Academic Syllabus

Course Name: Use and Abuse of Data: Critical Thinking in Science
Course Number: BDS 211
Course Credits: 3
Course Location: Corvallis
Faculty: Rebecca Hutchinson
Contact Info: KEC 2071, rah@oregonstate.edu
Class Meetings: TR 14:00-15:20 or MWF 14:00-14:50

Course Catalog Description: Critically examine how data analysis can support legitimate conclusions from biological datasets and also how deceptive visualizations, misleading comparisons, and spurious reasoning can lead to false conclusions. Analyze data to break down the logical flow of an argument and identify key assumptions, even when they are not stated explicitly.
Prerequisites: MTH 251* OR MTH 251H* OR instructor consent
Co-requisites: None

Student Learning Outcomes:
At the completion of the course, students will be able to:
1. Recognize weak and misleading arguments from data in their daily life.
2. Track arguments from data to the source to evaluate claims.
3. Distinguish aspects of arguments from data that may invalidate their conclusions from aspects of sound reasoning.
4. Deconstruct - both to a layperson and to a data scientist - errors and assumptions in arguments from data that alter the conclusions which may be drawn.
5. Reflect on roles and strategies for group work and communicate effectively to collaborate in accomplishing common goals.

Evaluation of student performance:
- Participation: 30% of final grade. Participation will be judged based on contributions to class discussions and in-class exercises.
- Assignments: 30% of final grade. Assignments will include a mix of in-class and out-of-class exercises and reading summaries.
- Projects: 40% of final grade. There will be two projects done in small groups - one at midterm and one at end of term.

Students will be assessed on their ability to analyze arguments from data (break into parts and articulate relationships), apply standards, seek relevant information, and use logical reasoning during participations, and in their assignments and projects.

Grading scale:

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<th>% of points earned</th>
<th>Course letter grade</th>
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<tr>
<td>≥ 93</td>
<td>A</td>
<td>≥ 70</td>
<td>C-</td>
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<tr>
<td>≥ 90</td>
<td>A-</td>
<td>≥ 67</td>
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<td>≥ 87</td>
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<td>≥ 73</td>
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Course Content:
Sample schedule of class meeting topics:
Week 1  Introductions, Cultivating Skepticism
Week 2  Misleading Visualizations
Week 3  Statistical Traps
Week 4  Correlation vs. Causation, p-values
Week 5  Refuting Faulty Arguments
Week 6  Mid-term Project Presentations
Week 7  The Scientific Process, Publication Biases
Week 8  Fake News, Big Data
Week 9  Debunking Myths, Project Peer Review
Week 10 Final Project Presentations

Learning Resources:
There is no textbook for the class. All learning resources (readings, videos, etc.) will be made freely available to students.

Statement Regarding Students with Disabilities:
Accommodations for students with disabilities are determined and approved by Disability Access Services (DAS). If you, as a student, believe you are eligible for accommodations but have not obtained approval please contact DAS immediately at 541-737-4098 or at http://ds.oregonstate.edu. DAS notifies students and faculty members of approved academic accommodations and coordinates implementation of those accommodations. While not required, students and faculty members are encouraged to discuss details of the implementation of individual accommodations.

Link to Statement of Expectations for Student Conduct:
http://studentlife.oregonstate.edu/code

Diversity Statement:
Oregon State University strives to create an affirming climate for all students including underrepresented and marginalized individuals and groups. Diversity encompasses differences in age, color, ethnicity, national origin, gender, physical or mental ability, religion, socioeconomic background, veteran status, sexual orientation, parental status, and marginalized groups. We believe diversity is the synergy, connection, acceptance, and mutual learning fostered by the interaction of different human characteristics.

Oregon State University strives to respect all religious practices. If you have religious holidays that are in conflict with any of the requirements of this class, please contact the instructor immediately so that we can make alternative arrangements.

Student Evaluation of Courses:
The online Student Evaluation of Teaching system opens to students the Wednesday of week 8 and closes the Sunday before Finals Week. Students will receive notification, instructions and the link through their ONID. They may also log into the system via Online Services. Course evaluation results are extremely important and used to help improve courses and the learning experience of future students. Responses are anonymous (unless a student chooses to “sign” their comments agreeing to relinquish anonymity) and unavailable to instructors until after grades have been posted. The results of scaled questions and signed comments go to both the instructor and their unit head/supervisor. Anonymous (unsigned) comments go to the instructor only.