ECE 318 Algorithms
3 credits
Required for CE

Contact hours: Three 50 minute lectures per week OR two 75 minute lectures per week

Course Instructor or Coordinator: Stephen Murrell   **21st September 2017**

Textbook: Algorithms in C++ parts 1-5, Robert Sedgewick, ISBN 020172684X or 978-0201726848, 2002.
Other supplementary material:
 a.   Class web site, http://rabbit.eng.miami.edu/class/een318

Special for fall 2017:
Last day of class: Wednesday 20th December.
Final Examination: Wednesday 13th December.

2017-2018 University of Miami Academic Bulletin Description: Continuation of the programming sequence. Object oriented programming with C++, emphasizing the skills required of a professional programmer. Essential data structures and algorithms: graphs, hash tables, parsing, and text processing. Advanced sorting and data management algorithms. Advanced features of C++.
Prerequisites or co-requisites: ECE 218

Specific outcomes of instruction: The student will be able to:
1.   Design and implement complete working programs making suitable use of complex data structures and algorithms.
2.   Determine which techniques are appropriate for use in given circumstances.
3.   Make use of the advanced features of object oriented programming as provided by C++

Topics
1.   Inheritance and code reuse; protected and private members
2.   Virtual methods and polymorphism; static and dynamic typing
3.   Fast (O(NlogN) or better) sorting algorithms
4.   Hashing, hash tables, and other fast data retrieval methods
5.   Advanced tree structures and related algorithms
6.   Graph structures and basic graph algorithms
7.   Analysis of data structures and algorithms

Student outcomes strongly addressed by the course:
(a)   *an ability to apply knowledge of mathematics, science, and engineering (4):* Students must design and implement programs to test and explore computer engineering principles and solve real world problems.

(b) *an ability to design and conduct experiments, as well as to analyze and interpret data (3):* Calculated algorithm complexities are verified experimentally.

(c) *an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability (4):* The entire class is about designing software systems, components, and processes.

(e) *an ability to identify, formulate, and solve engineering problems (4):* As for c, the class is about identifying and solving problems in programming.

(i) *a recognition of the need for, and an ability to engage in life-long learning (4):* A programming course covering algorithms and data structures really makes it clear that there is no end to things to be learned and that technology never stands still.

(k) *an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice (4):* Students gets extensive experience programming, testing, debugging, and refining programs.

Course contributions to student outcomes

		Outcome	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
a	A1	Mathematics	2	2	3													
	A2	Science and Engineering	4	4	2													
b	B1	Conduct experiments	0	0	0	0	2	2	3	3	2	0						
c	C1	Fundamental design capabilities	4	3	3	3												
	C2	System design capabilities	3	2	0	0	0	0	0	0	4	4	0	0				
d	D1	Teamwork	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
e	E1	Identify, formulate, solve	2	4	4	1	2	0	1	1	4	4	4	2				
f	F1	Professional and Ethical	0	0	0	0	0	0	0	0								
g	G1	Oral Communications	0	0	0	0	0	0	0	0								
	G2	Written communications	0	0	0	0	0	0	0	0	0	0	0					
	G3	Graphical communications	0	0	0	0	0	0	2									
h	H1	Broad education	1	1	0	1	1											
i	I1	Life-long learning	4	4	4	0	1	2	2	4								
j	J1	Contemporary issues	0	0	2	1	2											
k	K1	Analog simulation	0	0	0	0	0											
	K2	Matlab	0	0	0	0	0	0	0	0								
	K3	Computer-aided digital design	0	0	0	0	0	0	0	0								
	K4	Test equipment	0	0	0	0	0	0	0	0								
	K5	Application development	4	4	2	0	0	0										
	K6	Programming Tools	4	4	4	4	4	4	3	2	0	0						
	K7	Development tools	0	0	3	0												