

BILD44: Scientific Perspectives for a Changing World

Course Information Winter 2022

Instructor:

Dr. Aspen Reese, areese@ucsd.edu

Class sessions: MW 5-6:20PM CENTR 216

Office Hours: Tu 2-4PM virtual

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 will 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 you 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 you with ample opportunities to practice these skills in contexts relevant to your lives and futures. The skills taught in this class, falling under the umbrellas of information literacy, quantitative reasoning, and critical thinking, could be applied by you in future courses, but also will outfit you to be scientifically literate citizens regardless of their major.

Class Structure/Assignments:

Classes will involve a combination of lecturing and active learning including clicker questions. Participation is a significant part of your grade (15%) but will be broken down simply: check (completed), check plus (excellent), or check minus (not completed or <50% correct) for the set of questions/activities 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. Each check plus will add 1% to your participation grade and can provide extra credit. Students are required to complete the active learning exercises themselves; if any student is found to be completing activities for others (e.g., answering with more than one clicker or completing more than one written exercise) both the absent student and the student completing the activity will receive no credit for that session. If this is found to happen more than once, further penalties may be enacted.

Discussion section activities will be focused on readings or practice problems and can be completed synchronously or asynchronously. This work will be done in small groups via googledocs, but each individual will receive their own grade. As such, all students in a group must contribute to the google doc for all to receive credit for that week's activity. Contributions must be added to the end of the day it is due 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.

The current plan is for the first two weeks to be via zoom then all class sessions (except 1/17 and 2/21 which are university holidays) should be held in person. For classes missed due to university holidays, instead of rescheduling lecture or discussion sections, there will be an online activity (video/audio/reading plus short answer prompt) to complete before the end of the week. If circumstances change, other lectures and/or discussion sections may be moved online. In that case, lecture videos will be interspersed with active-learning prompts (multiple choice and short answer questions) or followed by a quiz and completion of those assignments will count for the participation in that session. Virtual sections will be held via zoom (for discussions) or can be completed in shared google docs (for practice problems). In the case of virtual lectures, students will have until 11:59 pm Pacific time to complete assignments online. Virtual section assignments must be completed by the end of the student's assigned section period.

Students who are impacted by the ongoing COVID-19 pandemic and are unable to attend class in person should contact Prof. Reese or their IA as early as possible before the next class meeting to accommodate attending and participating virtually. Class sessions will not be recorded.

Assignments will include 4 problem sets and 2 exams. Problem set and exam questions will resemble those found in lecture 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 but cannot be discussed with others in the class. They must be completed individually. The current plan is to offer exams in person, but this is subject to change based on circumstances.

Prof. Reese will be available for Zoom office hours for questions and conversations on Tuesday afternoons from 2-4pm but you are not obliged to attend. You can email to schedule alternate meeting times if you are unavailable on Tuesdays or if you would like to meet in person.

Grading Rubric:

Assignment	Weighting
Lecture participation	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 without 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	1/3	Interpreting data/figures pt1		
	1/5	Interpreting data/figures pt2		
	D1		<i>Interpretation exercises</i>	
2	1/10	Probability and stats pt1		
	1/12	Probability and stats pt2		
	D2		<i>Inference exercises</i>	
3	1/17	Online activity (no in person class) goals of science		
	1/19	Prediction vs explanation		PS1 due
	D3		<i>Data journalism discussion</i>	
4	1/24	How science works		
	1/26	Reading scientific papers		
	D4		<i>Ologies discussion</i>	
5	1/31	Science journalism+ publicity		
	2/2	Trustworthy sources		PS2 due
	D5		<i>Review</i>	
6	2/7	<i>Midterm exam</i>		
	2/9	Sample populations + experimental design		
	D6		<i>Invisible Women discussion</i>	
7	2/14	Big data + biases		
	2/16	Pseudoscience		
			<i>Algorithms activity</i>	
8	2/21	Reading only (no in person class) how to argue with a racist		
	2/23	Bad science		PS3 due
	D8		<i>Science vs discussion</i>	
9	2/28	Regulation		
	3/2	Changing behavior		
	D9		<i>Flame retardants discussion</i>	
10	3/7	Future issues		
	3/9	Skepticism skills		PS4 due
Finals				Final exam