

Course Number, Course Title and Credit Hours

CIS 245: Operating Systems and Networks, 4 sh

Course Coordinator: Lynn R. Heinrichs; Instructor Fall 2008 – Maureen Nowak Allen

Current Catalog Description

This course introduces the fundamental concepts of operating systems and networks needed for today's client-server and distributed processing environments. Topics include resource and device management, process scheduling, and network connectivity. Students use operating systems to solve installation, configuration and maintenance problems involving hardware and software. Not available to students who have already completed CSC 342. Prerequisite: Core math requirement. Offered fall.

Textbook (New)

Computer Systems Architecture: a Networking Approach, 2/E Rob Williams, *University of West of England* ISBN-10: 0321340795 ISBN-13: 9780321340795 Publisher: Prentice Hall Copyright: 2007

References

<http://www.howstuffworks.com>
<http://www.ee.surrey.ac.uk/Teaching/Unix/>
<http://www.learntcpip.com>
<http://www.myitlab.com> (new)
<http://courses.cs.vt.edu> (new)
<http://www.ee.surrey.ac.uk> (new)
<http://www.jerrywang.net/vi/> (new)
<http://www.codecoffee.com> (new)
<http://msdn.microsoft.com> (new)
<http://technet.microsoft.com> (new)

Course Goals

- Describe the basic components of an operating system.
- Explain the role of the operating system in managing memory, I/O devices, and file systems.
- Explain the role of the operating system in the selection and scheduling of processes for execution.
- Discuss operating system implications for peer-to-peer, client-server, 3-tier, and n-tier architectures.
- Describe how communication takes place in a TCP/IP network.
- Perform basic system and network administration tasks using a common network operating system.
- Discuss ethical issues faced by network and system administrators.

Prerequisites by Topic

- Course Prerequisite: Core math
- Basic Windows desktop skills
- Core math skills

Major Topics Covered in the Course

Fundamentals of Computers Operating Systems

- History of computing and operating systems
- Number systems representation
- CPU and Memory
- Digital logic
- I/O Devices and Drivers
- Disk Storage and File systems

Linux Operating System Fundamentals

- Linux File and Directory Commands
- Linux Environment and Boot Process
- Simple Text Editing and Shell Scripting
- Simple Software Installation

Fundamentals of Networks

- Local Area Network Components and Terminology
- OSI Model/Standards
- Ethernet
- TCP/IP
- IP addressing

Fundamentals of Windows Client/Server

- Configuring Windows Client/Server Environment (Virtual PC)
- Active Directory
- DHCP
- Controlling User Desktops with Group Policy

Learning Objective/Outcomes with Cross Reference to CIS Program Outcomes

- Describe the basic components of an operating system (1,6).
- Explain the role of the operating system in managing memory, I/O devices, and file systems (1,6).
- Explain the role of the operating system in the selection and scheduling of processes for execution (1,6).
- Discuss operating system implications for peer-to-peer, client-server, 3-tier, and n-tier architectures (1,6).
- Describe how communication takes place in a TCP/IP network (1,6).
- Perform basic system and network administration tasks using a common network operating system (10).
- Discuss ethical issues faced by network and system administrators (5).

Laboratory projects (specify number of weeks on each)

No.	Description	How Assessed	Weeks
1	Identify and explain the differences between the two types of computers in Duke 304 in terms of Intel processor model, speed (measured in hertz), RAM (measured in bytes), L2 cache (measured in bytes), front side bus (measured in hertz), and operating system.	Written Report	1
2	Build six different derived logic circuits using the digital logic kits and explain their outputs for each combination of inputs	Visual Check and Written Report	2

	using truth tables.		
3	Using Internet sources, investigate the following daemons in the Linux environment and explain their purpose: sshd, crond, httpd, iptables, kudzu, lpd, mysqld, smb. Explain the difference between inetd and xinetd. Identify services associated with specific port numbers.	Written Report	1
4	Use the following Linux file and directory commands:	Inclass Check	2
5	Use the VI editor to create and a simple shell script.	Inclass Check	1
6	Download and install the Apache Web server.	Inclass Check	1
7	Windows client/server install using Virtual PC.	Outside Check	1
8	Active Directory install and population.	Outside Check	1
9	Installing and configuring DHCP services.	Outside Check	1
10	Controlling user desktops with Group Policy.	Outside Check	2

Estimate Curriculum Category Content in semester hours (Max semester hours per course is .5. Please use minimum increments of .5 hours)

	Core	Advanced
Hardware and Software	2.5	
Modern Programming Language		
Data Management		
Networking and Telecommunications	1.5	
Analysis and Design		
Role of IS in organizations		
Quantitative Analysis		
Information Systems Environment		

Oral and Written Communications

Written. Every student is required to submit at least 3 written reports (not including exams, tests, quizzes, or commented programs) and a final project. Written reports are typically 2 pages; the final project is typically 6-8 pages.

Oral. Students informally present homework solutions in class. The final project requires a formal PowerPoint presentation.

Collaborative Skills

Please describe opportunities for developing collaborative skills in this course.

During class time, students work in pairs to complete problems. The final project can optionally be done as a team.

Global, Social and Ethical Issues

Please list the topics that address the global, social and ethical implications of computing covered in all course sections. Estimate the class time spent on each topic. In what ways are the students in this course graded on their understanding of these topics (e.g., test questions, essays, oral presentations, and so forth)?

Social – History of computing (test questions)

Global - Role of standards in networking (test questions)

Ethical – Component included in learning outcomes; needs development

Theoretical Content

Please list the types of theoretical material covered, and estimate the time devoted to such coverage.

- Number systems representation (4 hours)
- CPU and Memory (4 hours)
- Digital logic (4 hours)
- I/O Devices and Drivers (4 hours)
- Disk Storage and File systems (4 hours)
- Local Area Network Components and Terminology (4 hours)
- OSI Model/Standards (4 hours)
- Ethernet (4 hours)
- TCP/IP and IP Addressing(8 hours)

Analysis

In the early laboratory assignments, especially those involving Linux, the testing procedure to determine whether or not a laboratory assignment is working or not is straightforward. By the time they complete the later laboratory assignments in Windows, they must be able to answer the question, how do I know my lab is working correctly? The most difficult assignment is Windows group policy, in which students apply several group policies to an established active directory and then must determine how the policies will affect different users' desktops when they log in.

Design

This course does not really involve design.

Course Assessment (Fall 2008)

Proposed changes from last offering (Fall 2007) (Planned **assessment**):

1. New book with updated features
2. Utilization of myitlab online software and testing
3. Increased emphasis on Networking security and ethics
4. Redesign CIS 245 to place more emphasis on IT over computer architecture.
5. Modify the course description to restrict the experience level of students taking the course.
6. Continue to work toward establishing an appropriate laboratory space for the course.

Learning objectives/outcomes to be assessed (Planned **assessment**):

CIS 245 was designated as one of the courses to assess the following two CIS learning outcomes:

1. Students will communicate effectively, both orally and in writing, and will have experience communicating to groups.
Assessment: Final Project Performance
2. Students will comprehend and articulate the fundamental concepts and theories of the discipline.
Assessment: Test Performance
2. Students will be assessed with a pretest in the first week and results will be compared to final exam testing to review the statistical effectiveness of utilization of supplemental online software.

Assessment data and analysis (Final assessment):

Test Performance (Outcome #6)

A pre and post assessment exam was given to students the first week of class and the last week of class. This test was designed using a combination of both a simulation test and an objective multiple choice test. Test were given to students without notice and just advised to do their best as it was assessing the skills before the semester began and then at the end to see if their performance increased. The pre and post tests had no reflection on their final grade, just as an assessment of the course. A 16% increase was noted.

	Pre Test	Post Test
Average (Mean)	70	86
Distribution: A >=90	1	6
B >=80	6	8
C >=70	6	2
D >=60	0	0
F <59	3	0

Tests are a combination of simulation, multiple choice, true false items and problems. The table below shows the performance across the six tests.

	T1	T2	T3	T4	T5	T6
Average (Mean)	90	87	73	70	77	80
Distribution >=90	10	5	0	0	4	3
>=80	3	9	5	4	7	7
>=70	3	2	6	4	3	4
>=60	0	0	0	1	0	0
Below	0	0	0	0	0	0

T1 = Networks and Telecommunications

T2 = TIA5&6 (5 =Using System Software: The Operating System, Utility Programs, and File Management; 6= Understanding and Assessing Hardware: Evaluating Your System)

T3 = Computer Systems Architecture

T4 = Linux Exam myitlab

T5 = Security Ch6 Exam

T6 = Networking Exam TIA7 and 12 (7=Networking and Security: Connecting Computers and Keeping Them Safe from Hackers and Viruses; 12= Behind the Scenes: Networking and Security)

The first test average was higher than tests two through six. In fact, probably higher than a test average should be. This was likely because some of the introductory material was already familiar to many students including number system conversion, Office Software and basic utilization of networks (wireless systems). Test 2 dealt with Operating systems students were utilizing on their own systems (XP and Vista). The hardware content was easier to students to comprehend due to lab involving the disassembly of a computer laptop. I was very pleased with the results of this test since students were tested on hardware aspects on a pretest and did not do very well on those specific questions. Tests 3 and 4 was new material for students and required studying of concepts and participation in new operating systems for which they were working in unfamiliar territory. Sometimes students can complete lab assignments without really

understanding what they have done, particularly by getting help from other students. The lack of understanding generally shows up on the tests. Additionally, the textbook did not contain much content in the Linux and Windows area, so I supplemented it with related Web sites and PowerPoint slides. Many concepts utilized for tests 3 and 4 carried into test 6 which explains the increased in the mean.

Final Project Performance (Outcome #1)

The goal of the final project was to integrate technical expertise with written and technical communication skills through a team project. Students were allowed to work in groups or individually if they preferred.

The focus of the project was to expose students to the most current networking, operating systems and software components which can assist students and those pursuing an IT career. Step by step lab assignments were developed for a future CIS 245 class. The assignment required a technical component, written component, and oral presentation. Teams proposed a project idea which had to be approved through consultation with the instructor. Presentations were completed during the final exam period and had to include a “proof of concept” for their proposed project.

A summary of projects completed are shown below. The entire project was worth 200 points which included the proposal, the presentation, a step by step manual for classmates to test and a research paper.

Project Focus	Team/Ind	Pts (200)
Networking and Your TV - Compare TiVo, Myth TV and Sling box	Individual	200
Utilizing a SharePoint Environment	Individual	192
Remote Access for Windows XP and Vista Operating Systems	Individual	190
Unix Operating System	Individual	190
Anti-spy Software – Ad-aware vs others	Individual	189
Windows Server 2008	Team	189
Ubuntu vs. Windows XP	Individual	185
Voice over IP technology	Individual	185
Setting up a Debian Server	Individual	181
P2P Networks	Individual	173
Skype Networking Technology	Individual	172
WEP vs. WPA Wireless Security	Individual	167
Social Network Sites	Individual	165
Windows Server 2003 verses Server 2008	Individual	160
Setting Up a Wireless Network in Your Home	Individual	159

“A” Projects. (181-200) The highest score (200) demonstrated excellence across the board; well-written, well-presented, and demonstrated technical integrity. Others were also nicely done, but lacked some attention to detail in the written or presentation component. For example, one item that was supposed to be addressed in the step by step guide were problems that students might

encounter in completing the lab (low bandwidth). One group addressed this by simply saying there were not any anticipated problems and when they attempted their presentation it was delayed.

“B” Projects. Projects in the B-range (160 – 173) were usually missing a substantive component. For five of these projects, the primary problem was failure to follow directions with respect to the content of the guides and presentations. Grade sheets were not reviewed by the student prior to their presentation. Two of the projects fell short of their technical goals, meaning the proof-of-concept wasn't complete.

“C” Project. The C project (159) was similar to the B projects, but also had writing problems that detracted from the quality of the final product. The lowest scoring projects looked like they were started and completed two hours before they were due. There was little effort to produce either technical or written quality.

Overall, designing a laboratory assignment seemed to work well as a project. Students could focus on a particular topic or technology of interest. The project was able to integrate technical, writing, presentation, and group components. If I were to do the project again, I would probably strengthen the proposal part and require students to complete a basic literature review before selecting a project.

Proposed changes for next offering (Final assessment)

This was the second offering of CIS 245 since the substantial CIS curriculum change.

- Fine-tune learning objectives for the course. The current learning objectives were developed based upon F2007 content. Some of the learning objectives that are being addressed are not currently described.
- Find a different textbook solution. Perhaps supplemental manuals, use of online training links and additional myitlab material. There are several new texts on the market that are probably better than the one used in F2007 and F2008. F2008 was an excellent resource book which was utilized extensively the first 6 weeks and referenced after that.
- Continue to utilize the myitlab online software which was tested in F2008. Students did very well utilizing the simulation and help call simulations to learn many networking aspects. Often new material was developed in-house and uploaded to supplement online training.
- Continue including a comprehensive project that allows students to integrate multiple skill components.
- Develop ethical issues module.
- Allocate additional time on Operating Systems students are less familiar with such as Linux and Microsoft Server 2008. Since Server 2008 was recently released, I expect more online tutorial links to be available for F2009.