22C:030/115 – Computer Science III
Spring 2003

Instructor: **Dr. Ramon Lawrence**
Class Schedule: 2:30 – 3:45 p.m. Tuesday/Thursday
Location: 221 CB (Chemistry Building)
Office Hours: 11:00–12:00 a.m. Tues/Thurs and 4:00-5:00 p.m. Tuesday or by appointment
Office Location: 201L MacLean Hall
Phone: 335-0561
E-mail: ramon-lawrence@uiowa.edu (preferred contact method)
Course URL: http://www.cs.uiowa.edu/~rlawrenc/teaching/030/index.html

Course Description
This course is a continuation of 22C:020, and is required for all computer science majors and minors. The course deals with applications of software engineering techniques to the design and implementation of programs composed of complex data structures. Topics include manipulation of sets, files, stacks, lists, trees, symbol tables; searching and sorting; comparison of implementation techniques for data structures; analysis of program efficiency; and dynamically allocated data structures and recursion. The C++ and Java programming languages are used.

Prerequisite
- grades of C- or higher in 22C:016 and 22C:020

Marking and Evaluation

Homework Assignments		**10 %**	(approximately 4 assignments)
Programming Assignments		**20 %**	(approximately 4 assignments and one project)
Exams		**70 %**	
Midterm #1	15 %		(non-cumulative, one hour)
Midterm #2	15 %		(non-cumulative, one hour)
Final Exam	40 %		(cumulative, two hours)

This course will use +/- grading. No late assignments will be accepted.

Textbook and Reference Material
Michael Main and Walter Savitch, *Data Structures and Other Objects Using C++ (second edition)*, ISBN 0-201-70297-5, 2001.

Teaching Assistants and Lab Sessions

Section	Lab Times and Location	TA Name	Office	Office Hours
A01	3:30 – 4:20 p.m. Monday 110 MLH	Benton McCune bmccune@cs.uiowa.edu	101J MH	Wed. 3:30-5:15 pm Thurs. 4:00-5:15 pm
A02	11:30 – 12:20 p.m. Tuesday 217 MLH	Benton McCune bmccune@cs.uiowa.edu	101J MH	Wed. 3:30-5:15 pm Thurs. 4:00-5:15 pm
A03	11:30 – 12:20 p.m. Thursday 207 PH	Mai Ibrahim mibrahim@cs.uiowa.edu	B20J MH	Tues. 10:00-11:30 am Wed. 2:30-3:20 pm

Expectations

- I expect students to attend **all** classes and prepare before attending class. This includes reading relevant sections of the textbook and reviewing notes from previous lectures.
- I recommend all students download and read a copy of the lecture notes **before** the lecture.
- I expect all students to learn the material in the course and undertake sufficient effort to produce all of the homework and programming assignments.
- I want all students to enjoy attending class and feel free to participate according to their own personalities. Feel free to ask questions by raising your hand or speaking out at appropriate moments.
- Please actively participate in class discussions, questions, and problem solving exercises.
- **I want all students to pass the course, receive a good grade, and feel the course was beneficial.**

Grievances and Complaints Procedures

If you have any grievance or complaint about course direction, your treatment during class, your assigned marks, or any other problem, please first talk to your professor about the situation. I am very approachable and will work hard to ensure the course is enjoyable for you.
If there is a situation that cannot be resolved in this manner, please contact the Chair of the Department of Computer Science, Professor James Cremer, at 14D MacLean Hall, 335-0736.

Academic Dishonesty

A student must submit original work of his or her own construction. Academic dishonesty in the form of copying assignments, projects, or exams from other students or sources is not permitted. If you have any questions about what constitutes academic dishonesty, please contact your professor or consult the printed policy in the *Schedule of Courses* and the *CLAS Bulletin*.

Students with Disabilities

I would like to hear from anyone who has a disability that may require some modification of seating, testing, or other class requirements so that appropriate arrangements can be made. Please see me after class or during my office hours.

Missing an Exam

Only students who miss an exam for a reason that corresponds to the University of Iowa's policy on "Excused Absences from Examinations" will be permitted to take the exam at a later time. Please note that a make-up exam may have a question format that is different from the regular exam. You must complete an "Explanatory Statement of Absence from Class" form (available at the Registration Center) and present it to the professor for evaluation. If the reason for absence is satisfactory, the student may either take the exam, or if a midterm exam is missed, the midterm exam can be forfeited and the student's final exam will be worth more of the final grade.

Course Outline

The course has a substantial amount of material to be covered in a short time. This requires the student make a strong effort to keep up with the material discussed in class. It is especially important to work hard during the first month of classes during the transition from Java to C++. Below is an outline of the dates and topics covered, and initial exam dates. The professor is not bound to the topics, timelines, and outline provided as they only serve as a general reference.

Date	Topics Covered and Description
January 21 (T)	**First day of classes. Introduction to course, discuss syllabus, C++ intro**
January 23 (TH)	Program specification, design, analysis and big-Oh notation (Sections 1.1-1.2)
January 28 (T)	Abstract Data Types and C++ classes (Sections 2.1-2.2) Methods, parameters, and operator overloading (Sections 2.3-2.5)
January 30 (TH)	Building a collection (bag) class (Section 3.1) Building an ordered collection (sequence) class (Section 3.2)
February 4 (T)	**C++ pointers, new, and dynamic memory allocation** (Sections 4.1-4.2)
February 6 (TH)	Implementing a collection class using a dynamic array (Section 4.3)
February 11 (T)	Linked lists (Section 5.1) Linked list operations (Section 5.2)
February 13 (TH)	Linked list applications and examples Linked list review
February 18 (T)	Template classes (Sections 6.1-6.2)
February 20 (TH)	Standard template classes and iterators (Sections 6.3-6.5)
February 25 (T)	Midterm #1 Review.
February 27 (TH)	**Midterm Exam #1 in class.**
March 4 (T)	Stacks (Sections 7.1 & 7.3) Arithmetic evaluation using stacks (Sections 7.2 & 7.4)
March 6 (TH)	Queues (Sections 8.1-8.3) Priority queues (Section 8.4)
March 11 (T)	Recursion (Sections 9.1-9.3)
March 13 (TH)	Recursion on ADTs
March 16 - 22	**No classes. SPRING BREAK.**
March 25 (T)	Trees (Sections 10.1-10.2)
March 27 (TH)	Tree traversals (Section 10.4)
April 1 (T)	Binary search trees (Section 10.5)
April 3 (TH)	Game trees
April 8 (T)	Midterm #2 Review.
April 10 (TH)	**Midterm Exam #2 in class.**
April 15 (T)	Heaps (Section 11.1)
April 17 (TH)	B-trees (Section 11.2)
April 22 (T)	Searching (Section 12.1) Hashing (Section 12.2) Chained hashing (Section 12.3)
April 24 (TH)	Quadratic sorting algorithms (Section 13.1)
April 29 (T)	Mergesort (Section 13.2) Quicksort (Section 13.2) Heapsort (Section 13.3)
May 1 (TH)	Sorting review and STL sorting (Section 13.4)
May 6 (T)	ADT and algorithm applications Project Results
May 8 (TH)	Final exam review.
May 13 (T)	**Final Exam Date: Tuesday, May 13 at 7:30 a.m. in 221 CB**