CSC 4421 Computer Operating Systems
Section 003
Winter 2017
Mondays from 06:30 PM to 08:10 PM in SCLB 050B

Instructor: Rui Chen
Email: chenrui@wayne.edu
Office Hours: Tuesday and Thursday from 03:00 PM to 03:40 PM.
Friday from 11:30AM to 12:10PM at Maccabees building Room 2212

Course Description:
From the undergraduate bulletin: Prereq: CSC 2200 and CSC 2201 (both with grade of C or better; CSC 3100 and CSC 3101 (both with grade of C-minus or better; coreq: CSC 4420. Mandatory two-hour closed lab; lecture materials and hands-on exercises which complement CSC 4110. System call interface; introduction to operating systems programming; use of simulation to better understand operating systems behavior. Material Fee as indicated in the Schedule of Classes (F, W)
Lab topics include system call interface; introduction to operating systems programming; processes, signals, threads, and use of simulation to better understand operating systems behavior. The goals of the course are to help you understand how concepts you learned in lecture are implemented and to provide experience implementing those concepts in a real world operating system.

Credit Hours: 1 Credit Hour (Lab)

Prerequisites: CSC 2200 and CSC 2201 (both with grade of C or better); CSC 3100 and CSC 3101 (both with grade of C-minus or better).

Co-requisites: CSC 4420: Computer Operating Systems is a co-requisite for CSC 4421. You must elect the lecture in order to take the lab CSC 4421.

Optional Textbooks:

Programming Environment:
Course work will be performed on an Ubuntu operating system using a shell (text-based) interface. Labs must compile with no segmentation faults on the latest version of Ubuntu (http://www.ubuntu.com/download/desktop). Labs that do not compile, have segmentation faults, and/or were compiled using a different operating system are subject to receiving no credit. It is recommended that all work is created in the C programming language, but C++ will be accepted.
<table>
<thead>
<tr>
<th>Date</th>
<th>Subject</th>
<th>Assignment</th>
<th>Due Date</th>
<th>Attendance</th>
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</thead>
<tbody>
<tr>
<td>1/09/17</td>
<td>Installation of Linux Ubuntu Operating System</td>
<td>Warm-up 01</td>
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<tr>
<td>1/16/17</td>
<td>Holiday - University Closed (Martin Luther King Jr. Day)</td>
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<tr>
<td>1/23/17</td>
<td>Introduction to the Linux Shell and C</td>
<td>Lab 01</td>
<td>1/30/17 11:59 PM</td>
<td>2</td>
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<tr>
<td>1/30/17</td>
<td>System Calls</td>
<td>Lab 02</td>
<td>2/06/17 11:59 PM</td>
<td>3</td>
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<tr>
<td>2/06/17</td>
<td>Basic I/O</td>
<td>Lab 03</td>
<td>2/13/17 11:59 PM</td>
<td>4</td>
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<tr>
<td>2/13/17</td>
<td>Process Control</td>
<td>Lab 04</td>
<td>2/20/17 11:59 PM</td>
<td>5</td>
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<tr>
<td>2/20/17</td>
<td>Process Control 2</td>
<td>Lab 05</td>
<td>2/27/17 11:59 PM</td>
<td>6</td>
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<tr>
<td>2/27/17</td>
<td>Threads</td>
<td>Lab 06</td>
<td>3/06/17 11:59 PM</td>
<td>7</td>
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<tr>
<td>3/06/17</td>
<td>Pipe</td>
<td>Lab 07</td>
<td>3/20/17 11:59 PM</td>
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<td>3/13/17</td>
<td>Holiday – No Classes (Spring Break)</td>
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<td>3/20/17</td>
<td>Signals</td>
<td>Lab 08</td>
<td>3/27/17 11:59 PM</td>
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<tr>
<td>3/27/17</td>
<td>Process Simulator</td>
<td>Lab 09</td>
<td>4/03/17 11:59 PM</td>
<td>11</td>
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<tr>
<td>4/03/17</td>
<td>Address Simulator</td>
<td>Lab 10</td>
<td>4/10/17 11:59 PM</td>
<td>12</td>
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<td>4/10/17</td>
<td>I/O Simulator</td>
<td>Lab 11</td>
<td>4/17/17 11:59 PM</td>
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<tr>
<td>4/17/17</td>
<td>Help with Project: Attendance not required</td>
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<td>4/24/17</td>
<td>Help with Project: Attendance not required</td>
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ABET (Computing Accreditation Commission)

Program Educational Objectives:
Program educational objectives are broad statements that describe what graduates are expected to attain within a few years of graduation. Program educational objectives are based on the needs of the program’s constituencies.

BSCS Program Educational Objectives:
The main objective of the Bachelor of Science in Computer Science (BSCS) program is to provide an outstanding curriculum and learning environment, so that, following completion of the program BSCS:
1) Students will be able to apply the principles of computer science, mathematics, and scientific investigation to solve real-world problems appropriate to the discipline.
2) Students will have lifelong learning skills, which will allow them to successfully adapt to evolving technologies throughout their professional careers.
3) Students are sufficiently prepared for employment and advanced studies, and will have significant experiences with complex software development for real-world problems.
4) Students will have sufficient teamwork, communication, and interpersonal skills to enable them to work with others effectively in their professional careers.
5) Students can function ethically and responsibly, and are conscious of ethical, social, global, legal, security and professional issues related to computing.

Student Outcomes:
Student outcomes describe what students are expected to know and be able to do by the time of graduation. These relate to the knowledge, skills, and behaviors that students acquire as they progress through the program. Below is a list of student outcomes from the ABET Criterion 3:
a. An ability to apply knowledge of computing and mathematics appropriate to the discipline.
b. An ability to analyze a problem, and identify and define the computing requirements appropriate to its solution.
c. An ability to design, implement and evaluate a realistic computer-based system, process, component, or program to meet desired needs.
d. An ability to function effectively on teams to accomplish a common goal.
e. An understanding of professional, ethical, legal, security, and social issues and responsibilities.
f. An ability to communicate effectively with a range of audiences.
g. An ability to analyze the local and global impact of computing on individuals, organizations and society.
h. Recognition of the need for, and an ability to engage in, continuing professional development.
i. An ability to use current techniques, skills, and tools necessary for computing practices.
j. An ability to apply mathematical foundations, algorithmic principles, and computer science theory in the modeling and design of computer-based systems in a way that demonstrates comprehension of the tradeoffs involved in design choices.
k. An ability to apply design and development principles in the construction of software systems of varying complexity.

Course Learning Objectives:
The course learning objectives are skills and abilities students should have acquired by the end of the course. These outcomes are defined in the terms of the ABET Accreditation Criterion 3 student outcomes which are relevant to this course.
The aim of the course is to enable students to understand a set of abstractions and constructs that are useful in many large-scale software systems, not just operating systems. Specifically, upon successful completion of this class, the student is able to do the following:

<table>
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<tr>
<th>Course Learning Objectives for CSC 4421 – Computer Operating Systems Laboratory</th>
<th>Student Outcomes</th>
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<tbody>
<tr>
<td>1. Learn the design and implementation of prevalent Operating Systems strategies through stage-wise systems software creation that encourages critical thinking (to identify and evaluate system design tradeoffs).</td>
<td>a, b, h, k</td>
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<td>2. Develop a comprehensive understanding of different Operating Systems management primitives, such as process, and resource management; including scheduling, paging, concurrency control, communication, and synchronization.</td>
<td>c, k</td>
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<td>3. Learn modern Operating Systems concepts and techniques, such as SMP, microkernels, clusters, disc allocation, memory management, and Objected Oriented Design.</td>
<td>a, b, c, i</td>
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<td>4. Learn threads and multithreading concepts and techniques in Operating Systems.</td>
<td>a, b, c, i</td>
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<tr>
<td>5. Learn Operating Systems functions associated with Input / Output operations and file management (with deadlock avoidance, detection, and recovery).</td>
<td>b, c, j, k</td>
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Assessment:
- Labs: 90%
- Attendance: 10%

Grading Scale:
- 93 – 100% A
- 90 – 92% A-
- 88 – 89% B+
- 83 – 87% B
- 73 – 77% C
- 63 – 67% D
- 60 – 62% D-
- Below 60% F

Course Policies:
1. Attendance will be taken at the beginning and end of every lab (you may leave early if you finish the lab).
   - There will be 13 lab sessions. You are allowed to miss 2 labs for any reason and still receive full attendance. If you miss more than 2 for any reason you will start to lose attendance points. The 2 are given for emergencies so use them wisely.
2. Labs will be submitted via blackboard. Labs should be submitted as a single file unless otherwise stated. The naming convention should be `last_first_lab#.zip`, for example `Warnke_David_Lab1.zip`
3. Labs must compile and cannot return segmentation faults. Furthermore, they must be compilable in the latest version of Ubuntu. Not meeting the aforementioned criteria can result in a zero for the lab.
4. As in the lecture, late homeworks lose 20% of their scores per day (except in cases of illness or emergency), and will not be accepted 3 days after the due date. If there are extenuating circumstances that requires an extension, the student must inform the instructor either before the assignment is due or as soon as possible. Upon request documentation must be supplied.
5. The following reasons are not considered extenuating circumstances: The computers / network / printers were down, you had a job interview, you had job responsibilities, or you lost all your files. Starting early and keeping backups of your work can avoid these problems. I emphasize backups because if you are new to Linux, it will most likely crash on you and you will lose all your work.
Religious Holidays:
Because of the extraordinary variety of religious affiliations of the University student body and staff, the Academic Calendar makes no provisions for religious holidays. However, it is University policy to respect the faith and religious obligations of the individual. Students with classes or examinations that conflict with their religious observances are expected to notify their instructors well in advance so that mutually agreeable alternatives may be worked out.

Student Disabilities Services:
If you have a documented disability that requires accommodations, you will need to register with Student Disability Services for coordination of your academic accommodations. The Student Disability Services (SDS) office is located in the Adamany Undergraduate Library. The SDS telephone number is 313-577-1851 or 313-202-4216 ( Videophone use only). Once your accommodation is in place, someone can meet with you privately to discuss your special needs. Student Disability Services' mission is to assist the university in creating an accessible community where students with disabilities have an equal opportunity to fully participate in their educational experience at Wayne State University.

Students who are registered with Student Disability Services and who are eligible for alternate testing accommodations such as extended test time and/or a distraction-reduced environment should present the required test permit to the professor at least one week in advance of the exam. Federal law requires that a student registered with SDS is entitled to the reasonable accommodations specified in the student’s accommodation letter, which might include allowing the student to take the final exam on a day different than the rest of the class.

Academic Dishonesty - Plagiarism and Cheating:
Academic misbehavior means any activity that tends to compromise the academic integrity of the institution or subvert the education process. All forms of academic misbehavior are prohibited at Wayne State University, as outlined in the Student Code of Conduct (http://www.doso.wayne.edu/student-conduct-services.html). Students who commit or assist in committing dishonest acts are subject to downgrading (to a failing grade for the test, paper, or other course-related activity in question, or for the entire course) and/or additional sanctions as described in the Student Code of Conduct.

Cheating: Intentionally using or attempting to use, or intentionally providing or attempting to provide, unauthorized materials, information or assistance in any academic exercise. Examples include: (a) copying from another student’s test paper or program; (b) allowing another student to copy from a test paper or program; (c) using unauthorized material such as a "cheat sheet" during an exam.

Fabrication: Intentional and unauthorized falsification of any information or citation. Examples include: (a) citation of information not taken from the source indicated; (b) listing sources in a bibliography not used in a research paper.

Plagiarism: To take and use another’s words or ideas as one’s own. Examples include: (a) failure to use appropriate referencing when using the words or ideas of other persons; (b) altering the language, paraphrasing, omitting, rearranging, or forming new combinations of words in an attempt to make the thoughts of another appear as your own.

Other forms of academic misbehavior include, but are not limited to: (a) unauthorized use of resources, or any attempt to limit another student’s access to educational resources, or any attempt to alter equipment so as to lead to an incorrect answer for subsequent users; (b) enlisting the assistance of a substitute in the taking of examinations; (c) violating course rules as defined in the course syllabus or other written information provided to the student; (d) selling, buying or stealing all or part of an un-administered test or answers to the test; (e) changing or altering a grade on a test or other academic grade records.
Course Drops and Withdrawals:
In the first two weeks of the (full) term, students can drop this class and receive 100% tuition and course fee cancellation. After the end of the second week there is no tuition or fee cancellation. Students who wish to withdraw from the class can initiate a withdrawal request on Pipeline. You will receive a transcript notation of WP (passing), WF (failing), or WN (no graded work) at the time of withdrawal. No withdrawals can be initiated after the end of the tenth week. Students enrolled in the 10th week and beyond will receive a grade. Because withdrawing from courses may have negative academic and financial consequences, students considering course withdrawal should make sure they fully understand all the consequences before taking this step. More information on this can be found at the following link: [http://reg.wayne.edu/pdf-policies/students.pdf](http://reg.wayne.edu/pdf-policies/students.pdf)

Student services:
The Academic Success Center (1600 Undergraduate Library) assists students with content in select courses and in strengthening study skills. Visit [www.success.wayne.edu](http://www.success.wayne.edu) for schedules and information on study skills workshops, tutoring and supplemental instruction (primarily in 1000 and 2000 level courses).

The Writing Center is located on the 2nd floor of the Undergraduate Library and provides individual tutoring consultations free of charge. Visit [http://clasweb.clas.wayne.edu/](http://clasweb.clas.wayne.edu/) writing to obtain information on tutors, appointments, and the type of help they can provide.

Class recordings:
Students need prior written permission from the instructor before recording any portion of this class. If permission is granted, the audio and/or video recording is to be used only for the student’s personal instructional use. Such recordings are not intended for a wider public audience, such as postings to the internet or sharing with others. Students registered with Student Disabilities Services (SDS) who wish to record class materials must present their specific accommodation to the instructor, who will subsequently comply with the request unless there is some specific reason why s/he cannot, such as discussion of confidential or protected information.