



COURSE NUMBER: Ve281		COURSE TITLE: Data Structures and Algorithms	
CREDIT: 4		PREREQUISITES: Ve203 and Ve280	
TEXTBOOKS/REQUIRED MATERIAL:		PREPARED BY: Weikang Qian LAST UPDATED: Oct. 9, 2012 DATE OF DISCIPLINE GROUP APPROVAL: DATE OF UC APPROVAL:	
CATALOG DESCRIPTION (No more than 100 words): Introduction to asymptotic algorithm analysis and big-O notation; Fundamental data structures including priority queues, hash tables, binary trees, binary search trees, balanced search trees, and graphs; Searching and sorting algorithms; Basic graph algorithms; Introduction to dynamic programming.		COURSE TOPICS: 1. Asymptotic algorithm analysis 2. Sorting algorithms 3. Linear-time selection algorithms 4. Hashing 5. Priority queues 6. Binary search trees 7. k-d trees 8. Balanced search trees, such as AVL trees and red-black trees 9. Graphs and basic graph algorithms 10. Dynamic programming	
COURSE STRUCTURE and CONTACT HOUR: 48 hours of lecture and 12 hours of discussion			
COURSE OUTCOMES [Student Outcomes* in brackets] <i>for each course outcome, links to the Student Outcomes are identified in brackets.</i>	After completing Ve281, students should be able to: 1. Get familiar with common data structures and algorithms. [1] 2. Know how to implement these data structures and algorithms. [1] 3. Know how to analyze the time/space complexity of these algorithms. [1,6] 4. Take a problem and consider various possible data structures and algorithms for solving it. [2,6] 5. Select the data structure and the algorithm that are most efficient in solving the problem. [2,6] 6. Write code to solve the problem using the selected data structures and algorithms. [1] 7. Be able to quickly design, implement, test and debug a large scale project independently (1000+ lines of code). [1]		
	COURSE OBJECTIVES [Course Outcomes in brackets] <i>for each course objective, links to the course outcomes are identified in brackets.</i>		
ASSESSMENT TOOLS [Course Outcomes in brackets] <i>for each assessment tool, links to the course outcomes are identified</i>	Written Assignments [1, 2, 3, 4, 5, 6] Programming Projects [1, 2, 3, 4, 5, 6, 7] Midterm and Final Exam [1, 2, 3, 4, 5, 6]		

ABET Student Outcomes* — Apply to Engineering, Math, and Science Courses Only

- 1) an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
- 2) an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
- 3) an ability to communicate effectively with a range of audiences
- 4) an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts
- 5) an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
- 6) an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
- 7) an ability to acquire and apply new knowledge as needed, using appropriate learning strategies