Topics Covered in 6.00SC
Spring 2011

Linguistic issues
Values, types, expressions variables
Builtin types: int, float, string, list, dictionary, tuple
Mutability and aliasing
Control flow and iteration
Functions and methods
Input/output
Recursion and call stacks
Exceptions
Polymorphism
Classes, objects
Pylab

Algorithms
Big O notation
Exhaustive enumeration
Guess and check
Successive approximation
   Newton’s method
Divide and conquer algorithms
Binary search
Merge sort
Hashing
Orders of growth
   Exponential
   Polynomial
   Linear
   Log
Amortized analysis

Simulations and modeling
Random walks
Monte Carlo methods
Queuing network models
Graph-based models
Understanding data
  Building computational models
  Normal distributions, standard deviation, coefficient of variation,
  Confidence interval, confidence level
  Linear regressions
  Plotting
  Evaluating fits
    Over fitting
  Statistical sins
  GIGO
    Texas sharpshooter
    Data enhancement
    Non-representative sample
    cum hoc ergo propter hoc

Optimization problems
  Knapsack
  Shortest path
  Dynamic programming

Machine learning
  Supervised learning, basic idea
  Unsupervised learning, clustering
    Hierarchical
    k-means

Software engineering
  Debugging and testing
  Data abstraction and inheritance
  Program organization
  Specifications

Anything needed to successfully complete problem sets
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