

**ECE 511 Computability, Complexity, and Algorithms**  
3 credits

**Course Instructor or Coordinator: Stephen Murrell**

**1<sup>st</sup> January 2020**

**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. Understand the limitations on software designs and computational power.

**Topics**

- 1 Dynamic programming
- 2 Essential NP complete problems and algorithms
- 3 Advanced and application specific sorting and searching
- 4 Essential graph algorithms
- 5 Data modelling and representative structures
- 6 2-3-trees, AVL trees, red-black trees, enumerators
- 7 Efficient data storage and retrieval techniques
- 8 Countability, Non-enumerable data types, Uncomputable numbers
- 9 Integer decision functions, Uncomputable functions