Syllabus and Suggested Curriculum for Candidacy Exam in CS Theory

Suggested curriculum:

CS 260 (In fulfillment of the core requirements.)
CS 261 Data Structures
CS 262 Computational Complexity
CS 263 Analysis of Algorithms

Two courses chosen from:
CS 201 Cryptography and Computer Security
CS 247 Computer Security Algorithms
CS 265 Graph Algorithms
CS 266 Computational Geometry
CS 267 Data Compression

Topics and Reading for Candidacy Exam

Covered in: CS 260 and Ch. 1-4 from Garey & Johnson.
NP-Completeness
Strong vs. Weak NP-completeness
Pseudo-polynomial time algorithms

Covered in: CS 262 and Ch. 3 & 4 from Sipser
Turing Machines
Decidability
diagonalization

Covered in: CS 263 and Chs 7-10 from CLRS
Sorting Algorithms

Covered in: CS 260, CS 263, Ch 16 CLRS and Ch 6 in Kleinberg-Tardos
Dynamic Programming

Covered in: Cs 260, CS 263, Chs 23-27 CLRS, and Chs 3 & 4 in Kleinberg-Tardos
Graph algorithms

Covered in: CS 260 and Chs 6, 7, and 9 from Ahuja-Magnanti-Orlin
Network Flow
Min Cost Flow

Covered in: CS 261 and Chs 8, 9, 10 from Goodrich-Tamassia
Data Structures
Search Trees
Skip Lists
Hash Tables
Priority Queues

Covered in: CS 263 and Chs 1-4, 8 from Motwani-Raghavan, Chs 1-5 from Mitzenmacher-Upfal
Randomized Algorithms
  Basic Probability
  Tail Inequalities
  The Minmax Principle
  Randomized Data Structures
  Hashing

Texts:

Motwani-Raghavan:
Title: Randomized Algorithms
Authors: Rajeev Motwani and Prabhakar Raghavan
Publisher: Cambridge University Press (August 25, 1995)

Garey & Johnson:
Title: Computers and Intractability : A Guide to the Theory of NP-Completeness
Authors: M. R. Garey and D. S. Johnson
Publisher: W. H. Freeman (January 15, 1979)

Ahuja-Magnanti-Orlin
Title: Network Flows: Theory, Algorithms, and Applications
Authors: Ravindra K. Ahuja, Thomas L. Magnanti, James B. Orlin
Publisher: Prentice Hall; 1 edition (February 18, 1993)

Sipser:
Title: Introduction to the Theory of Computation
Author: Michael Sipser
Publisher: Course Technology; 1 edition (December 13, 1996)

CLRS:
Title: Introduction to Algorithms, Second Edition
Authors: by Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein
Publisher: The MIT Press; 2 edition (September 1, 2001)

Kleinberg-Tardos:
Title: Algorithm Design
Authors: Jon Kleinberg and Eva Tardos
Publisher: Addison Wesley (March 16, 2005)
Goodrich-Tamassia:
Title: Data Structures and Algorithms in Java
Authors: Michael Goodrich and Alberto Tamassia
Publisher: Wiley; 3 edition (December 10, 2003)

Mitzenmacher-Upfal:
Title: Probability and Computing: Randomized Algorithms and Probabilistic Analysis
Authors: Michael Mitzenmacher and Eli Upfal
Publisher: Cambridge Univ. Press, 2005.