Faculty Activity Report 2018

Rose-Hulman Institute of Technology

Eric Reyes **Associate Professor of Mathematics**

TEACHING, STUDENT ADVISING AND CURRICULUM DEVELOPMENT

COURSES TAUGHT

Quarter	Course Name and Number	Enrollment
201810	MA223-03 Engineering Statistics I	24
201810	MA386-01 Statistical Programming	11
201820	MA223-02 Engineering Statistics I	26
201820	MA223-03 Engineering Statistics I	28
201820	MA480-01 Bayesian Statistics	11
201820	MA496-01 Senior Thesis I	1
201830	BE482-01 Bioengineering Statistics	7
201830	MA223-06 Engineering Statistics I	25
201830	MA223-07 Engineering Statistics I	27
201830	MA482-01 Bioengineering Statistics	19
201830	MA496-02 Senior Thesis I	1
201830	MA497-01 Senior Thesis II	1
201840	MA223-ONL Engineering Statistics I	16

COURSE DEVELOPMENT

COURSE

This was the second time I offered the Bayesian Data Analysis course as a special topics course within the department. I updated the course dramatically to have a more applied feel than the more theoretical offering previously. The course was well received and the department voted to put it in the course catalog.

DEPARTMENT CURRICULUM REVISIONS

Dr. Megan Heyman and I developed a new curriculum for the introductory statistics (MA223) course. We piloted various components of the new curriculum throughout the year. The new curriculum has a heavier focus on data collection and study design; we also included a new unit on randomized complete block design. The course also has a stronger modeling component.

We spoke with members from each department whose students take MA223 to discuss the changes in the course. The curriculum changes were approved by the department and curriculum committee in May 2018.

ADVISING

ACADEMIC ADVISEES

Advisee Count: 5

Advisor for the statistics minor.

STUDENT ORG ADVISEES

Advisee Count: 125

Faculty advisor for InterVarsity Christian Fellowship

Advisee Count: 25

Faculty advisor for Lilly Scholars Network (new this year).

THESIS ADVISEES

Advisee Count: 2

John Lambrecht: deep learning boasts that with enough data, it can uncover any underlying pattern. This could potentially cause problems when constructing models if the deep learning models can begin to pick up on the pseudo-random number generator used when performing cross-validation during fitting. This would lead to the deep learning models having optimistic performance metrics. John is investigating whether this is a valid concern in practice.

Ty Adams: selecting the variables which are important to the data generating process is a difficult problem; one complication is the need to specify the form of the relationship. Ty is using the distance correlation measure as a means of developing a non-parametric variable selection algorithm.

Both intend to graduate early next year.

PROFESSIONAL DEVELOPMENT ACTIVITIES

PROFESSIONAL DEVELOPMENT

SEMINARS

CONFERENCE PRESENTATION

Introducing Data Science Elements through Parallel Courses in Statistics and Computing, Electronic Conference on Teaching Statistics

Webinar with Dr. Megan Heyman.

Abstract:

In the fall of 2017, Rose-Hulman Mathematics and Computer Science departments jointly launched a minor in Data Science. The popularity of the minor has already resulted in increased enrollment in required statistics electives. Specifically, all students receiving the minor take an introductory course in statistics. With the constraints of the minor, many students also elect to take a course which emphasizes statistical programming. Both the introductory course and the statistical programming course are offered only in the fall. In order to support the new minor, we have aligned these courses to provide a strong Data Science foundation for students electing to take both concurrently. Changes we have made to the courses include assignments and lectures incorporating open-ended questions, increased group work, intensive programming, and data analysis projects. In this session we will highlight these changes as well as discuss how the structures support statistical and computational thinking and communication. Participants will be asked to begin developing a project that could be offered in a future iteration of their course.

Is the Central Limit Theorem Still Central to the Introductory Course?, Electronic Conference on Teaching Statistics

Round-table discussion on a major component of the introductory course.

Abstract:

A traditional curriculum for an introductory statistics course builds up to the Central Limit Theorem as a model for the sampling distribution. The remainder of the course flows out of this theorem using it to develop and/or motivate inferential methods. As more instructors move toward randomization-based inference, incorporating more data visualization elements, and emphasizing computational thinking, we ask the question: is the Central Limit Theorem still central to the introductory course? In addition to sharing how sampling distributions are motivated in their own classes, the group will wrestle with questions like is the Central Limit Theorem helpful for conveying the notion of a sampling distribution and its properties? Is it distracting? Is it relevant in the world of big data?

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 Math Conference, MA (Member)

Responsible for the registration and schedule for the Undergraduate Math Conference.

INSTITUTIONAL

Quality of Education (Member)

Asked to fill in after departure of current members

Animal Care and Use (Member)

PROFESSIONAL SERVICE

MEMBERSHIPS

Member of American Statistical Association

Member of ASA/MAA Joint Committee on Statistics Education, ASA/MAA Joint Committee on Statistics Education

ON CAMPUS SERVICE

High School Math Contest

Organize the registration system for the High School Math contest hosted by the mathematics department.

REVIEWER

Journal Articles, INFORMS Journal on Computing

Reviewed article with significant statistical content.