Operating Systems COSC 3346
Department of Computing Sciences
Summer 2017

A. COURSE INFORMATION

Course number/section: COSC 3346.001
Class meeting time: MW 12:00 p.m. - 2:30 p.m.
Class location: CS-103
Course Website: http://sci.tamucc.edu/~dkar/summer2017/3346

B. INSTRUCTOR INFORMATION

Instructor: Dr. Dulal Kar
Office location: CI 321
Office hours: 2:30 p.m. – 4:00 p.m. (MTWR)
Telephone: 361-825-5878
e-mail: dulal.kar@tamucc.edu
Appointments: Required for meetings beyond office hours

C. COURSE DESCRIPTION

Catalog Course Description
Introduction to operating systems concepts, principles, and design. Topics include: processes and threads, CPU scheduling, mutual exclusion and synchronization, deadlock, memory management, file systems, security and protection, networking, and distributed systems. Selected existing operating systems are discussed, compared, and contrasted.

Extended Course Description
None

D. PREREQUISITES AND COREQUISITES

Prerequisites
COSC 2334 (Computer Architecture) or ENTC 3418 (Microprocessors/microcontrollers) and COSC 2437 (Data Structures). Strong knowledge of C/C++. 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.

Corequisites
None

E. REQUIRED TEXTBOOK(S), READINGS AND SUPPLIES

Required Textbook(s)
- Operating System Concepts (9th Edition) by Silberschatz, Galvin and Gagne, John

Wiley & Sons (ISBN: 978-1-118-06333-0)

Optional Textbook(s) or Other References
None

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:

ACTIVITY	% of FINAL GRADE
Exams	45
Quizzes	5
Homework Assignments	5
Projects	45

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.

Exams: The first exam will be given on June 21, 2017, and the final exam will be given on July 19, 2017 during the scheduled class time.

I. COURSE CONTENT/SCHEDULE

05/31/17:	Course Overview, Introduction, Chapter 1
06/05/17: 06/07/17:	Chapter 2: Operating System Structures, HW1 UNIX System Calls, Signals, **Project 1**

06/12/17:	Chapter 3: Processes
06/14/17:	Chapter 4: Threads, **Project 2**
06/19/17:	Chapter 5: CPU Scheduling, Exam 1 Review
06/21/17:	**Exam 1**
06/26/17:	Chapter 6: Process Synchronization, **HW2**
06/28/17:	Chapter 6: Process Synchronization, Chapter 7: Deadlocks, **Project 3**
07/03/17:	Chapter 7: Deadlocks
07/05/17:	Chapter 8: Main Memory
07/10/17:	Chapter 9: Virtual Memory, Chapter 10: File System Interface , **Project 4**
07/12/17:	Chapter 11: File System Implementation, Chapter 12: Mass-Storage Structures
07/17/17:	Chapter 13: I/O Systems, Chapter 15: Security
07/19/17:	**Final Exam**

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 and 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. While in class or lab 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.

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.

K. COLLEGE AND UNIVERSITIY POLICIES

- **Academic Integrity (University)**

University students are expected to conduct themselves in accordance with the highest standards of academic honesty. Academic misconduct for which a student is subject to penalty includes all forms of cheating, such as illicit possession of examinations or examination materials, falsification, forgery, complicity or plagiarism. (Plagiarism is the presentation of the work of another as one's own work.) In this class, academic misconduct or complicity in an act of academic misconduct on an assignment or test will result in a failing grade.

- **Classroom/Professional Behavior**

Texas A&M University-Corpus Christi, as an academic community, requires that each individual respect the needs of others to study and learn in a peaceful atmosphere. Under Article III of the Student Code of Conduct, classroom behavior that interferes with either (a) the instructor's ability to conduct the class or (b) the ability of other students to profit from the instructional program may be considered a breach of the peace and is subject to disciplinary sanction outlined in article VII of the Student Code of Conduct. Students engaging in unacceptable behavior may be instructed to leave the classroom. This prohibition applies to all instructional forums, including classrooms, electronic classrooms, labs, discussion groups, field trips, etc.

- **Statement of Civility**

Texas A&M University-Corpus Christi has a diverse student population that represents the population of the state. Our goal is to provide you with a high quality educational experience that is free from repression. You are responsible for following the rules of the University, city, state and federal government. We expect that you will behave in a manner that is dignified, respectful and courteous to all people, regardless of sex, ethnic/racial origin, religious background, sexual orientation or disability. Behaviors that infringe on the rights of another individual will not be tolerated.

- **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. Please consult with the instructor before you decide to drop to be sure it is the best thing to do. Just stopping attendance and participation WILL NOT automatically result in your being dropped from the class. Should dropping the course be the best course of action, visit the Office of the University Registrar for the Course Drop Form that must submitted. No student is eligible to receive a W without completing the official drop process by this deadline. Please consult the Academic Calendar (http://www.tamucc.edu/academics/calendar/) for the last day 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/

- **Statement of Academic Continuity**

In the event of an unforeseen adverse event, such as a major hurricane and classes

could not be held on the campus of Texas A&M University–Corpus Christi; this course would continue through the use of Blackboard and/or email. In addition, the syllabus and class activities may be modified to allow continuation of the course. Ideally, University facilities (i.e., emails, web sites, and Blackboard) will be operational within two days of the closing of the physical campus. However, students need to make certain that the course instructor has a primary and a secondary means of contacting each student.

A. <u>OTHER INFORMATION</u>

- **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.

<u>GENERAL DISCLAIMER</u>

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 periods.