

ECE 492-067 or ECE 592-067

Operating systems design

Instructor(s): Michela Becchi (mbecchi@ncsu.edu)

Objective or Description: The course explores basic concepts and mechanisms related to the design of modern operating systems, including: process scheduling and coordination, memory management, synchronization, storage, file systems, security and protection, and their application to multi-core and many-core processors and to distributed systems.

Prerequisites:

- ECE306 or equivalent embedded systems course (pre-requisite not enforced)
- Strong C programming experience

Textbook:

Recommended textbooks (one of them is sufficient, the first one has a free online edition and is preferred)

- R. and A. Arpaci-Dusseau - Operating Systems: Three Easy Pieces, Arpaci-Dusseau Books, March 2015 (Version 0.90) - <http://pages.cs.wisc.edu/~remzi/OSTEP/>
- A. Silberschatz, P. Galvin, G. Gagne. Operating System Concepts, John Wiley & Sons, 2013. (9th edition)
- W. Stallings. Operating Systems – Internals and Design Principles, Pearson, 2015. (8th edition)

Textbook covering the Xinu operating systems used for programming assignments (not required)

- D. Comer. Operating System Design – The Xinu Approach, CRC Press, 2015 (2nd edition)

Topics:

- Operating systems structure
- Processes and threads
- CPU scheduling
- Synchronization
- Deadlocks
- Interrupts
- Physical and virtual memory
- I/O management
- File system
- SSD
- Advanced topics: protection & security, operating systems for multi- and many-core processors

Grading: (tentative)

- Exams (50%) – two exams (20% midterm/30% final or 15% midterm/35% final)
- Programming assignments (40%) – 4 programming assignments, weight TBD
- Paper reviews, quizzes and homework assignments (10% - weight TBD)

- Class participation - extra points (max 3%)

Cross-listing in other departments: -

Include anything else that is unique to the course - this information will be posted on the ECE Current Graduate/Undergraduate Student Portals for all students to view

The programming assignments involve modifying Xinu, an open-source operating system designed and implemented at Purdue (<https://xinu.cs.purdue.edu/>). Given the complexity of this system, strong C programming skills and familiarity with the Make environment are required.