Hongyan Xu, PhD
Associate Professor

Department of Biostatistics
College of Graduate Studies
Georgia Health Sciences University

Educator's Portfolio

Educator's Portfolio
Hongyan Xu
Associate Professor, Department of Biostatistics
Georgia Health Sciences University
April 28, 2012

Prepared for Consideration for Tenure

Percentage effort devoted to teaching/other educational activities: 25%

Direct Teaching Responsibilities

- **Teaching Venue**

  The courses that I teach are primarily didactic in lectures format. They are balanced between statistical theory/concepts of computational methods and the demonstration of statistical/computational methods at computer labs so that students can get "hands-on" experience of using and developing these methods with real data sets. I also supervise students in their biostatical milestone consulting projects and serve as major advisor and participate in advisory committees for M.S. and Ph.D. students in Biostatistics. I also serve as an advisory committee member for graduate students in the Biomedical Ph.D. in Genomic Medicine program.

- **Teaching Philosophy**

  My teaching philosophy is that the classes should be balanced between teaching theory/concepts and demonstrating the practical usage using statistical and computational methods with real data sets. I found this worked well with our students, especially students in the Biostatistics program, which emphasizes practical data analysis in biomedical sciences. In this respect, Biostatistics is different from Mathematics or Statistics. A student could excel at statistical theory and yet had no clue when faced with real data problems. This is not the student that we want to train in the Biostatistics program.

  From my observation, students also respond well when they see the statistical theory/concepts "in action". The theory/concepts could be abstract and hard to grasp when they are presented initially in formulas and equations. When they are presented with real data problems, it helps students connect the theory/concepts

with their practical usage in real world. With the demonstration of the analysis using statistical software, students not only benefit from learning how to perform the analysis, it also helps student grasp the underlying concepts better rather than trying to memorizing the formulas and equations. Therefore, in my classes, I try to motivate the theory with some real data problem, then present the theory, and finally go back to the real data problem with the solution in statistical software. By using the examples from real data problems rather than ‘artificial data’ from routine textbooks, I find that students can learn from my experience of how biostatisticians tackle the problem in our consulting and collaborative work.

It also helps to keep the teaching materials current by using real data problems. In my courses, those problems are mainly drawn from my research in Genomics and Bioinformatics, which are rapidly evolving fields mostly driven by the modern biotechnology. New data generated from these biotechnological platforms call for new statistical models for proper analysis. Statistical models for one platform may become obsolete when the platform is replaced with new platforms. By using the real data problem, I can make sure the models are proper in the relevant context. The current data sets ensure that the analysis models are current.

My goal as an educator in biostatistics is to create the best material and environment for student to learn and grow up a biostatistician with methodological and collaborative work. I find that my balanced approach between theory and computational demonstration works well.

(***Educator’s Portfolio continued on next page.***)

- **Evidence of Quantity and Quality**

Table 1. Mean ratings in response to "The instructor's overall teaching effectiveness was excellent." Responses are on a 5-point scale (1: Strongly Disagree, up to 5: Strongly Agree).

Teaching Activity/Role	Year	Quantity	# Learners	Quality
GNMD 8050 Computational Methods in Genomics and Genetics (Graduate Course in Genomic Medicine & Biostatistics)				
Lecturer	2006, 2007, 2008	10 hrs/semester	4-8	mean rating = 4.1 (Based on 3 classes, n=18 students)
STAT 9150 Advanced Statistical Methods in Genetic Analysis (Graduate Courses in Biostatistics)				
Main Instructor	2009	40 hrs/semester	2	mean rating = 4.0 (Based on 1 class, n=2 students)
Lecturer in STAT 8880 Introduction to Statistical Genomics (Graduate Course in Biostatistics)				
Main Instructor	2009, 2011	40 hrs/semester	3-4	mean rating = 4.67 (Based on 2 classes, n=7 students)
Lecturer in GNMD 8051 Translational Genomics & Proteomics (Graduate Course in Genomic Medicine)				
Lecturer	2008, 2010, 2012	10 hrs/semester	2	mean rating = 4.0 (Based on 1 class, n=2 students)
Lecturer in STAT 8510 Programming for Data Analysis (Graduate Course in Biostatistics)				
Main Instructor	2010, 2011	40 hrs/semester	4	mean rating = 4.25 (Based on 2 classes, n=8 students)
Lecturer in STAT 8550 High Throughput Data Analysis (Graduate Course in Biostatistics)				
Main Instructor	2012	40 hrs/semester	8	To be rated

Curriculum Development

Title: Introduction to Statistical Genomics (Second-year graduate students in Biostatistics)

Role(s): Course Director/Main Instructor
Organized lectures and weekly homework problems for the 3-credit hours course
Developed contents with objectives to introduce basic concepts of statistical genomics

Clear Goals: Create a new statistical genetics course for all second-year biostatistics students and students who perceive as relevant. This is the first time such a course has been offered. The predecessor course consistently received "very poor student evaluations".

Adequate Preparation

- PhD in Statistical Genetics
- Review of "best practices: McMaster's curriculum"
- Teaching Certificate:
  - Classrooms of the 21st Century: Evaluation and Feedback
  - Classrooms of the 21st Century: Learner-Centered Instruction
- Powerpoint slides and weekly homework

Appropriate Methods:

- Multi-method approach including: Interactive lecture series, assigned homework problems and readings
- Assessment methods: Test questions are drawn from applications (not rote memorization)

Significant Results (Outcomes)

- Course evaluation improved from prior offering
- Graduate survey — from inadequate exposure to appropriate/excessive
- Help to develop 4th year elective involving advanced statistical genetics

Effective Presentation (Dissemination)

- Results presented to curriculum committee
- Content replicated in subsequent years planned

Reflective Critique (Next steps for continuing improvement)

- Share the contents at departmental internal website

Title: High Throughput Data Analysis (graduate students in Biostatistics)
Role(s): Course Director/Main Instructor
Organized lectures and weekly homework problems for the 3-credit hours course
Developed contents with objectives to introduce basic concepts and methods for high throughput data analysis

Clear Goals: Create a new elective course for high throughput data analysis for all biostatistics students and students who perceive as relevant. This is the first time such a course has been offered. It exposes students with relevant statistical and bioinformatics methods for high throughput data.

Adequate Preparation

- PhD in Statistical Genetics/research in bioinformatics
- Review of "best practices: McMaster's curriculum"
- Teaching Certificate:
    - Classrooms of the 21st Century: Evaluation and Feedback
    - Classrooms of the 21st Century: Learner-Centered Instruction

Appropriate Methods:

- Multi-method approach including: Interactive lecture series, assigned homework problems and readings
- Assessment methods: Test questions are drawn from real applications (not rote memorization)

Significant Results (Outcomes)

- Help to fulfill the elective course requirement

Effective Presentation (Dissemination)

- Content to be replicated in subsequent years

Reflective Critique (Next steps for continuing improvement)

- Convert course to on-line format
- Share the contents at departmental internal website