Overview
This course is an introduction to machine learning, focusing on supervised learning. We will cover the mathematical foundations of learning and a number of important techniques for classification and regression, including linear and logistic regression, neural networks, nearest neighbor techniques, kernel methods, decision trees, and ensemble methods. Note that the material in this course is a prerequisite for CSE 517A, the graduate level machine learning class.

Prerequisites
CSE 247, ESE 326 (or Math 320), Math 233, and Math 309 (can be taken concurrently) or equivalents. If you do not have a solid background in calculus, probability, and computer science through a class in data structures and algorithms then you may have a hard time in this class.

Format
Class sessions will be lectures. There will be two in-class exams, one in early October (tentatively October 8th), and one on the last day of class, December 5th. There will be no separate final exam. There will be 5 or 6 homework assignments that will involve a mix of programming/computational exercises and pencil-and-paper problems; homeworks will be assigned roughly every other week. Students will submit homeworks online using the Gradescope platform.

Preliminary List of Topics
2. Generalization in finite and infinite hypothesis spaces. Training versus testing, model complexity, the VC bound, the bias-variance tradeoff.
3. Linear models: the perceptron, regression, logistic regression.
5. Overfitting. Regularization and validation as ways of preventing overfitting.
6. Modern supervised learning techniques, including decision trees, neural networks, nearest neighbor methods, support vector machines, boosting, and random forests.
7. Issues related to fairness, accountability, transparency, and ethics in machine learning.
Textbooks
We will use the following textbooks:


In lieu of lecture notes, we will give references sections to sections of the above textbooks that correspond to the material covered in that lecture. Also, the slides for every lecture will be made available just before each class.

Announcements
All announcements related to the class will be made either in lecture or posted on the course website. We will assume that any announcement made on the website is known to everyone within 24 hours of it being posted. It is important to check the website regularly! You are responsible for all announcements made in lecture or on the website.

We will use Piazza for all questions and discussions related to the class. Please post questions on Piazza: they will reach the instructors as well as all the TAs and you will get a quicker response. Individual emails about class issues will typically be met with a response saying “Please post your question to Piazza.” The Piazza site can be found here: https://piazza.com/wustl/fall2019/cse417t/home/

Assessment and Course Grade
Your overall course score will be determined on a curve using the following weights:

1. Homework assignments: 50%
2. Each in-class exam: 25%

Your lowest homework grade will be discounted by 50% when computing your final grade. If you would like to appeal your grade on any work, you must do so within 7 days of the work being handed back. All appeals will be made through Gradescope. In order to appeal a grade, you must provide a detailed statement explaining why you believe the assigned grade is incorrect. We may regrade the entire piece of work, and your grade may go up, down or stay the same.

Late Days
Assignments will be due by 9PM on the due date. Each student will be given a budget of five late-days that they can use to turn in homeworks late. A late-day can be used without explanation to extend a homework submission deadline by 24 hours, but no more than two late-days can be used on any one homework.

Any part of a late-day that you use counts as a full late day. For example, if you do not submit your homework until 10PM and it is due at 9PM, that counts as a full late-day. If you submit an assignment 26 hours late, you will have used two late-days.
You are responsible for keeping track of your usage of late-days. Use your late-days wisely, if at all. This late-day policy is intended to cover unanticipated things like minor sickness, exams in other classes, etc. so that you do not have to ask for extensions. Once you have used up your budget of late-days you will not be allowed to turn in homeworks late for any reason other than true medical or family emergencies.

**Collaboration and Academic Integrity**

In this class, you are allowed to collaborate on assignments to the following extent: you are welcome to discuss problems with each other and to take your own notes during these discussions. However, **you must write up solutions on your own**. Additionally, you must write in your submission the names of all students you discussed each problem with and any external sources you used in a significant manner in solving the problem. Lack of citations is a serious violation of this policy.

You may not use any solution keys, guides, or solutions prepared by others, however obtained, from previous versions of the class, similar classes, or the textbooks. You may not give or receive help from other students in the class on exams.

Submitting an assignment or exam that is in violation of this policy will automatically lead to receiving no credit for the assignment and a reduction of at least one grade modifier (e.g. from B to B-) beyond that in the overall course grade. Depending on the circumstances, it could also lead to harsher penalties such as a failing grade in the class and initiation of the appropriate school’s formal academic integrity review process. If you have any questions about the level of collaboration permitted or any other aspect of this policy, please speak with the instructors before handing in the assignment!

**Other Accommodations and Resources**

**Accommodations based upon sexual assault**

The University is committed to offering reasonable academic accommodations to students who are victims of sexual assault. Students are eligible for accommodation regardless of whether they seek criminal or disciplinary action. Depending on the specific nature of the allegation, such measures may include but are not limited to: implementation of a no-contact order, course/classroom assignment changes, and other academic support services and accommodations.

If you need to request such accommodations, please direct your request to Kim Webb, Director of the Relationship and Sexual Violence Prevention Center, or Jen Durham Austin. Both Kim Webb and Jen Durham Austin are confidential resources; however, requests for accommodations will be shared with the appropriate University administration and faculty. The University will maintain as confidential any accommodations or protective measures provided to an individual student so long as it does not impair the ability to provide such measures.

If a student comes to us to discuss or disclose an instance of sexual assault, sex discrimination, sexual harassment, dating violence, domestic violence or stalking, or if we otherwise observe or become aware of such an allegation, we will keep the information as private as we can, but as faculty members of Washington University, we are required to immediately report it to our Department Chairs or Deans or directly to Ms. Jessica Kennedy, the University’s Title IX Coordinator. If you would like to speak with the Title IX Coordinator directly, Ms. Kennedy can be reached at (314) 935-3118, jw kennedy@wustl.edu, or by visiting the Title IX office in Umrath Hall.
Additionally, you can report incidents or complaints to the Office of Student Conduct and Community Standards or by contacting WUPD at (314) 935-5555 or your local law enforcement agency. See: https://titleix.wustl.edu/ You can also speak confidentially and learn more about available resources at the Relationship and Sexual Violence Prevention Center by calling (314) 935-3445 or visiting the 4th floor of Seigle Hall. See: https://rsvcenter.wustl.edu

Bias reporting
The University has a process through which students, faculty, staff and community members who have experienced or witnessed incidents of bias, prejudice or discrimination against a student can report their experiences to the University’s Bias Report and Support System (BRSS) team. See: https://students.wustl.edu/bias-report-support-system

Mental health
Mental Health Services professional staff members work with students to resolve personal and interpersonal difficulties, many of which can affect the academic experience. These include conflicts with or worry about friends or family, concerns about eating or drinking patterns, and feelings of anxiety and depression. See: http://shs.wustl.edu/MentalHealth

Center for Diversity and Inclusion
The Center for Diversity and Inclusion (CDI) supports and advocates for undergraduate, graduate, and professional school students from underrepresented and/or marginalized populations, creates collaborative partnerships with campus and community partners, and promotes dialogue and social change. One of the CDI’s strategic priorities is to cultivate and foster a supportive campus climate for students of all backgrounds, cultures and identities. See: https://students.wustl.edu/center-diversity-inclusion/