Teaching Portfolio

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1 Teaching Statement

I am genuinely grateful to have received sound teaching from professors in the past, as the knowledge I acquired has had a profound impact on my present career. Academia provides a wonderful avenue by which I can explore the field I love in greater depth. The depth of knowledge I continue to embrace fortifies me with the confidence to teach students well and to continue the learning cycle by passing on my knowledge to them. I am indeed fortunate to be a teacher.

My goals for both undergraduate and graduate students include, but are not limited to: motivating and equipping them with statistical skills, inspiring them to become independent thinkers, and training them to be able to communicate statistics. Reflecting on my five years of teaching experience to reach those goals, I summarize my teaching philosophy as follows: preparing teaching contents with a tailored focus, intentionally reaching students at different levels of studying abilities and availabilities, trying to accommodate students at different states of physical and mental health, always learning and practicing good communication skills, and seeking to keep course topics up to current methods and practices.

Good teaching content with tailored focuses plays an essential role in effective teaching. For my undergraduate class of introductory probability and statistics, the focuses are to develop students' interests in the course topics and to help them understand basic concepts and methods well. In this class, students are given real data examples to excite them about the topic being introduced; then students are exposed to concepts and methods; then students are given examples illustrating the methods; finally, they are given time to work on exercises in class. For most of my graduate classes, the focuses are to teach students analytical skills in certain fields of statistics and to train them to practice their skills. In those classes, students are introduced to the topics by real projects; they are exposed to concepts, methods, and theorems; students are then given data analysis examples, which include instruction in software packages and graphic production tools; and, finally, students are given projects to cement the knowledge they have gained in class. This teaching progression requires a high level of organization on the part of the teacher, in order to keep the students'

minds engaged and allow them to remain in an uninterrupted flow of logical thinking. To reinforce students' learning outcomes, exams, homework assignments, and projects (when applicable) are given. In some courses, I require oral presentations, which aim to build the students' abilities to communicate statistical analysis and results clearly and concisely. I also encourage students to work as groups on some assignments. This enhances the students' ability to explain statistics to peers.

Reaching students at different academic and health levels is one of my passions for teaching. There was a Chinese movie in the 90s titled "Not even one behind," which tells a touching story of a teacher who relentlessly tried to reach students who dropped out of elementary schools due to poverty and child labor. In a different cultural context, students in my classes have big differences in their abilities in understanding statistics, their availabilities for showing up classrooms and finishing homework assignments in time, and their overall mental and physical health states. All these factors contribute significantly to learning outcomes. In response to these challenges, I tested the following strategies: (1) provide easy, medium, and hard examples for every new concept; (2) make the hard example application oriented or otherwise connect it with the applied methods where the concept will be used; (3) skillfully weave in repetitions of important concepts, (4) give students homework feedbacks and incentives for revisions, (5) be available to students beyond office hours. I observe better performances in their tests overall and saw less students falling behind. One student sent an email expressing "I just wanted to send a thank you for giving those of us who did not do as well as they feel they are able to submit corrections and validate their ability through test 3." There are frequently some students who suffer from metal and physical health problems. Despite my efforts to give students more opportunities, I found it difficult to reach to the roots of their problems, which calls for individual care outside the classroom.

Good communication practices enhance teaching outcomes. Classroom teaching relies on effective verbal (oral and visual), and nonverbal communications. I strive to have clear, well-paced, organized speeches. I also regularly pause to have students working on in-class exercises. Visually, I use slides with short bulletins and leave black spaces for students to fill in answers for examples and exercises. In the future, I plan to get students involved in some small-scale random experiments in class. These practices aim to provide versatile communication channels that stimulate but not overwhelm students' visual or hearing load. I am still learning effective communication skills, for example, how to make slides visually more appealing, how to better organize lectures, and even how to have more effective nonverbal communications (eye contacts and body languages). Interactions among students can also aid learning for students. I ask students to discuss in groups for more involved problems and projects and encourage students to teach each other. Looking

towards the future, I am also interested in learning non-traditional teaching methods, for example, flipped classroom method and online teaching. "Flipped classroom" has been designed to stimulate more interactions among teachers and students, which is also one way to enhance communications, besides to promote self-motivated learning. In "flipped classroom" method, short video lectures are viewed by students at home before the class session, while in-class time is devoted to exercises, projects, or discussions. The trend of video lectures is also evident in the growing popularity of online classes. For video lectures, effective verbal communication is even more paramount as it lacks nonverbal communication during the presentations.

Lastly, I believe delivering topics that are most up to current methods and practices is an important task for teachers. The body of statistical knowledge is fast-growing and is also giving birth to new areas. Meanwhile, some old methods and concepts are facing potential modification or even obsolescence. Causal discovery and causal inference methods have become powerful tools in the last decade for social science, epidemiology, business, and many other areas. Machine learning algorithms greatly complement traditional regression-based prediction and classification methods. Among machine learning algorithms, deep learning methods have had significant advances in the last decade and have become important tools for big data discovery and precision medicine. Many new software packages sprout every year which can be great aids to teaching. It takes teachers great patience and dedication to select and learn new software packages. A classical concept of p-value is under heated debate currently and traditionally taught interpretations of p-values are likely to be modified or supplemented. I dedicate myself to learn new methods and best practices and desire to pass on my knowledge to students.

In summary my philosophy in the classroom is based on the following: set goals to understand the best academic interests and learning outcomes for students; strive to use good teaching practices; and constantly seek to make improvements.

2 Summary of My Teaching Effort

In my last five years of teaching in UNM, I have taught graduate-level courses Introduction to Time Series Analysis (four times), Spatial Statistics and Bio-applications (once), Introduction to Bayes modeling (once), Biostatistics and logistic regression (once), and an undergraduate-level course Elements of Probability and Statistics (seven times). Spatial Statistics and Its Bio-applications was a new topic course for the department. In Fall 2019, I am teaching a graduate-level course Statistics computing and Elements of Probability and Statistics. Our typical course load

is two courses per semester except that I had a total of two-course releases during the first two years after hiring and a research semester (no teaching) in my fourth year. I typically have forty to fifty students in the undergraduate course and six to twenty students in graduate-level courses. In addition to class teaching, I have had two master students graduated, several graduate students involved with research reading, two current master students and one current Ph.D. student. I attended a teaching seminar in the Department of Mathematics and Statistics about the "flipped" classroom method and several workshops by Professor Erhardt on computing packages. I am also a member of statistical education section sponsored by ASA.

3 Documentation of Course Development

STAT 345 Elements of Probability and Statistics: The course content includes combinatorics, Bayes' theorem, probability distributions, expectations, variances, correlations, estimation, confidence intervals, and hypothesis testing. The components are selected to achieve the learning goals for this course. Specifically, the learning goals are: demonstrate knowledge of probability and statistical inferences, including a) concepts of probability and statistical inferences, b) calculus foundations, c) symbolic and abstract thinking, and d) applications using discrete and continuous univariate random variables including Central Limit Theorem, estimation, confidence intervals, and hypothesis testing. Throughout the semester, I give seven to nine homework assignments and three exams. Problems in homework assignments and exams help students to understand concepts and employ statistical methods. Grades of exams and homework assignments are used to evaluate students' performances. I prepare slides that I use for classroom teaching and class notes, which provide the main ingredients for concepts and methods, as well as blank spaces for students to fill out answers for examples and exercises.

STAT 481/581 Introduction to Time Series Analysis: Time-series data modeling is a powerful tool to analyze trends, variability, rates of change, covariation, and cycles, etc, in data from business processes, weather forecasting stations, temporal measurements in engineering, and many other fields. The course content includes exploratory methods for time series data, modeling for stationary processes, such as ARIMA modeling, analysis in the frequency domains using Fourier analysis, and some advanced topics, such as long memory models, GARCH models, and state-space models. The syllabus I used is a standard syllabus for this discipline and the textbook we used is also widely accepted. Topics such as GARCH models and state-space models are under continuing development. My goals for the students in this course include: understanding

state-of-art time series models, performing data analysis of time series using appropriate models, interpreting technical results in scientific context, and performing diagnostics of models. Students in this class have been very motived to learn because of its importance in applications. Students are given six to seven homework assignments and a final project. The final project requires the students to perform statistical analysis on real data and to give a short talk to the class.

STAT 579 Spatial Statistics and Its Biostatistics application: This course is a new topic course to the department. Researchers in diverse areas such as climatology, ecology, environmental health, and real estate marketing are increasingly faced with the task of analyzing data that are highly multivariate, with many important predictors and response variables, geographically referenced, and often presented as maps, and temporally correlated, as in longitudinal or other time series structures. This motivates hierarchical modeling and data analysis for complex spatiotemporal data sets. The course content includes an overview of spatial data, basics of point-referenced data models and areal models, basics of Bayesian inference, hierarchical modeling for univariate and multivariate spatiotemporal data, and point pattern modeling. The textbook we use is widely accepted for graduate-level spatial data analysis courses. Many topics, including spatiotemporal data analysis and point pattern modeling, have been receiving increased attention in the literature and for applications. Students are given several homework assignments and a final project. My goals for the students in this course include: understand basic spatial and spatial-temporal models, performing data analysis of spatial and spatiotemporal data using appropriate models and interpreting technical results within their scientific context. Since this discipline is still under development, it lacks a well-organized software package for use. If I teach this course again, I will devote some time to write an organized study guide of software packages for the students.

STAT 477/577 Introduction to Bayesian modeling: Bayesian modeling is a branch of Statistics that can be very helpful for modeling, inferences, and predictions. This course starts with a review of multivariate probability distributions and then introduces Bayes' rule, prior elicitation, posterior derivation, Markov Chain Monte Carlo computation, single or multiple parameter inferences, and hierarchical linear and generalized linear modeling. We also learned the basics of using 'STAN' package in R, which implements the Hamiltonian Monte Carlo algorithm for computation. My goals for the students include: being able to employ Bayesian modeling to some fundamental inference problems, being familiar with informative and non-informative priors construction, and being capable of carrying out Bayesian inference and correctly interpreting the results. Students are given six to seven homework assignments and a final project. The final project requires the students to perform full Bayesian data analysis to a dataset for goals of interests and write a report.

STAT 474/574 Biostatistics and logistic regression: In this course, we focus on survival analysis and logistic regression. Survival analysis is a branch of statistics analyzing time-to-event data, where the event of interest are commonly seen in the biomedical field, for example, death, the occurrence of cancer relapse after treatment, heart attack, etc. Since time-to-event data is often accompanied by censoring, statistical methods that are typically used are quite different from what students are exposed to in other statistics classes. I teach data display, hazard and survival functions, censoring mechanisms, likelihood principle, single or multiple parameter inferences, parametric proportional hazard and accelerated failure time modeling, Cox survival modeling, Cox survival model diagnosis using Cox-Snell residuals, Deviance residuals, and Schoenfeld residuals, modeling for time-varying coefficients, and modeling for time-varying covariates. Logistic regression is used to obtain a quantitative relationship between categorical outcomes and covariates. I teach basic modeling, likelihood construction, statistical inference, interpretations, and regularized logistic regression. Students are given six to seven homework assignments and a final project. The final project requires a written report for employing data display and modeling skills to answer several questions of interest using a real time-to-event dataset.

4 Peer Evaluation of Teaching

Based on the previous peer evaluations of teaching, I worked on my introduction to each class so as to capture more of the students' attention. This was done by presenting an overview of previous teaching content and some related examples to motivate the students. I also encouraged the students to participate more in class and ask more questions. I included more examples that are related to their subject fields to increase their interests.

5 Student Evaluation of Teaching

STAT 345: Based on multiple teaching assessments, 65% to 90% of the students rated the overall teaching to be effective and highly effective. 70% to 90% of the students thought that they feel comfortable or very comfortable to approach me with questions or comments. Representative student comments include: "Nicely made notes and clear structure. Always knew what we are doing and what was expected!"; "The homework was fantastic and really representative of the exams and class in general."; "She was very willing to help."; "The teacher's preparedness and thorough explanations. Very organized and helpful."; "The features of this course that contributed

to my learning were the notes that Dr. Li gave out to the class for use. The notes were well put together and easy to understand. The examples in these note packets were also very helpful because they closely related to the homework. The homework assignments in this class were also very helpful for when it came time for the exams. As long as you studied the note sheet and the homework, then you are able to be successful in this class. Dr. Li was also very flexible when it came to setting up meetings to answer questions. Most of the time she would give you various times to meet with her outside of her set office hours. She wants her students to succeed in this course, and will do whatever she can to help them. Overall, she is a great professor who knows statistics very well and is willing to help you learn." There were also suggestions, such as, "Daily Quiz. Or iClickers. Something to make class engaging."; "Maybe more real life examples outside of the notes!". In response to some of the past comments, I have improved the organization of the course material and write more clearly on the board. In response to some newer comments, I prepare examples that are more related to their subject fields.

STAT 481/581 Introduction to Time Series Analysis: 90% of the students rated the overall teaching to be effective and highly effective. 80% rated "comfortable" in approaching me. Representative student comments include: "The topics of this course are very useful and interesting. Instructor taught this course in detail, which is really good."; "1. She was very clear about which subjects she wanted us to study. 2. The homework assignments were not too lengthy but required us to do a lot of research. The assignments prepared me for the final project, at least over the subject matter part. 3. She is approachable and the one on one time that I got helped. She responds really well to emails. 4. I would just like to say again that the homework assignments were not too lengthy. I had time to think about what I was writing down, instead of trying copy the right answer down before a short deadline", "Explaining in plain English what we were doing and why"; "Dr. Li is a sweet person that cares about her students. She is thoughtful and challenges the students to work hard (because she works hard)"; "I think it's better for the instructor to pick up some important problems from homework to review." I will use homework problems to review the content when I teach this course again.

STAT STAT 579 Spatial Statistics and Its Biostatistics application: 50% of the students rated the overall teaching to be effective and highly effective. 100% rated "comfortable" in approaching me. Representative student comments include: "The instruction of the R code within the lectures helped significantly"; "Dr. Li is very approachable, and always willing to help. Her lectures are pretty good, and the homework load was very reasonable." "Didn't like our book, it should be accompanied with easier (more practical) book. It is better to include more examples from other sources. The class is more theoretical than practical. She didn't feel very confident and

experienced while teaching". In response to students' comments about needing a more practical book and more applicable contents, I hope this can be addressed in future teaching.

STAT 477/577 Introduction to Bayesian modeling: 100% of the students rated the overall teaching to be effective and highly effective. 100% rated "comfortable" in approaching me. Representative student comments include: "The prof. was very attentive so student can follow the entire course contents"; "The matter of this matter is complex, but she really makes sure everybody understand everything. Sometimes I think there is too much matter for a single course. Probably it would be great have one course focused on theory and other more focused on programming with R and other tools."; " I think the professor puts a lot of time into her lectures, and they are usually very clear. I also really liked the textbook, and thought that the problems chosen were good problems and really contributed to my learning."; "Dr. Li's approachability was the best part about this course. She really took the time to understand my problems with the material and clarify them. Also, her talent for explaining something as complicated as Bayesian Analysis is a testament to her ability as an instructor. Overall, I really enjoyed this class, and I felt like I learned a lot from Dr. Li. I'm so excited to take more classes with her! :)"; "Dr. Li keeps the examples relevant to real-world application of Bayesian analysis. She takes opportunities, whenever possible, to contrast this analysis framework with the classical frequentist approach. Dr. Li also puts a lot of prep time into her lessons and it shows - lectures are easy to follow. Lastly, this level of stat is calculus-based."; "Dr. Li is willing to sometimes just slow down, and explain this math, without making students feel intimidated because their calculus skills need a few pointers. Very patient." Students had suggestions to use a more accessible textbook for an introductory level and also felt a little overwhelmed by too many contents in one semester. Our department now offers two courses as a sequel for Bayesian data analysis, which would make the pace much more easier. If I get to teach the sequel, my pace would be slower and more detail oriented.

STAT 474/574 Biostatistics and logistic regression: 100% of the students rated the overall teaching to be effective and highly effective. 100% rated "comfortable" in approaching me. Representative student comments include: "She's so nice! I really struggled with a homework and she wrote the kindest feedback. I actually thought about framing it because it made me feel so much better about struggling."; "I would teach the class with your own power points. Your notes were great, I liked them much more than his."; "if we can get homework solutions that would be great." Teaching in Spring 2019, I mostly wrote down corrections on students' papers. In response to students' comments though, I will develop more of my notes and post answers to homework problems.

6 Interaction Between Scholarship and Teaching

One of my primary research areas regards Bayesian survival analysis. I employ both Bayesian modeling skills and survival modeling in developing new methodologies for complex time-to-event data. My experience in these two fields helps me to teach the two courses on Bayesian statistics and survival analysis. One reward from teaching these topics is that I have a greater comprehensive knowledge of the best practices. I also found great joy in teaching these courses to students as I have relevant experience to share with them.

Another area of my research regards spatiotemporal data modeling. I have worked on large environmental and epidemiological time-to-event data, which involves subject-specific geographic information. This research prepared me to teach the course Spatial Statistics and Its Biostatistics Application. Since large epidemiological and environmental data are also often collected at multiple time points, there is a call for developing techniques that can analyze spatiotemporally correlated data, such as data in longitudinal or other time series structures. This work also bears on my teaching of Introduction to Time Series Analysis. Teaching this course reinforces my background for doing research in this field.

Lastly, my multidisciplinary collaborations with biostatisticians and toxicologists have recently sparked my interests in causal inferences and mediation analysis. I learned that causal reasoning can play such an important role in interpretations for a lot of statistical models, for example, multivariate regression and mixed modeling. I will be very interested in teaching a sequel of causal inference and mediation analysis.