Computer Science 170
Introduction to Computer Science
Spring 1997 - Dr. Robert E. Bailey
e-mail: oxmaeb@emory.edu

Text: Data Structures in C++ Including Breadth & Laboratories, by Angela B. Shiflet

Course Content: This course will consist of material related to the concepts of Software Engineering; an introduction to time and space complexity of algorithms; an in-depth study of the C++ language and Object-Oriented Programming(OPP); an introduction to the use of Abstract Data Types (ADT) and their uses with such data structures as arrays, stacks, lists, and queues; a study of several different methods of sorting an array of data and the comparison of these types; an introduction to Binary Trees, Hash Tables and Networks.

Goals: On completion of this course, students who successfully complete this course will know about the software life cycle, begin to understand how to analyze algorithms for efficiency in terms of time and space, will be able to view arrays, stacks, queues and lists as abstract data types and to implement this abstraction, understand the terms encapsulation, polymorphism and inheritance in relation to object-oriented programming in C++, learn how to apply backtracking techniques, learn how an operating system employs job queues, understand the implement an ADT list both dynamically and statically in C++, learn about the use of the ADT list in computer networks, learn how to implement the ADT binary tree for both search and storage, comprehend the algorithm to perform an insertion sort, selection sort, quicksort, heapsort and mergesort, understand the use of hash tables and an introduction to the use of graphs in computer networks.

Grading: Grades will be determined by student performance on three tests; ten laboratories and a comprehensive final exam:

3	tests @ 150	450	In general,	
10	labs @ 30	300	A, A-	900 points +
1	final @ 250	250	B+, B, B-	800 - 899
			C+, C, C-	700 - 799
		1000	D+, D, D-	600 - 699
			F	below 600

Each test will have a minimum of 150 points and will be given on the following Fridays beginning at class time in Pierce 120: Feb. 14, Mar. 21 and April 18. Tests should take around 60 minutes. Lab assignments are given on the attached homework assignment sheet. Each lab has a potential of a minimum of 30 points. Lab reports will be due as given on the assignment sheet.

Homework : The textbook homework problems will not be collected but are to benefit you. The assigned problems will not be collected but will form the basis for class discussions and lecture. You will need to stay current with the assignments.

To do well in this class, the average student will need to study about 2 hours outside of class for every class meeting or around 6 hours per week. Preparing labs and studying for tests will take additional time.

Attendance : You are expected to attend all classes since you are responsible for work covered in class. An inordinate amount of absences will be handled in accordance with school policies.

You are expected to take tests at the scheduled times. Any conflicts or problems will be handled on an individual basis. If the excuse is considered legitimate by the instructor, arrangements will be made to **take a test prior to the testing time**. Labs will be assigned during the lab times on Wednesdays, most due the following Mondays.

Office Hours : 8:30 - 11:00 (Monday - Friday) Seney 105A

Honor Code : THE HONOR CODE OF OXFORD COLLEGE APPLIES TO ALL WORK SUBMITTED FOR CREDIT POINTS TOWARD YOUR GRADE. ALL SUCH WORK WILL BE PLEDGED TO BE YOURS AND YOURS ALONE. YOU PLEDGE THAT WITH YOUR SIGNATURE.

Topics and Homework Assignments

Jan. 15	Software Engineering (Part I)	
	Section 1.1, p. 7	1,2,4,9
	Section 1.2, p. 18	1,4
Jan. 17	Software Engineering (Part II)	
	Section 1.3, p. 23	4,5
Jan 20	King Holiday	
Jan 21	Last day to change schedule	
Jan. 22	Analysis of Algorithms, Recursive Functions	
	Section 2.1, p. 40	1,3,7,9,11,16,26,30,33,35
	Section 2.2, p. 57	2,4,7,9
	Section 2.3, p. 65	1, 4, 5
Lab 1	Page 29 - Analysis and Design	
	Due - Jan. 27 @ class time.	
Jan 24	Induction and Program Verification, Abstract Data Types	
	Section 2.4, p. 72	1, 4, 10, 12
	Section 2.5, p. 79	3, 6, 16, 20, 25, 29
	Section 2.6, p. 84	1
Jan 27	Elementary Data Types - Arrays	
	Section 3.1, p. 98	1, 3
	Section 3.2, p. 109	1, 5, 9, 13, 19
	Section 3.3, p.117	3, 12a, 13a
Jan 29	Elementary Data Types - Structures and Pointers	
	Section 3.4, p. 121	1
	Section 3.5, p. 134	1, 3, 8
Lab 2	Page 86 - Using the C++ compiler	
	Due - Feb 3	
Jan 31	Elementary Data Types - Strings -- Pattern Matching in AI	
	Section 3.6, p. 143	3,7,9,11,16
	Section 3.7, p. 157	7, 8, 9

Feb 3	Encapsulation - OOP Section 4.1, p.187	5,11
Feb 5	Polymorphism - OOP Section 4.2, p.199	3,9,10b
Lab 3	Rational ADT Page 159 --- Due Feb. 10	
Feb 7	Inheritance and File I/O Classes Section 4.3, p. 209 Section 4.4, p. 217	 2 1,3,5
Feb 10	Review for Test 1 Previous assigned problems	
Feb 12	Review for Test 1 Previous assigned problems	
Lab 4	Development of the ADT rational P. 221 ---- Due Feb. 17	
Feb 14	**TEST ONE -- CHAPTERS 1 - 4**	
Feb 17	Stack Abstraction and Applications of Stacks Section 5.1, p. 239 Section 5.2, p. 250	 6, 8, 9, 15 1, 5, 14
Feb 19	Static Implementation of Stacks, Templates and Backtracking Section 5.3, p. 265 Section 5.4, p. 274 Section 5.5, p. 277	 3, 6, 12 1, 3 3
Lab 5	Development of the ADT Stacks Page 280 --- Due Feb. 26	
Feb 21	Queue Abstraction and the Applications of Queues Section 6.1, p. 292 Section 6.2, p. 298	 4, 8, 15 4

Feb 24	Static Implementation of Queues ; Operating System Job Queues Section 6.3, p. 311 3, 10, 17, 21 Section 6.4, p. 323 1, 5
Feb 26	List Abstraction and Applications; Dynamic and Static Implementations of Lists Section 7.1, p.348 1, 3, 6 Section 7.2, p.376 1, 3, 6 Section 7.3, p.387 1, 2, 6, 11, 19, 25
Lab 6	Development of the ADT Queues Page 326 -- Due March 3
Feb 28	Time Complexity and Space Efficiency Memory Management for Data Structures Section 7.4, p.395 1, 4 Section 7.5, p. 403 5 Section 7.6, p. 411 9, 13 Section 7.7, p. 421 1, 3
Mar 3	Variations of Lists Section 8.1, p. 439 3, 8, 15, 21, 25 Section 8.2, p. 442 1
Mar 5	Dynamic Implementation of Stacks and Queues Section 8.3, p. 452 1, 5 Section 8.4, p. 456 5
Lab 7	Development of a checkout system P. 423 -- Due March 24
Mar 7	Implementation of Sets and Computer Networks Section 8.5, p. 468 3, 13, 24 Section 8.6, p. 474 1, 7

March 10 to Mach 15 -- Spring Break

Mar 17	Review of Chapters 5 - 8 Previously assigned problems
Mar 19	Review of Chapters 5 - 8 Previously assigned problems

Lab 7 (cont)	Completion of the Checkout system Due -- March 24
Mar 21	**TEST TWO -- CHAPTERS 5 - 8**
Mar 24	Binary Trees Abstraction and Implementation Section 9.1, p. 487 1, 6, 7 Section 9.2, p. 501 5, 15, 19, 29 Section 9.3, p. 525 7, 11
Mar 26	Compilers, Game Trees and Huffman Codes Section 9.4, p. 537 3, 5 Section 9.5, p. 546 4 Section 9.6, p. 551 1, 3
Lab 8	Static and Dynamic implementations of Stacks P. 476 -- Due April 2
Mar 28	Binary Search Trees -- Abstraction and Implementation Section 9.7, p. 558 4, 9 Section 9.8, p. 564 2, 7 Section 9.9, p. 579 1, 3, 9 Section 9.10, p. 585 1, 4
Mar 31	Insertion and Selection Sorts Section 10.1, p. 607 1, 7 Section 10.2, p. 613 1, 8, 12
April 2	Quicksort and Heapsort Section 10.3, p. 622 1, 3, 9 Section 10.4, p. 639 1, 5, 9, 12
Lab 9	Development of the ADT binary tree package Page 587 --- Due April 14
April 4	Mergesorts and a comparison of sorting techniques Section 10.5, p. 649 1,7, 11, 13 Section 10.6, p. 654 1 Section 10.7, p. 657 1, 4, 7 Section 10.8, p. 664 1, 3

April 7	Table Abstraction and Implementation Section 11.1, p. 677 1, 7, 13 Section 11.2, p. 685 2, 4, 11, 34
April 9	Hash Tables Section 11.3, p. 703 1, 2, 14, 22, 37, 42 Section 11.4, p. 713 4, 5
Lab9	Continuation of Tree traversal program p. 587 -- Due April 14
April 11	Graph Abstraction and Implementations Section 12.1, p. 731 2, 3, 8, 13 Section 12.2, p. 745 1, 3, 11, 16
April 14	Review for Test Three Previously assigned problems
April 16	Review for Test Three Previously assigned problems
Lab 10	Begin timing experiments of the five basic sorting methods Page 666 - Due April 28
April 18	**TEST THREE -- CHAPTERS 9 - 12**
April 21	Networks and Finite-state machines Section 12.5, p. 772 5, 114, 18 Section 12.6, p. 779 1, 3, 6, 15, 23
April 23	Review for Final Exam -- Previously assigned Problems
Lab 10	Continuation of the timing experiments Page 666 - due April 28
April 25	Review for Final Exam -- Previously assigned Problems
April 28	Review for Final Exam -- Previously assigned Problems
April 29 ---	**Last day of classes**
May 5	**Final Exam - 2:00 -- 5:00 PM**