



MATH 4320/8326 Computational Operations Research

MW 4:00-5:15pm | Dr. Love

Prerequisite: MATH 3200 and MATH 4300 or permission of instructor.

Operations research uses mathematics, computer science, and economics to address advanced data science and analytics problems.

You have the data. It's been cleaned. It's been analyzed. Now you want to use it to **optimize** your operations. You need operations research. Some examples:

- **Scheduling workers:** you have the forecast based on historical data showing how many workers are needed at what times over the next six months. You have a pool of workers. Do you need to hire more? How do you **optimally** schedule them?
- **Manufacturing:** the busy holiday season is coming up and you want to make sure you have enough of your products in stock to meet demand. You need to balance the amount (and cost) of warehouse space needed to store the product with the amount of overtime needed to pay workers closer to the holidays so that you don't need to store so much. What the **optimal** production plan?
- **Routing and scheduling:** an insurance company has a staff of nurses who visit policy holders to do wellness and post-hospitalization checks. This reduces the number and cost of doctor visits and allows the infirm to be seen at home rather than having to travel. How do you **optimally** determine which patients each nurse sees on a given day? In which order does she see them so that her route is shortest?
- **Revenue management:** you own a rental car agency (or hotel chain or airline). You know when your busy times are...times all your inventory (cars, rooms, seats) is exhausted. You realize you could increase your revenue if you charged higher rates during those times. But you don't want to charge too much because you might end up with extra unused supply which loses you money. Maybe you rent some at your normal rate, but save some for the last-minute bookers. Or maybe you have multiple rate tiers. How do you decide how many? Where the cut-off points are? What the rates for each are? In an **optimal** manner.

In this course, we'll work on:

- building mathematical models of such problems
- implementing solution methods using both optimization software as well as implementing our own metaheuristic algorithms (e.g. genetic algorithms)
- solve real-world problems (using real-world data)

Do you want to learn the impact of operations research? Visit <https://youtu.be/9-MITCoka-Q>



For More Information:

Dr. Love | blove@unomaha.edu