CSCE-5640.001/600 Operating System Design
Fall 2022

Instructor: Amar M. Maharjan

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- Include CSCE 5640.001 in subject line.
- Always use your official UNT email address.

Class Location/Time: NTDP B155 / Sa 11:30 AM – 2:20 PM

Office Hours (In-Person/zoom): NTDP E260J, Tu 10:00 – 11:00 AM, We 4:30 – 5:30 PM, or by appointment.

Office Hours Zoom Link: https://unt.zoom.us/j/7033013440


Course Web Page: Canvas

Operating Systems Design
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, memory management, cpu scheduling, and security. If time permits, we will discuss some of the important issues in the area of distributed systems. While the course will loosely follow the textbook, however, we will study material from many other sources, e.g., journals. The course will strike a balance between the programmers (applied) perspective and a theoretical view of operating systems.

Course outcomes:
Students will be able to:
1. use the principles of processes and threads for abstraction of real-world events.
2. formulate solutions for mutual exclusion and process synchronization.
3. understand the concept of deadlock to develop deadlock free systems of processes.
4. understand principles of memory and resource management.
5. identify different process scheduling paradigms and utilize them in system development.
6. develop fundamental security features to protect systems and data.

Useful References:
1. Advanced Concepts in Operating Systems by M. Singhal and N. G. Shivaratri
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
7. Online references will be posted on the course website.

**Tentative List of Topics:**

<table>
<thead>
<tr>
<th>Topic</th>
<th>Reading</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction to OS</td>
<td>Chapters 1 and 2 in Textbook</td>
</tr>
<tr>
<td>Processes and Threads</td>
<td>Chapters 3 and 4</td>
</tr>
<tr>
<td>CPU Scheduling</td>
<td>Chapter 5</td>
</tr>
<tr>
<td>Process Synchronization and Coordination</td>
<td>Chapter 6</td>
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<td>Classic Process Coordination Problems</td>
<td>Chapter 7</td>
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<tr>
<td>Deadlocks, Avoidance and Prevention</td>
<td>Chapter 8</td>
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<tr>
<td>Memory Management</td>
<td>Chapter 9</td>
</tr>
<tr>
<td>Virtual Memory and File Systems</td>
<td>Chapters 10, 11, and 13</td>
</tr>
<tr>
<td>Protection and Security</td>
<td>Chapters 16 and 17</td>
</tr>
<tr>
<td>Distributed Systems</td>
<td>Handouts and References (time permitting)</td>
</tr>
</tbody>
</table>

**Important Dates:**

- 08/29: First Class Day
- 09/05: Labor Day (No Classes)
- 11/23-26: Thanksgiving Break (No Classes)
- 12/09: Reading Day (No Classes)
- 12/16: Last Day of Term

**Homework:**
There will be about 4-5 homework assignments. 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 two 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. The 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 listed in the table above. Material covered in each of the textbook chapters assigned may form the basis for questions in homework, projects, and exams.
Exams:
There will be two exams: midterm and final exams, each covering separate parts of the course material.

Grading:

<table>
<thead>
<tr>
<th>Item</th>
<th>% of final grade</th>
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<tbody>
<tr>
<td>Quizzes</td>
<td>5%</td>
</tr>
<tr>
<td>Homework</td>
<td>20%</td>
</tr>
<tr>
<td>Projects (2)</td>
<td>30%</td>
</tr>
<tr>
<td>Tests (2)</td>
<td>45%</td>
</tr>
</tbody>
</table>

Policies:
- All homework assignments and projects must be turned in at the beginning of class on their respective due date. These assignments will be accepted up to 24 hours late and be assessed a 50% grade reduction penalty. Assignments submitted more than 24 hours late will not be accepted and receive a grade of 0. All assignment submissions must be typed.
- This course follows UNT’s policy for Student Academic Integrity that can be found at [https://policy.unt.edu/policy/06-003](https://policy.unt.edu/policy/06-003) as well as the Cheating Policy for the Department of Computer Science and Engineering (posted on Canvas). Specifically, the first instance of a student found to have violated the academic integrity (i.e., cheating) policy will result in a grade of “F” for the course and have a report filed into the Academic Integrity Database, which may include additional sanctions.
- **Cheating will not be tolerated.** Anyone found guilty of cheating on a test or assignment will be awarded an F grade for the course. Discussions of problems and assignment with your classmates is welcome and encouraged, however, sharing of solutions is not. If you need help, you should ask the instructor. Cheating includes, but is not limited to, all forms of plagiarism and misrepresentation.
- There will be NO “make-up” Exams. In case of verifiable emergencies, arrangements must be made with the instructor.
- **Lecture Section:** Class attendance is regarded as an obligation as well as a privilege. All students are therefore expected to attend each class meeting. A student who misses class is still responsible to find out what was discussed and to learn the material that was covered and obtain the homework that was assigned on the missed day. The instructor is not responsible for re-teaching material missed by a student who did not attend class. Therefore, each student is accountable for and will be evaluated on all material covered in this course, regardless of attendance. If there are extenuating circumstances preventing you from attending the class, please notify your instructor so that you can work together to ensure your success in learning the material.
- If you are experiencing any symptoms of COVID-19 ([https://www.cdc.gov/coronavirus/2019-ncov/symptoms-testing/symptoms.html](https://www.cdc.gov/coronavirus/2019-ncov/symptoms-testing/symptoms.html)) please seek medical attention from the Student Health and Wellness Center (940-565-2333 or askSHWC@unt.edu) or your health care provider PRIOR to coming to campus. UNT also requires you to contact the UNT COVID Team at COVID@unt.edu for guidance on actions to take due to symptoms, pending or positive test results, or potential exposure.
• **Face Coverings:** UNT encourages everyone to wear a face covering when indoors, regardless of vaccination status, to protect yourself and others from COVID infection, as recommended by current CDC guidelines. Face covering guidelines could change based on community health conditions.

• **Course Materials for Remote Instruction:** Remote instruction may be necessary if community health conditions change, or you need to self-isolate or quarantine due to COVID-19. Students will need access to a working webcam, speaker, and microphone to participate in fully remote portions of the class. Information on how to be successful in a remote learning environment can be found at [https://online.unt.edu/learn](https://online.unt.edu/learn).

**ADA STATEMENT**
The University of North Texas makes reasonable academic accommodation for students with disabilities. Students seeking reasonable accommodation must first register with the Office of Disability Access (ODA) to verify their eligibility. If a disability is verified, the ODA will provide you with a reasonable accommodation letter to be delivered to faculty to begin a private discussion regarding your specific needs in a course. You may request reasonable accommodations at any time; however, ODA notices of reasonable accommodation should be provided as early as possible in the semester to avoid any delay in implementation. Note that students must obtain a new letter of reasonable accommodation for every semester and must meet with each faculty member prior to implementation in each class. Students are strongly encouraged to deliver letters of reasonable accommodation during faculty office hours or by appointment. Faculty members have the authority to ask students to discuss such letters during their designated office hours to protect the privacy of the student. For additional information, refer to the [Office of Disability Access](http://www.unt.edu/oda) website. You may also contact ODA by phone at (940) 565-4323.

**ACCEPTABLE STUDENT BEHAVIOR**
Student behavior that interferes with an instructor’s ability to conduct a class or other students’ opportunity to learn is unacceptable and disruptive and will not be tolerated in any instructional forum at UNT. Students engaging in unacceptable behavior will be directed to leave the classroom and the instructor may refer the student to the Dean of Students to consider whether the student’s conduct violated the Code of Student Conduct. The university’s expectations for student conduct apply to all instructional forums, including university and electronic classroom, labs, discussion groups, field trips, etc. The Code of Student Conduct can be found at [http://deanofstudents.unt.edu](http://deanofstudents.unt.edu).

**STUDENT RESPONSIBILITY**
Students are responsible for submitting the correct assignments (i.e., uploading the proper files) for each applicable assignment submission on Canvas. In certain cases, when an assignment is submitted on time, but to an incorrect assignment location (e.g., submitting Homework 03 to Homework 04 location on Canvas), the assignment may be assessed a 30% reduction penalty if the due date has passed. If you have any questions or concerns about your submission, please work with your instructor or IA to ensure the correct file(s) is/are submitted.