Course Objectives and Outcomes

Objectives
This course assumes that students know how to analyze simple algorithms and data structures from having taken 6.006. It introduces students to the design and analysis of more sophisticated algorithms. Upon completion of this course, students will be able to do the following:

- Apply important algorithmic techniques and methods of analysis.
- Display a familiarity with important algorithms and data structures.

Outcomes
Students who complete the course will have demonstrated the ability to do the following:

- Perform competitive analysis of algorithms.
- Perform amortized analysis of algorithms.
- Analyze running times of randomized algorithms. Differentiate between expected running-time and high probability bound on the running time. Employ indicator random variables and linearity of expectation to perform the analyses. Differentiate between worst-case randomized algorithms and average-case algorithms.
- Demonstrate a familiarity with advanced data structures and their applications to algorithms.
- Describe a flow problem and cite problems that can be solved using flow. Reduce problems to flow formulations. Understand the complexity of solving flow problems.
- Describe a linear program and cite problems that can be solved using linear programming. Reduce problems to linear programming formulations. Understand the complexity of various linear programming approaches.
- Understand the benefits of using approximation algorithms rather than exact algorithms. Demonstrate a familiarity with basic approximation algorithms.
- Appreciate that algorithmic methods can be applied to other models than the standard random-access-machine model of computation.