EEN318 - Advanced Programming
3 credits

B.S.E.E.			B.S.Cp.E.	B.S.I.S.E.	
EEN	EAN	WCN	ECN	IT	SE
elect	elect	elect	**REQ**	**REQ**	**REQ**

2007-8 Catalog Data: Continuation of programming. Object oriented programming with C++, emphasizing the skills required of a professional programmer. Essential data structures and algorithms: trees, graphs, hash tables, parsing, and text processing. Advanced sorting and data management algorithms. Advanced features of C++, effective programming with C.

Prerequisites: EEN218

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

References: None

Objectives:
1. Ability to design and implement complete working programs making suitable use of complex data structures and algorithms.
2. Ability to determine which techniques are appropriate for use in given circumstances.
3. Knowledge of, and ability to use the advanced features of object oriented programming as provided by C++
4. Experience and Ability to implement effective software solutions and basic systems programming tasks in C.

Topics:
1. Object Oriented Programming with C++
2. Inheritance and code reuse; protected and private members
3. Virtual methods and polymorphism; static and dynamic typing
4. Interactions between constructors, destructors, assignment, and initialisation
5. Data Structures and Algorithms
6. O(nlogn) Sorting and fast searching algorithms
7. Tree structures and algorithms
8. Vectors and other linear structures.
9. Hashing and Hash tables
10. Graph structures and basic graph algorithms
11. Analysis of Algorithms and data structures
12. Time analysis: O() notation, consequences.
13. Memory efficiency and the trade-off between speed and memory
14. Selection of the best structure or algorithm for the circumstances.
15. ANSI C: standard input and output, string functions.
16. Systems programming

Schedule: 150 minutes lecture per week

Professional Component: Engineering topics: 3 credits, design 2 credits
Students learn the essential tools of advanced programming, and engage in software design and implementation projects.

EEN318: This class is assessed for outcomes A_2, I_1, and K_7.

Significant contributions of syllabus topics to outcomes

Topic 1: Outcomes I, C, K
Topic 5: Outcomes A, C, E, K
Topic 11: Outcomes A, B, E
Topic 15: Outcome K
Topic 16: Outcomes C, E, K

Contributions to all outcomes

		Outcome	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
a	A_1	Mathematics	2	2	3													
	A_2	Science and Engineering	4	4	3													
b	B_1	Conduct experiments	0	0	0	0	2	2	3	3	2	0						
c	C_1	Design	3	4	3	3	4	4	3	3	4	4	0	0				
d	D_1	Teamwork	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
e	E_1	Identify, formulate, solve	4	4	3	1	3	3	2	4	4	4	4	3				
f	F_1	Professional and Ethical	0	0	0	0	0	0	0	0	2	3						
g	G_1	Oral Communications	0	0	0	0	0	0	0	0								
	G_2	Written communications	2	2	2	2	2	2	2	2	2	2	2					
	G_3	Graphical communications	0	0	0	0	0	0	3									
h	H_1	Broad education	1	2	0	3	2											
i	I_1	Life-long learning	4	4	4	0	1	2	2	4								
j	J_1	Contemporary issues	1	1	3	1	2											
k	K_1	Analog simulation	0	0	0	0	0											
	K_2	MatLab	0	0	0	0	0	0	0	0								
	K_3	Quartus	0	0	0	0	0	0	0	0								
	K_4	ModelSim	0	0	0	0	0	0	0									
	K_5	Test equipment	0	0	0	0	0	0	0	0	0							
	K_6	Application	4	1	1	0	0	0										
	K_7	Programming Tools	4	4	4	4	4	4	2	4	3	0						
	K_8	Development tools	0	0	0	4	0											