CSCE 4600: Introduction to Operating Systems

Name: Dr. Zeenat Tariq

Pronouns: she/her

Class Location/Time: NTDP K150 / Th @ 5:30 PM to 8:20 PM

Office Location: Discovery Park, NTDP F278

Office Hours: By appointment

Email: Zeenat.Tariq@unt.edu

Teaching Assistants:

• Syed Badruddoja

Graders:

• Vandana Sinha

Communication Expectations: Please communicate with the instructor and Teaching Assistants exclusively through email and Canvas.

Textbook: Operating System Concepts Essentials 2nd Edition (but edition 1 can be used if you have a copy) by Abraham Silberschatz, Peter Galvin, Greg Gagne.

Prerequisite: CSCE 3600 - Principles of Systems Programming

Course Description

After a brief overview of the different issues, we will encounter during this course, we will review the principles of Operating Systems in detail. This course will focus specifically on the management of processes and their coordination; deadlocks; file systems; memory management; process scheduling; and security. Time permitting, we will discuss some of the important issues in the area of distributed systems.

Course Objectives

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

• Use the principles of processes and threads for the abstraction of real-world events.
- Formulate solutions for mutual exclusion and process synchronization.
- Understand the concept of deadlock to develop deadlock-free systems of processes.
- Understand principles of memory and resource management.
- Identify different process scheduling paradigms and utilize them in system development.
- Develop fundamental security features to protect systems and data.

These course objectives have been specified by the Department of Computer Science and Engineering in order to facilitate the department's continued accreditation by the Accreditation Board for Engineering and Technology, Inc. (ABET).

**Useful References:**

1. Advanced Concepts in Operating Systems by M. Singhal and N. G. Shivaratri
2. Operating Systems – Advanced Concepts by Maekawa, Oldehoeft, and Oldehoeft
3. Operating Systems by J. Bacon and T. Harris
4. Operating Systems by W. Stallings
5. Advanced Programming in the UNIX Environment by W.R. Stevens
6. Beginning Linux Programming by R. Stones and N. Matthew

**Tentative Schedule of Topics**

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<th>Topics</th>
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<tr>
<td>Introduction to OS</td>
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<tr>
<td>Operating System Structures and Introduction to Processes</td>
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<td>Processes &amp; Threads – basic concepts</td>
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<td>Process Synchronization and Coordination</td>
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<td>Classic Process Coordination Problems</td>
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<td>Higher-Level Synchronization Mechanisms</td>
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<td>Process Scheduling – Conventional and Real-Time</td>
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<td>Real-Time Scheduling, Intro to Process Synchronization</td>
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<td>Intro to Deadlocks</td>
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<td>Deadlock Avoidance and Prevention</td>
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<td>Main Memory Management</td>
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<td>Virtual Memory</td>
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<tr>
<td>Protection and Security</td>
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<td>Distributed Systems (time permitting)</td>
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**Homework:** There will be regular homework assignments for each topic covered. Homework assignments are to be completed individually unless specified otherwise. Homework will consist of problem sets as well as small programming assignments. It is important to spend the time to experiment with the various program elements, so start your homework promptly. All assignment submissions must be typed. Handwritten assignments WILL NOT be graded.

**Projects:** There will be several course projects for which you will be expected to work in small groups. The maximum group size will depend on the type of project and will be specified at a later time. Each project must be accompanied by a detailed project report describing the problem, the implementation, experiments, and results as well as their interpretation.

**Reading Assignments:** In addition to regular homework, there is a standing reading assignment of all chapters from the textbook. The material covered in each of the textbook chapters assigned may form the basis for questions in homework, projects, and exams.

**Exam:** There will be three exams, each covering separate parts of the course material.

**Grading**

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<tr>
<td>Homework</td>
<td>35%</td>
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<td>Exam (3)</td>
<td>30%</td>
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<td>Project (2-3)</td>
<td>35%</td>
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- A: 90-100% (Outstanding, excellent work. The student performs well above the minimum criteria.)
- B: 80-89% (Good, impressive work. The student performs above the minimum criteria.)
- C: 70-79% (Solid, college-level work. The student meets the criteria of the assignment.)
- D: 60-69% (Below average work. The student fails to meet the minimum criteria.)
- F: 59% and below (Sub-par work. The student fails to complete the assignment.)

**Course Policies**

**Attendance:** Students are expected to attend all lectures. There are aspects of the material that are being discussed in class, which are not found in the textbook or the slides. Further, in-class discussions are an important part of the course and students should actively participate.

All homework assignments and projects must be turned in at times specified and in the dropbox provided in BB Learn. Late assignments will be accepted with a 25% penalty per day. Assignments that are submitted more than two days past their deadline will not be accepted and not graded. All assignment submissions must be typed.

**Cheating and Plagiarism** will not be tolerated. Anyone found guilty of cheating on a test or assignment will receive zero points for the entire unit of work and will result in a lowering of the
grade for the course. Discussions of problems and assignments with your classmates are welcome and encouraged, however, sharing of solutions is not. If you need help, you should ask the TA or the instructor. Cheating includes, but is not limited to, all forms of plagiarism and misrepresentation. Multiple occurrences of cheating will result in a failing grade for the course and reporting of all students involved to the appropriate college and university level offices for academic conduct. In extreme cases, the instructor will recommend that the student be expelled from the university.

**There will be NO "make-up" Tests.** In case of verifiable emergencies, arrangements must be made with the instructor.

**There will be NO early Tests or Exams**