Challenges in a Modern Regression Course

Charles E. McCulloch
University of California, San Francisco

JSM, August 2003
Summary

I describe a modern, two-quarter, regression course encompassing multiple linear, logistic and repeated measures regression, as well as proportional hazards models. We teach this course to beginning health sciences researchers. I discuss the challenges in educating such an audience as well as balances in theory vs. practice, lecture vs. lab, and level of computing we have found to work well. We use a “just in time” approach to curriculum organization in the course as a motivational tool.
The Setting

- Research oriented medical school
- One year certificate/two year masters in clinical research
- Postdoctoral – beginning researcher
- Previously
  - Introduction to clinical research (TICR)
  - One quarter basic statistics
  - Epidemiological methods
The Course

- Two quarter sequence
- ~25 students
- Multiple linear regression, multiple logistic regression, survival analysis, repeated measures and hierarchical models
- Lectures Tu 10:30am – 12:00noon
- Labs Th 10:30am – 12:30pm
TICR Summer program

- Training in Clinical Research
- Lecture + small group discussion
- Develop a research protocol
- Text: Designing Clinical Research, 2nd Ed. by Hulley, et al.
ATCR Certificate Program

- Requires MD, PhD, DDS or PharmD
- Requires at least 70% of time will be available September - June
- Home department research mentor
## ATCR: Program of Study

<table>
<thead>
<tr>
<th>Fall</th>
<th>Winter</th>
<th>Spring</th>
</tr>
</thead>
<tbody>
<tr>
<td>Epi methods</td>
<td>Clinical Trials</td>
<td>Publishing</td>
</tr>
<tr>
<td>Intro to Stat.</td>
<td>Biostat II</td>
<td>Biostat III</td>
</tr>
<tr>
<td>Clin Epi</td>
<td>Data Manage</td>
<td>Mol Methods</td>
</tr>
<tr>
<td>Sys Reviews</td>
<td>ATCR Seminar</td>
<td>ATCR Seminar</td>
</tr>
<tr>
<td>ATCR Seminar (+ Electives)</td>
<td></td>
<td>Total = 25 units</td>
</tr>
</tbody>
</table>

Total = 25 units
Master’s Degree Program

- First year of program same as ATCR
- Products
  - Preparation of a systematic review
  - Presentation at a national meeting
  - Publication as first author of a peer-reviewed clinical research report
  - Obtain experience in the instruction of clinical research methods
## Master’s: Second Year Program of Study

<table>
<thead>
<tr>
<th></th>
<th>Fall</th>
<th>Winter</th>
<th>Spring</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biostatistical Methods IV</td>
<td>Biostatistical Methods V</td>
<td>MAS Seminar</td>
<td></td>
</tr>
<tr>
<td>MAS Seminar</td>
<td>MAS Seminar</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

+ Electives:
- Quality of Life and Behavioral Measures
- Decision & Cost-Effectiveness Analysis
- Medical Informatics
- Clinical Research with Diverse Communities
- Molecular Methods in Clinical Research II
- Outcomes Research

*And other graduate offerings at UCSF*

Total = 36 units
Fees

- Summer TICR: $1200 (UC); $2400 (other)
- ATCR: $1300/quarter (UC only)
- MCR: $17,000/year × 2
  - UC employees $10,000/year
  - Further discount if TA
- Courses alone: $1,000 per quarter for UCSF, $2,000 for non-UCSF
Biostatistics: The “Usual”

- Few mathematical requirements
- Computing rich and integrated - Stata
- Case studies
- Projects
Biostatistics: The “Less Usual”

- Lead by example not concepts
- Practical – yet advanced
- Unified approach to multipredictor methods
- Balance between hands-on, lab time and lecture time
- Team taught
- Mentored projects
- Fee based
Biostatistics: The “Unusual”? 

Organized in a “Just in Time” manner as students develop their protocols and conduct research:

Sample size during design of protocol.
Ideas of multivariate methods, confounding and bias during design of data collection.
Biostatistics while designing an analysis plan.
Data management while collecting data.
Project based biostatistics courses for masters students as detailed follow-up.
Challenges

- Advanced yet non-mathematical
- Mentoring effort
- Book?
- Computing
- Time allocation by students
Conclusions

- Challenging but motivated audience
- Use all the “usual”: case studies, computing, projects, minimize “talking heads”, lead by example.
- JIT motivates need for complicated methods, makes the students more receptive.
Acknowledgements

- Other instructors: Peter Bacchetti, David Glidden, Steve Shiboski, Eric Vittinghoff.
- K-30 grant supports teaching effort. Steve Hulley, PI