Course Synopsis:

- Explores hardware capabilities and programming interface for a prominent vendor's family of gigabit-speed ethernet controllers
- Assumes familiarity with the C/C++ programming language, x86 machine architecture, Unix/Linux operating system commands, plus standard data-structures and algorithms (e.g., CS 112/210/245/326)
- Focuses on writing kernel device-driver modules for the Open Source Linux operating system running on an Intel x86 processor
- Open to USF Graduate Students (and to qualified undergraduates or nondegree students with consent of the instructor)

The course includes lectures, readings, discussions, and demonstrations, plus some in-class programming exercises and homework projects. Classes meet Tuesdays and Thursdays, 7:30pm-9:15pm, in the Michael D. Kudlick Interactive Computer Classroom (HRN-235). Students will need individual USF computer accounts set up for access during classes.

List of planned course topics:

- Loadable kernel modules
- Character and network device-drivers
- Transmission and reception of Ethernet packets
- Network address and protocol filtering
- Support for packet-splitting and checksum-offloading
- Statistical counters
- Jumbo-sized Ethernet frames
- IEEE 802.3x Flow Control
- Support for VLAN implementations
- Interrupt mitigation and Message-Signaled Interrupts
- Software tools for configuration and diagnostics

# Learning Outcomes:

- You will become acquainted with factors affecting ethernet LAN performance
- You will acquire perspective on how PC network capabilities have evolved
- You will possess a capacity to visualize low-level network-hardware activities
- You will understand strategies now being deployed to optimize networking
- You will acquire some insights regarding low-level 'security' vulnerabilities
- You will gain experience reading and writing device-driver code-modules

#### Instructor:

Dr. Allan B. Cruse, Professor of Computer Science and Mathematics Harney Science Center - Room H-212 Telephone: (415) 422-6562 Office Hours: Mon-Wed 1:30-2:20pm, Tue-Thu 6:15-7:15pm Email: <u>cruse@usfca.edu</u> Website: http://cs.usfca.edu/~cruse/cs210

## Recommended Textbooks (for collateral readings):

Mark Norris, <u>Gigabit Ethernet Technology and Applications</u> (Artech House Telecommunications Library, 2002), ISBN 1-580-53505-4

Corbet, Rubini and Kroah-Hartman, <u>Linux Device Drivers (3rd Edition)</u> (O'Reilly & Associates, Incorporated, 2005) ISBN 0-596-00590-3

## Exam Dates:

Midterm Exam I will be Tuesday, February 19. Midterm Exam II will be Tuesday, April 1. Final Exam will be 7:30pm Tuesday, May 13.

### Grading scheme:

Class Participation	25%
Programming Projects Midterm and Final Exams	25% 50%

NOTE: Unprofessional conduct, such as an abuse of USF computer privileges (unauthorized access), or a violation of academic integrity (plagiarism or fraud), will result in the student receiving a failing grade.