Fall, 2022 -- APSTA-GE.2401: Statistical Consulting

Instructor: Tod Mijanovich

Zoom Meeting Times: Mondays from September 12 – December 12, 4:55-6:55pm, except for October 10, which session will meet on October 11 (Tuesday) instead.

Course Goals: This course is designed to help masters students of applied statistics develop effective communication, problem solving skills and teamwork in statistical consulting. In this seminar format, students will have the opportunity to develop a project idea with others and to use their statistical knowledge to help refine the statistical questions/tasks. Students are expected to work in small groups of up to four people, or individually. Each working group/individual is expected to present their progress to the rest of the class. Every group/student is required to critique and provide constructive suggestions during their fellow students' presentations. The critiques should focus on effective communications and solutions delivery, including styles of presentations (written materials, slide deck as well as oral presentation styles), correctness and appropriateness of research methodology, statistical modeling strategy, interpretations, etc. Students will also benefit from instructor feedback regarding statistical and presentation issues in their work and possible solutions, and from discussions of statistical problems that arise in others' presented work.

Prerequisites: A course in multivariate regression and a course in study design at the graduate level. Ideally students will have also taken at least one additional statistical modeling course such as multilevel modeling, causal inference, multivariate analysis, or generalized linear models, so that their statistical tools are not limited to ordinary least squares regression models.

Course requirements & grading (3 credits*): Grading for this class is based on participation (50%) and completeness/quality of deliverables (50%). Some important elements of the class are described as follows:

Class exercises: Especially in the first few class sessions, we'll engage in various exercises to work on defining answerable research questions, designing methods for answering those questions, anticipating typical research problems that might arise, exploring best practices for analysis and presentation of results, etc. Participation in these exercises will comprise an important part of the class "participation" requirement.

Consulting Projects and clients: The instructor and class will work together to define possible projects that students can choose from. Students can also come up with their own projects. When there are no external "clients" involved, the professor will serve as the "client" for the project.

Consultants: Each student should sign up for one project as a consultant. In general, student consultants should try to form small consulting teams of 3-4 members to work on the project together. A student may also choose to work alone if he/she has his/her own project.

Presentation: Each consulting project will be presented and discussed in class at least three times—plan and preparation, mid-progress report, and final report.

Critique and discussion of other projects: Each group/student will also serve as the designated discussant(s) and feedback provider(s) for one other project. Discussants should view themselves as "helpful and friendly colleagues" of the consultants who work on the project. Discussants are required to facilitate class presentations and check in regularly with other fellow discussants and consultants on the same project, to help ensure the progress of the consulting project and provide suggestions and feedback for the consulting group.

Project deliverables: The deliverables will be different for each project, to be discussed and agreed to between students and the "client." To complete the deliverables, students should expect to spend approximately 5-10 hours per week outside class meetings understanding the substantive background, getting familiar with the literature, performing analytical work, participating in group discussions, communicating with the "client," report writing, etc. Examples of deliverables include reports of analysis results, a complete research design, a user-friendly software package, etc. There are no *a priori* limitations on the contents of the project or the types of statistical methods used. The only requirement is that the project must involve thoughtful statistical methodologies, such as study design, sampling, data analysis, innovative applications of statistical methodology, innovative tools for visualizing complex data, or any combination of the above, and must result in a clearly presented and understandable set of deliverables.

Interim deliverables: These will depend in part on class exercises still to be determined, but they're also likely to include: regular meetings with the instructor; brief memos/progress reports (frequency to be determined) summarizing consulting and discussant activities and plans for the near future; and written feedback to the consulting project for which you are a critic/discussant, providing helpful suggestions to the consulting group.

Grading Guidelines: The grading will be based on: 1) the quality of the deliverables, 2) the quality and level of participation, and 3) class presentations.

*If a student wishes to register this class for one or two credits, they should contact the instructor to discuss course evaluation criteria. In principle, grading will still be based on class participation (50%) and quality of deliverables (50%). However, the scope of participation and deliverables should be determined with the instructor based on project needs.