Improving Student Statistical Skills Via An Interactive Web-based Portal

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Poster PDF

PLACE HOLDER

http://membrane.urmc.rochester.edu

Jupyter Interactive Lessons

http://membrane.urmc.rochester.edu/jupyter/

Abstract

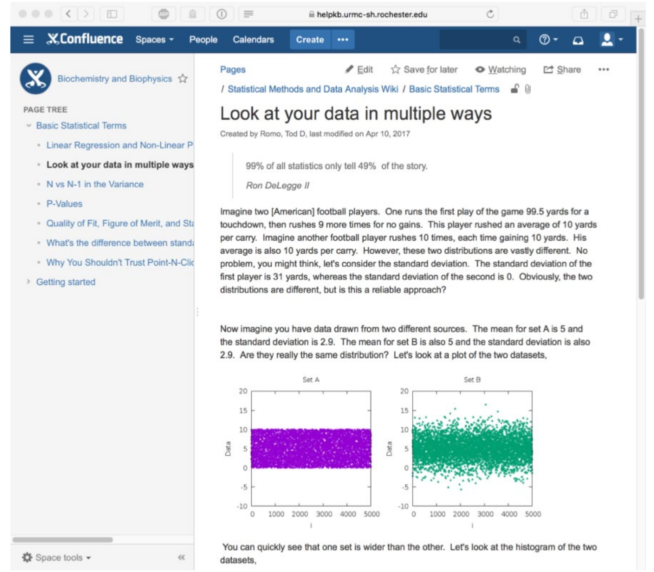
A general lack of statistical awareness is one of the major challenges facing the scientific workforce. Consequently, developing better ways to train graduate students in the sciences is crucial to helping them reach their potential in their future careers. Moreover, it is clear that this training must reach beyond the classroom in order to help students apply the lessons directly to their research. Accordingly, we have created a statistics and data analysis web portal to allow students to learn the best ways to handle their data. Our approach is three-pronged:

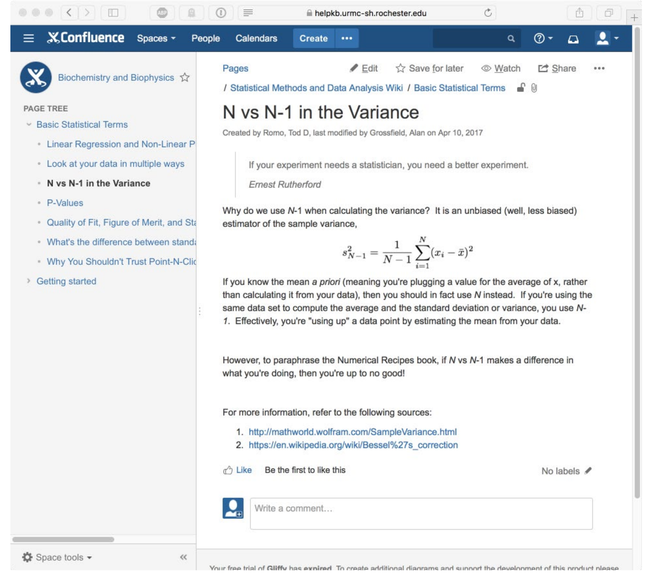
- Answer common questions in clear, non-specialist language, while providing links to more rigorous treatments for those with specialized interests
- Provide interactive demonstrations of key concepts to help students build intuition by "playing" with data
- Encourage users to take ownership by facilitating student comments and authorship on the site.

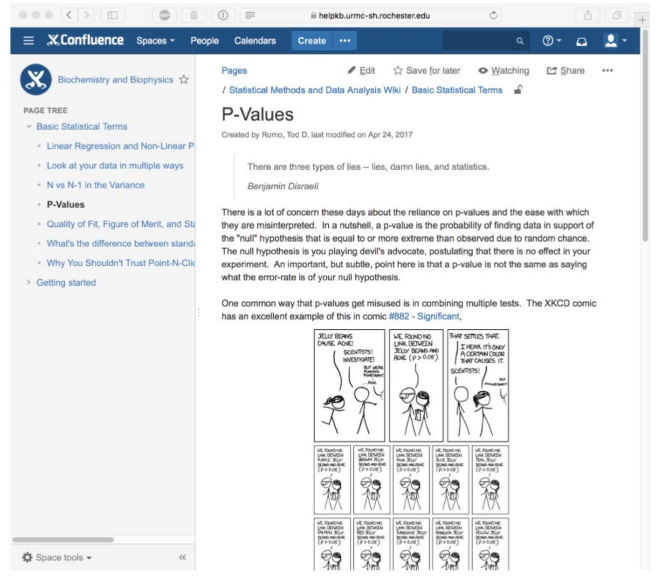
Finally, we recognize that certain disciplines (e.g. proteomics) have very specific data-handling requirements; for these cases, we will recruit local experts to create articles and link to authoritative external sites.

Statistics Wiki

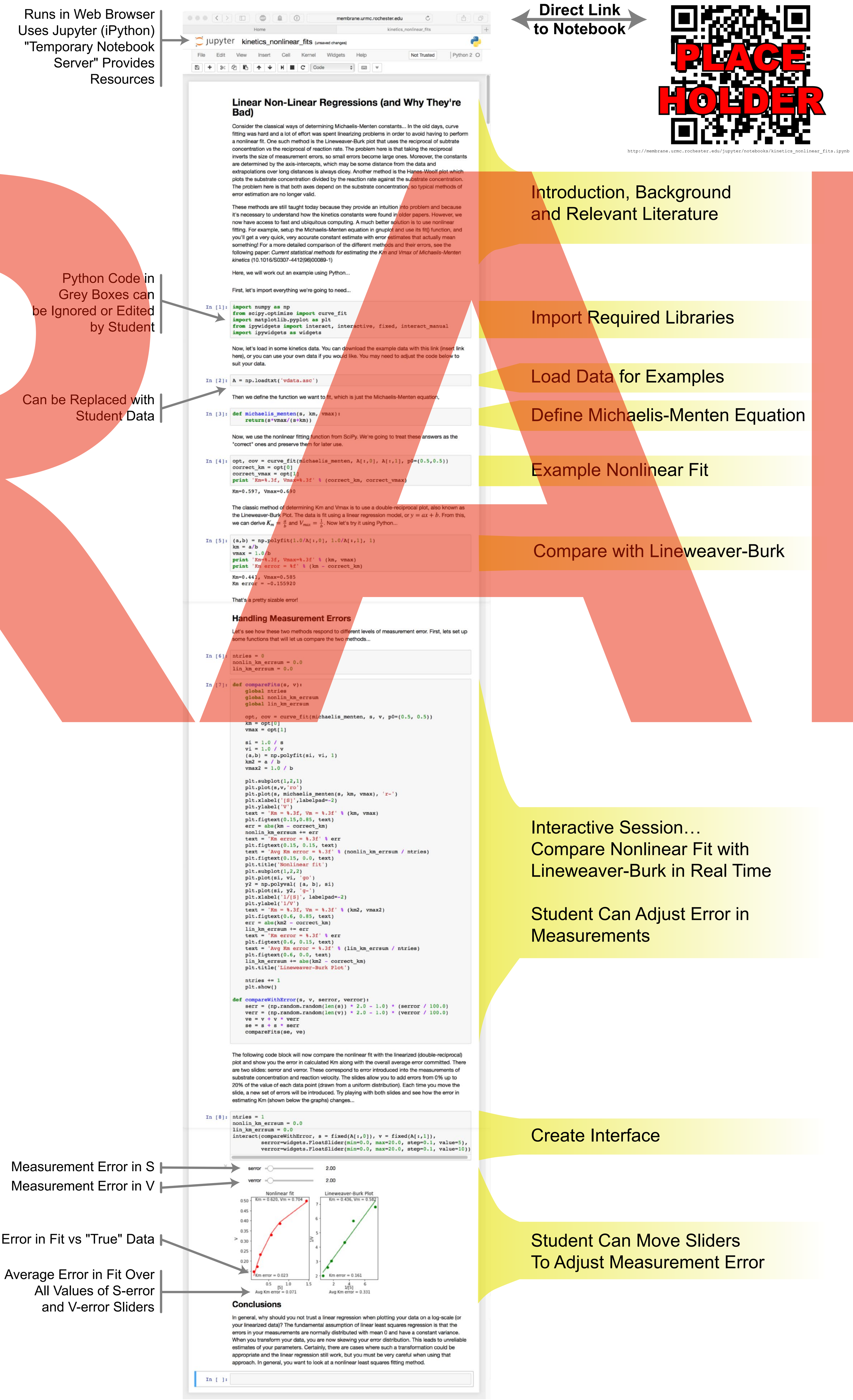
- Make it easy to find relevant information
- Wiki format, editable by anyone within University
- Proctored by faculty from the T32
- Students encouraged to create new posts:
  - Describe succesful applications to their own research
- Include links to outside sources
- Leverages students as a creative workforce





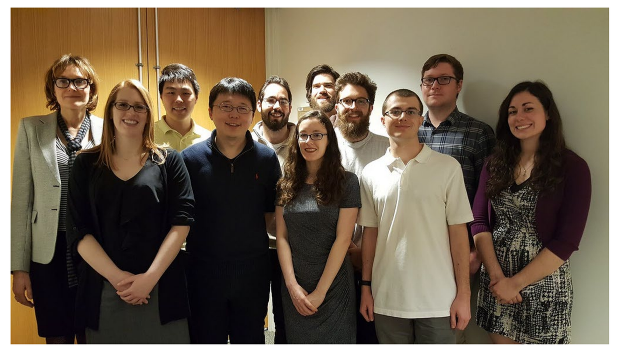


Interactive Lessons

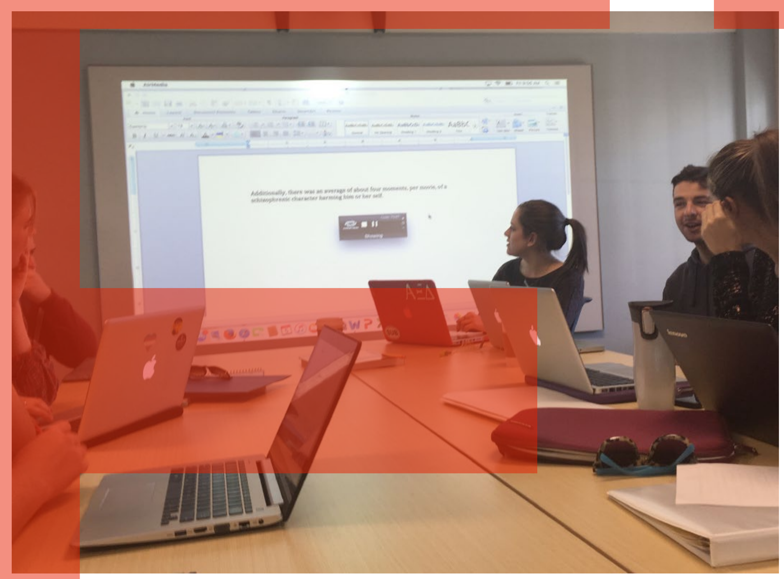


Summer Mini-Courses

Students will take this course the summer before their qualifying exam, so that they can incorporate the lessons into their thesis proposal and qualifying exam in the fall.

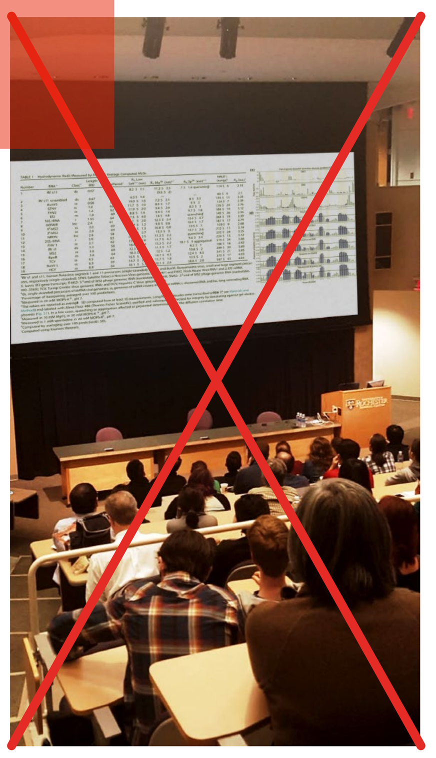


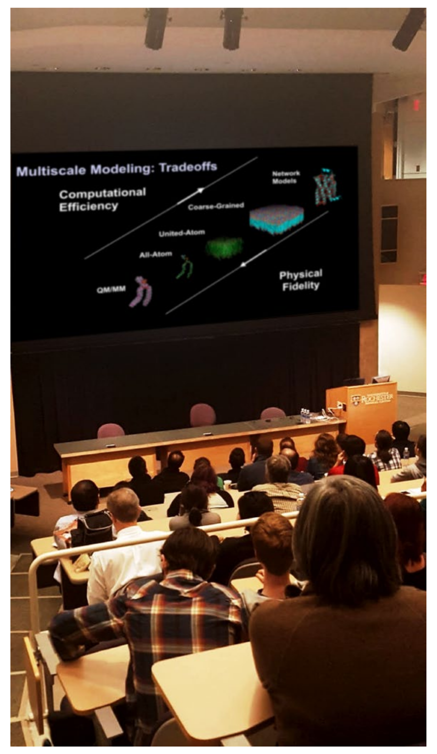
Statistical Thinking



- Focus on statistics applied to biochemistry & molecular biology
- Emphasize meaning and application, not formal math
- Lecture Component
  - Small sample sizes
  - Measures of error
  - Tests of statistical power
- Small-Group Case Studies
  - Provided by faculty
  - Determine appropriate analyses
  - Implement and present findings

Presentation Skills





- How to frame a talk for an audience
- How to design clear, effective slides
- Students submit slides to instructor
- Slides will be incorporated into lecture along with critique.
- Small-group workshop where students present and critique each other's work.

Computer Resources

- Train on practicalities in working with big data sets
- Introduce the University linux cluster
- Discuss range of software available
- Break into small groups:
  - Supervised by CIRC Staff & Faculty
  - Work with real data
  - Perform analysis using CIRC resources