CSCI 270　　　　Data Structures

Spring 2017

270.0SB/07B TR　2:00-3:15　BA 338
270.02E　　　MW　4:30-5:45　Jour 110

Instructor:	Sandy Huerter (pronounced HER-ter)
Office:	JOUR 211 (follow the hallway to the left of JOUR 222 or to the right of JOUR 218)
Phone:	903-886-5494 (CSci Dept. Office in JOUR 122 is 903-886-5409)
Email:	Sandy.Huerter@tamuc.edu (email again if I haven't answered within 24 hrs)

Office Hrs:

M	3:30pm – 4:30	If I'm not in my office during office hours, look for a note on
T	3:45pm – 4:30	the door. If there's no note, you can check with the CSCI dept
W	1:00pm – 2:00	admin (Mrs. Rose) in Jour 122 to be sure I'm on campus.
	3:30pm – 4:30	Unless I'm sick that day, I'm probably on my way and will be there
R	3:30pm – 4:30	as soon as I can.
	or by appointment	

Course Description:

This course continues with the concept of abstract data structures (classes) begun in 152 and concentrates on building programming tools known as container classes which can be used to store and manipulate data. Topics covered include address variables, linked lists, stacks, queues, recursion, analysis of algorithm efficiency, binary search trees, and hash tables.

Student Learning Outcomes:

(measured by exam and program assignment results)

After completion of this course, you will be able to use classes to implement the basic data structures (stacks, queues, linked lists, trees, and hash tables) and to use predefined classes from the Standard Template Library. You will be able to design and code a program for application areas in which these data structures would be useful. Given multiple algorithms to solve the same problem, you will be able to estimate which algorithm would be more efficient in terms of time and memory required.

- Use address variables.
- Use the linked list data structure.
- Use the stack data structure.
- Use the queue data structure.
- Design, code, and use recursive functions.
- Understand Big-O notation (for algorithm efficiency): what it means, how it is determined, and why it should be considered in effective programming.
- Use the binary tree data structure and a hash table.
- Integrate the use of container classes (user-created or STL) into a moderately complex program solution.

Prerequisite: CSci 152 (basics of the C / C++ language and an introduction to C++ classes)
Note: ideally this should **not** be your first class using C or C++

Recommended Text:

C++ Programming: from Problem Analysis to Program Design by D.S. Malik
5th edition　 ISBN: 9780538798082
or　6th edition　 ISBN: 9781133626381
or　7th edition　 ISBN: 9781285852744

A copy of the 5th edition of the Malik text is on reserve in the university library.

Online Resources:

Some recommended sites for explanations, compiler information, tutorials, sample code, and general how-tos:
(All of the following links open in a new window)

C/C++ Programming Resource site   (http://www.cprogramming.com/)
C++ Resource Site　　　　　　　　 (http://www.cplusplus.com/)
SparkNotes Computer Science Study Guides   (http://www.sparknotes.com/cs/)
Microsoft Visual C++ Resources　　 (https://msdn.microsoft.com/en-us/vstudio/hh386302)
Microsoft Visual Studio Resources　 (https://msdn.microsoft.com/en-us/vstudio/default.aspx)
Essays on Basic Topics in Computer Science   (http://www.aihorizon.com/essays/basiccs/)

Evaluation:

Your grade for the course will be based on the following approximate percentages:

Pct	Activity
70%	**Exams** (3) Each exam is worth approximately 23% of your grade.
20%	**Programs** (probably 4-6) Assuming 5 programs, each one would be worth 4% of your grade.
10%	**Current events discussions** about social, ethical, and security issues in computers and technology (one per week for 10 weeks – week 3 through week 12) Each of the 10 weeks of discussions is worth 1% of your grade.

This is primarily a *web-enhanced* course, though it can be taken completely online if necessary (I don't recommend this, but please notify me if this is your intent). However, **all exams will be taken on a face-to-face basis**.

Format for the exams will typically be approximately half coding (usually small sections of code such as functions, parts of functions, or calling a function) and half analyzing the effects of executing code (for example, describing output, completing diagrams to show values assigned, etc.) or multiple-choice/true-false/fill-in-the-blank/short-essay questions about the behavior of the data structures being studied.

A **study guide** will be provided for each exam, listing topics to be covered (or omitted) and recommending selected problems from the text from which many of the exam questions will be derived. The study guides and the sample exams and problem-answer files will be available for downloading from eCollege Doc Sharing. For each topic covered, I will recommend page numbers from the text and/or online tutorial links for your reference.

An optional **makeup exam** will be given toward the end of the semester which can be used to replace one of the grades for an exam already taken. More info on this later.   This makeup exam will be in multiple-choice, true/false, and short answer format with minimal coding required.

Letter grades for the course will be assigned according to this scale of percentage points:

90 – 100	A
80 – 89	B
70 – 79	C
60 – 69	D
0 – 59	F

You must earn an A on your own. Assuming that you have completed all assignments, lower borderline grades may be affected positively or negatively by factors such as:
- the class grade distribution
- your class attendance, participation, and behavior (including what should be common courtesies: no sound-producing device use in class, arrive on time, stay until class is over, avoid distracting other students)

You need to give me a reason to think you deserve a grade higher than your percentage indicates and that you've made every effort to help yourself (you're attending class, are at least attempting programs, and participating in the current events discussions).

Additions to the syllabus:

Details of **program requirements** will be provided in a separate handout **General Policy for Programming Assignments** . Details of the **Current Events Discussions** will also be provided in a separate handout. We'll start Current Events in week 3. Both of these handouts along with the syllabus and an explanation of **How the Gradebook works** will be available for download from the top-level folder in eCollege Doc Sharing.

Course Policies

> **Makeups:**
> If you miss one of the first two exams, the makeup exam will be used to replace the missing grade. If you know ahead of time that you have a problem with an exam time, let me know as soon as possible.

> **Attendance:**
> You are responsible for everything covered in all class meetings, whether you're in class or not.
>
> You can earn **extra credit** for your class attendance at the rate of one-tenth of a percentage point for each complete class meeting attended. You must arrive on time and remain for the entire class. There are no exceptions for excused absences.
>
> In order to be considered officially present for a class period, you must **sign the roster sheet** which will be passed around at the beginning of class. If you arrive late, it's your responsibility to sign the roster after class before you leave.

Compilers:

All the computers in the Computer Science labs in Jour 101-102 and 200 have at least three C++ compilers installed: Microsoft Visual C++, Microsoft Visual C++ Express Edition (a more limited but possibly easier-to-use version of Visual C++), and Orwell Dev C++. Any C++ compiler you may have access to is fine for programming assignments for this course.

All of these compilers can be downloaded for free for installation on your own computer:
(All of the following links open in a new window)

> **Orwell DevC++** 5.11 – click on the dark green rectangle labeled **Download**
> **http://sourceforge.net/projects/orwelldevcpp/**

> **Visual Studio Express 2013 or 2015 (includes C++, C#, Visual Basic, JavaScript, Visual F#):**
> **http://www.microsoft.com/express/vc/**
>
> **Visual Studio Express is still available but seems to have been replaced by Visual Studio Community 2015, also available for free**
> **https://beta.visualstudio.com/visual-studio-community-vs/**
>
> **Visual C++** Developer Center (links for how-to videos, tutorials, etc. in addition to downloading):
> **http://msdn.microsoft.com/en-us/visualc/default.aspx**
> You can download a 90-day trial version of Visual Studio
>
> For some Visual Studio Tips and Tricks, go to:
> **http://www.cprogramming.com/visual.html**

> The entire Visual Studio (of which **Visual C++** and the express edition are a part) is available for free download by students enrolled in computer science courses at A&M Commerce through the DreamSpark program. If you don't already have an account from enrollment in a computer science course in a previous semester, an account for downloading free Microsoft products will be set up for each of you after the 12th class day (when enrollments are stabilized).

> Not currently on Computer Science lab computers, but available for free for your own computer:
>
> Code::Blocks for **Windows** users: **http://www.codeblocks.org/downloads**
> or **http://sourceforge.net/projects/codeblocks/?source=recommended**
>
> Code::Blocks for **Linux** users: **http://www.cprogramming.com/g++.html**
>
> XCode for **Mac** users: **http://www.cprogramming.com/xcode.html**
> You already have XCode on your system disk – the link is for help in installing it.
>
> XCode can also be used with the Code::Blocks interface

eCollege:

You can access eCollege either directly or through your myLeo account.

1. To access eCollege through myLeo, log on to your myLeo account and click on **eCollege** in the bar in the upper right of the screen under the myLeo logo (there may be an additional link **Go to class** available in the menu on the left side of your screen).
   You can bypass the university's home page by going to **http://online.tamuc.edu**

2. In eCollege click on the **MyCourses** tab (next to **Home**) in the upper left corner of the screen between the university logo and the date.

3. Scroll down to the bottom of the MyCourses screen and click on the class you want from the list of online and web-enhanced courses you may be taking this semester.

eCollege Announcements:

The course home page (the first page once you get into a specific course) contains an **Announcements** box. There is a file in the Announcements for each week titled **Week n in Class** in which you will find information about each class meeting (what's due, what we did today, and for next time) in case you missed that class or forgot to write down an assignment. Click on an announcement name (or on the + sign to the left of the name) to open and view the file. The most recent class period will always be at the top of the file, but all previous class periods will remain in the file and can be viewed by scrolling down in the document.

Please check the eCollege Announcements frequently (or opt in for automatic notifications).

eCollege Document Sharing:

Input data files, sample programs, and most handouts can be downloaded from eCollege. All of these files can be found in the Document Sharing section. Click on **Doc Sharing** in the toolbar at the top of the screen. The files will be organized according to topic; files not associated with a particular chapter will be listed under the default category of the course name.

In the **Categories** box, click on the category (folder) you want. Then in the box below (title is the category selected), click on the name of the file to be downloaded. You're given the option of saving the file or opening it directly in its application program (most are Word 2003 files, so the document will be opened in Word) and then saving it if you wish to keep a copy of it.

Some recommendations for a successful semester:

1) **Be here** as often as possible.

2) **Read assignments** and be ready for what we'll be talking about in class.

3) **Ask** if you don't understand something.

4) **Get help** (sooner rather than later) if you have problems:
   - dept lab tutors (usually in Jour 200)
   - the Academic Success Center also provides tutoring in the library for a wide variety of subjects
   - make friends with at least one person in class so you can compare notes or check for anything you might have missed
   - get a study group together

5) **Stay caught up** as much as possible.

6) **Get started** on programs so that you have time to get help if you find you need some help.

7) **Do your own work.** Consult with others about problem-solving strategies, but **code it yourself**.

8) What you get out of any class depends to a very large degree on what you're willing to put into it. Get in the habit of writing little practice programs to try out new language features as we learn them. As you write more programs (even small ones), the process becomes easier, you're much more likely to remember how the language works, and you get much better at programming logic (the hardest part of computer programming).

9) Know your own limits and **don't over-extend yourself** any more than necessary.

TENTATIVE SCHEDULE

Week	Class Dates	Activity
1	16 Jan 17 -19 Jan	**MLK holiday – no class for the MW section** Introduction and course overview eCollege access demo Review/intro structs and classes
2	23- 26 Jan	Review/intro structs and classes
3	30 Jan – 2 Feb	Review/intro structs and classes
4	6 – 9 Feb	Pointer variables & Dynamic Variables
5	13 – 16 Feb	Pointer variables & Dynamic Variables **Exam 1** over arrays, structs, using classes
6	20 – 23 Feb	Pointer variables & Dynamic Variables
7	27 Feb -2 Mar	Linked Lists
8	6 – 9 Mar	Linked Lists
	13 – 17 Mar	Spring Break!
9	20 – 23 Mar	Stacks
10	27 – 30 Mar	Stacks Stack applications: function calls, postfix notation
11	3 – 6 Apr	**Exam 2** over pointers, dynamic variables, linked lists Queues
12	10 – 13 Apr	Recursion
13	17 – 20 Apr	Recursion
14	24 – 27 Apr	Recursion Algorithm Analysis
15	1 – 4 May	Trees, Binary Search Trees Hash Tables
16	8 – 12 May **Final Week**	**Exam 3** over stacks, queues, recursion, algorithm analysis, binary trees, hash tables

University Policies and Announcements

Students with Disabilities:

The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you have a disability requiring an accommodation, please contact:

Office of Student Disability Resources and Services
Texas A&M University-Commerce
Gee Library
Room 132
Phone (903) 886-5150 or (903) 886-5835
Fax (903) 468-8148
StudentDisabilityServices@tamuc.edu

Student Conduct

"All students enrolled at the University shall follow the tenets of common decency and acceptable behavior conducive to a positive learning environment."
(See Student's Guide Handbook, Policies and Procedures, Conduct)

Nondiscrimination Notice

Texas A&M University-Commerce will comply in the classroom, and in online courses, with all federal and state laws prohibiting discrimination and related retaliation on the basis of race, color, religion, sex, national origin, disability, age, genetic information or veteran status. Further, an environment free from discrimination on the basis of sexual orientation, gender identity, or gender expression will be maintained.

Campus Concealed Carry Statement

Texas Senate Bill – 11 (Government Code 411.2301, et al.) authorizes the carrying of a concealed handgun in Texas A&M University-Commerce buildings only by persona who have been issued and are in possession of a Texas License to Carry a Handgun. Qualified law enforcement officers or those who are otherwise authorized to carry a concealed handgun in the State of Texas are also permitted to do so. Pursuant to Penal Code (PC) 46.035 and A&M-Commerce Rule 34.06.02.R1, license holders may not carry a concealed handgun in restricted locations.

For a list of locations, please refer to the Carrying Concealed Handguns On Campus document and/or consult your event organizer.

Web url:
http://www.tamuc.edu/aboutUs/policiesProceduresStandardsStatements/rulesProcedures/34SafetyOfEmployeesAnd
Students/34.06.02R1.pdf

Pursuant to PC 46.035,the open carrying of handguns is prohibited on all A&M-Commerce campuses. Report violations to the University Police Department at 903-886-5868 or 9-1-1 .

Plagiarism

All students should be aware that plagiarism is a serious offense. This is true not only of written essays but also of work written in computer languages such as C++. Copying code for assignments from other students or the internet is not allowed. You may certainly discuss with one another the general aspects of programming assignments (like "what does this requirement mean?") and strategies for coding solutions for these assignments, but you must write the actual code for the programming assignments on your own.