AMATH 515
Optimization: Fundamentals and Applications

Winter 2020, MW 9:00 - 10:20, Online (Zoom ID = 966 6775 4570).

Instructor: Sasha Aravkin, *saravkin@uw.edu*. Zoom ID = 942 1287 1177.

Teaching Assistant: Alexey Sholokhov, *aksh@uw.edu*. TBD.

Course Description and Objectives. We aim to give a basic introduction to optimization, including modeling, algorithms, and theory. This class serves students gearing up for research in optimization methods, as well as users of optimization in various areas.

The course covers a range of problem types and algorithms, with many detailed motivating examples and emphasis on building blocks and practical implementation. Theoretical development required to support deeper understanding is presented, including key concepts of convex analysis and duality, and basic analysis of the algorithms and objects we study.

Prerequisites. Proficiency in linear Algebra and advanced calculus/analysis. Strongly recommended: familiarity and/or strong interest in statistics, as many of our models require statistical modeling. Desirable: optimization, e.g. Math 408, scientific programming experience in Python.

References.

- *Course notes*. These will be available on Canvas.
- *Convex Optimization*, Stephen Boyd. (Helpful secondary reference).
- *First-Order Methods in Optimization*, Amir Beck. (Helpful secondary reference).
- *Numerical Recipes*, Nocedal and Wright. (Helpful secondary reference).
- Papers discussed in class will be available on Canvas.

Course Webpage. `https://canvas.uw.edu/courses/1352857`.
You can find this directly through Canvas.

Grading Policy. Grading will be based on **five homework assignments**. The homeworks will cover modeling, theory, and computation. Homework will be submitted via Gradescope. Use code **BPBN4V** to register at `gradescope.com`.

All theoretical solutions must be uploaded as PDF; LaTeX is recommended for typesetting. Computational solutions will be uploaded as notebooks. LaTeX solution templates for the homeworks (as well as starter code in Python) will be provided on the course website. Late homework accepted only with doctor's note or letter from dean.