CS 3100 Operating Systems
Syllabus

General Information

Semester: Spring 2017

Textbooks: Required: Operating Systems: Three Easy Pieces, version 0.90; Arpaci-Dusseau and Arpachi-Dusseau, online at http://pages.cs.wisc.edu/~remzi/OSTEP/ (also in print)


When: Tuesdays and Thursdays, 5:30pm to 7:20pm

Location: SLCC Business Building, room 215

Instructor Info: Ted Cowan
tedcowan@weber.edu
(801) 957-4769 (office @SLCC Redwood)

Office Hours: Mon, Tue and Thu @SLCC Redwood by appointment only, Technology Building, First Floor, Room 133. To schedule me when I am available at SLCC, access https://webercsatslcc.youcanbook.me.

Website: https://weber.instructure.com/courses/421855

Objectives of This Course

From the catalog: An overview of computer operating systems concepts, system software components with emphasis on installation, management, monitor/supervisor and I/O management, control commands, network installation, and device drivers. The operating systems studied will be Windows or UNIX.

Upon successful completion of this course, students should be able to:

• Describe the purpose of and the services provided by operating systems
• Describe the concept of virtualization, its advantages and potential disadvantages
• Describe many of the internal data structures and algorithms that operating systems use to efficiently manage computing resources
• Describe and be able to use operating system calls to access computing services
• Describe how operating systems create new processes and threads, concurrency and locking, and demonstrate how to program these operations
• Describe how operating systems synchronize concurrent tasks, and demonstrate how to program synchronized tasks
• Describe task scheduling algorithms and implement at least such algorithm
• Describe how address spaces are managed in a modern operating system
CS 3100 Operating Systems
Syllabus

- Describe paging and caching and how they used to improve system performance
- Describe how directories and file systems are implemented
- Describe disk scheduling algorithms
- Describe disk drive redundancy and the implementation of RAID

Students with Disabilities

Students who have special needs or disabilities that may affect their ability to access information and/or material presented in this course are encouraged to access [http://www.weber.edu/ssd/ssdPP00_registering.html](http://www.weber.edu/ssd/ssdPP00_registering.html) to register with the WSU SSD.

Allotted Time

You should anticipate spending two to three hours of study per week for each credit hour of a university course. Computer and programming classes typically require time in the upper range.

Grading

Your final grade will be determined from your performance in the following areas:

<table>
<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lab Assignments and other assignments</td>
<td>60%</td>
</tr>
<tr>
<td>Quizzes</td>
<td>10%</td>
</tr>
<tr>
<td>Midterm 1</td>
<td>15%</td>
</tr>
<tr>
<td>Midterm 2</td>
<td>15%</td>
</tr>
</tbody>
</table>

Course Fees

Course fees for the Computer Science major are designed to cover the costs of lab equipment maintenance and replacement including desktop and server computer systems and software; consumable materials and supplies; and support for lab aides, student tutors, and online instructional resources.

Class Format

I will be presenting the lecture material using PowerPoint slides, which will be available in Canvas. Attendance is mandatory. I will also allow time for lab work during class. Unless otherwise specified, you may study together as a group but you must turn in your own lab work as an individual.

Questions about the lab or reading material may be asked either in the classroom or in the Instructor’s Blog in Canvas. Students are encouraged to reply to questions in the Instructor’s Blog if they know the correct answer. Please do not simply post code or solutions to Lab assignments, but it is ok to provide hints and pointers.
Honesty

CS Department policy dictates that any verifiable evidence of student academic cheating, as defined and determined by the instructor, will result in: 1) an automatic failing grade for the class and 2) a report to the Dean of Students that will include the student's name and a description of the student's dishonest conduct. Cheating is defined in the Weber State University Policies and Procedures Manual located at http://www.weber.edu/ppm/Policies/6-22_StudentCode.html.

Anyone determined to have copied another student's lab assignment, quiz or test will receive a failing grade for the semester. Please do your own work. You may study together but lab assignments, quizzes and tests are to be completed individually and not as a group. Please do not distribute or post solutions to lab assignments or the content of any quiz or test on the Internet.

Homework

Please complete the reading assignment prior to class. A schedule of reading and lab assignments can be found below. Lab time will be set aside so that lab work may be completed in class, but not guaranteed. Lab work may be completed at home if sufficient time is not available in class. The icarus server is accessible from anywhere on the Internet using a compatible ssh client.

Assignments

Lab assignments will be given during the semester. The lab assignments are designed to help you learn operating systems concepts one task at a time. All lab assignments will be written and tested on your own computer and your source code will be uploaded to Canvas as specified in the assignment writeup.

You will indicate that your assignment is complete by turning in the assignment in Canvas along with any files specified by the assignment. All required files must be uploaded to Canvas as specified in the assignment. In your source code please include (1) your name (2) the lab number, (3) a description of the lab (use the same text I put in the Lab assignment) and (4) our course number (CS 3100). I will run the lab as you and ensure that the output of your lab complies with the assignment. If your lab runs without errors and produce the proper output, you will receive full credit for the assignment. If significant features are missing or bugs are found, you will receive a lower score based on the severity of the error. Naming of files is critical to grading so please name your folders and files exactly as specified in the lab description and ensure that your program is compilable.

Lab assignments are due on the date listed in Canvas. Please refer to the Calendar in Canvas for lab assignment due dates.

Students will be organized in groups of 2-4 students (mid-semester) to complete a 5-7 page research paper on an emerging operating system technology, which will be due on the last class period of the semester.
Quizzes

Quizzes are conducted in class on the days listed in Canvas and based on the material in the associated Lab and chapter. Quizzes may consist of multiple choice, true/false and short answer questions. Your lowest quiz score will be dropped. Quizzes are closed book, closed neighbor and closed Internet. Quizzes cannot be turned in late. You will have about 10 minutes to complete each quiz.

Exams

Two midterms will be administered during the semester in the classroom on the day listed in Canvas. The midterms are based on multiple-choice, true/false or short answer-type questions. An in-class preparation hour will be provided prior to each exam. The Midterms are closed book, closed Internet and closed neighbor. You will have the entire class period to complete each Midterm unless special arrangements are made in advance.

Class Participation

I welcome relevant questions and discussion during class but I reserve the right to limit discussion in the interest of time. You must complete the reading assignment prior to class in order to participate in class discussion in any meaningful way.

Grading Scale

The grading scale will be as follows:

- 100-94% = A
- 83.9-80% = B-
- 93.9-90% = A-
- 79.9-77% = C+
- 89.9-87% = B+
- 76.9-74% = C
- 86.9-84% = B
- 73.9-70% = C-
- below 60% = E

Miscellaneous

Please place pagers, cell phones and PDAs on silent mode during class. If you must take an emergency call or page, quietly leave the classroom to conduct your conversation.

We will be using computers in the classroom. Please ensure that all classroom computer activity is directly related to the lecture or assignment.

The instructor reserves the right to amend the course schedule, study material, to add, change or subtract lab assignments, quizzes or examinations or to change the weight or percentage of the total grade of any assignment to best meet the needs of the class.

Your instructor maintains office hours at his office at the SLCC Redwood Road campus on Mondays, Tuesdays and Thursdays by appointment only during the semester. See the Instructor Info section at the top of this syllabus for directions and instructions.
We will not take a break during the class period. If you need to leave the classroom, please do so quietly without disturbing the class.

If class is canceled due to weather or illness of the instructor, an email will be sent to your Weber State email address, a note will be place on the door of the room and an announcement will published on Canvas.

No extra credit will be offered for this class.

I will not accept any late assignments this semester. If you do not turn in your assignment with all required files to Canvas, the due date has passed and I begin grading assignments, I will not attempt to grade yours and you will receive a zero for that assignment.

A grade of Incomplete will be given only in extreme circumstances: 80% of the coursework must have been completed and the student must have an extenuating circumstance, such as a death in the immediate family or a severe illness.
### CS 3100 Operating Systems Schedule

<table>
<thead>
<tr>
<th>Week</th>
<th>Date</th>
<th>Topics</th>
<th>Assignments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Jan 9</td>
<td>Announcements and Introductions</td>
<td>Linux Virtual Machine</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Syllabus and Schedule Review</td>
<td>Chapters 1, 2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Icarus and C development tools</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Jan 16</td>
<td>Processes</td>
<td>Chapters 3, 4, 5, 6</td>
</tr>
<tr>
<td>3</td>
<td>Jan 23</td>
<td>CPU Scheduling</td>
<td>Chapters 7, 8, 9</td>
</tr>
<tr>
<td>4</td>
<td>Jan 30</td>
<td>Main Memory</td>
<td>Chapters 12, 13, 14</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Process Scheduling</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Feb 6</td>
<td>Segmentation</td>
<td>Chapters 15, 16, 17</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Free Space Management</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Feb 13</td>
<td>Paging</td>
<td>Chapters 18, 19, 20</td>
</tr>
<tr>
<td>7</td>
<td>Feb 20</td>
<td>Virtual Memory</td>
<td>Chapters 21, 22</td>
</tr>
<tr>
<td>8</td>
<td>Feb 27</td>
<td>Midterm</td>
<td>Chapters 1-22</td>
</tr>
<tr>
<td>9</td>
<td>Mar 6</td>
<td>SPRING BREAK</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Mar 13</td>
<td>Threads</td>
<td>Chapters 25, 26, 27</td>
</tr>
<tr>
<td>11</td>
<td>Mar 20</td>
<td>Locks</td>
<td>Chapters 28, 29</td>
</tr>
<tr>
<td>12</td>
<td>Mar 27</td>
<td>Process Synchronization</td>
<td>Chapters 30, 31, 32</td>
</tr>
<tr>
<td>13</td>
<td>Apr  3</td>
<td>I/O Devices</td>
<td>Chapters 35, 36, 37</td>
</tr>
<tr>
<td>14</td>
<td>Apr 10</td>
<td>Raid</td>
<td>Chapters 38, 39</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Files and Directories</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>Apr 17</td>
<td>Midterm 2 Preparation, Midterm</td>
<td>Chapters 25-39 (except 33-34)</td>
</tr>
</tbody>
</table>