



## COURSE CONTENT

- 📖 Convex Sets
- 📖 Convex Functions
- 📖 Linear Programming
- 📖 Quadratic Programming
- 📖 Semidefinite Programming
- 📖 Optimality Conditions
- 📖 Duality Theory
- 📖 Unconstrained Optimization
- 📖 Interior-Point Methods
- 📖 Engineering Applications

📶 Optimization theory and methods are a foundation to many areas in modern science and engineering, e.g., machine learning.

📶 Optimization is about achieving the “best result” given an **objective** and a set of **constraints**. Optimization problems can be found in communications, signal processing, power, transportation, and many other areas.

📶 In this course, we will learn the theory and methods of convex optimization, including the basic **concepts**, optimization **problems**, optimization **algorithms**, and **applications**. In the course project, you may either find an optimization problem or choose an application and formulate a problem, and use an optimization tool (CVX) to solve the problem in MATLAB.



### Prerequisites:

Linear Algebra, Introduction-level Algorithms, Probability



### Textbook:

“Convex Optimization”, Cambridge University Press, 2004



### Instructor:

Dr. Jie Gao, Electrical and Computer Engineering,  
Marquette University

## PROJECT INFORMATION



### Project Steps:

- ⤴ Study an optimization method or algorithm
- ⤴ Simulate and solve a problem using optimization tools



### Project Delivery

- ⤴ Presentation
- ⤴ Short report



### Project Topics

- ⤴ From the textbook
- ⤴ From a research work
- ⤴ Propose your own topic