Educational information systems and networks

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**Description:** From a foundation of computer networks and systems, this course expands to cover instructional technology infrastructure: file systems, users, wired and wireless networks, email, web servers, computer labs, and common educational software services. This course focuses on Free Software; where the source code is free to use, study, or modify. (50 words)

GOALS & OBJECTIVES ——————

The Educational Technology Specialist certification track must prepare graduates to be school-based technology leaders. One of their main duties will be to install and maintain local computer networks, workstations, and school servers. Other graduates will be developing networked learning solutions, requiring the fundamental knowledge and skills covered in this course.

Students in this course develop a basic understanding of computer operating systems and digital networks. Upon completing this course they will be able to:

* set up a secure, network computing environment
* effectively use the basic tools of Unix/Linux computing environments
* implement techniques for administering group and user permissions
* install and troubleshoot hardware and software infrastructure for networked and internet computing
* configure various server-side applications to support teaching and learning
* identify the ethical and legal concerns surrounding school information systems

## Required Books

Esteve, J. 2009. [*The GNU/Linux Operating System.\*Free Technology Academy*](http://ftacademy.org/materials/fsm/2#1). Barcelona.

Kurose, J. (2010). *Computer networking : a top-down approach* (5th ed.). Boston: Addison-Wesley. ISBN 0136079679.

## BIBLIOGRAPHY

Adelstein, Tom. 2007. *Linux System Administration.* O’Reilly Media. ISBN 0596009526.

Gift, Noah. 2008. *Python for Unix and Linux System Administration.*O’Reilly Media. ISBN 0596515820.

Peterson, Larry L. 2011. *Computer Networks, Fifth Edition: A Systems Approach.*Morgan Kaufmann. ISBN 0123850592.

Tanenbaum, Andrew S. 2002. *Computer Networks.*Prentice Hall. ISBN 0130661023.

## Class sessions

### Networks and the internet

Students will get an overview of current network computing scene. They will learn how to install the Ubunutu GNU/Linux operating system.

### The linux operating system

This session focuses on the organization of the Linux OS. Students will also learn about package management, maintaining and upgrading software, Gnome and KDE windowing systems.

### UNIX tools and utilities

Students will learn the basic tools of the linux shell: text editors (emacs/vi/nano), head/tail/more, cat, man, etc.

### Users and groups

Students will look at managing users and groups, superuser and sudo, password files, and more.

### File systems

Students will format drives, create file permissions, use uname, symbolic links, rsync, and backup strategies.

### Ethics & school computer systems

Reviewing several cases of controversies in school systems, students will consider the ethical and legal considerations of administering computer systems in a school setting, including maintaining the privacy of sensitive data, equitable distribution of computing resources, design for universal access, and more.

### Network protocols

This session introduces Interent Protocol (IP), the concept of network layers, TCP, UDP, DNS, and routing.

### Local area networks

Students practice with local area networks: distributed file systems, DHCP, print servers, and user management.

### Wireless networks

This session looks at wireless networking standards, routers and access points, and wireless security protocols.

### computer security

This session looks more specifically at the security of computer networks, including firewalls, hardening servers, virus protection, and encryption.

### The educational computer lab

Students will learn strategies for maintaining computer labs, including Linux Terminal Server.

### Web servers

Students configure the Apache HTTP server, learn about configuration files, and plugins, security settings for Apache.

### Database servers

Students learn how to set up databases with mySQL, grant user permissions, and use the mysql CLI client to run sql commands.

### Educational applications and services

This session looks at installing and configuring some of the popular applications used in learning environments: Moodle, WordPress, Drupal, Kaltura, etc.

### Cloud computing

Examines the trend towards cloud computing; what this paradigm really means. Also, looks at the benefits and drawbacks of “cloud” vendors, such as Amazon EC2.

## Grades & Assignments

Students will have weekly homework assignments. These assignments will measure the discrete skills and knowledge covered each week. In addition, there will be practice-based midterm and final exams, where students will have to use their own server space to install and configure network and application services.

*Grading:*

* Homework (30%)
* Midterm (30%)
* Final project (40%)