OPERATING SYSTEMS

School of Advanced Technology

Course Number: **DAT2330**	**Contribution to Program:** Core Vocational	**Educator(s):** Ian D. Allen
Applicable Program(s): Computer Programmer	**AAL:** 02	**Approved For:** Fall 2004 **Approved By:**
Course Hours: Delivered: 64 Normative: 64	**Prerequisites:** DAT2210	Claude Brulé, Chair Computer Studies Department
	Corequisites: None	**Approved for Academic Year:** 2004 - 2005

COURSE DESCRIPTION

This course covers operating system components and focuses on the effective use of the programmer's interface to file management, program preparation and testing, backup and recovery, and automating of procedures using shell scripts.   The course covers theoretical and practical knowledge of the Unix/Linux O/S.

RELATIONSHIP TO PROGRAM LEARNING OUTCOMES

Visit: http://www.edu.gov.on.ca/eng/general/college/progstan/techno/comp_prg2.html

This is a vocational course that supports the following vocational program standards:	This course contributes to your program by helping you to achieve the following provincial generic skills standards:
1,2,3,4,6,8,	2,3,4,10,11

COURSE CURRICULUM

I.   Course Learning Requirements/Embedded Knowledge and Skills

Course Learning Requirements	Knowledge and Skills
To earn credit for this course, you must reliably demonstrate your ability to:	
1. Make an intelligent choice as to which features or components of operating system are relevant to your needs at home or on the job.	− state the purpose of an Operating System and the generic name and purpose of each component of a typical operating system.
2. Use a LINUX system effectively to create and test programs.	− log on, create and manage files, and use basic LINUX utilities, − use the on-line "help" facilities, − recall and edit previous commands at the command line, − use the **vi** editor and basic utilities to create, modify, sort, search and otherwise manipulate files, − control access to files and directories via permissions, − create and execute basic shell scripts, − compile, link and execute a C program, − specify instructions to the shell to control execution of programs, monitor execution via information re. processes, and suspend, restart or terminate programs.
3. Use LINUX to communicate over a network.	− use mail and message facilities, − use Networking utilities, − use Internet services.
4. Use more advanced features of the Linux Operating System.	− use control structures and user interection to write shell scripts of moderate complexity, − use LINUX source code management facilities, − perform basic system administration tasks.

II.   Learning Resources

Required Textbooks:

1)   <u>Running Linux</u>, 4th ed., by Matt Walsh, Matthias Kalle Dalheimer, Terry Dawson and Lar Kaufman, O'Reilly, ISBN 0-596-00272-6   **http://www.oreilly.com/catalog/runux4/**

2)   <u>Learning the Unix Operating System</u>, 5th ed., by Jerry Peek, Grace Todino-Gonguet & John Strang, O'Reilly, ISBN 0-596-00261-0   **http://www.oreilly.com/catalog/lunix5/**

Other resources:

Web Site for Fall 2004:
http://teaching.idallen.com/dat2330/04f/

III.   Teaching/Learning Methods

The course consists of 2 hours of lectures and 2 hours of lab per week. It is anticipated that you will need to spend an additional 4 hours per week, on average, of your own time for assignments and study.

During this course you are likely to experience:

<u>Lectures:</u>

The theoretical material of the course will be presented in lectures. Students are responsible for all the theoretical material, even if they miss a lecture or a lab.

Students are expected to attend all of the lectures whether presented in a lecture or lab time.   Students are encouraged to ask questions during lectures and to consult with the professors on topics which they do not clearly understand. Professors will inform students at the beginning of the course of suitable times for consultations.

<u>Labs:</u>

Students are expected to perform initial analysis and design **before** their scheduled lab, in order to take advantage of the limited lab time. Laboratory assignments will be closely integrated with the lecture material. The students' ability to successfully complete the assigned exercises will directly correlate with their level of success on tests and the final exam.

IV.   Learning Activities

Samples of learning activities include:

- taking notes during lectures and lab sessions
- participation in problem solving during in-class demos
- homework exercises (guided by postings on the course web page)
- hands-on lab work, following the examples demonstrated by the instructor

V.   Course Content
Topics covered include: (Web notes: http://teaching.idallen.com/dat2330/04f/)

1.   Introduction to DAT2330 and instructor
                - Course Outline, Textbooks, Evaluation and Assessment
                - Course Home page on Blackboard and on WWW
                - Arranging an Office Appointment
                - Assignment submission procedures and standards
                - Reading Usenet news for Course Announcements
                - Academic Honesty and Plagiarism

2.   Operating Systems Concept Overview
            - Purpose of an Operating System
            - Generic name & purpose of O/S components

3.   Introduction to Unix/Linux
            - History and Background
            - Booting and Using the Knoppix Linux CD
            - Connecting to the Course Linux Server using SSH
            - Connecting to the College ACADUNIX IBM Unix system
            - Using and searching Unix manual pages
            - The Unix Password File

4.   Introduction to the VIM editor
            - Basic editing commands
            - Setting useful VIM options
            - Recovering VIM sessions

5.   Introduction to the Unix Shell
            - Search $PATH
            - I/O redirection, pipes
            - Standard input, output, and error
            - Shell local and environment variables, command substitution
            - Using Quoting to protect characters from the Shell
            - Login and start-up environment, profiles
            - A simple first shell script
            - Debugging scripts with -x and -v

6.   The Unix File System
            - Absolute and relative paths
            - GLOB patterns (wildcards)
            - Unix file permissions and ownership
            - Setting umask and default permissions
            - Hard links and symbolic links
            - Text file differences on Unix / Windows / Macintosh

7.   The Unix start-up and execution environment
            - System start-up and shut-down
            - Maintenance mode (single-user)
            - Basic System Administration
            - Processes and jobs
            - Job control; foreground and background jobs
            - Terminating processes and jobs

8.   Shell control structures
            - Command exit and return code statuses
            - Conditional execution using || and &&
            - The "test" command
            - IF/ELSE/WHILE/FOR
            - Intermediate shell scripts

9.   Introduction to C++ Program development and debugging
                - Compile, Link, Go
                - The GNU C compiler
                - Using program libraries
                - The GDB program debugger
                - Building and using program Makefiles
                - Source code management

10.   Unix/Linux Networking
                - Networking tools and programs
                - Secure and insecure network connections
                - The X11 Window system
                - Remote system use and management
                - Electronic mail (EMail)

11.   Software packaging and distribution
                - Fetching and installing programs
                - Compression with gzip and zip
                - Software packaging using tar
                - Backup and recovery

Weekly exercises worth 1-2% each will be assigned most weeks, due the following week.

VI.   Evaluation/Earning Credit

The following will provide evidence of your learning achievement:

Assessment of student learning will be done by means of hand-in exercises, in-class tests and a final exam.

Laboratory attendance is recorded and strongly recommended, but, it is not compulsory. Where a student is in a borderline situation with regard to marks, regular attendance may be a determining factor in any marks adjustments.

All laboratory assignments must be successfully completed in order to obtain course credit. Late assignments will be penalized and receive a mark of zero, but they must still be completed. Any missed evaluation points will result in a grade of "0". In the case of a documented emergency, the professor, in consultation with the Chair, will determine how the marks will be made up and/or final grade adjusted.

The Computer Studies Department has adopted a standard for the submission of lab assignments. Professors will ensure that students are advised on these requirements. Student submissions that do not meet the published submission standards may not be marked, and will incur a penalty of up to 100%.

The factors in the final grade are:

1.   Assignments   20%
2.   Test 1   10%
3.   Test 2   15%
4.   Test 3   20%
5.   Final Exam   35%

Assignments and exercises will not be included in the final grade unless the student achieves at least a grade of 50% or **"D-"** on the final exam. (Students who have a failing grade on the final exam will receive a grade of **"F"**).

All students are required to write the final examination. There are no provisions for "making up" a missed final exam. If, as a result of being off-track in your program or some unforeseen circumstance, you note that there is a scheduling conflict in your final exam schedule, it is your responsibility to alert <u>your course professor</u> no later than one week before final exams start, to allow for any special arrangements.

VII. Related Information

Retention of course material. It is your responsibility to retain copies of all assignments, labs and mid-term tests (returned from the professor), and any other evaluations and pertinent records (except for final exams, which are not returned) in case you become involved in an appeal hearing at a later date.

It is also your responsibility to retain course outlines for possible future use to support applications for transfer of credit to other educational institutions.

See College Directives E15 or E24 for details in your Instaguide.

College email account. Algonquin College provides all full-time students with an email account. This is the address that will be used when the College, your professors, or your fellow students communicate important information about your program or course events. It is your responsibility to ensure that you know how to send and receive email using your Algonquin College account, and check it regularly.

Harassment/Discrimination/Violence will not be tolerated. Any form of harassment (sexual, racial, gender or disability-related), discrimination (direct or indirect), or violence, whether involving a professor and a student or amongst students, will not be tolerated on the college premises. Action taken will start with a formal warning and proceed to the full disciplinary actions as outlined in Algonquin College Directive - A8.

Harassment means one or a series of vexatious comment(s) (whether done verbally or through electronic means), or conduct related to one or more of the prohibited grounds that is known or ought reasonably to be known to be unwelcome/unwanted, offensive, intimidating, derogatory or hostile.

This may include, but is not limited to: gestures, remarks, jokes, taunting, innuendo, display of offensive materials, offensive graffiti, threats, verbal or physical assault, stalking, slurs, shunning or exclusion related to the prohibited grounds.

For further information, a copy of the official policy statement can be obtained from the Student Association.

The School of Advanced Technology's Standard Operating Procedure on Plagiarism and Academic Honesty defines plagiarism as an attempt to use or pass off as one's own idea or product, work of another without giving credit. Plagiarism has occurred in instances where a student either directly copies another person's work without acknowledgement; or, closely paraphrases the equivalent of a short paragraph or more without acknowledgement; or, borrows, without acknowledgement, any ideas in a clear and recognizable form in such a way as to present them as one's own thought, where such ideas, if they were the student's own would contribute to the merit of his or her own work.

Plagiarism is one of the most serious academic offences a student can commit. Anyone found guilty will, on

the first offence, be given a written warning and an "F" on the plagiarized work. If the student commits a second offence, an "F" will be given for the course along with a written warning. A third offence will result in suspension from the program and/or the college.

For further details on this directive, consult the Algonquin College Directive - E16 in your Instaguide, and the School of Advanced Technology's Standard Operating Procedure on Plagiarism and Academic Dishonesty.

Violation of the Copyright Act.

- General – The Copyright Act makes it an offence to reproduce or distribute, in whatever format, any part of a publication without the prior written permission of the publisher. For complete details, see the Government of Canada website at http://www.cb-cda.gc.ca/info/act-e.html . Make sure you give it due consideration, before deciding not to purchase a textbook or material required for your course.

- **Software Piracy**. The Copyright Act has been updated to include software products. Be sure to carefully read the licensing agreement of any product you purchase or download, and understand the term and conditions covering its use, installation and distribution (where applicable). Any infringement of licensing agreement makes you liable under the law.

The Use of Electronic Devices, with the sound turned on, during classes is strictly prohibited. In particular, cell phones are not to be used to communicate during a class. The use of any electronic devices during exams and mid-term tests, other than those sanctioned by the faculty in charge of the examination, is strictly prohibited.

Anyone caught using a prohibited device will be considered to have plagiarized, and will be treated as such in accordance with College Plagiarism Policy. For further details on this directive, consult the Algonquin College Directive E39 on the use of Electronic Devices in Class and Exams.

Disruptive Behaviour is any conduct, or threatened conduct, that is disruptive to the learning process or that interferes with the well-being of other members of the College community. It will not be tolerated.

Members of the College community, both students and staff, have the right to learn and work in a secure and productive environment. The College will make every effort to protect that right.

Incidents of disruptive behaviour must be reported in writing to the departmental Chair as quickly as possible. The Chair will hold a hearing to review available information and determine any sanctions that will be imposed. Disciplinary hearings can result in penalties ranging from a written warning to expulsion.

For further details, consult the Algonquin College Directive - E27 in your Instaguide.

Students with Disabilities. If you are a student with a disability that affects your learning ability, and wish to receive special dispensation or academic accommodation, you are first required to identify your needs to the Centre for Students with Disabilities (CSD) so that support services can be arranged for you.

If, as a result of that consultation process, you are issued a letter from the CSD office prescribing certain special academic accommodations for that academic term, it is your responsibility to present this letter to each of your course professors, in order to obtain the special dispensation you are entitled to.

For further details, consult the Algonquin College Directive – E4 in your Instaguide.

Prior Learning Assessment (PLA)

See College Directive E35 for details on eligibility and process.

For this course, evidence of learning achievement for PLA candidates will include the successful completion of:

- A challenge exam with a breadth of coverage and level of difficulty equivalent to the final examination in the course;

- A hands-on or practical component to ensure that the requisite skill level has been achieved; and

- A computer programming (where applicable) assignment comparable to a representative assignment in the course.