Program in
Information Technology

Computer Architecture &
Operating Systems

Formerly:
Foundations of Information Technology II

CGS 3374
Sections 521
Spring 2014
4 Credit Hours
**Instructor Information**

Instructor: Frederic B. “Rick” Walsh  
Office Location: Virtual Office  
Office Hours: As arranged  
Phone Number: 941-358-2001 - 8 AM to 10 PM  
Please allow time for 12 “Rings” while the phone system switches between my “landline”, cell phone, and finally voicemail.  
E-mail: Please use CANVAS “Messages” for ALL Course Related communications.  
Alternate E-mail: fbwalsh@sar.usf.edu (non-course related communications only)

**Course Information**

Course Title: Computer Architecture and Operating Systems  
Course Number: CGS 3374  
Course Sessions: Tuesday & Thursday sessions -- Consult OASIS Schedule for times  
(Asynchronous) All (synchronous) sessions are recorded and remain available all semester for asynchronous student attendance and review  
Classroom: None: Fully Online
Texts and Materials

Required Texts:

Schaum's Outline of Operating Systems (Paperback)
by J. Archer Harris
McGraw-Hill; 1st edition (October 23, 2001)

AND

Schaum's Outline of Computer Architecture (Paperback)
by Nick Carter
McGraw-Hill; 1st edition (December 26, 2001)

Recommended:

Schaum's Outline of Digital Principles (Paperback)

Course Description

Computer Architecture and Operating Systems is intended to provide a basic understanding of computer functioning by studying both computer hardware organization and supporting operating systems structures in an integrated fashion. The student gains a broader technical understanding, as well as problem solving skills, by studying these closely related topics in one course.
CGS 3374 is a required “core” course for the BSIT & BSAS degree.

Course Goals

Upon completion of this course, students will be familiar with the organization of typical digital computers, and be able to understand combinational and elementary sequential circuits. Additionally, the student will acquire a general knowledge of Machine and Assembly Language. The student will also understand the basic tradeoff between cost and performance, and understand how this tradeoff affects many aspects of computer design.

Operating Systems are vital to all areas of computing and information systems. Operating systems are essential for keeping systems running smoothly and ensuring that users programs, information, and files are available, convenient, and protected. This course guides students through the basics of Operating Systems and how they support modern computer hardware. The course does not focus on one particular operating system, since many administrators are responsible for mixed computing environments, but rather focuses on fundamentals found in most modern operating systems.
Course Learning Objectives

This course provides an introduction to computer engineering topics normally covered in discrete courses on digital design, computer architecture and computer organization. These areas will obviously not be covered in complete depth, but will be addressed sufficiently to provide you with a good understanding of what happens "under the hood" of the computer, in areas normally "out of sight" of users and programmers. All engineering disciplines are inherently practical. There is no "best" organization or architecture for a system. Instead, the process of planning and designing a computer system is a series of "trade-off" decisions, usually between performance and cost. This will be illustrated in this course when appropriate.

This course also examines the general concepts underlying most modern operating Systems, including the Windows and Linux operating systems. This course is another fundamental part of your Information Technology "culture" and establishes a foundation for IT undergraduate degrees. It is aimed at providing you with an overview of the algorithms and concepts underlying modern Operating Systems implementations. The lecture will stay general enough to cover a wide spectrum of OS techniques. Examples will be taken essentially from open sources operating systems (Linux and other instructional OSes) to provide practical illustration. If time permits, state of the art advances in OSes will be presented.

Course Content and Methods of Instruction

I. Review
   a. A collection of electronic components
      i. Logic Integrated Circuits
      ii. Busses
      iii. I/O devices
   b. Controlled by software
      i. Operating system
      ii. Applications programs
   c. Connected together by a variety of means
   d. To solve a wide variety of problems
   e. The software
      i. Contains detailed instructions on how to solve a problem
      ii. The instructions are then performed (executed) by the hardware

II. The Logical Overview of a Computer
    a. The CPU
i. ALU
   ii. Control Unit
b. The Bus
c. Memory
   i. MAR
   ii. MBR
   iii. Control lines
d. Disks
   i. Basic components
   ii. Interface to bus
e. The User input devices
   i. Keyboard
   ii. Mouse
f. User output device – the screen
g. The Logical interaction of these components

III. The Building Blocks of Computation
a. Bits, Bytes, Words, …
b. How to manipulate them
   i. Math
   ii. Logic
c. More about
   i. AND
   ii. OR
   iii. XOR

Upon completion of this course, students will have acquired knowledge concerning the following topics and an understanding of the relationships between them:

Computer Evolution and Performance
Buses
Processor Structure and Function
Control Unit
Micro-Programmed Control
Cache Memory
Internal Memory
External Memory
Input Output
Arithmetic
Instruction Sets characteristics
Instruction Sets addressing modes
RISC
Superscalar
Parallel Processing
Multiprogramming
File Systems
Virtual memory
Multi-CPU support
Graphical User Interfaces
Segmentation
The program development process, including; editing, compiling, linking & loading, execution, and debugging
Buffering of output
Spooling
Critical code sections
Semaphores & inter-process messaging
UNIX / Linux fundamentals and applications
Windows client and server applications

Grading and Evaluation

Student performance will be evaluated based on participation, exercises and assignments, lab assignments, and tests including a Midterm and a Final examination. Grades are assigned using the official University of South Florida grading system including plus & minus grades as described in the USFSM Undergraduate Catalog.

The Mid-Term Exam counts as 25%
The Final Exam counts as 30%
Lab assignments (2) count as 20%
Participation via Blackboard Forums (20 postings) counts as 20%
Participation via 2 postings for improving the study guide counts as 5%

Lab Assignments will be announced and discussed in class sessions. Late assignments will receive reduced or Zero credit. The amount of credit reduction will be proportional to the “lateness” of the assignment.

Opportunities for Extra Credit will be discussed during class sessions.
**Important Dates**

<table>
<thead>
<tr>
<th>Date</th>
<th>Event</th>
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<tbody>
<tr>
<td>January 6th</td>
<td>First day of classes</td>
</tr>
<tr>
<td>January 20th</td>
<td>Martin Luther King Jr</td>
</tr>
<tr>
<td>March 4th – 9th</td>
<td>Midterm Exam available for student attempt</td>
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<tr>
<td>March 10th – 15th</td>
<td>Spring Break</td>
</tr>
<tr>
<td>March 22nd</td>
<td>Last day to drop with a “W”, No refund &amp; No Academic Penalty</td>
</tr>
<tr>
<td>April 24th – 30th</td>
<td>Final Exam available for student attempt</td>
</tr>
<tr>
<td>April 25th</td>
<td>Last Day of Classes</td>
</tr>
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<td>April 26th – 2nd May</td>
<td>Final Exams</td>
</tr>
<tr>
<td>May 5th</td>
<td>USFSM Commencement</td>
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</table>

**CANVAS and Collaborate Tutorials**

Tutorials:


Technical assistance

- Contact Dale Drees: 941-359-4215 or ddrees@sar.usf.edu
- Toll-free Helpline: 866-974-1222
- Live online help: [http://usfsupport.custhelp/app/chat/chat_launch](http://usfsupport.custhelp/app/chat/chat_launch)
Class Attendance Policies

Students in Fully On-line courses ARE required to comply with the First Day Attendance Policy. This policy is easily met by sending a CANVAS MESSAGE to the instructor before the Wednesday of the first week of class.

Flex Attend<sup>sm</sup> Procedures

This class features Flex Attend<sup>sm</sup>, with each class session being recorded and available online throughout the semester. Students may “attend” Synchronously (online during normal class hours), Asynchronously (by viewing recorded class sessions), or using ANY combination of these.

Educational research has found a strong positive correlation between class attendance and academic success. The student is advised to “attend” all class sessions via any convenient Flex Attend<sup>sm</sup> mode and not to fall behind in either “attendance”, nor in assignments and participation. It is a student’s responsibility to “attend” all class sessions by utilizing whichever Flex Attend<sup>sm</sup> modes the student finds convenient.

Attendance records are NOT utilized as a component when determining course grades. NO excuses are ever needed for attendance issues. Flex Attend<sup>sm</sup> recorded sessions are available for review or makeup of missed classes. Therefore, students who find themselves unable to “attend” any class session(s) for any reason including; religious observances, family obligations, emergencies, or employment, need NOT notify the instructor, or submit documentation.

Permission is not required for any student to share or sell notes or recordings of class sessions.
Religious Observances

Students who anticipate the necessity of being absent from class due to the observation of major religious observance are **NOT** required to provide notice of their absences, as all class sessions can be “made-up” via the Flex Attend℠ recorded mode.

Emergencies

In the event of an emergency, it may be necessary for USFSM to suspend normal operations. During this time, USFSM may opt to continue delivery of instruction through methods that include but are not limited to Blackboard, Elluminate, Skype, and email messaging and/or an alternate schedule. It’s the responsibility of the student to monitor Blackboard site for each class for course specific communication, and the main USFSM, College, and department websites, emails, and MoBull messages for important general information.

Emergency Preparedness


- **1 (800) Hotline**: The USF hotline at 1 (800) 992-4231 is updated with pre-recorded information during an emergency. The hotline can also be operated by staff during an emergency if the situation necessitates that additional information, direction or resources need to be communicated and the personnel can be put in place in advance, such as in the event of a hurricane or ongoing emergency

- **Fire Alarm Instructions**: At the beginning of each semester please note the emergency exit maps posted in each classroom. These signs are marked with the primary evacuation route (red) and secondary evacuation route (orange) in case the building needs to be evacuated.
• **Contingency Plans**
  The University requires professors to have a contingency plan for continuing course instruction, if possible, in the event of continued natural disruption (e.g., significant hurricane damage to the area or a pandemic affecting the area). Since all courses at USFSM are supported by CANVAS, the most feasible plan would be to move instruction more completely online. Also, advisable would be a plan to extend deadlines as appropriate.

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**Students with Special Needs**

USF is committed to providing reasonable support for students with disabilities. Students with disabilities are responsible for registering with the Office of Students with Disabilities Services (SDS) in order to receive academic accommodations. Reasonable notice must be given to the SDS office (typically 5 working days) for accommodations to be arranged. It is the responsibility of the student to provide each instructor with a copy of the official Memo of Accommodation.

Contact Information: Disability Coordinator, 941-359-4714
disabilityservices@sar.usf.edu; http://www.usfsm.edu/students/disability
Academic Dishonesty and Plagiarism

The University considers any form of plagiarism or cheating on exams, projects, or papers to be unacceptable behavior. In accordance with university guidelines as found in the USF Student Handbook, anyone found cheating during exams, submitting work that is not their own, plagiarizing or falsifying work that is submitted to represent work they have done, shall receive an “F” grade with numerical value of zero on the item submitted, and the “F” shall be used to determine the final course grade. It is the option of the instructor to assign the student a grade of “F” or “FF” (the latter indicating dishonesty) in the course.

The instructor may use the “Safe Assignment” software within the BlackBoard system to access potential plagiarism and the obligation to reference all materials taken from electronic and other sources.

The University of South Florida has an account with an automated plagiarism detection service which allows instructors and students to submit student assignments to be checked for plagiarism. I reserve the right to 1) request that assignments be submitted as electronic files and 2) electronically submit assignments to SafeAssignment, or 3) ask students to submit their assignments to SafeAssignment through myUSF. Assignments are compared automatically with a database of journal articles, web articles, and previously submitted papers. The instructor receives a report showing exactly how a student’s paper was plagiarized. For more information about SafeAssign and plagiarism, go to http://www.c21te.usf.edu. Click on Plagiarism Resources. For more information about USF’s plagiarism policies, refer to USF’s Undergraduate Catalog - page 46. http://www.ugs.usf.edu/pdf/cat0809/cat0809.pdf

Pursuant to the provisions of the Family Educational Rights and Privacy Act (FERPA), students are requested to maintain confidentiality as a way to keep their personal contact information (i.e. name, address, telephone) from being disclosed to vendors or other outside agencies. By your submission, you are also agreeing to release your original work for review for academic purposes to SafeAssign.

PLEASE REMOVE YOUR NAME FROM THE BODY OF YOUR PAPER AND REPLACE IT WITH YOUR USF ID#. ALSO REMOVE YOUR NAME FROM THE FILE NAME AND REPLACE IT WITH YOUR USF ID# (e.g., “U12345678”) BEFORE SUBMITTING IT TO SafeAssign.
SURVIVAL NOTES

Classmates - FYI

BE SURE TO READ ALL ANNOUNCEMENTS

Everyone: Get into the habit of using the "in-course" messaging system (COURSE MESSAGES tab) on the left panel of my CANVAS classes.

IF you can't see the leftmost panel navigation buttons, it may have collapsed as the default. You are getting into the course, but you may just be seeing the announcements. On the left should be the menu, but if it has collapsed, open it back up. Use the small right facing "->" enclosed in a small TAB which is on the very left edge of the screen, about level with the first sentence of this announcement to expand the navigation menu.

Survival Notes

1. Students in Fully On-line courses ARE required to comply with the First Day Attendance Policy.

2. This Class is fully on-line. (i.e. No Classroom)

3. You "attend" class in "real time" via Collaborate during actual class hours (Synchronously) OR later (hours, or days) by viewing & listening to Collaborate Recordings (Asynchronously) OR "Mix & Match" to fit your job schedule, family obligations, religious holidays, conflicting class times, illnesses, Whatever! Therefore Written Excuses are never needed.

4. Class links become "hot" 1/2 hour before class times.

5. Recordings are created during each class & available throughout the semester, starting an hour or more after class ends, for asynchronous students and/or for review purposes. - N.B. If anyone exits a class without disconnecting properly, it can take up to 24 hours for the recording to appear. Therefore Synchronous students need to DISCONNECT from Collaborate by clicking the Red “X” in the upper right of the session screen and confirming that you want to leave the session before exiting your browser!

6. PLEASE Use CANVAS MESSAGES rather than emails.

Do not reply to this Email. Instead, your FIRST ASSIGNMENT is to send me a CANVAS Message confirming your typical attendance plans (synchronous, asynchronous, or both). All course-related communications should be sent via the CANVAS Messaging system. These messages do not get lost among Spam or filtered and blocked by the USF email filters! I hope this helps to explain why all course related messages need to go through Messages (a course-centric communications tool). I don't want anyone to think that I am "prematurely cranky", YET? :o)
Also, Course Messages are routed into the correct course & are saved along with everything else done during the semester, when at the end of the semester the entire course is backed up & saved for 3 years.

Then Why am I sending this to you using the public USF email system? Because, you may not yet have the habit of checking for Course Messages. (hopefully the spam filters will not intercept this message to you!) Get into the habit of checking Course Messages at least daily. I try to read all your Course Messages, Discussion Forums, etc. at least every eight hours - 24/7!

So "get with the program" and send me your attendance plans ASAP via Course Messages.

By replying properly, you are proving you not only know how to read & write, and follow directions, but also know what I mean when I say "Use the Course Messaging system". Have I nagged you enough?

7. To find class & recording links - Click "Blackboard Collaborate". Select "Sessions" or Recordings".

TUTORIALS FOR CANVAS AND Collaborate

http://www.sarasota.usf.edu/Academics/DE/current_students.php

http://www.sarasota.usf.edu/CampusComputing/Documents/CC_Student_Resources.php

Students needing technical assistance with CANVAS to the following resources:

Toll-free Helpline: 866-974-1222

Live online help: http://usfsupport.custhelp.com/cgi-bin/usfsupport.cfg/php/enduser/chat.php

8. Call me 10 min. before any class if you are having trouble logging in. 941-358-2001

9. IF/Whenever WE have technology problems, please keep trying for 30 minutes, and periodically check "Announcements" for "real-time" updates. MESSAGE me or call me if you solve the problem so that I can send Announcements to everyone.

10. N.B. We are all adults. I understand that "Life Happens". Do Yourself a favor! Don't Cheat (You will only be cheating yourself in the long run) AND Don't Lie to me. I can only use the TRUTH when trying to figure out how to work with you to accommodate your "emergency" or
other "Real Life" problem.

11. Remember the motto on the front cover of "The Hitchhiker's Guide to the Galaxy" - "DON'T PANIC"

And remember to have fun with our class.

Here are some additional useful hints.

For fewer problems when using CANVAS Links, Don't just click on a link. Right Click then select "open in a new window" or "open in a new tab", then left click.

**Setup Instructions before using Collaborate**

If this is the first time you will be using Collaborate, you may be prompted to download some software which may take anywhere from 2 to 20 minutes depending upon your Internet connection speed. You can pre-configure your system with the required software by going to the support page located at:

[http://131.247.100.61:80/support.help](http://131.247.100.61:80/support.help) OR go to [www.collaborate.com](http://www.collaborate.com) then click on "Support" on the left hand menu. Then follow steps 1, 2, & 3.

The most critical components for web conferencing systems and distance learning classes (Collaborate, WiZiQ, Skype, etc.) are quality audio devices, which prevent audio feedback, howling and echos, caused by Internet "round trip" delays.

Although a headset with a microphone is the minimum requirement, an echo-canceling speakerphone is **much more comfortable** and eliminates "Hat Hair". There is a low cost (<$40) echo-canceling USB speakerphone (about the size of a deck of playing cards) which has been tested with the 32 & 64 bit versions of Windows XP, Vista, Windows 7, and Linux. It allows you to conveniently listen and speak while using Elluminate, WiZiQ, Skype, and similar web conferencing systems. Pictures and ordering info can be found in COURSE DOCUMENTS.

**Possible reasons for Whiteboard Inactivity**

The Collaborate session starts automatically up to 30 minutes before the class is scheduled to start, to allow students to log in early and test their equipment or practice with Collaborate. This first part may not exhibit activity or audio content until students or the instructor logs in.

The recording continues for up to a half an hour after the class is scheduled to terminate to allow students to ask questions at the end of the class. These endings may also exhibit inactivity. Inactivity within a course session is usually caused by the class taking a break or other interruptions.

If the PowerPoint or PDF presentations are too small to read or are missing due to a technical fault, please download your own copy of the presentation slides from the Course Documents folder and continue following along with the lecture audio.
USEFUL INFO
Student Pricing for Software which is not available through our MSDN AA site can be purchased from the USF Computer Store (NOT the bookstore)

IF THE SHOE FITS
http://www.youtube.com/watch?v=lpygfmEU2Ck&feature=player_embedded

Get used to using a browser with an automatic spell checker. (FireFox, Chrome, etc.)

Copying your text into Word to make sure that you are using the correct "To, Two, or Too", or the correct "Their vs. There", etc.

FREE SOFTWARE
Dreamspark & DreamSpark Premium (info sometimes displayed when you log into MyUSF)

and

Libre Office (was Open Office) (Similar capabilities and file compatible with MS Office)
Lots of Open Office tutorials are available on the Internet

http://www.openoffice.org/product/

MSDNAA & VMware SOFTWARE SITE INSTRUCTIONS
Please refer to this COBA website for info & help regarding downloading free software. The instructions are basically the same for IT students.

web.usf.edu/blwarner/msdnaa

Your invitation email should have arrived or be arriving in a few days.

Your ID is your official USF email address.

Use the forgotten Password tool if you forgot.

The Microsoft DreamSpark Premium webstore is at:

The VMware Webstore is at:

IT CLUB WEBSITE
WWW.ITNETWORKUSF.com

POWERPOINT NARRATION.... Directions
Record a
narration during a presentation

If you want to capture your own comments, the comments of your audience, or both during your presentation, you can turn on narration before you begin your presentation.

1. In Normal view, select the slide that you want to start the recording on.
2. On the Slide Show tab, in the Set Up group,

   click Record Narration.

3. Click Set Microphone Level, follow the directions to set your microphone level, and then click OK.

4. Do one of the following:
   - To embed (embedded object: Information (object) contained in a source file and inserted into a destination file. Once embedded, the object becomes part of the destination file. Changes you make to the embedded object are reflected in the destination file.) the narration, click OK.
   - To link the narration, select the Link narrations in check box, click Browse, click a folder in the list, and then click Select.

5. If you selected the first slide to begin the recording on, go to step 6.

   If you selected a different slide to begin the recording on, the Record Narration dialog box appears. Do one of the following:
• To start the narration on the first slide in the presentation, click **First Slide**.
• To start the narration on the currently selected slide, click **Current Slide**.

6. In Slide Show view, add your speaker comments along with any audience comments, and then click the slide to advance to the next slide. Repeat this process for all the slides in your presentation.

**Tip** To pause and resume the narration, right-click the slide, and then on the shortcut menu (shortcut menu: A menu that shows a list of commands relevant to a particular item. To display a shortcut menu, right-click an item or press SHIFT+F10), click either **Pause Narration** or **Resume Narration**.

7. Click the black Exit screen.
8. The narration is automatically saved, and a message appears asking if you want to save the timings for the presentation as well. Do one of the following:
   • To save the timings, click **Save**.
     Your slides appear in Slide Sorter view, with the slide timings shown below each slide.
   • To cancel the timings, click **Don't Save**.

**Record comments on a slide**

1. In Normal view, click the slide that you want to add a comment to.
2. On the **Insert** tab, in the **Media Clips** group, click the arrow under **Sound**, and then click **Record Sound**.
3. To record the comment, click **Record**, and start speaking.
4. When you are finished recording, click **Stop**.
5. In the **Name** box, type a name for the sound, and then click **OK**.

A sound icon appears on the slide.

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**Set the slide timings manually**

Office PowerPoint 2007 will automatically record your slide timings when you add narration or you can manually set the slide timings to accompany your narrations.

1. In **Normal view**, click the slide that you want to set the timing for.
2. On the **Animations** tab, in the **Transition To This Slide** group, under **Advance Slide**, select the **Automatically After** check box, and then enter the number of seconds that you want the slide to appear on the screen.

Repeat the process for each slide that you want to set the timing for.
**Tip** If you want the next slide to appear either when you click the mouse or automatically after the number of seconds that you enter — whichever comes first — select both the On Mouse Click and the Automatically After check boxes.

**Turn the slide timings off**

Turning off the slide timings does not delete them. You can turn the timings back on at any time without having to recreate them. However, when the slide timings are turned off, your slides will not automatically advance when you record a narration, and you will need to manually advance the slides.

1. In Normal view, on the Slide Show tab, in the Set Up group, click Set Up Slide Show.

2. Under Advance slides, click Manually.

**Tip** To turn the timings back on, under Advance slides, click Using timings, if present.
USF Sarasota-Manatee Policies and Procedures

Disabilities Accommodation
Students are responsible for registering with the Office of Students with Disabilities Services (SDS) in order to receive academic accommodations. Reasonable notice must be given to the SDS office (typically 5 working days) for accommodations to be arranged. It is the responsibility of the student to provide each instructor with a copy of the official Memo of Accommodation.  www.sarasota.usf.edu/Students/Disability/
Contact Information: Disability, Coordinator 941-359-4714

Academic Dishonesty
The University considers any form of plagiarism or cheating on exams, projects, or papers to be unacceptable behavior. Please be sure to review the university’s policy in the catalog, USFSM Undergraduate Catalog or USFSM Graduate Catalog and the USF Student Code of Conduct.
Undergraduate: http://www.sarasota.usf.edu/Academics/Catalogs/
Graduate: http://www.sarasota.usf.edu/Academics/Catalogs/
USF Student Code of Conduct: http://www.sa.usf.edu/srr/page.asp?id=88

Academic Disruption
The University does not tolerate behavior that disrupts the learning process. The policy for addressing academic disruption is included with Academic Dishonesty in the catalog; USFSM Undergraduate Catalog or USFSM Graduate Catalog and the USF Student Code of Conduct.
Undergraduate: http://www.sarasota.usf.edu/Academics/Catalogs/
Graduate: http://www.sarasota.usf.edu/Academics/Catalogs/
USF Student Code of Conduct: http://www.sa.usf.edu/srr/page.asp?id=88

Contingency Plans
In the event of an emergency, it may be necessary for USFSM to suspend normal operations. During this time, USFSM may opt to continue delivery of instruction through methods that include but are not limited to: Blackboard, Elluminate, Skype, and email messaging and/or an alternate schedule. It's the responsibility of the student to monitor Blackboard site for each class for course specific communication, and the main USFSM and College websites, emails, and MoBull messages for important general information. The USF hotline at 1 (800) 992-4231 is updated with pre-recorded information during an emergency.

Emergency Preparedness
It is strongly recommended that you become familiar with the USF Sarasota-Manatee Emergency Action Plan on the Safety Preparedness site http://www.sarasota.usf.edu/facilities/SafetyPreparedness.php

Fire Alarm Instructions
At the beginning of each semester please note the emergency exit maps posted in each classroom. These signs are marked with the primary evacuation route (red) and secondary evacuation route (orange) in case the building needs to be evacuated.
Course Schedule

Deviations to the following schedule can be expected in order to properly accommodate and respond to students’ questions, interests, and requests.

<table>
<thead>
<tr>
<th>Week</th>
<th>Assignments</th>
<th>Chapter</th>
</tr>
</thead>
</table>
| 1 & 2 | - Course Orientation  
- The Core of Computing: How the Key Elements of Hardware Work Together CA-1  
- Computer System Overview OS-1  
- Operating System Overview OS-2 | Read & Review | |
| 3 | - Memory, Storage, and Input / Output CA-2  
- Computer Monitors and Graphic Systems CA-3  
- “Paper Computer” components, Registers, ALU, Memory Operation | Read & Review | |
| 4 | - High Level >> Assembler >> Machine Language  
- Op Codes, Addresses, I/O Addresses & Instructions  
- “Paper Computer” Operation | Read & Review | |
| 5 | - Multiprogramming (Juggling tasks)  
- Interrupts  
- Logic Gate review & analogy, Flip Flops, SRAM | Read & Review | |
| 6 | - ALU functions, AND Bits, OR Bits, XOR Bits  
- Complement & Increment  
- ALU ADD Half & Full Adder Truth Table  
- K Map for Full Adder >> Circuit  
- Connections and shorthand for multi-bit operation | Read & Review | |
| 7 | - Multiprogramming O/S components  
- Threaded Linked Lists & Queues  
- Interrupts, Context Switching, PCBs, & Task Switching | Read & Review | |
<p>| 8 | - O/S Block Diagram (Layers) | Midterm | |</p>
<table>
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<tr>
<th>Week</th>
<th>Read &amp; Review</th>
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<tr>
<td>9</td>
<td>- Command Interpreter, Shell, - GUI, File Manager</td>
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<tr>
<td>10</td>
<td>- Scheduling, CIC, Dispatcher, and Idle Point - Moving PCBs between Scheduling Queues &amp; I/O Queues - FIFO, Round Robin, Priority, Separate Time List linked Queue</td>
</tr>
<tr>
<td>11</td>
<td>- Threads - SMP - Multi-Core</td>
</tr>
<tr>
<td>12</td>
<td>- Critical Code sections &amp; Race Conditions - Concurrency, Deadlocks, Starvation</td>
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<tr>
<td>13</td>
<td>- Memory Management - Memory Protection &amp; Absent Bit - Paging &amp; Segmentation</td>
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<tr>
<td>14</td>
<td>- Virtual Memory &amp; Thrashing - “Usually Add More Memory” - Spooling</td>
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<td>15</td>
<td>- Mobile, Embedded &amp; Real-Time O/S - Review</td>
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<td>Final Exam</td>
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