Critical reading in quantitative biology

PHYS 259A

Terry Hwa, UC San Diego

Why this class?

• to help physicists assess biological findings and help biologists assess quantitative methods/arguments (“cheapest” way for math/physicists to learn about bio expt and biologists to learn about theory)
• to protect you from basing research on dubious claims
• to make you a better reader and writer, and ultimately a better scientist
• to raise the hygiene standard of the community
• to expose you to different lines of research in qbio
Key elements to reading biological studies

- **significance**: how would the findings, if true, change how others work/think (on and beyond the subject)
- **validity**: does the paper establish key claims beyond reasonable doubt
  - complexity of living systems
  - heterogeneity of methods (especially for quantitation)
  - perturbation to physiology by the experiment
  (analogy to legal proceeding)
- **attitude**: find out how nature actually works rather than how it might work
  (use worksheet to guide yourself through the reading)

Papers after week 2

timeline for each paper:

- start reading as early as possible
- discuss with others in assigned small group
  (ask the instructor if there are unresolved questions)
- submit review (one per small group) by Wednesday evening
- big group discussion on Friday (be prepared of all details!)

ingredients of the review:

- give concise summary of what was done and claimed
  (to demonstrate that you have understood the work)
- comment on significance assuming claims are true
- assess the validity of the findings
- suggest additional work if needed
- overall assessment of the study
- worksheet: you do not need to turn it in