

DATASCI 550: Quantitative Sciences Project

Department of Data and Decision Sciences

Emory University

Meeting Room: Math and Science Center Room N301

Meeting Time: TTh 4:00 - 5:15 PM

Instructor: Dr. Kevin McAlister & Dr. Peter Sentz

Email: kevin.mcalister@emory.edu & peter.thomas.sentz@emory.edu

Course Description

Quantitative Sciences Capstone is a culminating experience for DSci juniors and seniors. It is a distinctive collaboration between college and community where organizations (e.g., non-profits, corporations, other university units) bring their unique challenges and DSci faculty put together small teams of students to provide theoretically sound, analytically rigorous, and creative solutions. Each team is composed with student interests, talents, and the particulars of the project challenge in mind. The capstone provides an opportunity for students to apply their knowledge of the foundations, theory, and methods of data science, along with their substantive expertise to address data driven problems in industry, government, and the non-profit sector.

Because of the collaborative nature of the project, all students are required to contribute equally in the joint effort. The anticipated workload is 9-12 hours per student per week, which includes biweekly class meetings. As a capstone, this class will be conducted as a Problem Based Learning classroom, where students are provided with objectives, grading criteria, a problem statement, and deadlines. The project will be provided in writing and discussed on the first day of class. This more closely approximates real-world problem solving, and encourages teamwork, autonomy, working with ambiguous goals, and ownership of the project outcome. Evaluations will be conducted by both the instructors and student peers, and the group deliverables will be evaluated as a whole. The instructors will act only as facilitators and guides; students will be responsible for:

- Directing use of class time
- Determining when and how to meet outside of class
- Determining team communication and expectations

- Completing necessary research and reading related to the problem
- Determining technical approach
- Clarifying and communicating with the project stakeholders via progress reports and a final presentation. The outcome and associated materials (i.e., code, slides, codebook, and white paper) will be presented to the project partner (i.e. an organization) and stakeholders (i.e. individuals) as a practical data product to solve a real-world problem.

Through this course, students will

- Identify and assess personal improvement in coding, presentation, organizational, and writing skills
- Manage project, modes of communication, and conflict resolution in an interdisciplinary team
- Appraise peers' work and recommend solutions/revisions
- Incorporate feedback from peers and stakeholders
- Interpret and summarize project results
- Create visualizations, presentation(s), and documentation
- Use communication as a form of inquiry, invention, and reflection
- Communicate effectively for specialized audiences in more than one genre

Course Requirements

Attendance: Attendance is mandatory for this class. Unexcused absences will result in 1% subtracted from your final grade. The quality of your experience in this class is directly tied to your availability to communicate with the stakeholder and collaborate with your project team. As is the case in real life, a large chunk of success in this class is just showing up and being available. For this reason, only illness and other extreme circumstances will warrant an excused absence. Please do not come to class if sick—contact the instructors in advance of missing class due to illness.

Assignments: Individual and group work outside of class is expected and due dates will be agreed upon by the group. Late assignment submissions affect the entire group's workflow and ability to move the project forward. Late submissions will accrue deductions from individual grades per day overdue and are likely to result in poorer peer evaluations. In addition to the specific assignments described below, individual and group work on the project (coding, analysis, visualizations, etc.) will be agreed upon by the group.

- *White Paper.* At the end of the semester, the team will co-author an in-depth report of the problem and all resulting analysis and recommendations. Each student will be responsible for their assigned section(s) of the white paper and, throughout the final segment of the project submit (1) an outline of their section(s); (2) a draft of their section(s); (3) final sections that the team will integrate into the report. Each of these submissions will receive feedback from the instructor and/or peers. The audience for the white paper is both the external partner/stakeholders and the larger community of interested individuals— the bulk of the paper should be in plain, accessible language but the technical discussion of analysis and results should be included (in an appendix or main text). A literature review or more in-depth background sections may be included depending on the project and team’s discretion.
- *Oral Presentations.* At the end of the semester, the team will co-present their project to the external partner, stakeholders, and other students and faculty at DSci’s DataBlitz conference. The students are responsible for the agenda, content, and slide design (including visualizations) of the presentation as well as answering audience questions. The diverse audience at DataBlitz requires students to present the substantive context/problem, a plain language (and visualized) discussion of the approach and results, as well as more technical details of the project for DSci faculty and students. Prior to DataBlitz, additional formal check-in presentations – in which students present their progress orally (with slides) to the external partner – are highly recommended, but at the discretion of the team.
- *Public-Facing Communications.* During the semester, students will create two public-facing communications for different audiences (additional communications in this category are at the discretion of the team): (1) a short memo, video, or flyer describing the problem and main takeaways to a general audience (e.g. non-technical and outside the substantive area of expertise) and (2) a description of the project for the student’s resume, LinkedIn, or other professional/networking site to a technical audience.
- *Reflections.* Throughout the semester, students will submit short, written reflections on their experience with the project and team, with a focus on areas of growth. In a final reflection at the end of the semester, students will reflect on their

growth in the different areas of the project—substantive expertise, programming and analysis, visualizations, communication via presentation, communication via writing, communication and collaboration with teammates, and organization and project management.

Important Due Dates: Capstone partners expect periodic progress updates throughout the semester and a final deliverable that consists of a presentation of findings/insights, applicable models/code, and a recommended course of action described in a white paper. The key deadlines will be negotiated with the project sponsor before the semester begins. Students will make a presentation of their findings to the stakeholder at DataBlitz, currently scheduled for **April 24th**. All other deliverables (code, codebook, and white paper) are due **May 5th** at the latest.

Grading & Evaluation

- 48% Individual grade--determined by the instructor(s) based on the following criteria:
 - 15% Active class participation
 - 25% individual assignments such as leadership role(s), drafts, code reviews, public-facing communications, and reflections
 - 8% Individual contributions to final deliverables and presentations to stakeholders
- 30% Common grade-- determined by final report and presentation
 - 10% Presentation
 - 15% Whitepaper
 - 5% Quality of Data Product and Documentation
- 10% Stakeholder grade --determined by instructors and stakeholder
 - 5% Summarization, discussion, and completion of stakeholder feedback
 - 5% Stakeholder evaluation of response to feedback and requests
- 12% Peer Evaluation --determined by peer evaluations conducted throughout the semester
 - 3% Team Project Evaluation 1
 - 4% Team Project Evaluation 2
 - 5% Team Project Evaluation 3

Accessible Learning and Accommodations: There are a variety of resources on campus to improve your learning in this course and in any course at Emory, including the Emory Writing Center, Department of Accessibility Services, Emory Libraries, and Academic Advising at the Office of Undergraduate Education. If you need official academic accommodations, you have a right to have these met. If you are seeking classroom accommodations or academic adjustments, you should register with Office of Accessibility Services (<http://accessibility.emory.edu>). To utilize any academic accommodations for this class, please ensure you submit your official DAS letter as soon as possible and meet with the instructor(s) at the beginning of the semester to discuss your needs for this course. As exam proctoring and other accommodations take time to set up, you need to give at least two weeks' notice prior to the use of accommodations.

Writing Center: The Emory Writing Center (EWC) is open year-round to support writers in Emory College. They offer one-on-one remote and in-person tutoring for writers working on a range of composition projects (essays, applications, reports, theses, etc.), at any stage of the writing process (from brainstorming to final revisions). Writing Center tutors work on idea development, structure, use of sources, style, grammar, and more. They are not a proofreading or editing service, but rather offer strategies and resources writers can use as they compose, revise, and edit their own work. Tutors also support the literacy needs of English Language Learners (ELL); several tutors are trained ELL Specialists. The Writing Center is located in Callaway N111 and a maximum of two appointments are allowed each week. You can learn more about the Emory Writing Center and make an appointment on their website: <http://www.writingcenter.emory.edu>. Please review their policies before your first appointment, including their new policy on inclusivity and respect.

Incomplete Grades: Incompletes are now handled by Emory's Office of Undergraduate Education, with permission of instructors. The College's general policy on Incompletes can be found here: (<https://catalog.college.emory.edu/policies/incompletes.html>); further questions can be directed to your OUE Academic Advisor. There must be an agreement between the instructor and the student prior to the end of the course for approval of an Incomplete, in addition to the approval from OUE.

Honor Code: All students enrolled at Emory are expected to abide by the Emory College Honor Code. Any type of academic misconduct is not allowed which includes 1) receiving or giving information about the content or conduct of an examination knowing that the release of such information is not allowed and 2) plagiarizing, whether intentionally or unintentionally, on any assignment. For the activities that are considered to be academically dishonest, refer to the Honor Code:

<http://catalog.college.emory.edu/academic/policies-regulations/honor-code.html>. If you have questions regarding the use of generative AI (such as ChatGPT) and what would be considered an Honor Code violation in this course, please contact the instructor prior to submitting the assignment in question.