COSC 5331.001 Foundations of Computer System Software
School of Engineering and Computer Science
Fall 2016

A. COURSE INFORMATION

Course number/section: COSC 3346.001  Credit-Hrs: 3 hrs.
Class meeting time:  MW: 5:30 - 6:45 PM
First meeting date:  08/24/2016
Class location:  CI-122
Course Website:  Blackboard (bb9.tamucc.edu)

B. INSTRUCTOR INFORMATION

Instructor:  Dr. Jeffrey Gordon
Office location:  EN 316L
Office hours:  R: 2-4 PM, F: 9 AM-12 PM (or by appt.)
Telephone:  361-825-3688 (x3688)
E-mail:  Jeffrey.Gordon@tamucc.edu
Appointments:  by email

C. COURSE DESCRIPTION

Catalog Course Description
A study of various system software components such as operating systems and language processors. The general underlying design philosophies, implementation approaches, and uses are discussed primarily with respect to the interface role provided by the software between programmers or users and the hardware.

Extended Course Description
None

D. PREREQUISITES AND COREQUISITES

Prerequisites
Pre-requisite: COSC 5313 (Foundations of Computer Organization and Architecture)
Co-requisite: COSC 5321 (Data Structures).
Strong knowledge of C/C++. If you do not have the prerequisites, corequisites (or equivalents from another university) shown on your TAMUCC records, you may be dropped from class at any time.

Corequisites
None
E. REQUIRED TEXTBOOK(S), READINGS AND SUPPLIES

Required Textbook(s)


Optional Textbook(s) or Other References


Supplies
None

F. STUDENT LEARNING OUTCOMES AND ASSESSMENT

Assessment is a process used by instructors to help improve learning. Assessment is essential for effective learning because it provides feedback to both students and instructors. A critical step in this process is making clear the course’s student learning outcomes that describe what students are expected to learn to be successful in the course. The student learning outcomes for this course are listed below. By collecting data and sharing it with students on how well they are accomplishing these learning outcomes students can more efficiently and effectively focus their learning efforts. This information can also help instructors identify challenging areas for students and adjust their teaching approach to facilitate learning.

By the end of this course, students should be able to:

1. Understand the functionality operating systems provide, basic operations and services
2. Understand the design of various operating systems, system calls, kernel and user modes, operating system structures, virtual machines, and the system boot process
3. Understand the concept of a process, process scheduling and inter-process communication
4. Understand the concept of a thread, multi-threading models and libraries
5. Understand the concepts of CPU scheduling, scheduling criteria, and scheduling algorithms
6. Understand various aspects of process synchronization including the critical section problem, Peterson's solution, synchronization hardware, and semaphores. Classic synchronization problems will also be explored.
7. Understand the system model and characteristics of deadlocks and methods of handling deadlocks (prevention, avoidance, detection, recovery)
8. Understand the structures for main memory including swapping, paging, and segmentation
9. Understand the structures for virtual memory including demand paging, page replacement algorithms, frame allocation, and thrashing
10. Understand the concepts related to the file system interface and file system implementation including free space management, efficiency and performance
11. Understand the concepts related to mass storage structures such as disk structure, attachment, and scheduling and including the various RAID architectures
12. (Time Permitting) Understand the various aspects regarding security and protection in operating systems
13. (Time Permitting) Understand distributed operating system structures, distributed file systems, and distributed coordination
14. (Time Permitting) Explore case studies using the Microsoft Windows and Linux operating systems

Assessment of objectives will be conducted through exams, homework assignments, and projects.

G. INSTRUCTIONAL METHODS AND ACTIVITIES
Lectures using online electronic documents and slides.

H. MAJOR COURSE REQUIREMENTS AND GRADING
This is a high-level core course. This is a difficult course that demands all students attend all classes! Regular completion of all reading, homework, and other outside assignments, are absolutely essential for success in this course.

Your course grade will be decided on your performance in the homework assignments, quizzes, projects, and two exams. The distribution of points is as follows:

<table>
<thead>
<tr>
<th>ACTIVITY</th>
<th>% of FINAL GRADE</th>
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</thead>
<tbody>
<tr>
<td>Exams</td>
<td>45</td>
</tr>
<tr>
<td>Quizzes</td>
<td>5</td>
</tr>
<tr>
<td>Homework Assignments</td>
<td>5</td>
</tr>
<tr>
<td>Projects</td>
<td>40</td>
</tr>
<tr>
<td>Final Paper</td>
<td>5</td>
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</table>

Grading scale: A: 100-90, B: 89-80, C: 79-70, D: 69-60, and F: 59-0.

Homework Assignments and Quizzes: Approximately 2-3 homework assignments will be given. No late homework assignments will be accepted. Partial credit will be given for incomplete assignments. In addition, there may be a pop quiz from time-to-time.

Projects: There will be approximately 4-5 programming projects. Unless otherwise directed, the programming projects must be written in C/C++. The projects can be submitted electronically and the details on project submission will be given to you together with the project assignment.

Final Paper: The final paper should be written individually. The topic for the paper must be approved by the instructor. Additional details on the final paper will be provided during the semester.

Exams: The first exam will be given on September 26, 2016, the second exam will be given on November 2, 2016 during the scheduled class time, and the final exam will be given on December 12, 2016 from 4:30 – 7:00 pm.
1. **COURSE CONTENT/SCHEDULE** *(subject to change)*

<table>
<thead>
<tr>
<th>Date</th>
<th>Chapter(s)</th>
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<tbody>
<tr>
<td>08/24/16</td>
<td>Chapter 1: Computer System Overview</td>
</tr>
<tr>
<td>08/29/16</td>
<td>Chapter 2: Operating System Overview&lt;br&gt;UNIX System Calls, Signals, <strong>HW1</strong></td>
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<tr>
<td>08/31/16</td>
<td>Chapter 3: Process Description and Control, <strong>Project 1</strong></td>
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<tr>
<td>09/05/16</td>
<td>Labor Day, <strong>No Class</strong></td>
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<tr>
<td>09/07/16</td>
<td>Chapter 3: Process Description and Control&lt;br&gt;Chapter 4: Threads, <strong>HW2</strong></td>
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<tr>
<td>09/12/16</td>
<td>Chapter 4: Threads, <strong>Project 2</strong></td>
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<tr>
<td>09/14/16</td>
<td>Chapter 5: Concurrency: Mutual Exclusion &amp; Synchronization</td>
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<tr>
<td>09/19/16</td>
<td><strong>Exam 1</strong></td>
</tr>
<tr>
<td>09/21/16</td>
<td>Chapter 5: Concurrency: Mutual Exclusion &amp; Synchronization</td>
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<tr>
<td>09/26/16</td>
<td>Chapter 6: Concurrency: Deadlock and Starvation, <strong>HW3</strong></td>
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<td>10/03/16</td>
<td>Chapter 7: Memory Management, <strong>Project 3</strong></td>
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<tr>
<td>10/05/16</td>
<td><strong>HW4</strong></td>
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<tr>
<td>10/10/16</td>
<td>Chapter 8: Virtual Memory</td>
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<tr>
<td>10/12/16</td>
<td>Chapter 9: Uniprocessor Scheduling</td>
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<tr>
<td>10/17/16</td>
<td>Chapter 10: Multiprocessor, Multicore, and Real-Time Scheduling&lt;br&gt;<strong>Exam 2</strong></td>
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<tr>
<td>10/19/16</td>
<td><strong>HW5</strong></td>
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<tr>
<td>10/24/16</td>
<td>Chapter 11: I/O Management and Disk Scheduling, <strong>Project 4</strong></td>
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<tr>
<td>10/26/16</td>
<td><strong>HW6</strong></td>
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<tr>
<td>11/02/16</td>
<td>Chapter 12: File Management, <strong>HW7</strong></td>
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<tr>
<td>11/07/16</td>
<td>Chapter 13: Embedded Operating Systems&lt;br&gt;<strong>Thanksgiving Break, No Class</strong></td>
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<td>11/09/16</td>
<td><strong>HW8</strong></td>
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<tr>
<td>11/14/16</td>
<td>Chapter 14: Virtual Machines&lt;br&gt;<strong>Project 5</strong></td>
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<tr>
<td>11/16/16</td>
<td><strong>HW9</strong></td>
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<tr>
<td>11/21/16</td>
<td>Chapter 15: Operating System Security&lt;br&gt;<strong>Project 6</strong></td>
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<tr>
<td>11/23/16</td>
<td><strong>HW10</strong></td>
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<tr>
<td>11/28/16</td>
<td>Chapter 16: Distributed Processing, Client/Server, and Clusters&lt;br&gt;<strong>HW11</strong></td>
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<tr>
<td>12/05/16</td>
<td><strong>Project 7</strong></td>
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<tr>
<td>12/07/16</td>
<td><strong>HW12</strong></td>
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<tr>
<td>Final Exam</td>
<td>on Wednesday, December 12, 2016 from 4:30 PM to 7:00 PM</td>
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**Note:** Changes in this course schedule may be necessary and will be announced to the class by the Instructor. The assignments and exams shown are directly related to the Student Learning Outcomes described in Section F.
J. COURSE POLICIES

Course Syllabus: We will meet for lecture on Mondays and Wednesdays, when new material will be presented. We will follow the text generally, but non-text material may also be included in the lectures. The assignments and exams will be given during the class hours. You are responsible for all the material presented during the lecture.

Exams: Exams will cover all lecture and reading material discussed in the class. Exams must be taken on the hour they are scheduled.

Missed Exam: In the event, if you cannot attend the class to take the exam due to some emergency or some unavoidable situation (such as serious illness, death in the family, participation in university sports, religious observations, and so on) you must notify me as soon as possible before the exam and also you must validate your absence by providing me a document (e.g., with a letter from your doctor). Once your cause is validated a make-up exam will be given.

Homework Assignments & Projects: They will significantly be based on the material from the lectures and other material considered essential for the successful completion of this course. They will be posted on the course web page or hard copies are handed out in the class during the lecture sessions. The submission details will be provided to you along with the assignment. All the homework assignments and projects are due at the beginning of the class on the due date. If the student is absent on the due date, it is the student's responsibility to see to it that the assignment is submitted on the designated date. No late homework assignments will be accepted. Late projects will be accepted. There is a penalty for late submissions. A project that is turned in after the class on the due date is considered one day late. There is a penalty for late submissions. 25% penalty for 1 day late, 50% penalty for 2 days late, 75% penalty for 3-4 days late and 100% penalty (i.e. no credit) if submitted after 4 days. If you have not completed your assignment by the due date, you should submit the work you have done for partial credit. No work will be accepted once the graded work has been returned or the solution has been disclosed to the class, except for unusual circumstances which the instructor feels reasonable. Note that any kind of hardware or software failure or machine unavailability in the lab does not merit an extension on the assignment. Diskettes upon which major examinations, assignments, projects or papers submitted may be retained by the instructor as a permanent record of the student's work.

Grading Error: All questions concerning a test score or grading of a returned test or assignment must be resolved within one week. It is always a good idea to keep all of your work until the end of the semester. In case of any recording errors or doubts, you may produce them for correction or verification.

Academic Honesty Policy: You are expected to avoid all forms of academic dishonesty as defined in Catalog. In addition, students are expected to behave in an ethical manner in all class activities. If you feel uncertain about a particular activity, please speak to me BEFORE problems arise. Ethical behavior is a requirement for passing this course. All work submitted for grading must be the student's own work. Plagiarism will result in a score of 0 (zero) for the work or dismissal from the course and the Dean of Students office will be notified. No copying from another student's work, of any class, is allowed.
It is the student's duty to allow no one to copy his or her work. Anyone found cheating and/or copying, in the exams or assignments, in the instructor's opinion, will receive an automatic F for the course.

**Collaboration:** If two or more people collaborate on an assignment assigned it should be notified on the assignment and each student should submit his or her solutions for grading. The grade obtained on such an assignment is the total points obtained for the assignment divided by the square of the number of people who collaborated on the assignment (e.g., if 3 people collaborate on an assignment and the grade for that assignment is 90 out of 100, then each student receives a grade of 90/3^2 = 10). If you do not notify me of such collaboration it will be treated as copied and action will be taken as discussed under the academic honesty policy.

**Attendance:** You must attend all classes and labs. In-class or lab attendance can directly affect your grade and you are responsible for any materials covered or handed out or any announcements made for the tests and assignments in your absence. Records of your attendance will be maintained and reported to the University. Students found missing classes without the instructor's permission will be automatically withdrawn from the course.

**Absence from class:** Students are responsible for all materials covered in class and assigned. Should a student be absent from class, it is his/her responsibility to get the notes, etc. for that missed class. More important, should there be assignments, it is the student responsibility to obtain such assignments. No excuse will be accepted for assignments not turned in because the student was absent when it was due.

**Cell Phone Use:** Cell phones and pagers must be turned off during class. First violation receives a warning. All succeeding violations result in a ten point deduction on the final exam. Any violation during a quiz or exam results in a ten percent deduction off the corresponding paper. No warnings for quizzes or exams.

**Laptop Use**
Laptops, Tablets cannot be used in the class.

**Food in Class**
No food in the class or labs.

**Student Security Statement:** Please read the [Student Security Statement](http://catalog.tamucc.edu/content.php?catoid=10&navoid=313#Academic Integrity).

**K. COLLEGE AND UNIVERSITY POLICIES**

- **Academic Integrity (University)**
  It is expected that university students will demonstrate a high level of maturity, self-direction, and ability to manage their own affairs. Students are viewed as individuals who possess the qualities of worth, dignity, and the capacity for self-direction in personal behavior. See Full University Policy at: [http://catalog.tamucc.edu/content.php?catoid=10&navoid=313#Academic Integrity](http://catalog.tamucc.edu/content.php?catoid=10&navoid=313#Academic Integrity)
Classroom/Professional Behavior
You are expected to behave professionally in the classroom, labs and during office visits. Unprofessional behavior will be reported to the dean of students.

Deadline for Dropping a Course with a Grade of W (University)
The grade of W will be assigned to any student officially dropping a course by Friday, November 11, 2016. No student is eligible to receive a W without completing the official drop process by this deadline. Visit the Office of the University Registrar for the Course Drop Form that must be submitted. After November 11, 2016 a student will not be allowed to drop a course.

Grade Appeals (College of Science and Engineering)
As stated in University Procedure 13.02.99.C2.01, Student Grade Appeal Procedures, a student who believes that he or she has not been held to appropriate academic standards as outlined in the class syllabus, equitable evaluation procedures, or appropriate grading, may appeal the final grade given in the course. The burden of proof is upon the student to demonstrate the appropriateness of the appeal. A student with a complaint about a grade is encouraged to first discuss the matter with the instructor. For complete details, including the responsibilities of the parties involved in the process and the number of days allowed for completing the steps in the process, see University Procedure 13.02.99.C2.01, Student Grade Appeal Procedures. These documents are accessible through the University Rules website at http://www.tamucc.edu/provost/university_rules/index.html, and the College of Science and Engineering Grade Appeals webpage at http://sci.tamucc.edu/students/GradeAppeal.html. For assistance and/or guidance in the grade appeal process, students may contact the chair or director of the appropriate department or school, the Office of the College of Science and Engineering Dean, or the Office of the Provost.

Disability Services
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 believe you have a disability requiring an accommodation, please call (361) 825-5816 or visit Disability Services in Corpus Christi Hall 116.

If you are a returning veteran and are experiencing cognitive and/or physical access issues in the classroom or on campus, please contact the Disability Services office for assistance at (361) 825-5816. http://disabilityservices.tamucc.edu/

Academic Advising
The College of Science & Engineering requires that students meet with an Academic Advisor as soon as they are ready to declare a major. The Academic Advisor will set up a degree plan, which must be signed by the student, a faculty mentor, and the department chair. Meetings are by appointment only; advisors do not take walk-ins. Please call or stop by the Advising Center to check availability and schedule an
appointment. The College’s Academic Advising Center is located in Center for Instruction 350 or can be reached at (361) 825-3928.

L. OTHER INFORMATION

None

GENERAL DISCLAIMER

I reserve the right to modify the information, schedule, assignments, deadlines, and course policies in this syllabus if and when necessary. I will announce such changes in a timely manner during regularly scheduled lecture period.
This document is to inform you of the policies that you must follow to allow your usage of student computer resources in the Department of Computing Sciences (CSCI). This document provides a summary of the guidelines for using CSCI student computer resources. If you have questions or are uncertain whether a proposed action is appropriate, discuss them with your faculty member or go to original documents.

These computer systems are primarily located in Cl 226, 228, 229 230, 344, 346 and ST 111, 116, 208, 209, 214, 217, 220, 221. Most the computers in these rooms are dual-boot Windows XP and LINUX or Window XP only. All share a common network server where student files are maintained.

These computers are to be used by computing sciences students and faculty to research and learn about computers, programming, and networks. They have been specially configured to allow students to explore these areas. They include tools for writing programs, compiling programs, monitoring networks, accomplishing word processing, and many more specialized tasks.

This is a shared system, with many users. Usage of these systems is encouraged for appropriate computer science learning and research. If all students cooperate and share these resources appropriately, everyone usage of this system will be enhanced. On the other hand, if students misuse these resources, run programs that take inordinate computer resources (there are other systems available for programs that require large resources), everyone’s response time will be slowed.

User Accountability. Students are accountable for their actions and may be held accountable to applicable administrative and/or legal sanctions.

Resource Use. Computers, software, and communications systems provided by CSCI are to be used only for TAMUCC class related work. CSCI systems are provided to our users without any warranty. CSCI will not be held liable in the event of any system failure or loss of data.

Passwords and Usernames. Your campus wide user name is used on these computers. The initial password is your first initial+last initial+last 6 digits of your SSN. This password should immediately be changed during your first logon to this system. This is accomplished by using a browser and entering this URL: http://www.sci.tamu.edu/password. New passwords should be at least 8 characters long, contain numbers, upper and lower case letters, and special characters. Passwords must not be shared with any other person and must be changed as soon as possible after they have been exposed to unauthorized personnel, when a suspected compromise has taken place, or by direction of a CSCI faculty/staff member.

Software Use. All software used on CSCI computers must be legally acquired and used in accordance with the licensing agreement that came with that software. Possession, use or transmission of illegally obtained software is prohibited. Likewise, users shall not copy, store or transfer copyrighted software or data, except as permitted by the owner of the copyright, this includes storing copyrighted music, movies, or photographs on the system, unless appropriate permission has been received.

Software on these systems are governed by software license agreements, that limit how this software may be used. Users may not copy or otherwise use this software on other computers than those where it was initially installed. This includes copying student created programs from other users, where permission has not been obtained. Software that has not been legally procured and installed by computer administration personnel is not allowed on these systems.

Prohibited Actions.

- Do not share your passwords with anyone. As account holder, you are liable for any misuse that originates from your account.
- Do not use the department’s computing resources for personal, political, and commercial activities. Strictly use the resources for your education and research in computing sciences as per instructions of your professor.
- Do not use the department’s computing and networking resources to download any unauthorized or illegal software or data in any form including audios, texts, videos, images, and animations.
- Do not install any unauthorized software or store any unauthorized or illegal files in any form on the department’s computers.
- Do not use the department’s computing resources to duplicate electronically any unauthorized or illegal documents.
- Do not harass or threaten any user by sending messages via email or any other way.
- Do not engage in any subverting activities such as deleting or modifying system files, installing unauthorized hardware, tampering with existing hardware, infecting computer systems with viruses.
- Do not disrupt and attack services on department’s servers.
- Do not reveal or attempt to reveal private information of other users using any hardware or software tools.
- Never use the computing resources of the department to attack any computer or network in the university or on the Internet.
- Users are prohibited from changing or circumventing access controls to allow themselves or others to perform actions outside their authorized privileges.

Users must not intentionally introduce or use malicious software such as computer viruses, Trojan horses, or worms.

Users must not download/install or run security programs or utilities that reveal or exploit weaknesses in the security of a system.

All pornographic, harassing, or discriminatory pictures, movies, games and programs are specifically prohibited.

Data Retention. CSCI reserves the right to remove any data at any time. The CSCI makes no warranty for information stored in this system. Students are responsible for keeping a backup copy of all information. Normally, information will be retained between semesters as long as a student remains enrolled computer science classes. Data on client computers (not stored on a server), is routinely removed between semester or when any problem occurs with a system.

Monitoring and Privacy. Users have no explicit or implicit expectation of privacy. CSCI and TAMUCC Computer Services monitors the activities that occur on these computers and the content of all files on CSCI systems and networks and will access any computer files without prior knowledge or consent of users, senders or recipients. CSCI and TAMUCC Computer Services may retain copies of any network traffic, computer files or messages indefinitely without prior knowledge or consent of the student.

Games and Other Inappropriate Computer Usage. These systems are not to be used for entertainment purposes. All games, entertainment programs, music, movies, and similar programs/files are not authorized. The exceptions to this are student created programs/files done for class work or research. If in doubt, contact a CSCI faculty member.

Disciplinary Responsibilities. Violations of these guidelines will be processed in accordance with University rules for Student Disciplinary Proceedings, 13.02.99.C1 and the Student Code of Conduct (Student Handbook, Section 5). According to the Student Handbook, the Dean of the College of Science and Technology is responsible for all academic disciplinary actions whereas the Office of the Student Affairs is responsible for all non-academic disciplinary actions. Depending on the degree and extent of a violation, a penalty can be as severe as expulsion of the student from the university. In case of severe violations such as violations of Texas Penal Code, complaints will be filed with legal authorities by the Chief of Police on behalf of the university.