Syllabus CS 33001
Fall 2008
Computer Science II: Data Structures & Abstraction

Instructor: Dr. Jonathan I. Maletic
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Course Time: MW 11:00am-12:15pm
Course Location: MSB 121
Course URL: www.cs.kent.edu/~jmaletic/CS33001/

Course Description: Advanced computer programming design, and development with a primary focus on data structures and abstraction using an object oriented programming language.

Prerequisites:
- CS 23021 Computer Science I: Programming & Problem Solving - with C (2.0) or better
- CS 23022 Discrete Structures for Computer Science

Text Book: Data Structures with C++ using STL, Ford & Topp, Prentice Hall 2002

Course Objectives:
- Continue developing a disciplined approach to problem solving methods and algorithm development.
- Provide a clear understanding of the concepts of abstract data types.
- To teach a number of the basic algorithms and data structures used in computer science.
- To teach the concepts of object oriented programming.
- To provide a foundation for further studies in Computer Science.
- On completion of this course, students must have a basic understanding of the concepts of abstract data types and object oriented programming methods. Data structures such as lists, stacks, queues, strings, and trees must be understood. The student will have working knowledge of the concepts of classes and objects, operator overloading, constructors, destructors, and generics. The concepts of dynamic data structures and recursion must be well understood. The student will also have an intermediate understanding of sorting, searching, and tree-based algorithms.

Course Organization and Grading:
- 30% Programming Assignments (4-6 projects)
- 10% Homework Assignments (4-8 assignments)
- 10% In class quizzes and exercises (~20)
- 20% Midterm (Oct. 13th)
- 30% Final Exam (Dec 10th, 10:15am-12:30pm)


Assignments:
There will be at least four substantial programming projects given over the term. The requirement for these assignments will be posted on the course web page. The general topics of the programs will be:
- Program 1 – Abstract Data Types & Classes
- Program 2 – Dynamic Memory, Containers, Templates
- Program 3 – Stacks and/or Queues
- Program 4 – Dynamic Data Structures (Complex Pointers)

There will be four to eight homework assignments given. These will typically relate directly to the programming assignments but may relate to a particular issue not addressed in the assignments.
Additionally, there will be a number of in class exercises and quizzes. These will be completed during the class period and handed in at the end of class.

Other Notes:
- Lecture is the student’s responsibility, if class is missed; it is in the students best interests to get the notes from a fellow student. The instructor does not have slides or lecture notes to hand out.
- There will be no make up exams.
- Turn off any wireless phones, beepers, or other noise making devices. Turn off volume on lab tops.
- Any modifications to the syllabus will be made on the URL noted below.

University Requirements and Announcements:
- Registration Requirement: The official registration deadline for this course is September 7, 2008. University policy requires all students to be officially registered in each class they are attending. Students who are not officially registered for a course by published deadlines should not be attending classes and will not receive credit or a grade for the course. Each student must confirm enrollment by checking his/her class schedule (using Student Tools in FlashFast) prior to the deadline indicated. Registration errors must be corrected prior to the deadline.
- University Policy 3342-3-01.3 requires that students with disabilities be provided reasonable accommodations to ensure their equal access to course content. If you have a documented disability and require accommodations, please contact the instructor at the beginning of the semester to make arrangements for necessary classroom adjustments. Please note, you must first verify your eligibility for these through Student Accessibility Services (contact 330-672-3391 or visit www.kent.edu/sas for more information on registration procedures).
- Copying or plagiarism of any type will not be tolerated and will be dealt with in accordance to Kent State University’s policy on cheating and plagiarism described in the student handbook. See the Department’s policy on academic Dishonesty: http://www.cs.kent.edu/programs/grad/studentinfo.html#dishonesty and University’s policy no cheating and plagiarism: http://www.kent.edu/policyreg/chap3/3-01-8.cfm.

Course Content:
Abstract Data Types (ADTs) and Object Oriented Concepts:
- Definition of ADTs
- Encapsulation and information hiding
- Classes, methods, constructors, and destructors
- Information hiding: Public, private, (and protected)
- Operator overloading and polymorphism
- Generics (templates)
- Inheritance, polymorphism, and virtual functions (dynamic variable binding)

Dynamic Memory Structures:
- Allocation and de-allocation of memory (new, delete)
- Dynamic Arrays
- Pointers, Linked Lists (insertion, deletion, etc.)

Abstract Data Structures & Algorithms:
- Array, multi-dimensional arrays records, files, strings
- Lists, stacks, and queues, sets, bags, vectors
- Infix, prefix, and postfix notations and conversion algorithms
- Binary trees, binary search trees
- Recursion: Design and implementation of recursive functions
- Sorting, Searching
- Hashing and priority queues
- Brief introduction to graphs & associated algorithms

Additional Topics:
- Multi-file programs, make
- Testing and debugging techniques
- Exception handling

Last updated: 08/18/2008