

# Applied Machine Learning

Matt Kusner & Brooks Paige

COMP0081 Module Overview

# Instructors



Matt Kusner



Brooks Paige

Best way to reach us for this module: **COMP0081 Moodle**

# What is COMP0081?

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This module is **not about how to use existing toolkits** such as Scikit-learn.

It is “applied” in the sense that the topics covered center on methods, challenges, and pitfalls that relate to many real-world data analysis tasks.

**You will need to understand the mathematics behind these methods, and be able to code them yourself!**

# Prerequisites

The **lectures focus on the mathematics** of the topics we will cover. We will assume familiarity with:

- Linear algebra
- Probability
- Multivariate calculus

There is a math “placement exam” / self-test in the first week Moodle section, as well as links to resources.

The **courseworks focus on implementation** of these methods, by programming them yourself in **Python** and analyzing their behavior.

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The **courseworks focus on implementation** of these methods, by programming them yourself in **Python** and analyzing their behavior.

- **If you do not understand the math, you will struggle with the coursework.**

# Course outline

Week 1 Course overview; applied ML intro and background

Week 2 Optimization; linear models and regularization

Week 3 Decision trees and ensembles

Week 4 Nearest neighbors and metric learning

Week 5 Kernel methods and Gaussian processes

*(reading week)*

Week 6 Automatic differentiation and deep learning

Week 7 Clustering; visualization

Week 8 Matrix factorization and dimensionality reduction

Week 9 Causality

Week 10 Data ethics, fairness, and privacy

■ Matt

■ Brooks

# Online delivery

- Weekly video lectures will be **pre-recorded and available on Moodle** at the start of the week, along with links to other resources
- **Use Moodle for questions** and discussions — we will monitor these!
- Two weekly synchronous sessions: **Monday and Friday, 4pm, Zoom** we will hold online Q&A sessions, where we will discuss unresolved or challenging questions that came up on Moodle, and will take additional questions in chat.



# Assessment

Two **individual** courseworks, 50% each

- Programming assignments, in **Python**
- Other languages (Matlab, R, Julia, ...) are **not** supported

# Math background self-assessment

Matt has a self-test on his website for gauging familiarity with math background for the module:

[http://mkusner.github.io/comp0081\\_pretest.html](http://mkusner.github.io/comp0081_pretest.html)

A link to this is also posted on Moodle.