HUMBER
School of Applied Technology

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COURSE OUTLINE
ACADEMIC YEAR 2005-2006

It is the student's responsibility to retain course outlines for possible future use in support of applications for transfer credit to other educational institutions.

PROGRAM:	**COMPUTER AND NETWORK SUPPORT TECHNICIAN**
COURSE NUMBER/NAME:	**NEST 304 - UNIX OPERATIONS**
CREDITS:	**3**
PRE-REQUISITES:	**CTEC 203 - INTRODUCTION TO UNIX & THE INTERNET**
PRE-REQUISITE FOR:	**NEST 403 - ROUTERS ANS SWITCHES** **NEST 404 - UNIX ADMINISTRATION** **NEST 405 - WEB/INTERNET SERVICES**
PREPARED/REVIEWED BY:	**Mike Lake, May 2001/Kenn Baker, May 2005**
PROGRAM COORDINATOR:	**PAUL MICHAUD**

APPROVED BY: _____ **September 2005**
DEAN (or designate) **DATE**

I. COURSE DESCRIPTION

This course focuses on the principles, theory and features of multi-user, multi-tasking operating systems. It covers processes, scheduling, input/output, memory management, file systems, and system management. These concepts are illustrated by studying the operation of a free UNIX operating system (e.g. Linux, FreeBSD).

II. LEARNING OUTCOMES

Learning outcomes are clear statements of the critical/essential knowledge, skills and attitudes that a student is required to demonstrate to indicate successful completion of the course. Generic/Employability Skills are transferable skills that provide the foundation for a student's academic, vocational, and personal success. These outcomes include communications, personal, interpersonal, thinking, mathematics, and computer skills.

A. Core Outcomes

Upon completion of this course, the successful student will be able to:

1. Install and configure Linux on a desktop computer.
2. Use a single disk Linux system (i.e. tomsrtbt) to examine and modify an existing Linux installation.
3. Describe the boot process of a Linux/UNIX system.
4. Examine site specific details of files involved in the boot process of a Linux/UNIX system.
5. Identify the commonly available file systems used with desktop Linux/UNIX systems.
6. Describe the major components of the Linux/UNIX file system.
7. Describe the use of Linux/UNIX commands and filters such as those in start up scripts.
8. Examine and interpret system tables in Linux including the process, inode and open file tables.
9 Create multiple processes to carry out tasks.
10. Create and test shell scripts that use Linux/UNIX system calls.
11. Add users to a Linux system.
12. Configure printing for a Linux system.
13. Add new software packages to a Linux system.

B. Generic/Employability Skills Outcomes

14. Produce clear, concise, correct and coherently written texts to suit the intended audience.

15. Read, comprehend and summarize a variety of texts

16. Interpret and restate accurately or summarize spoken messages

17. Research and/or communicate ideas through involved Media

18. Apply knowledge to demonstrate an ability to solve problems and make decisions in his/her subject area

19. Perform basic operations in addition, subtraction, multiplication and division; solve problems in percent, estimation, ratio and proportion.

20. Quantify simple problems and solve the resulting algebraic equations

The following generic skills will be acquired and/or enhanced.

COMMUNICATION

- Write clear, concise sentences and paragraphs in program documentation, projects and tests.
- Communicate in written, oral, and diagrammatic form using appropriate formal and information vocabulary and format.
- Respond to oral and written instruction.
- Read and comprehend reference materials, diagrams and reports.
- Interpret a range of technical and non-technical instructions (program specifications) through dialogue and refined questioning skills.
- Read and interpret policy and procedure.

MATHEMATICS

- Apply the fundamentals of mathematics to the solution of routine programming problems.
- Apply appropriate formulae to solve common technical problems.
- Define precision and accuracy in mathematical calculations and use the rules for significant figures.
- Solve word problems through the use of equations.

INTERPERSONAL

- Complete projects as an effective member of a team.
- Participate effectively in-group discussion on technical problems.
- Work with others by co-operating, sharing ideas and constructively resolving conflicts.

III. COURSE CONTENT

1. Introduction to Operating Systems

- Describe the main components of a modern computer operating system and their functions.
- Describe the differences between user mode and kernel mode.
- Describe the differences between single user and multi-user operating systems.
- Describe the differences between programs and processes and give examples in UNIX.
- Define a resource, provide examples of hardware and software resources, and distinguish between dedicated and shared resources.
- Describe the following operating system services: the command interpreter or shell, scripting languages, interactive and batch services.

2. System Installation and Operation

- Explain the steps required to install an OS such as Linux and Solaris.
- Explain the system boot and shutdown processes for these OS's.
- Explain the following terms and/or concepts related to a Linux install: device name, disk formatting, disk partitioning, file system type, and file system creation.
- Install Linux on a desktop computer.
- Use tomsrtbt to examine the installed system.

3. System Configuration and Customizing

- Explain the entries in the system start-up scripts and tables in Solaris and Linux.
- Manage system services using a tool such as ntsysv.

4. File Systems

- Describe the strategies for allocating space for files on a hard disk.
- Give examples of the FAT tables in MS DOS and the i-node in Unix.
- Describe the characteristics of the UNIX file system including disk layout, partitions and their use, the Super Block, i-Nodes, and the block cache.
- Describe the main characteristics of the ext-2 file system used in Linux.
- Examine other system tables such as the open file and i-node tables.
- Understand how file systems are mounted.

5. Files and File Structures

- Describe directory and file hierarchies of Linux and Solaris.
- Define the following terms: root directory, pathname, working directory, permission bits, file descriptor.

6. Process Management

- Describe the functions of the following components of an OS or operating system: the kernel, the user space, the scheduler, system calls, the virtual memory manager, device drivers.
- Describe the three-state model of a process.
- Explain the differences between cooperative and preemptive multitasking.
- Define the following terms: PID, PPID, UID, child process, process table, text segment, data segment and stack segment, signals.
- Draw a process tree showing the relationship between parent and child processes.
- Describe the function of the init process.
- Describe how a zombie process arises.
- Describe the memory layout of a typical process.
- Manage process scheduling using: sleep command, foreground and background commands, and at and crontab commands.

7. Basic Utilities

- Distinguish between a command and a utility and give specific examples from the UNIX and DOS environments.
- Use the following utilities to communicate electronically: who, finger, w, talk, write mesg, mail, pine, lynx.
- Use the following utilities to obtain system information: which, whereis, man, echo, date.
- Use the following utilities to manage text: more, head, tail, grep, sort, uniq, diff, compress.
- Use awk to filter and reformat text.

8. Shell Programming

- Differentiate between the following shells: ksh, csh, sh, bash, rsh, etc.
- Create new shell commands and make them executable.
- Pass arguments and parameters to commands.
- Set the value of shell variables, and pass them on to sub-shells.
- Read from stdin and write to stdout.
- Read from and write to a file.
- Use a decision.
- Use a loop.
- Debug shell scripts.
- Create functions for the .profile file.

9. Managing Users

- Add/remove and manage users and groups.
- Explain the entries in the default user profile and customize them.
- Specify user access rights for secure systems operation.

10. Managing local and remote printing

- Explain the following components of a printing subsystem: the print device, the queue device, the queue, the virtual printer.
- Administer print jobs and queues

11. Installing and Upgrading Software

- Download and unpack different types of tarred/zipped files.
- Install a software package in Linux using the rpm utility.
- Install a patch in Linux using the patch utility.

IV. EVALUATION PROCEDURE

To achieve an overall passing grade in the course, students must independently pass both the test and the lab/assignment sections of the course. If one of these two sections is failed, the final grade will be the lower mark. A passing grade for this course is 60%.

The following is a suggested evaluation scheme for this course. If it is changed the course teacher will provide the student with the revised evaluation scheme in writing

Activity	Weighting (%)
TESTS (2)	60
LABS/ASSIGNMENTS	40
TOTAL	100

Group consulting and teamwork are encouraged, but projects and labs handed in must represent the student's own work. The student must be prepared to demonstrate their knowledge individually to the instructor in labs.

Please note: The Distance Learning version of this course (if available) may have a different grading scheme than the classroom version. Check the information page of the Distance Learning version for details. Students must pass the proctored final exam for any other test and lab assignments to count towards their final mark.

V. REQUIRED TEXTS AND OTHER LEARNING MATERIALS

A Practical Guide to Red Hat Linux : Fedora Core and Red Hat Enterprise Linux, Second Edition, by Mark G. Sobell: Prentice Hall, ISBN 0-13-147024-8

From the prerequisite course , the students should already have either A Practical Guide To Solaris by Mark Sobell or Your UNIX, The Ultimate Guide by Sumitabha Das

VI. DELIVERY FORMAT

Lecture and Lab sessions.

VII. SUPPLEMENTARY ASSIGNMENTS/TESTS/EXAMINATIONS

Supplementals are not available in this course, unless extraordinary, documentable circumstances have prevented a student from participating in scheduled course activities. All applications for supplementals are made to the course instructor.

VIII. ACADEMIC CONCERNS/APPEALS

Any student having an academic concern or questioning an academic decision should first discuss the matter directly with their professor; then with the program coordinator if the issue cannot be resolved; then with the Dean (or designate) if the prior two steps were unsuccessful. Complete details regarding academic appeals are found in the College's Academic Complaint and Appeal Policy.

IX. POLICIES AND PROCEDURES

It is the student's responsibility to be aware of the **COLLEGE'S ACADEMIC REGULATIONS** and the **SCHOOL OF APPLIED TECHNOLOGY POLICIES AND PROCEDURES.** (See School of Applied Technology's Academic Handbook). The College's Academic Regulations can be found at http://registrar.humberc.on.ca/acregs.html

X. PRIOR LEARNING ASSESSMENT AND RECOGNITION (PLAR)

Course credits may be granted in recognition of prior learning. Application for consideration is made through the Office of the Registrar. The method(s) of assessment are:

Challenge Exam	Portfolio	Skills Test	Interview	Other (please specify)	Not Available for PLAR
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XI. DISCLAIMER

While every effort is made by the professor to cover all content material listed in this outline, the order, content and/or evaluation may change as a result of special circumstances (e.g. time constraints due to inclement weather, College closure, technology/equipment problems and/or changes, etc.) In any such case, every effort will be made to make appropriate adjustments to the course delivery.