# COEN 4650: Introduction to Algorithms

**Class Schedule:** 3 Credit course meeting the equivalent of two 75-minute class periods per week.

**Course Coordinator**: Dr. Henry Medeiros

**Course Materials:**

**Required:** *Introduction to Algorithms* *(Third Edition)* by Cormen, Leiserson, Rivest, and Stein, *The MIT Press* (2010).

**Course Description:** Introduction to the design and analysis of algorithms. Topicsto be covered include: the concepts of time andspace complexity, advanced data structures,general issues in problem solving methodologies,greedy algorithms, dynamic programming,graph algorithms, AI-related algorithms, and anintroduction to NP-completeness theory.

**Prerequisites**: COSC 2010

**Elective in** COEN Intelligent Systems area (breadth and depth)

**Contribution to Professional Component**:

Engineering Science: 50 %

Engineering Design 50 %

**Course Goals:**

The goal of the course is to provide students with fundamentals of computer algorithms and how to apply them to solve real-world problems.

**Course Objectives:**

*By the end of this course, students should be able to*

1. Analyze algorithms with respect to time-complexity or space complexity.
2. Implement and program basic data structures such as stacks, queues, lists, and trees, and know how to use such structures to aid in the implementation of specific algorithms.
3. Implement and program greedy algorithms and apply it appropriately to solve problems..
4. Identify, design and implement dynamic programming solutions to problems for which such a solution exists.
5. Implement and program graph search techniques, including breadth-first and depth-first algorithms.
6. Explain the underlying concepts of NP-Completeness theory.

**Contribution to Program Objectives**: Partial fulfillment of Criterion 3 objectives A, B, C, E, J, K

**Course Topics:**

## Topic Weeks

Introduction 1

Complexity 2

Data Structures 3

Greedy Algorithms 4-5

Dynamic Programming 6-7

Graph Algorithms 8-11

NP-Completeness 12

**Last modified**: November 13, 2017