

Intro to Machine Learning (1st half)

Syllabus

Jared S. Murray

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This class is an introduction to supervised learning, i.e., machine learning for prediction. On successfully completing this course students will understand the bias-variance tradeoff in building predictive models, and how to tune and choose prediction methods to (approximately) optimize that tradeoff. They will be familiar with fundamental methods in supervised learning, know how to implement them in R, and effectively communicate their findings in writing and in presentations. This course has a very applied focus, with more in-depth coursework to follow later in the program. Topics covered include: (i) k -Nearest Neighbors, the bias-variance tradeoff, and cross-validation; (ii) Tree methods and ensembling via bagging and boosting (iii) Regression and variable selection; (iv) Classification; and (v) Neural Nets.

This is going to be a very intensive class and students are expected to keep up with the readings, labs, and assignments on a daily basis!

1. Text Book: We will be using as required text

An Introduction to Statistical Learning by James, Witten, Hastie and Tibshirani.

Our goal is to cover most of chapters 1, 2, 3, 4, 5, 6, 8 and 10 (not in that order!). Students are expected to read the the chapters as we cover the material and complete the R labs at the end of each chapter.

2. Class Notes: All course materials include slides and sample code will be made available in the class website at:

https://jaredsmurray.github.io/sta380_msba/

3. Office hours: Our TA (Pedro Lima plima@utexas.edu) will hold office hours on Zoom, with times TBD (posted to the course website)

3. Evaluation: Your grade in this part of this course will be based on: **(1)** a substantial, cumulative homework assignemnt (60% of the grade), **(2)** an individual prediction project (10% of the grade), **(3)** a group project with a class presentation, code and data as deliverables (30% of the grade). Both 1 and 2 will be due by **10PM on August 4**, and the presentations for 3 will take place **July 29-30 during class**.

University Policies

RELIGIOUS HOLYDAYS

By UT Austin policy, you must notify me of your pending absence at least fourteen days prior to the date of observance of a religious holy day. If you must miss a class, an examination, a work assignment, or a project in order to observe a religious holy day, you will be given an opportunity to complete the missed work within a reasonable time after the absence.

SHARING OF COURSE MATERIALS IS PROHIBITED

Sharing of Course Materials is Prohibited: No materials used in this class, including, but not limited to, lecture hand-outs, videos, assessments (quizzes, exams, papers, projects, homework assignments), in-class materials, review sheets, and additional problem sets, may be shared online or with anyone outside of the class unless you have my explicit, written permission. Unauthorized sharing of materials promotes cheating. It is a violation of the University's Student Honor Code and an act of academic dishonesty. I am well aware of the sites used for sharing materials, and any materials found online that are associated with you, or any suspected unauthorized sharing of materials, will be reported to Student Conduct and Academic Integrity in the Office of the Dean of Students. These reports can result in sanctions, including failure in the course.

FERPA AND CLASS RECORDINGS

Class recordings are reserved only for students in this class for educational purposes and are protected under FERPA. The recordings should not be shared outside the class in any form. Violation of this restriction by a student could lead to Student Misconduct proceedings.

STUDENT RIGHTS & RESPONSIBILITIES

You have a right to a learning environment that supports mental and physical wellness. You have a right to respect. You have a right to be assessed and graded fairly. You have a right to freedom of opinion and expression. You have a right to privacy and confidentiality. You have a right to meaningful and equal participation, to self-organize groups to improve your learning environment. You have a right to learn in an environment that is welcoming to all people. No student shall be isolated, excluded or diminished in any way.

With these rights come responsibilities: You are responsible for taking care of yourself, managing your time, and communicating with the teaching team and with others if things start to feel out of control or overwhelming. You are responsible for acting in a way that is worthy of respect and always respectful of others. • Your experience with this course is directly related to the quality of the energy that you bring to it, and your energy shapes the quality of your peers' experiences. You are responsible for creating an inclusive environment and for speaking up when someone is excluded. You are responsible for holding yourself accountable to these standards, holding each other to these standards, and holding the teaching team accountable as well.

ACADEMIC INTEGRITY

Each student in the course is expected to abide by the University of Texas Honor Code: "As a student of The University of Texas at Austin, I shall abide by the core values of the University and uphold academic integrity." Plagiarism is taken very seriously at UT. Therefore, if you use words or ideas that are not your own (or that you have used in previous class), you must cite your sources. Otherwise you will be guilty of plagiarism and subject to academic disciplinary

action, including failure of the course. You are responsible for understanding UT's Academic Honesty and the University Honor Code which can be found at the following web address: deanofstudents.utexas.edu/conduct

UNIVERSITY RESOURCES FOR STUDENTS

There are also a range of resources on campus:

SERVICES FOR STUDENTS WITH DISABILITIES

This class respects and welcomes students of all backgrounds, identities, and abilities. If there are circumstances that make our learning environment and activities difficult, if you have medical information that you need to share with me, or if you need specific arrangements in case the building needs to be evacuated, please let me know. I am committed to creating an effective learning environment for all students, but I can only do so if you discuss your needs with me as early as possible. I promise to maintain the confidentiality of these discussions. If appropriate, also contact Services for Students with Disabilities, 512-471-6259 (voice) or 1-866-329- 3986 (video phone). diversity.utexas.edu/disability/about

COUNSELING AND MENTAL HEALTH CENTER

Do your best to maintain a healthy lifestyle this semester by eating well, exercising, avoiding drugs and alcohol, getting enough sleep and taking some time to relax. This will help you achieve your goals and cope with stress.

All of us benefit from support during times of struggle. You are not alone. There are many helpful resources available on campus and an important part of the college experience is learning how to ask for help. Asking for support sooner rather than later is often helpful.

If you or anyone you know experiences any academic stress, difficult life events, or feelings like anxiety or depression, we strongly encourage you to seek support. cmhc.utexas.edu/individualcounseling.htm

STUDENT EMERGENCY SERVICES

If at any time you experience an emergency that necessitates your absence from a class requirement (e.g., attendance, assignment submission, or exam), please report your circumstances and absence via the Student Emergency Services website: deanofstudents.utexas.edu/emergency

IMPORTANT SAFETY INFORMATION

If you have concerns about the safety or behavior of fellow students, TAs or Professors, call BCAL (the Behavior Concerns Advice Line): 512-232-5050. Your call can be anonymous. If something doesn't feel right – it probably isn't. Trust your instincts and share your concerns.

TITLE IX REPORTING

Title IX is a federal law that protects against sex and gender-based discrimination, sexual harassment, sexual assault, sexual misconduct, dating/domestic violence and stalking at federally funded educational institutions. UT Austin is committed to fostering a learning and working environment free from discrimination in all its forms. When sexual misconduct occurs in our community, the university can: (1) Intervene to prevent harmful behavior from continuing or escalating. (2) Provide support and remedies to students and employees who have experienced harm or have become involved in a Title IX investigation. (3) Investigate and discipline violations of the university's relevant policies.

Faculty members and certain staff members are considered “Responsible Employees” or “Mandatory Reporters,” which means that they are required to report violations of Title IX to the Title IX Coordinator. I am a Responsible Employee and must report any Title IX related incidents that are disclosed in writing, discussion, or one-on-one. Before talking with me, or with any faculty or staff member about a Title IX related incident, be sure to ask whether they are a responsible employee. If you want to speak with someone for support or remedies without making an official report to the university, email advocate@austin.utexas.edu For more information about reporting options and resources, visit titleix.utexas.edu or contact the Title IX Office at titleix@austin.utexas.edu.

The following recommendations regarding emergency evacuation from the Office of Campus Safety and Security, 512-471-5767, operations.utexas.edu/units/csas Occupants of buildings on The University of Texas at Austin campus are required to evacuate buildings when a fire alarm is activated. Alarm activation or announcement requires exiting and assembling outside. (1) Familiarize yourself with all exit doors of each classroom and building you may occupy. Remember that the nearest exit door may not be the one you used when entering the building. (2) Students requiring assistance in evacuation shall inform their instructor in writing during the first week of class. (3) In the event of an evacuation, follow the instruction of faculty or class instructors. Do not re-enter a building unless given instructions by the following: Austin Fire Department, The University of Texas at Austin Police Department, or Fire Prevention Services office. (4) Link to information regarding emergency evacuation routes and emergency procedures can be found at: emergency.utexas.edu