

Faculty Activity Report 2015

Rose-Hulman Institute of Technology

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TEACHING, STUDENT ADVISING AND CURRICULUM DEVELOPMENT

COURSES TAUGHT

<u>Quarter</u>	<u>Course Name and Number</u>	<u>Enrollment</u>
201510	MA223-01 Engineering Statistics I	22
201510	MA223-02 Engineering Statistics I	28
201510	MA480-01 Bayesian Statistics	9
201510	MA496-03 Senior Thesis I	1
201520	MA223-01 Engineering Statistics I	26
201520	MA223-02 Engineering Statistics I	25
201520	MA481-01 Mathematical Statistics	8
201520	MA497-03 Senior Thesis II	1
201530	BE482-01 Bioengineering Statistics	10
201530	MA223-01 Engineering Statistics I	24
201530	MA482-01 Bioengineering Statistics	9
201530	MA494-01 Senior Project III	1
201530	MA498-06 Senior Thesis III	1
201540	MA223-OL1 Engr Statistics I	7
201540	MA223-OL2 Engineering Statistics I	7

COURSE DEVELOPMENT

COURSE

Bayesian Statistics is a new course to Rose-Hulman. This course was developed for two reasons: (a) it fills a large gap in our statistics curriculum which currently only includes the Frequentist perspective and (b) it can potentially reach students who are not ordinarily exposed to statistical thinking but have a strong background in probability, such as computer science majors.

MA481 was revised so that 30% of the course content was computer simulation. It has become evident in the statistical community that students studying statistics need exposure to theory, practical application, and computational skills. The mathematical statistics course, primarily a proof-based course in the past, was revised to include statistical simulation as a means of both analysis and demonstrating statistical properties such as convergence.

MA223 was placed online during the summer. The content of the course was distributed through videos. Videos were developed for each of the modules of the course. The notes were reformatted to align with the video content. A new template was constructed for integrating random questions with statistical content into the Moodle environment. Over 300 hours of work went into developing the course. The material will be used for flipping courses in the upcoming academic year.

ADVISING

ACADEMIC ADVISEES

Advisee Count: 3

Advisor for mathematics majors with a concentration in statistics. While not the advisor of record for each student; these students are encouraged to discuss future career/graduate school plans with me.

OTHER

Advisee Count: 1

Directed Lorena Maxwell's Senior Project in Mathematics.

STUDENT ORG ADVISEES

Advisee Count: 50

Faculty Advisor for InterVarsity Christian Fellowship

THESIS ADVISEES

Advisee Count: 1

Directed Cody Roberts Mathematics Thesis.

Advisee Count: 1

Committee member for Anderson Adams master's thesis in Biomedical Engineering titled "A Comparative Evaluation of Cadaveric and Composite Femur Models for Total Hip Arthroplasty"

PROFESSIONAL DEVELOPMENT ACTIVITIES

PROFESSIONAL DEVELOPMENT

PUBLICATIONS

PAPERS PUBLISHED

Endoscopic Harvesting Device Type and Outcomes in Patients Undergoing Coronary Artery Bypass Surgery, Annals of Surgery

Statistician on clinical paper. Work done when consulting for Duke Clinical Research Institute.

Tutorial: Survival Estimation for Cox Regression Models with Time-Varying Coefficients, Journal of Statistical Software

The difficulty with these models is discussed in MA482 (bioengineering statistics).

Long-term clinical and angiographic outcomes in patients with diabetes undergoing coronary artery bypass graft surgery: Results from the PREVENT-IV Trial., American Heart Journal

Statistician on clinical paper. This is work done as a consulting for Duke Clinical Research Institute.

SEMINARS

CONFERENCE PRESENTATION

Name-Brand vs. Off-Brand: A Twist on Taste Testing for a Mathematical Statistics Course, Joint Statistical Meetings (JSM)

This introduced an activity developed for MA481 (Mathematical Statistics).

Six Sigmas of Separation: Strategies for Making Inter-Disciplinary Connections, US Conference on Teaching Statistics (USCOTS)

Dr. Diane Evans (Rose-Hulman) and I led a breakout session discussing how we get students to think broadly about the application of statistics in our courses, the connections we have developed with other departments regarding how statistics is taught in other courses, and the assignments and activities we have developed that engage a student beyond learning methodology.

CONFERENCES ATTENDED

Joint Statistical Meetings (JSM)

US Conference on Teaching Statistics (USCOTS)

WORKSHOPS ATTENDED

Teaching the Statistical Investigation Process with Randomization-Based Inference, Consortium for the Advancement of Undergraduate Statistics Education (CAUSE)

Will use this material to reorganize content and how it is delivered for MA223 (Engineering Statistics I).

WORKSHOPS PRESENTED

Engaging Intro Statistics Students with Activities

In conjunction with Diane Evans (Rose-Hulman), we were invited by Minitab to lead this workshop at the US Conference on Teaching Statistics. We introduced the 64 participating faculty to several activities we have developed at Rose-Hulman for MA223 Engineering Statistics I.

OTHER

COURSE PARTICIPATION

Winter 2014 Faculty Cohort for Online Course Development

Faculty member successfully completed 20 hours of training from the Learning and Technology Department on developing online courses

NON FUNDED RESEARCH

Nonlinear Modeling Framework for Estimating Young's Modulus from Stress-Strain Curves

Lorena Maxwell (2015) worked on this for her senior project. I hope to continue this project in future years. Our end goal is to construct an online program that will enable the Biomedical Engineering department explain the computation of Young's Modulus from stress-strain data and also provide an automated method for its computation.

Unified Approach to Variable Selection in the Presence of Missing Data

Cody Roberts (2015) worked on this for his senior thesis. This research presents a way of determining which potential predictors are useful for predicting a response and which are not when those predictors are not fully observed on all subjects. This research addresses an open question in statistics and would be very beneficial to medical applications of statistical modeling.

RESEARCH PROFILE

Scholarship Subject:	statistics, variable selection, statistics education
Study Area:	I am interested in the application of statistics to medicine. In particular, I focus on variable selection
Keywords:	Biomedical Research, Multidisciplinary Education/Instructional Programs Educational Evaluation/Assessment Educational Improvement Statistics

PROFESSIONAL SERVICE ACTIVITIES

COMMITTEES

DEPARTMENTAL

Statistics and Operations Research Curriculum Development Group, MA (Chair)

Undergraduate Mathematics Conference, MA (Co-Chair)

INSTITUTIONAL

Quality of Education (Member)

Served as part of the joint sub-committee on academic misconduct.

PROFESSIONAL SERVICE

ON CAMPUS SERVICE

High School Mathematics Competition

Helped set-up for the event, and register competing schools.

REVIEWER

Journal Articles

Reviewed article with significant statistical content.