets and 2 exams. Problem set and exam questions will resemble those found in lecture videos and discussion section assignments but may cover themes, case studies, or data not presented in class or the readings.

You can discuss problem sets with others in the class, but they must be individually completed and submitted. You cannot copy the work of others or have them complete your work for you. All sources should be cited appropriately. See the UCSD library citation style guide here.

Only 3 problem sets will be included in your problem set grade so you can skip 1 or complete all 4 then drop your lowest score. If you skip 1, all others must be completed and submitted by the beginning of the class period it is assigned for unless you have an excused absence with documentation. In the case of an excused absence, an extension or replacement option must be worked out with Prof. Reese within 1 week of the original due date.

Exams will be open book and cannot be discussed with others in the class. They must be completed individually and each student will receive an individual exam as questions will be randomly assigned from a master list. For the midterm you can start it anytime within the 24 hour period of May 4th (Pacific time), but once you start it you will have only up to 80 minutes to complete it. If

you start at 11:30PM you will have only 30 minutes to complete it so please plan accordingly. For the final exam, which will be cumulative, you will have 2 hours to complete it anytime during the day assigned for our final exam.

Prof. Reese will be available via Zoom for questions and conversations during the class sessions (Tu/Th 2-3:20) but you are not obliged to attend. You can email to schedule alternate meeting times if you're in a time zone for which afternoons doesn't work; otherwise, you're expected to use the class time.

Grading Rubric:

Assignment	Weighting
Lecture questions	15%
Discussion section	15%
Problem sets	30% (10% each)
Midterm	15%
Final	25%

Materials:
All assignments will be made available on Canvas and/or (for readings) through the library course reserves. Completed assignments must be submitted via Canvas.
All readings for class or discussion section will be posted at least one week in advance of the class meeting on the course website.

Policies:
- No late work will be accepted absent an excused absence. If a student has an excused absence, they will be required to provide documentation to Prof Reese by the beginning of class period when the assignment is due and then provide the made-up work within 1 week of that class.
- Email: areese@ucsd.edu Prof. Reese will respond to email questions or, if appropriate, direct to your IA within 48 hours. Prof. Reese may respond faster during the day M-F but please plan assuming she won't respond for 48 hours. So if you have a question about an upcoming assignment, plan to ask it early or come to class/section to ask in real time.

Schedule:

Wk	Date	Discussion Topic	Section Activity	Assignments
1	D1		*None*	
	3/ 30	Interpreting data/figures pt1		
	4/1	Interpreting data/figures pt2		
2	D2		*Interpretation exercises*	
	4/6	Probability and stats pt1		
	4/8	Probability and stats pt2		
3	D3		*Inference exercises*	
	4/13	Prediction vs explanation pt1		PS1 due
	4/15	Prediction vs explanation pt2		
4	D4		*Elections discussion*	
	4/20	How science works (method)		
	4/22	How science works (funding)		
5	D5		*Ologies discussion*	
	4/27	Reading scientific papers		PS2 due
	4/29	Science journalism+ publicity		
6	D6		*Review*	
	5/4	---------------------------------		Midterm
	5/6	Sample populations + experimental design		
7	D7		*Invisible Women discussion*	
	5/11	Big data + biases		
	5/13	Bad science		
8	D8		*Science vs discussion*	
	5/18	Pseudoscience		PS3 due
	5/20	Regulation		
9	D9		*Flame retardants discussion*	
	5/25	Changing behavior		
	5/27	Future issues		
10	D10		*none (Memorial Day)*	
	6/1	Skepticism skills		PS4 due
	6/3	Review/extra		
Finals				Final exam