

CSC 460: Theory of Computer Operating Systems

Catalog Description:

Prerequisite: CSC 320 and CSC 325. A study of the concepts and implementation techniques used on modern operating systems. Core topics include processes, threads, interprocess communication, deadlocks, memory management, file systems, I/O systems, security and distributed systems. 3(3-0) F,S

This is essentially a terminal course. It is a “maturity” prerequisite for CSC 482, the senior seminar course, in which the CS Major Field Test is administered.

Required Text:

Operating System Concepts Essentials, Silberschatz, Galvin, and Gagne, Wiley, 2012,
<http://os-book.com/>

Optional Text:

The Linux Programming Interface, Michael Kerrisk, No Starch Press, 2010,
<http://man7.org/tlpi/>

Major Topics (including information for course sequence or transition)

1. Introduction to Linux
2. The Linux C++ programming environment and tools
3. Basic operating system principles
4. Hardware support for modern operating systems
5. Processes and threads
6. Interprocess communication and synchronization
7. Deadlocks
8. CPU scheduling
9. Paging and virtual memory
10. File system interfaces and implementations
11. Protection and security

Student Outcomes Assessed in CSC 460

- A. Students will attain an ability to apply knowledge of computing and mathematics appropriate to the discipline
- C. Students will attain an ability to design, implement, and evaluate a computer-based system, process, component, or program to meet desired needs
- D. Students will attain an ability to function effectively on teams to accomplish a common goal
- E. Students will attain an understanding of professional, ethical, legal, security and social issues and responsibilities
- I. Students will attain an ability to use current techniques, skills, and tools necessary for computing practice
- K. Students will attain an ability to apply design and development principles in the construction of software systems of varying complexity

CAC Characteristics Enabled But Not Assessed in CSC 460

None

Table 1. Student Outcomes assessed by CSC 460

CSC 460 Student Outcomes	CSC 460 Performance Indicators	CSC 460 Assessment Goals
CSC 460 contributes to SO A: Students will attain an ability to apply knowledge of computing and mathematics appropriate to the discipline	PI 460-1a: Calculate average CPU utilization for n processes PI 460-1b: Calculate the effective access time for a cache	PI 460-1a: $\geq 80\%$ correct PI 460-1b: $\geq 80\%$ correct
CSC 460 contributes to SO C: Students will attain an ability to design, implement, and evaluate a computer-based system, process, component, or program to meet desired needs	PI 460-2: Write a C++ program for Linux that runs at least one other process and performs input redirection	PI 460-2: $\geq 70\%$ passing score
CSC 460 contributes to SO D: Students will attain an ability to function effectively on teams to accomplish a common goal	PI 460-3: With a team, write a real-time, networked, multiplayer, text-based, client/server Linux application in C++ (measuring percentage contribution)	PI 460-3: for $\geq 60\%$ of teams, the standard deviation of the percentage contributions is ≤ 10
CSC 460 contributes to SO E: Students will attain an understanding of professional, ethical, legal, security and social issues and responsibilities	PI 460-4: Demonstrate knowledge of the impact of permissions on security	PI 460-4: $\geq 70\%$ of students have a passing grade
CSC 460 contributes to SO I: Students will attain an ability to use current techniques, skills, and tools necessary for computing practice	PI 460-5a: Demonstrate the ability to use Makefiles PI 460-5b: Demonstrate the ability to use version control	PI 460-5a: integrated into course; see below PI 460-5b: integrated into course; see below
CSC 460 contributes to SO K: Students will attain an ability to apply design and development principles in the construction of software systems of varying complexity	PI 460-6: With a team, write a real-time, networked, multiplayer, text-based, client/server Linux application in C++ (measuring level of achievement)	PI 460-6: $\geq 80\%$ of teams achieve a score of 70% or better