COSC 5331.001 Foundations of Computer System Software
School of Engineering and Computer Science
Spring 2017

A. COURSE INFORMATION
   Course number/section: COSC 5331.001
   Class meeting time: MWF 11:00 - 11:50 AM
   Class location: CI-128
   Course Website: Blackboard (bb9.tamucc.edu)

B. INSTRUCTOR INFORMATION
   Instructor: Dr. Jeffrey Gordon
   Office location: EN 316L
   Office hours: R: 11 AM-1 PM; F: 12-3 PM or by appointment
   Telephone: 361-825-3688 (x3688)
   e-mail: jeffrey dot gordon at tamucc dot edu
   Appointments: by email

A. 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

B. 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
C. REQUIRED TEXTBOOK(S), READINGS AND SUPPLIES

Required Textbook(s)

Optional Textbook(s) or Other References

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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<tbody>
<tr>
<td>Exams</td>
<td>45</td>
</tr>
<tr>
<td>Quizzes &amp; participation</td>
<td>5</td>
</tr>
<tr>
<td>Homework Assignments</td>
<td>5</td>
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<tr>
<td>Projects</td>
<td>40</td>
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<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 February 20, 2017, the second exam will be given on March 31, 2017 during the scheduled class time, and the final exam will be given on May 5, 2017 from 11:00 am – 1:30 pm. per the University Final Exam schedule. Please leave cell-phones with instructor for any restroom breaks.
## I. COURSE CONTENT/SCHEDULE (subject to change)

<table>
<thead>
<tr>
<th>wk1: 01/18/17 01/20/17</th>
<th>Course overview, Introduction, Chapter 1</th>
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<tbody>
<tr>
<td>wk2: 01/23/17 01/25, 01/27</td>
<td>Chapter 2: Operating System Structures Chapter 2: Operating System Structures, HW1</td>
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<td>wk3: 01/30/17 02/01, 02/03</td>
<td>UNIX System Calls, Signals UNIX System Calls, Signals, Project 1</td>
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<td>wk4: 02/06/17 02/08, 02/10</td>
<td>Chapter 3: Processes Chapter 3: Processes</td>
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<td>wk5: 02/13/17 02/15, 02/17</td>
<td>Chapter 4: Threads Chapter 4: Threads, Exam 1 Review, Project 2</td>
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<td>wk6: 02/20/17 02/22, 02/24</td>
<td>Exam 1 (02/20/17) Chapter 5: CPU Scheduling</td>
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<tr>
<td>wk7: 02/27/17 03/01, 03/03</td>
<td>Chapter 5: CPU Scheduling, Chapter 6: Process Synchronization Chapter 6: Process Synchronization, HW2</td>
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<td>wk8: 03/06/17 03/08, 03/10</td>
<td>Chapter 7: Deadlocks, Project 3 Chapter 7: Deadlocks</td>
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<td>03/13/17 to 03/17/17 Spring Break</td>
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<td>wk9: 03/20/17 03/22, 03/24</td>
<td>Chapter 8: Main Memory Chapter 8: Main Memory</td>
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<td>wk10: 03/27/17 03/29, 03/31</td>
<td>Chapter 9: Virtual Memory, Exam 2 Review Exam 2 (03/31/17)</td>
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<td>wk11: 04/03/17 04/05, 04/07</td>
<td>Chapter 10: File System Interface Chapter 11: File System Implementation, Project 4</td>
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<td>wk12: 04/10/17 04/12, 04/14</td>
<td>Chapter 12: Mass-Storage Structures, HW3 Chapter 13: I/O Systems</td>
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<td>wk13: 04/17/17 04/19, 04/21</td>
<td>Chapter 15: Security Chapter 16: Distributed System Structures, Project 5</td>
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<td>wk14: 04/24/17 04/26, 04/28</td>
<td>Chapter 17: Distributed File Systems Chapter 18: Distributed Coordination</td>
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<tr>
<td>wk15: 05/01/17</td>
<td>Chapter 18: Distributed Coordination, Exam 3 Review</td>
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<td><strong>Final Exam</strong> on Friday, May 05, 2017 from 11:00 AM - 1:30 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).

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**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, April 7, 2017. 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 April 7, 2017 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
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.