Faculty Development Plan
June 15, 2013

1. Citizenship:

   Self-Assessment

   I am excited to be a member of the Brigham Young University community and the statistics profession at large. I know that my teaching and research-and my overall contribution to BYU-will be enhanced by my involvement in the "community of scholars." Further, I will bring recognition to Brigham Young University by my involvement in the broader statistics profession. This recognition helps to place students in exceptional Ph.D. programs elsewhere and reflects positively on the Church of Jesus Christ of Latter-day Saints.

   Goals

   My goal is to be known as an exceptional colleague in the Department of Statistics, the College of Physical and Mathematical Sciences, and the Brigham Young University as a whole. Further, I wish to be recognized as a leader in the statistics profession. Of course, these goals require concrete actions, which I outline below.

   Plans

   (a) Collaborative Teaching Activities:

      i. Speak with individual faculty members to get their opinions as I refine the curriculum for our graduate computing course.

      ii. Serve on the Computing Curriculum Committee with colleagues to build a consensus on what computing topics should be taught to our undergraduate students.

   (b) Collaborative Scholarship Activities:

      i. Mentor a junior faculty member by offering my time to read drafts of papers, provide suggestions, and generally letting it be known that I'm willing to help.

      ii. Initiate research and write a paper with a junior faculty member in an area of mutual interest.

   (c) Service Activities:

      i. Serve as an editor of Bayesian Analysis.


      iii. Serve as a referee for statistics journals when invited.

   (d) Activities to Build Collegiality:
i. Regularly attend Tuesday's "faculty collegiality lunch" to build relationships with department colleagues.

ii. Regularly play faculty basketball to build relationships with colleagues across the university community.

(e) Collaborating with Colleagues outside of BYU:

i. Participate in professional meetings, including the Conference on Bayesian Nonparametrics, Joint Statistical Meetings, and World Statistics Congress.

ii. Invite a scholar from outside BYU to spend two or three weeks on a collaborative project.

2. Teaching:

Self-Assessment

Educating the next generation of Latter-day Saint youth is central to the mission of Brigham Young University. Every time I walk into the classroom or meet with a student, I am reminded of my great privilege to teach and advise students. I enjoy sharing with students what I find compelling about statistics.

I strive to foster a successful learning environment for all students and to continually improve my teaching. At the start of each semester, I ask students to complete a survey about their background and what they hope to learn from the course. I conduct midterm student evaluations to elicit recommendations on how to improve the course. I carefully consider the end of the semester evaluations. As a result of this student input, I have made changes and learned how to better serve the students without compromising academic rigor.

I also strongly believe in two-way communication. At the beginning of each lecture, I give a review of previously covered material and answer questions from students. When introducing new material, I often start with a motivating example, then present the statistical method or theory more generally, and end by demonstrating the idea in software. At all times, I draw connections between concepts and emphasize reoccurring themes. Perhaps most importantly, I make my lectures interactive by asking questions designed to get the students actively thinking about the material rather than passively taking notes. When students' answers are not entirely correct, I praise the part that is correct and then clarify the area of confusion.

I feel it is essential that students be empowered to take ownership of the learning process. To this end, all of my courses are organized using comprehensive web pages. Students have commented to me that they appreciate the organization that the class web page brings to their studies. The web site is continuously updated with lecture material, examples, assignments, newspaper articles, and other materials to teach concepts and illustrate applications of methods from class. Homework solutions, old exams, reading assignments, and example datasets are also available. Finally, students have the ability to monitor their performance online.
One-on-one teaching in the form of student advising is both professionally and personally satisfying. At Texas A&M University, I directed two Ph.D. students, co-advised another, and served on other Ph.D. students' committees. I also served as the chair of several masters committees. Here at Brigham Young University, I am on several masters committees and I have mentored undergraduate student Richard Payne who recently wrote, "I can honestly say that doing research with you has been the highlight of my undergraduate experience here at BYU." Richard starts a Ph.D. program in statistics at Texas A&M University in the fall 2013. In short, I embrace the opportunities that I have to advise students. Mentoring students allows me to learn from them and share my approach to research and my enthusiasm for statistics.

I teach both undergraduate and graduate classes, including Bayesian statistics, statistical methods, statistical computing, and statistical theory. I am interested in improving my teaching in these classes and expanding my teaching experience. In my first year here at BYU, I taught STAT 121: Principles of Statistics in fall 2012 and STAT 340: Inference in winter 2013. I was generally pleased with the students' performance. Despite being one of the most theoretical undergraduate classes in our department, I believe that the majority of the STAT 340 students rose to the challenge and that it was a positive learning experience for them.

I have a strong desire to improve the learning experience for students. To that end, I asked Kenneth Plummer, Teaching and Learning Consultant in the BYU's Center for Teaching and Learning, to read my students' comments and provide feedback to me. I use his input and my own self-assessment to develop my teaching goals and plans below.

**Goals**

I strive to foster a successful learning environment for all students and to continually improve my teaching. I hope to be an example of excellence to the students in both my professional and personal life. I hope to foster two-way communication between instructor and student. My goal is to "teach to the student" rather than "teach the material."

**Plans**

- Focus on students' mastery of the material rather than rushing through material.
- Provide more computing support to STAT 340 students.
- Ask colleagues to sit in on my classes and provide feedback.
- Observe other faculty members' classes.
- Begin advising a masters student in fall 2013.

3. **Scholarship:**

**Self-Assessment**
My research focuses on Bayesian nonparametrics, model-based clustering, random partition models, and statistical computing. My work has appeared in journals including the *Journal of the American Statistical Association*, *Annals of Applied Statistics*, and *Bayesian Analysis*. I am interested in a variety of application areas. The organizing framework for my research has been a long-standing collaboration with statistician Marina Vannucci and biochemist Jerry Tsai. The motivating application area is protein structure prediction, but the methods that we develop produce novel statistical methods with general applicability. Our work is funded by a four-year grant from the National Institutes of Health.

**Goals**

By February 2014, my goals are to:

- Submit a paper entitled *Partition Distributions Indexed by Pairwise Information* to *Biometrika*.
- Submit a paper exploring the partition distributions introduced in the above paper as a clustering method.
- Submit a paper—with a BYU student as a co-author—entitled *jvmr: Integration of R, Scala, and Java* to the *Journal of Statistical Software*.
- Submit a paper on secondary structure prediction from primary sequence with my grant collaborators.
- Start a new research collaboration with a colleague in the Department of Statistics.
- Submit a paper on efficient Markov chain Monte Carlo (MCMC) algorithms for fitting both conjugate and nonconjugate Bayesian nonparametric models.

**Plans**

The strategies that I will employ to achieve my goals are:

- Reserve large blocks of time each week for my own research.
- Set aside time to read research articles.
- Keep a research log for each project.
- Schedule time daily to write.
- Work with the end in mind.
- Host my collaborator’s Ph.D. student for a two-week visit to work on the paper about secondary structure prediction.

4. **Relationship to Department and University Goals:**

The Mission of Brigham Young University is:

... to assist individuals in their quest for perfection and eternal life. That assistance should provide a period of intensive learning in a stimulating setting where a commitment to excellence is expected and the full realization of human potential is pursued.
Further, the Department of Statistics states that our mission is:

...to help students develop their intellect and faith, expand their understanding of the role of science in the objective systematic pursuit of truth, demonstrate how sound statistical methodology strengthens scientific conclusions, cultivate the ability to understand and communicate the results from empirical research in an ethical manner, and develop and apply methods of modern statistical science.

I believe that my own specific goals will help me contribute to the mission of Brigham Young University and the mission of the Department of Statistics. As I successfully complete my goals in citizenship, teaching, and scholarship outlined in this Faculty Development Plan, I believe that I will contribute in a meaningful way to advancing the mission of BYU and the mission of Department of Statistics.

5. Resources Needed:

The most important resource needed to accomplish these professional goals is time. The department administration has been sensitive to the issue and has been flexible in my teaching assignments, including placing lectures back-to-back and allowing me to repeat classes that I previously taught. My colleagues have been helpful in connecting me with strong students for research. I hope my research productivity is such that I can maintain a teaching load of three to four classes per year. The university has provided me with adequate computing and financial resources to accomplish my goals.

6. Current Activities and Accomplishments:

In terms of citizenship, I am currently serving as an editor of *Bayesian Analysis*, an associate editor of book reviews for the *Journal of the American Statistical Association* and *The American Statistician*. I plan to attend several conferences this summer and I will host at BYU a Ph.D. students of an outside collaborator. As for teaching, in the summer 2013 I will prepare to teach *STAT 624: Statistical Computing* for the first time. I will also be revising my *STAT 340: Inference* course. In terms of scholarship, I am actively working to finish several papers that are close to submission and I am continuing to work on the specific aims of our four-year grant from the National Institutes of Health.
Citizenship Project Proposal

June 15, 2013

I am excited to be a member of the Brigham Young University community and the statistics profession at large. I know that my teaching and research — and my overall contribution to BYU — will be enhanced by my involvement in the “community of scholars.” Further, I will bring recognition to Brigham Young University by my involvement in the broader statistics profession. This recognition helps to place students in exceptional Ph.D. programs elsewhere and reflects positively on the Church of Jesus Christ of Latter-day Saints.

My goals is to known as an exceptional colleague in the Department of Statistics, the College of Physical and Mathematical Sciences, the Brigham Young University as a whole. Further, I wish to be recognized as a leader in the statistics profession.

Of course, these goals require concrete actions. I propose that my citizenship project have the following specific elements:

1. Collaborative Teaching Activities:
   
   (a) Speak with individual faculty members to get their opinions as I refine the curriculum for our graduate computing course.

   (b) Serve on the Computing Curriculum Committee with colleagues to build a consensus on what computing topics should be taught to our undergraduate students.

2. Collaborative Scholarship Activities:

   (a) Mentor a junior faculty member by offering my time to read drafts of papers, provide suggestions, and generally letting it be known that I’m willing to help.

   (b) Write a paper with a junior faculty member in an area of mutual interest.

3. Service Activities:

   (a) Serve as an editor of Bayesian Analysis.

   (b) Serve as an associate editor of book reviews for the Journal of the American Statistical Association and The American Statistician.

   (c) Serve as a referee for statistics journals when invited.

4. Activities to Build Collegiality:

   (a) Regularly attend Tuesday’s “faculty collegiality lunch” to build relationships with department colleagues.

   (b) Regularly play faculty basketball to build relationships with colleagues across the university community.
5. Collaborating with Colleagues outside of BYU:

(a) Attend professional meetings, including the *Conference on Bayesian Nonparametrics*, *Joint Statistical Meetings*, and *World Statistics Congress*.

(b) Invite a scholar from outside BYU to spend a couple of weeks on a collaborative project.
1. **From my Faculty Development Plan:**

My research focuses on Bayesian nonparametrics, model-based clustering, random partition models, and statistical computing. My work has appeared in journals including *Journal of the American Statistical Association*, *Annals of Applied Statistics*, and *Bayesian Analysis*. I am interested in a variety of application areas. The organizing framework for my research has been a long-standing collaboration with statistician Marina Vannucci and biochemist Jerry Tsai. The motivating application area is protein structure prediction, but the methods that we develop produce novel statistical methods with general applicability. Our work is funded by a four-year grant from the National Institutes of Health.

2. **Specific Scholarship Goals to Complete by February 2014:**

- Submit a paper entitled *Partition Distributions Indexed by Pairwise Information* to *Biometrika*.
- Submit a paper exploring the partition distributions introduced in the above paper as a clustering method.
- Submit a paper — with a BYU student as a co-author — entitled *jvmr: Integration of R, Scala, and Java* to the *Journal of Statistical Software*.
- Submit a paper on secondary structure prediction from primary sequence with my grant collaborators.
- Start a new research collaboration with a colleague in the Department of Statistics.
- Submit a paper on efficient Markov chain Monte Carlo (MCMC) algorithms for fitting both conjugate and nonconjugate Bayesian nonparametric models.

3. **Specific Strategies of Scholarship Productivity:**

- Reserve large blocks of time each week for my own research.
- Set aside time to read research articles.
- Keep a research log for each project.
- Schedule time daily to write.
- Work with the end in mind.
- Host my collaborators Ph.D. student for a two-week visit to work on the paper about secondary structure prediction.
4. **Methods to Evaluate Success:**

The most obvious way to evaluate success in scholarship in the statistics discipline is the quality and quantity of peer-reviewed publications. Funding for research grants is another strong indicator of quality scholarship. Likewise, the quantity and quality of invited presentations at universities, conferences, and workshops are also good measures of scholarship. My mentor William Christensen and I will regularly review my progress.
Course Description
Statistics 340 is an introductory course to mathematical statistics and statistical inference. Covered topics include: continuous random variables (pdf, cdf, moments); sampling distributions; Central Limit Theorem; frequentist inference (estimation, intervals); Bayesian inference (estimation, intervals); simulation. Prerequisites: STAT 240 and MATH 113.

Instructor
Office Hours:

Teaching Assistants
Office hours:

Website
BYU's Learning Suite (http://learningsuite.byu.edu) provides announcements, a calendar, grades, etc. It also contains links to http://...byu.edu/teaching/340, where homework assignments, lecture materials, etc. are posted.

Learning Outcomes
- Understand assumptions and properties of named continuous univariate distributions: normal, beta, gamma, exponential.
- Solve problems using pdf’s and cdf’s of continuous distributions.
- Calculate expectation, variance, covariance, and correlation.
- Understand the Central Limit Theorem via simulation and use it to calculate probabilities.
- Make inferences on a population proportion using a random sample from a binomial distribution and on a population mean using a random sample from a normal distribution with known variance, including:
  - Deriving the sampling distributions of the sample mean and proportion.
  - Deriving the posterior distributions of the mean and proportion using conjugate priors.
  - Deriving the maximum likelihood and Bayes estimators of the mean and proportion.
  - Using pivots to construct approximate $100(1 - \alpha)$% confidence intervals for the mean and proportion.
  - Constructing Bayesian confidence intervals for the mean and proportion.

Calendar
The (tentative) class calendar is available on Learning Suite (http://learningsuite.byu.edu), where you can find recommended textbook readings, exam dates, homework due dates, etc. Note that Learning Suite provides an iCalendar feed for up-to-date access to the course calendar on your desktop and mobile calendars.
Textbook


Preparation for Lecture

Please read the material in the text prior to the lecture in which it is covered. If you miss a lecture, please obtain copies of note from fellow students.

Exams

There will be two midterm exams and a final. Exams are designed to assess a student’s mastery of definition, concepts, skills, and connections that the student will encounter in lecture, readings, and homework. The exam dates are available on the class calendar. Locations will be announced in class.

Homework

Homework is designed to challenge students to stretch their understanding from the readings and lecture, to hone their mathematical skills, and to explore applications of the material. Homework is due at the beginning of class on the appointed day. Late homework is only accepted at the discretion of Dr. Dahl and is subject to a 20% penalty per day. Your name and assignment number must be written on top of the first page of each homework set to receive credit.

Grading

<table>
<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Homework</td>
<td>40%</td>
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<tr>
<td>Midterms</td>
<td>30%</td>
</tr>
<tr>
<td>Final</td>
<td>30%</td>
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Class attendance, participation, and improvement over the course may be used in determining final grades in some situations. All course material is kept on file for one semester. Any review or appeal must be made within that time frame.

Honor Code

Students are encouraged to study together and discuss homework assignments, but this should not result in students submitting the same work. The submitted assignment must represent the individual student’s understanding and work. Cheating on exams is strictly prohibited and may result in automatically failing the class. Consultation of any material for exams is restricted to those approved by the instructor.

Students are expected to follow University policies (including dress and grooming standards).

Students with Disabilities

Brigham Young University is committed to providing a working and learning atmosphere that reasonably accommodates qualified persons with disabilities. If you have any disability that may impair your completing this course successfully, please contact the University Accessibility Center (UAC) at 801-422-2767. Reasonable academic accommodations are reviewed for all students who have qualified documented disabilities. Services are coordinated with the student and instructor by the UAC. If you need assistance or if you feel you have been unlawfully discriminated against on the basis of disability, you may seek resolution through established grievance policy and procedures. You may contact the Equal Employment Office at 801-422-5895, D-282 ASB.
Preventing Sexual Harassment

Title IX of the Education Amendments of 1972 prohibits sex discrimination against any participant in an educational program or activity that receives federal funds. The act is intended to eliminate sex discrimination in education. Title IX covers discrimination in programs, admissions, activities, and student-to-student sexual harassment. BYU's policy against sexual harassment extends not only to employees of the University but to students as well. If you encounter unlawful sexual harassment or gender-based discrimination, please talk to your professor; contact the BYU Equal Employment Opportunity Office at 801 422 5895; or contact the Honor Code Office at 801 422 2847.