MATH 4180 – Solving Industrial Research Problems

Syllabus Spring 2021, University of Minnesota Duluth

Professor: Dr. Tracy Bibelnieks
Office: Online Only
Email: tbibelni@d.umn.edu (preferred method of communication!)
Co-Instructor: Kim Mandery
Email: mande143@d.umn.edu
Office hrs: By appointment – email either Dr. B or Ms. Mandery to set up office hours.
Class Time: 2:00 – 3:15 MW on Zoom (see math4180.netlify.app for zoom meeting information)

Canvas and Course Web Site

Our UMD Canvas site will be for grades and for communication (mass email to all class for announcements) on a limited basis. The course website is math4180.netlify.app.

Course Description: This class is an opportunity to learn the art and mathematical/statistical techniques of data science with a focus on data analytics. The in-depth and semester long project used in this course is designed to give you breadth and depth of experience that mirrors what you would experience in the real world as a data science professional. A major portion of this course will be learning and applying statistical and computational software tools and techniques to answer the data question of the project.

Text: There is no required text for this course. A variety of open source resources will be used throughout the semester. All instructional material will be open source and can be accessed through the course website.

Technology/Software: You MUST have a computer with dependable or high speed internet access to a web browser along with a microphone and web cam. You will be required to use software in this course that is not accessible through the UMD VPN login (UMD does not support RStudio). Please contact Dr. Bibelnieks with technology issues as soon as possible as there may be an option to use RStudio Cloud for your work.

Learning Objectives: At the end of this semester I, as a student, will be able

- To perform data visualization, data cleaning, data augmentation and data organization

- To apply ethical uses of data in using results of data analytic

- To discern appropriate statistical, computational, and modeling approaches to data problems

- To write technical and nontechnical reports of data analytic insights

- To write professional level correspondence to ask questions/gather information

- To give professional level presentations to technical and nontechnical audiences whether in academic or industrial settings

Attendance/Participation in Team Meetings Outside of Class: Attendance and participation during class is essential and expected. Project team meetings outside of class will be required.

Personal Evaluations: You are expected to carry your weight within your group. There is no one that can bring your particular skillset to your group other than you. If you don't carry your weight, you are jeopardizing the project. As such, you will be required to submit evaluations on your yourself, documenting the tasks you have completed along with your group. Your goal is to work towards preparing a final technical report of the project with data analysis and strategic solution outcomes. As such, you must do your individual part.

Weekly Tasks: You will be required to complete weekly tasks as outlined on the course website. The schedule is fluid and may be adjusted to ensure the management timeline of the tasks and data project are appropriate for the course.

Final Group Presentations: Your group will give a final group presentation that may be recorded. This presentation will be held during the last week of class for this course.

Final Group Paper: Your group will write a technical paper summarizing the work of the semester. The breadth, depth and scope of the content will determine the length (minimum 3-pages, LaTex journal style paper).

Calendar	%Grade	Course Component
Weeks 1 – 2	**10%**	Data Visualization and basic statistics/analytic techniques.
		Focus on software, accessing data, preliminary data science techniques.
Weeks 3 – 4	**15%**	In depth look at data project and review of research literature.
		Continued teaching and development of knowledge/use of RStudio, github, and Slack.
		Focus on techniques of imputing data values and missing data.
Week 4 – 5	**10%**	Project team selection and teamwork begins. Preliminary data/strategy
		Exploration, literature/outside data source research, development of management
RStudio,		Timelines (specific to project). Continued teaching and development of knowledge/use of
		github, Slack for communication with focus on ethics of data use and analysis..
Weeks 6 – 10	**30%**	Data project work continues (with weekly management timelines/benchmark setting)
		Continued development of use of RStudio, github, Slack. Predictions of modelling due March 1, Week 8.
Weeks 11 – 12	**10%**	Preliminary report and assessment of strategic problem solutions with emphasis on further
		Exploration/extension of project/data analysis.
		Continued work on finalizing projects.
Weeks 13 – 14	**15%**	In-house preparation/practice of final presentations, technical reports.
		Development of personal netlify websites.
Week 15	**10%**	Finalizing formal presentations to class.
		Submission of final project products (technical paper and video presentation).
		Final presentations will take place during Final Exam week.

Rules of Engagement
- Respect. You should treat this course as a professional work engagement where Dr. Bibelnieks and Ms. Mandery are your direct supervisors.

- *All participants are expected to be considerate, respectful, and collaborative, and will refrain from demeaning, discriminatory, or harassing behavior and speech. Participants are expected to be mindful of their surroundings and of their fellow participants. This means that any intimidating, harassing, abusive or demeaning conduct of any kind will not be tolerated. Participants asked to stop any unacceptable behavior are expected to comply immediately.** Participants violating this Code of Conduct may be asked to withdraw from the course at the sole discretion of the instructors. In such cases, behavior of participants may also be reported to the appropriate agencies at the University of Minnesota Duluth.
- Meetings with group members outside of course zoom sessions should be conducted professionally and will adhere to the conduct in the previous bullet.
- Disagreements, complaints, issues with personnel (students or supervisors) should be communicated directly to Dr. Bibelnieks.
- Deadlines are deadlines - in order to complete a project within the scope of this semester we will need to attend to a consistent work ethic that includes significant time OUTSIDE of class.

UNGRADING

The percentages listed in the timeline refer to approximate time/effort needed to successfully complete the project and the course. The rubric for grading in this course is simple – all students are eligible to receive a 4.0 for satisfactory consistent engagement, effort and delivery of (1) a predictive model in Week 8 and (2) a technical paper and presentation at the end of the course. So, what is "ungrading"? In reviewing your performance in this course, we will use vocabulary commensurate with professional work in non-academic jobs. I will not be grading you but rather assessing your progress in the course against timelines and benchmarks. I will not answer questions about "what grade did I get?" but will rather ask YOU "what did you learn?". There will be no judgement, criticism or negative indicators usually associated with the usual system of percentages and letter grades. Instead, the focus will be on the challenges and opportunities presented to you in the course, your engagement, and the use of constructive feedback from myself and Ms. Mandery to contribute to you meeting the learning objectives in the course. At any time in this course, if I, as the instructor, or Kim Mandery, the co-instructor, feel that a student has fallen below the level of expectation of engagement, effort and contribution, I, Dr. Bibelnieks, will contact the student for a one-on-one meeting. Together, the student and I will decide how to move forward in the course. This discussion will include discussion of possible options for ending the course with a 4.0 or an agreed upon lesser grade. The lesser grade will be contractual with specific obligations and expectations articulared for the student.

*This code of conduct is consistent with WiDS, the organization sponsoring the data project, and is taken from the Stanford University Code of Conduct https://adminguide.stanford.edu/chapter-1/subchapter-1/policy-1-1-1

Academic Policies and Other Resources

Student Conduct Code

Appropriate class conduct promotes an environment of academic achievement and integrity. Disruptive behavior that substantially or repeatedly interrupts either the instructor's ability to teach, or student learning, is prohibited, including online. Student are expected adhere to Board of Regents Policy.

Teaching & Learning: Instructor and Student Responsibilities

UMD is committed to providing a positive, safe, and inclusive place for all who study and work here. Instructors and students have mutual responsibility to insure that the environment in all of these settings supports teaching and learning, is respectful of the rights and freedoms of all members, and promotes a civil and open exchange of ideas.

Academic Integrity

Academic dishonesty tarnishes UMD's reputation and discredits the accomplishments of students. Academic dishonesty is regarded as a serious offense by all members of the academic community. UMD's Student Academic Integrity Policy.

Final Exams

All 1xxx-5xxx courses offered for undergraduate credit should include a final graded component or end of term evaluation that assesses the level of student achievement of one or more course objectives. All final graded components are to be administered or due at the time and place according to the final exam schedule and not during the last week of class. Reference the full Final Examinations Policy. There will be no final exam for this course but there will be a final graded component due at the scheduled Final Exam time.

Excused Absences

Students are expected to attend all scheduled class meetings. It is the responsibility of students to plan their schedules to avoid excessive conflict with course requirements. However, there are legitimate and verifiable circumstances that lead to excused student absence from the classroom. These are subpoenas, jury duty, military duty, religious observances, illness, bereavement, and NCAA varsity intercollegiate athletics. Referencing the full Excused Absences Policy for complete information.

Policy on Late and Make-up Work

Late work will only be allowed under extenuating circumstances. Please talk to me about your situation as soon as you are able.

Appropriate Student Use of Class Notes and Course Materials

Taking notes is a means of recording information but more importantly of personally absorbing and integrating the educational experience. However, broadly disseminating class notes beyond the classroom community or accepting compensation for taking and distributing classroom notes undermines instructor interests in their intellectual work product while not substantially furthering instructor and student interests in effective learning. For complete details, reference the Appropriate Student Use of Class Notes and Course Materials Policy.

Students with Disabilities

It is the policy and practice of the University of Minnesota Duluth to create inclusive learning environments for all students, including students with disabilities. If there are aspects of this course that result in barriers to your inclusion or your ability to meet course requirements such as time limited exams, inaccessible web content, or the use of non-captioned videos, please notify the instructor as soon as possible. You are also encouraged to contact the Office of Disability Resources to discuss and arrange reasonable accommodations. Call 218-726-6130 or visit the Disability Resources web site for more information.

Sexual Harassment

"Sexual harassment" means unwelcome sexual advances, requests for sexual favors, and/or other verbal or physical conduct of a sexual nature. Such conduct has the purpose or effect of unreasonably interfering with an individual's work or academic performance or creating an intimidating, hostile, or offensive working or academic environment in any University activity or program. Such behavior is not acceptable in the University setting. For more information, reference the full Sexual Harassment Policy.

Equity, Diversity, Equal Opportunity, and Affirmative Action

The University provides equal access to and opportunity in its programs and facilities, without regard to race, color, creed, religion, national origin, gender, age, marital status, disability, public assistance status, veteran status, sexual orientation, gender identity, or gender expression. The UMD Department of Human Resources & Equal Opportunity is available to all UMD employees, students, and participants in University-related activities to discuss issues or concerns regarding University policies or practices involving potential bias, discrimination, harassment or retaliation that an individual may have experienced or observed. For more information, reference the full Equity, Diversity, Equal Opportunity, and Affirmative Action Policy.

The University of Minnesota Duluth's Land Acknowledgment

We collectively acknowledge that the University of Minnesota Duluth is located on the traditional, ancestral, and contemporary lands of Indigenous people. The University resides on land that was cared for and called home by the Ojibwe people, before them the Dakota and Northern Cheyenne people, and other Native peoples from time immemorial. Ceded by the Ojibwe in an 1854 treaty, this land holds great historical, spiritual, and personal significance for its original stewards, the Native nations and peoples of this region. We recognize and continually support and advocate for the sovereignty of the Native nations in this territory and beyond. By offering this land acknowledgment, we affirm tribal sovereignty and will work to hold the University of Minnesota Duluth accountable to American Indian peoples and nations.

To learn more about the context of this land acknowledgment, visit UMD's website on campus history.

Mental Health and Stress Management

Feelings such as anxiety, anger, depression, low self-esteem, or tension are a normal part of being human and can affect anyone. Sometimes these feelings are temporary and can be eased by rest, relaxation, exercise, good nutrition and the support of trusted friends. At other times, stressors, relationships or past family experiences cannot be managed so easily and become overwhelming. If this happens, and you find it hard to function, you may want to seek professional help. Counseling Services are available at UMD Health Services to assist you. If you are in need of mental health support when Health Services is closed, or in case of an emergency, please contact The Birch Tree Center's Crisis line at 218-623-1800 or go to the emergency room/urgent care at either St. Luke's Hospital or St. Mary's Hospital. If an ambulance is needed, call 911. If the emergency is non-life-threatening and you do not have a means of transportation, call Campus Police at 218-726-7000). If you have needs that Counseling Services does not treat, they have a case manager who helps connect students to referrals as well as navigating issues with insurance. You can learn more about the broad range of confidential mental health services available on campus at UMD Health Services.

Academic Policy Statements became effective: January 3, 2011 and was last updated as follows: Approved by EPC April 28, 2010; amended and approved by Campus Assembly November 9, 2010, updated & approved by EVCAA April 28, 2017; revised by TLC 10-31-18; approved by EVCAA 1-10-19 Policy Owner: Academic Affairs

This syllabus is subject to change. Changes will be announced through CANVAS announcements.