### COSC 5352 Advanced Operating Systems
#### Fall 2014 - Section 001

- **Meeting Times:** MW 5:30 - 6:45 PM
- **Meeting Place:** IH-267
- **Instructor:** Dr. Ajay K Katangur
- **Office:** CI 340
- **Office Hrs:** 3:30 - 5:15 PM MW, other times by appointment
- **Office Phone:** 361-825-2478
- **E-mail:** ajay dot katangur at tamucc dot edu
- **Course Web Page:** [http://faculty.tamucc.edu/~akatangur/fa14/COSC5352/](http://faculty.tamucc.edu/~akatangur/fa14/COSC5352/)

### Course Description:
An introduction to advanced concepts in operating systems and distributed systems. Topics include distributed system architectures, inter-process communication, distributed mutual exclusion, distributed synchronization and deadlock, agreement protocols, distributed scheduling and process management, distributed shared memory, and distributed file systems, multiprocessor system architectures and operating systems, recovery and fault tolerance.

### Pre-requisite:
COSC 5331 (Survey of Computer System Software). A strong knowledge of C/C++ programming will help you succeed in the programming projects. If you do not have the prerequisites (or equivalents from another university) shown on your TAMUCC records, you may be dropped from class at any time.

### Student Learning Outcomes:
Upon completion of this course, students will be able to:
- Define what a distributed computing system is and analyze various distributed computing system models.
- Comprehend and evaluate the basic fundamentals and design issues of distributed operating systems
- Recognize and evaluate various types of computer networks, communication protocols, and internetworking technologies
- Comprehend various methods and design issues for inter-process communication using message passing and remote procedure calls in a distributed system
- Explain the design and implementation issues for distributed shared memory, consistency models, replacement strategies, and thrashing
- Explain and analyze distributed operating system principles of clock synchronization (physical, logical, and vector), event ordering
- Explain and analyze various algorithms for distributed mutual exclusion
- Explain and analyze various algorithms for distributed deadlock
- Comprehend distributed system design issues for database systems and atomic transactions
- Explain and analyze concurrency control, scheduling, process migration, and load distribution in distributed operating systems
- Research specialized design issues in real-time operating systems, clusters, high availability systems, and disaster recovery methods.

### Course Text:
Course Requirements:
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.

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

1. Homework assignments, quizzes and class participation worth 10%.
2. Projects worth 45%.
3. Three exams worth 45% (Each exam worth 15%).

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: Approximately 4-5 programming projects will be given. Partial credit will be given for incomplete assignments.

Exams: The first exam will be given on September 29, 2014, the second exam will be given on October 29, 2014, and the final exam will be given on Monday, December 8, 2014 from 4:30 – 7:00 PM.

Course Organization and Policies:

Course Syllabus: We will meet in 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 from the text. Exams must be taken on the hour they are scheduled. 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).

Quizzes: They will cover all lecture and reading material from the text. No makeup quizzes will be given under any circumstances.

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 1-2 days late. 50% penalty for 3-4 days late. 75% penalty for 5 days late. 100% penalty (i.e. no credit) if submitted after 5 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.

**Last date to withdraw:** Friday, November 7, 2014 & receive an automatic grade of W.

**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 and lab 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 90/3² = 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. While in class attendance will not directly affect the grade, you are responsible for any materials covered or handed out or 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.

**Other Policies:** Cell phones and pagers must be turned off during class. First violation receives a warning. All succeeding violations result in a ten point deduction off 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.

**Student Security Statement:** Please read the [Student Security Statement](#).

**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 believe you have a disability requiring an accommodation, please contact the Disability Services Office at (361) 825-5816 or come by and visit us in Driftwood 101.
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.

**Academic Advising:** The College of Science and 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. The College's Academic Advising Center is located in Faculty Center 178, and can be reached at 825-6094.

**Grade Appeal Process:** 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 on 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 on the process, including the responsibilities of the parties involved in the process and the number of days allowed for completing the steps in the process, consult Texas A&M University-Corpus Christi University Procedure 13.02.99.C2.01 *Student Grade Appeal Procedures* ([http://www.tamucc.edu/provost/university_rules/index.html](http://www.tamucc.edu/provost/university_rules/index.html)), and the College of Science and Engineering Grade Appeals webpage ([http://sci.tamucc.edu/students/GradeAppeal.html](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 or the College of Science and Engineering Dean's Office.

### Tentative Course Schedule (Subject to change)

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<th>Week 1:</th>
<th>Review of Operating Systems Concepts</th>
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<td>Week 2:</td>
<td>Chapter 1: Characterization of Distributed Systems</td>
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<td>Week 6:</td>
<td>MPI Programming, <strong>Exam 1</strong></td>
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<td>Week 7:</td>
<td>MPI Programming</td>
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<td>Week 8:</td>
<td>Chapter 5: Distributed Objects and Remote Invocation</td>
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<td>Chapter 8: Transactions and Concurrency Control, <strong>Exam 2</strong></td>
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<td>Week 12:</td>
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<td>Week 13:</td>
<td>Chapter 10: Distributed Shared Memory</td>
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<td>Chapter 11: Distributed File Systems</td>
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<td>Week 15:</td>
<td>Chapter 12: Mobile and Ubiquitous Computing</td>
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<td><strong>Final Exam</strong></td>
<td>on Monday, December 8, 2014 from 4:30 - 7:00 PM.</td>
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**Note:** This syllabus represents a general plan for the course. Deviations from this syllabus may be necessary during the semester and changes will be announced in class.