

EEN 511 Computability, Complexity, and Algorithms
3 credits

Course Instructor or Coordinator: Stephen Murrell

3rd June 2013

Textbook: Algorithms in C++ parts 1-5. Robert Sedgewick, Addison-Wesley, ISBN 020172684X, 2002

Other supplementary material:

- a. Class web site, <http://rabbit.eng.miami.edu/class/een511>
- b. Introduction to Algorithms, Thomas Cormen, MIT press, 2011

2013-2014 University of Miami Academic Bulletin Description: Advanced programming techniques: dynamic programming, fast data retrieval and sorting, enumerators, data structures, and data management. The limits of software engineering, computability and models of computation, complexity analysis.

Prerequisites or co-requisites: EEN 318

Specific outcomes of instruction: The student will be able to:

1. Analyze complex problems and rationally plan and implement a software solution
2. Make effective use of known algorithms and data representations, and adapt and develop new ones as necessary
3. Create, understand, and verify specifications of software behaviour
4. Understand the limitations on software designs and computational power.

Topics

1. Dynamic programming and essential NP complete problems and algorithms
2. Advanced and application specific sorting and searching
3. Essential graph algorithms including shortest path
4. Data modelling and representative structures
5. Heaps, 2-3-trees, AVL trees, red-black trees, hashing, enumerators
6. Efficient data storage and retrieval techniques
7. Countability, Non-enumerable data types, Uncomputable numbers
8. Integer decision functions, Uncomputable functions
8. Gödel's incompleteness, the halting problem, Turing's thesis.