PlPa 4330, Ecology of Infectious Diseases
3 credits Fall Semester

The aims of the course are to:

1) Provide students with a broad, basic, and integrated understanding of infectious disease ecology and management
2) Provide students the skills to think about complex interactions within the context of a science-based learning format
3) Foster curiosity, critical thinking, and an appreciation of scientific inquiry
4) Provide students with the skills to ask good questions that will yield accurate answers about the world around them

Classroom Activities

- Posing questions/Brainstorming
- Short lectures
- Brief discussions of key concepts
- Problem solving/data analysis
- Critique and analysis of primary research papers

Assessment and Evaluation of Student Performance

• Class attendance & participation	30%
• Disease ecology proposal	20%
• Final exam	15%
• Prelim exam 1	10%
• Prelim exam 2	10%
• Weekly journals	5%
• Weekly quizzes	5%
• Proposal peer review	5%

General Scheme of Prelim Exams

- **Part 1a:** In-class responses to a contemporary disease scenario
  - » Ask two motivating questions
  - » Formulate hypotheses to "explain" their answers
- **Part 1b:** A required amendment due within 24 hr
  - » Purpose is to clarify questions, not to change them
- **Part 2:** Answering their primary question (1 week out-of-class)
  - » Provide answers to their main hypothesis plus PDFs of supporting evidence
- **Part 3:** Evaluations back to students and an in-class discussion of the quality of questions posed, answering strategies, challenges, etc.

Example of Part 1 (In-class)

1) List two important motivating questions, ranked in order of importance, about which you are curious and that you feel the answers would provide important insights into the ecology of [the specific disease]
2) Briefly explain your curiosity about the questions and the rationale for your chosen prioritization
3) Describe how you think the answers to these questions will improve our understanding of the ecology of [the pathogen causing the specific disease]
4) You should also describe the minimum essential facts you would need to know to be able to more effectively answer your questions
5) Based on your knowledge, understanding, and experience develop a list of multiple working hypotheses that represent the most logical explanations (i.e., answers) to your primary question. Please list only as many hypotheses as you think are logical (but list no more than 5)

Example of Part 2 (out-of class)

For each hypothesis, describe:

1) The evidence need to support your hypothesis.
2) Evidence that would refute your hypothesis.
3) The rationale for each line of evidence.
4) What you will specifically measure or observe.
5) The major assumptions in testing your hypothesis.
6) The validity of these assumptions (i.e., how certain can we be that the assumptions are true or at least within the realm of biological reality or possibility?)

Example of Part 2 (cont'd)

You should also do the following:

7) Provide the answer to your highest priority hypothesis posed in class (but amended as needed)
8) Cite at least two key primary research papers (one is not sufficient and you'll likely have more than two) that provide each line of evidence to support or refute your hypothesis (NOTE: Reviews may be cited but ONLY to provide context and NOT to serve as evidence for an hypothesis)
9) If there is no published support for a particular line of evidence, indicate how you arrived at that conclusion
10) When you submit your answers to me, please include a PDF of each of the papers you cite

Example Part 3

- Prior to our discussion, I will compile a list of all of your primary questions and corresponding primary hypotheses. After making a few general comments about how everyone responded, **I will expect each of you to actively participate in the discussion** of the questions, hypotheses, evidence, assumptions, and answers that this disease report generated. This part will not be evaluated as part of your grade.

Characteristics of Highly-Rated Responses

- All posed questions were answerable empirically or theoretically
- Answers had a broad scope of inference
- All integrated concepts from the class into their thinking and responses
- All used language that reflected their understanding of material from class
- The focus of attention was on formulating the hypotheses
- Considerable thought went into the minimum essential facts to answer the question and the required evidence to support or refute the hypothesis
- Assumptions underlying their hypotheses were well thought out
- All CLEARLY articulated their ideas

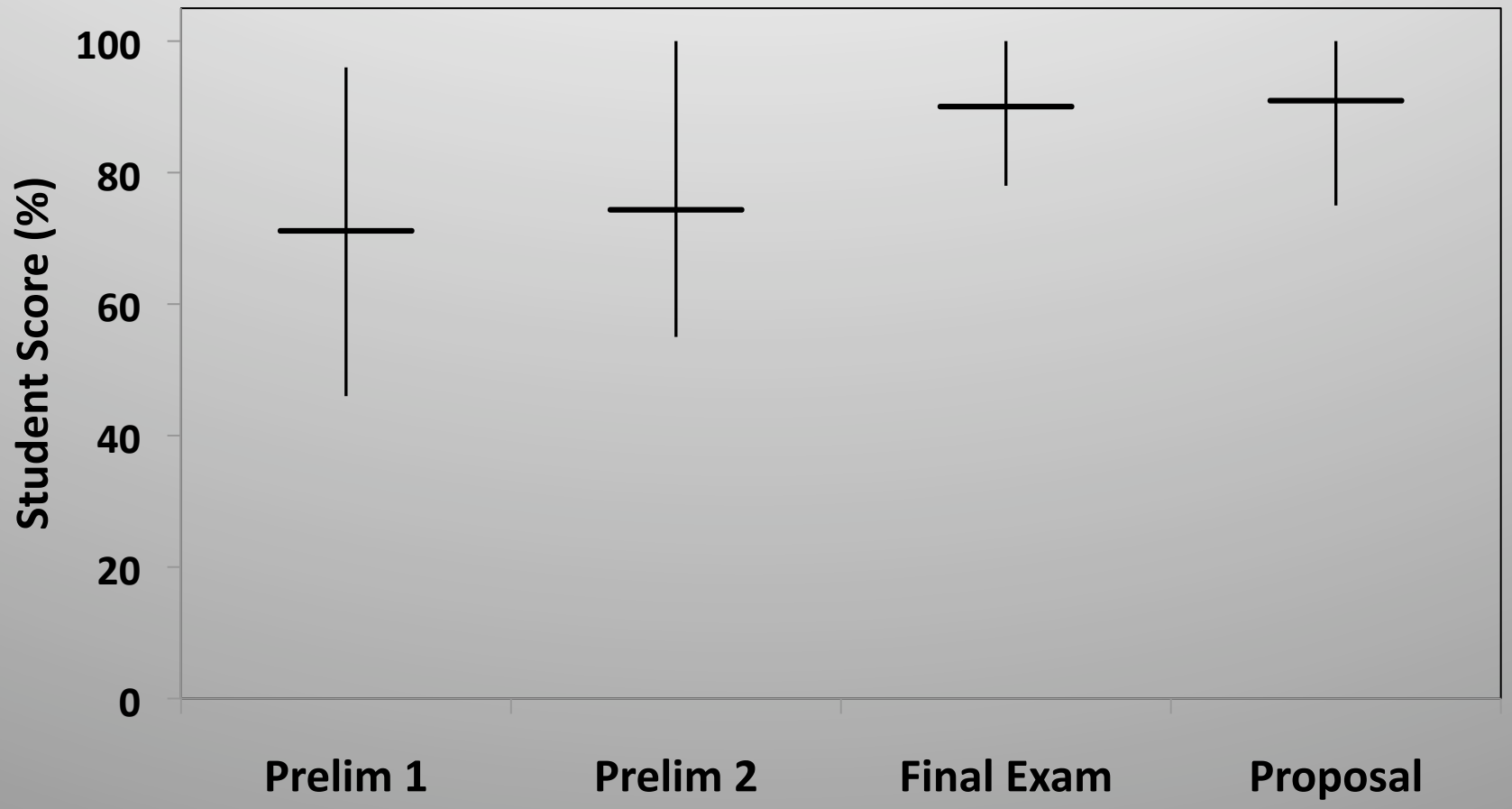
Characteristics of Highly-Rated Responses (Cont'd)

- The answers were to the point, well organized, clearly articulated and the logic was easy to follow
- Answers reflected the student's analysis of the evidence reported in primary research papers as opposed to simply parroting what the authors said of their results
- The student was confident in his/her data interpretation and was not afraid to refute their hypothesis
- It was obvious that the students had read the entire paper instead of just the abstract
- The conclusion succinctly summarized the test of the hypothesis and the possible answer to the question

Characteristics of Poorly-Rated Responses

- Responses were poorly articulated
- The language had not evolved with the class; terms used that reflected a rather primitive understanding of disease ecology
- Questions didn't get beyond the minutia of the scenario or they really didn't impact our understanding of disease ecology
- Hypotheses failed to elicit a clear yes or no answer (vague expressions or lack of consideration of scale or biological organization)
- The student went out of their way to confirm their hypothesis, even in the face of VERY weak or even contradictory evidence

Characteristics of Poorly-Rated Responses (Cont'd)

- It was apparent that the student had not read the papers that supposedly provided key evidence (may have only read the abstract)
- Got bogged down on issues that are either unrelated to the question or hypothesis or overly complicated by detail.
- Answers to the questions didn't relate well to the evidence that the student indicated was necessary for answering the question
- The student didn't offer their own interpretation of the evidence
- Terms and concepts were misunderstood

How Did Students Perform?