

LANE DEPARTMENT OF COMPUTER SCIENCE AND ELECTRICAL ENGINEERING

CS 350: Computer System Concepts

Spring Semester 2010

Course Instructor: Dr. Don Adjero

Room ESB 937 (Evansdale Campus)

Tel: 293-9681;

email: don@csee.wvu.edu

Office Hours: Tuesday 10:00am – 11:30am; Thursday 10:00am– 11:30am.

Course Tutor: TBA

Course Schedule:

Lectures: Tuesday and Thursday 5:00-6:15pm, ESB G39, Evansdale Campus

Labs: Tuesday 6:30 – 8:30pm and Thursday 6:30 – 8:30pm (Operating Systems Section only)

Course web site: <http://www.csee.wvu.edu/~adjero/classes/cs350/>

Purpose

The hardware and software subsystems are two basic components of a computer system. The aim of this course is to provide an introduction to fundamental topics in computer systems, especially the hardware-software interface, and the system-call interface provided by the operating system. The first part of the course will introduce basic concepts in programming using the C Language. The emphasis will be on C programming in a UNIX environment. The remaining part of the course will introduce basic concepts in operating systems. Operating systems are a special type of software that sits between the hardware and other software applications. They function to manage various computer resources, and to provide a convenient interface to the users. This part of the course will lay emphasis on processes, interprocess communications and system calls, which provide an interface between the operating system and higher-level software layers. Simple networking concepts will be introduced from the viewpoint of interprocess communication. This course will be important for students that want to know more about the internals of a computer system, and how the different components interact to produce a working system.

Expected Learning Outcomes

At the end of this course, students are expected to:

- Have acquired good programming skills, and understood good programming practices
- Be able to solve problems and program proficiently using the C Language
- Have understood the working principle of an operating system, especially from the user interface view point
- Have understood the basic concepts used in operating systems, such as processes, IPC, pipes, file I/O and threads.
- Be able to write system level C programs using low-level system calls
- Be able to solve practical problems using C programs with multiple processes (and/or multiple threads of execution)
- Have understood the problems of deadlocks and starvation in operating system, and how to handle them

Prerequisites CS 111 or CpE 310.

Recommended Texts

A. Silberschatz, P. Galvin, and G. Gagne, *Operating System Concepts*, John Wiley, Hoboken, NJ, 2005.

Others Texts

H.M. Deitel and P.J. Deitel, *C: How to Program*, Prentice Hall, Upper Saddle River, NJ, 2001, 2006.

K.A. Robbins and S. Robbins, *UNIX Systems Programming*, Prentice Hall, Upper Saddle River, NJ, 2003.

Assessment

Weekly quizzes	: 10%
2 in-class tests	: 25%
3 projects	: 35%
Comprehensive final exam	: 30%
Class Participation	: 5% extra on tests

Important Dates (Estimates)

In-class Test I: Week of Feb. 15, 2010

In-class Test II: Week of Mar 29, 2010

Final Exam: Sat. May 8, 2010, 11:00am–1:00pm

Grade Assignment

A: ≥ 85 ; B: 75 – 84; C: 65 – 74; D: 50 – 64; F < 50

Others

Labs

There will be no formal lab sessions. However, some lab materials may be made available and students will be expected to work on them at their own time. Also, some optional lab sessions will be organized from time to time during the course.

Expected Workload

CS 350 is a hands-on course, and the expected workload is relatively high. Prepare to dedicate AT LEAST 5-8 working hours a week to this class (excluding the time spent in the classroom). A minimal prerequisite for the successful completion of the course is a good understanding of programming concepts. Some familiarity with the C, Java, or a high level programming language is assumed. Laboratory instruction is not required in CS 350. However, the section on operating systems will involve (optional) laboratory work. You will be given class accounts on the Department's UNIX workstations and all assignments will have to be submitted and run there.

Final Exam

The final exam will be “partial-open notes”.

That is, students will be allowed to come in with one sheet (maximum of 2 pages) of HAND WRITTEN notes.

Academic Honesty

Students are encouraged to discuss class topics and analyze problems among themselves. However, collaboration during the implementation of programming assignments, laboratory assignments and tests is strictly forbidden. Copying assignment solutions or written reports (or part of) will not be tolerated. Please, be aware that your submitted programs may be AUTOMATICALLY compared with each other during the evaluation.

Social Justice Statement

West Virginia University is committed to social justice. I concur with that commitment and expect to foster a nurturing learning environment based upon open communication, mutual respect, and non-discrimination. Our University does not discriminate on the basis of race, sex, age, disability, veteran status, religion, sexual orientation, color or national origin. Any suggestions as to how to further such a positive and open environment in this class will be appreciated and given serious consideration. If you are a person with a disability and anticipate needing any type of accommodation in order to participate in this class, please advise me and make appropriate arrangements with Disability Services (293-6700).

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Weekly Course Schedule

Week	Starting	Topic	Notes
1	Jan. 11	Introduction Overview of C Language	
2	Jan. 18	Structured programming in C	
3	Jan. 25	Functions and recursion	
4	Feb. 1	Arrays & Strings	Programming Project 1 (due 2 weeks after)
5	Feb. 8	Pointers	
6	Feb. 15	Structures and Bitwise Operators File I/O	In-class Test I (C part)
7	Feb. 22	Data structures in C	
		OPERATING SYSTEMS SECTION	
8	Mar. 1	Introduction to operating systems (OS) Processes in OS	
9	Mar. 8	Process Synchronization and Inter-process communications (IPC)	Programming Project 2 (due 2 weeks after)
10	Mar. 15	Semaphores and pipes Signals	
11	Mar. 22	Brief introduction to networking Sockets	
12	Mar. 29	SPRING BREAK	
13	Apr. 5	Threads	In-class Test II (OS part) Programming Project 3: (OS project) (due 2 weeks after)
14	Apr. 12	Deadlocks in operating systems	
15	Apr. 19	Deadlocks in operating systems (cont'd)	
16	Apr. 26	DEAD WEEK The File System/Memory management Course Review	
17	May 8	FINALS WEEK	Final Test Sat. May 8, 2010, 11:00-13:00

Note that the above represents only an estimate of the weekly schedule. The actual date/week that a particular topic is discussed, and the specific topic sequence could vary during the semester.