Operating Systems Design
Fall 2014
Meeting Time: TTH 11:30 am - 12:50 pm
Classroom: NTDP B158

Instructors: Armin R. Mikler
Office: NTDP F245
Office Hours (Mikler) MT 9:30 - 11:00am, or by appointment
E-Mail: mikler@cs.unt.edu
Teaching Assistant: Joseph Helsing
TA Office Hours: TBA
Textbook: "Operating System Concepts - Essentials" 2nd Edition (but edition 1 can be used if you have a copy)
by Silberschatz, Galvin, and Gagne
Course Web Page: moodle.cse.unt.edu
Expected background: Systems Programming (or equiv.)

Operating Systems
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, process scheduling, and security. Time permitting 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 and other textbooks. The course will strike a balance between the programmers (applied) perspective and a theoretical view of operating systems.

CSCE 4600/5640 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
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:

<table>
<thead>
<tr>
<th>Week of</th>
<th>Topic:</th>
<th>Reading Assignments:</th>
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</thead>
<tbody>
<tr>
<td>8-26</td>
<td>Introduction to OS – an overview</td>
<td>Chapter 1 &amp; 2</td>
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<tr>
<td>9-2</td>
<td>Introduction to OS continued</td>
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<tr>
<td>9-9</td>
<td>Operating System Structures and Introduction to Processes</td>
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<tr>
<td>9-16</td>
<td>Processes &amp; Threads – basic concepts</td>
<td>Chapter 3 &amp; 4</td>
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<tr>
<td>9-23</td>
<td>Process Scheduling – Conventional and Real-Time</td>
<td>Chapter 6</td>
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<tr>
<td>9-30</td>
<td>Real-Time Scheduling, Intro to Process Synchronization</td>
<td>Chapter 5</td>
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<tr>
<td>10-7</td>
<td>Process Synchronization and Coordination</td>
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<td>10-14</td>
<td>Higher-Level Synchronization Mechanisms</td>
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<td>10-21</td>
<td>Classic Process Coordination Problems</td>
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<tr>
<td>10-28</td>
<td>Intro to Deadlocks</td>
<td>Chapter 7, TEST #2</td>
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<td>11-4</td>
<td>Deadlock Avoidance and Prevention</td>
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<td>11-11</td>
<td>Main Memory Management</td>
<td>Chapter 8</td>
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<tr>
<td>11-18</td>
<td>Virtual Memory and File Systems</td>
<td>Chapter 9, 10, 12</td>
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<tr>
<td>11-25</td>
<td>Protection and Security</td>
<td>Chapters 14 and 15,</td>
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<tr>
<td>12-2</td>
<td>Project Demonstrations and Presentations</td>
<td>TEST #3</td>
</tr>
<tr>
<td>12-9</td>
<td>Project Demonstrations and Presentations</td>
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**Homework:**
There will be regular homework assignments for each topic covered. Homework assignments are to be completed individually (see policies) 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 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.

**Testing:**
There will be three test, 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>Homework</td>
<td>25%</td>
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<tr>
<td>Projects</td>
<td>30%</td>
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<tr>
<td>Tests</td>
<td>45%</td>
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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 the beginning of class on their respective due date. 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 assignment with your classmates is 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.

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

- **There will be NO Tests or Exams**.

Disability Policy:

*The Computer Science Department and this instructor cooperate with the Office of Disability Accommodation to make reasonable accommodations for qualified students (cf. Americans with Disabilities Act and Section 504, Rehabilitation Act) with disabilities. If you have not registered with ODA, we encourage you to do so. If you have a disability for which you will require accommodation, please discuss with me after class and present a written accommodation request before the 2nd week of class.*

Please provide the following information and submit this page at the end of the first class.

**First Name**: ______________________________

**Last Name**: ______________________________

**E-MAIL**: ________________________________

*I have read and understood the above course policies!*

Initial: ________