

Unix/Linux Shell Scripting

School of Advanced Technology

Course Number: CST8129	Contribution to Program: Vocational, Core	Educator(s): Ian D. Allen
Applicable Program(s): Computer Engineering Technology Computer Engineering Technology - Computer Science	AAL: 02	Approved For: Fall 2005
Course Hours: Delivered: Normative:	Prerequisites: CST8110 CST8201	Approved By: Claude Brulé, Chair Computer Studies Department
	Corequisites: None	Approved for Academic Year: 2005-2006

COURSE DESCRIPTION

This course introduces students to Unix/Linux Shell Scripting and builds upon the foundation laid for systematic problem solving and the basics of the Unix/Linux operating systems. It covers in some detail the essential elements of shell scripting in **bash** and possibly other shells, and also prepares the student for the successor courses by addressing **regular expressions**, and in making use of powerful command-line tools and utilities including **sed**, **grep**, and **awk**. Some issues involved in system administration will also be addressed.

RELATIONSHIP TO PROGRAM LEARNING OUTCOMES

Visit: http://www.edu.gov.on.ca/eng/general/college/progstan/techno/comp_eng3.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:
1,5,7,10,11	1,2,4,7,8,11,12,13

COURSE CURRICULUM

I. Learning Requirements / Embedded Knowledge and Skills

To earn credit for this course, you must reliably demonstrate your ability to:

Course Learning Requirements	Knowledge and Skills
1. Know the significant arguments for and use many of the common Linux commands.	Fifty and more common Linux commands.
2. Edit Linux files with one of the common variants of vi , the vi sual editor.	Make use of on-screen editing control sequences, ex edit mode commands, etc.
3. Understand and be able to make effective and efficient use the LINUX file system	LINUX file structure, hierarchy, commonly used commands, file permissions, ownership.
4. Understand the concept of process creation, program execution in the foreground and in the background, I/O redirection, and pipes.	Process structure, process creation, concepts of command line input/output redirection.
5. Construct and analyze both standard and extended regular expressions .	Regular expressions , as used in grep , sed , and other commands.
6. Make use of awk and other Linux tools for data manipulation.	Data manipulation tools: head , tail , awk , sed , cut , tr , sort , etc.
7. Work effectively in the LINUX environment using available shell programming tools.	Script programming in bash and related Unix/Linux utilities and programs.
8. Understand some of the issues involved in system administration and security.	Login scripts, shell customization, environment settings, password files, etc.

II. Learning Resources

Required Textbook:

[UNIX Shells by Example \(fourth edition\)](http://vig.pearsoned.ca/catalog/academic/product/0,1144,013147572X,00.html), by Author: Ellie Quigley, Prentice Hall, ISBN 0-13-147572-X
<http://vig.pearsoned.ca/catalog/academic/product/0,1144,013147572X,00.html>

Course Home Page and Web Site:

<http://teaching.idallen.com/cst8129/05f/>

A link to the above site is also available via the Algonquin Blackboard system.

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 5 hours per week, on average, of your own time for reading, practice, assignments, finishing exercises, and study.

This course is presented using Lectures, Labs, and on-line notes. Basic notes for the course will be posted on-line through the Course Home Page. Not all course material is available in on-line form - students are expected to attend the lectures and labs and take supplementary in-class notes as needed. Students are responsible for all course material, even if they miss a lecture or a lab (get the notes for any missed classes from peers).

Students are encouraged to ask questions during class and to consult with the professors on topics which they do not clearly understand. The course material is cumulative and does not lend itself well to “cramming” at the last minute. Ask your questions early and often. The instructor is available for consultation outside of class times via on-line News Groups and office appointments. See the Course Web Page for details.

Lectures:

Attend lectures. Lectures are oral presentations supplemented with various audio/visual aids, including chalkboard/whiteboard and overhead data projector. Note-taking in both labs and lectures is strongly encouraged – instructors will refer students to their own notes when answering questions in labs. Students do not have access to laboratory computers during lectures; however, wireless laptops often work.

Labs:

Attend labs. Unix/Linux laboratory time is limited. Students must perform initial analysis and design **before** their scheduled lab, to take advantage of the limited lab time. There is not enough time to do all of read, analyse, code, and demonstrate a lab assignment during the assigned lab hours. The students' ability to successfully complete the assigned exercises on time will directly correlate with their level of success on tests and the final exam, where similar exercises will be presented. Lab practice is essential; be prepared.

Students may develop solutions to assignments and homework using any Unix/Linux system they choose, including systems at home or at work; however, for full credit, the final solutions must work correctly on the Unix/Linux machine(s) specified in the assignment.

Consultation (News Groups / Office Appointments):

Your instructor is available outside of classroom time for group or personal consultation on topics related to the course material. Consult the course home page for details on how to ask questions electronically outside of class time and/or arrange an office appointment.

General questions about course content should not be sent to the instructor by private EMail. Post them to the online discussion board or mailing list dedicated to the course. Answers will be posted frequently. This will allow everyone in the course to share information about the course content in a more meaningful way.

IV. Learning Activities

Samples of learning activities include:

- Taking notes during lectures and lab sessions
- Participating in problem solving during in-class demonstrations
- Completing homework exercises and assigned laboratory work
- Doing hands-on lab work, following the examples demonstrated by the instructor
- Undertaking practical and reading assignments (from textbook and on-line materials)

V. Course Content

- Editing text files using the **vi/vim** text editor, text editor tips and tricks
- Batching commands via the shell, shell scripting, shell control structures, functions
- The Unix file system, pathname hierarchies and syntax, pathname GLOBbing
- Regular expressions and pattern matching, utilities that use regular expressions
- Data mining and data conversion using Unix scripts

VI. Evaluation / Earning Credit

Assessment of student learning will be done through weekly assignments and exercises, term tests, and a final exam. See course web page for the exact dates of tests and the weights of assignments. Later assignments are weighted more heavily than earlier ones. The factors determining the final grade are:

Term Test #1	15%
Term Test #2	25%
Assignments and Exercises	30%
Final Examination	30%

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 combined term tests and final exam. (Students who have a failing grade on the combined term tests and final exam will receive a grade of **F**.)

Laboratory attendance is compulsory, and absence from three or more laboratory sessions without the prior consent of the professor will result in a final grade of “F”. Students are responsible for keeping a record of the number of laboratory sessions they have missed; professors will not inform students of an impending failure because of missed laboratory sessions. Where a student is in a borderline situation with regard to marks, regular attendance may become a factor in determining the final outcome.

Most laboratory work, and all tests and exams, have time as an evaluation parameter and will require you to complete the work by a specified time for full marks. Late submissions will be penalized (and the penalty may be up to 100% per evaluation). For full marks, adhere to the submission deadlines. Deadlines may differ between different sections of this course; your deadline is the one for the lab shown on your timetable.

Tests:

Online tests, exams, and in-laboratory exercises are time-limited and will be conducted in a Unix/Linux-only test environment. Students must practice and develop real facility with Unix/Linux command-line text editors and shell commands. No access to a GUI or other machines or operating systems will be allowed.

Tests and exams are time-limited. They are prepared from material given in assignments and homework. Failure to do the assignments and practice using the text editor may mean students don't have enough time to complete similar questions found on tests and exams. Do your homework!

Assessment evaluation points must be completed on time to obtain course credit. Late evaluations will be penalized up to 100%. Missed evaluation points will receive a mark of zero. In the case of a documented emergency, the professor, in consultation with the department Chair, will determine how the marks will be made up and/or the final grade adjusted.

Student submissions that do not meet the published submission standards for the course may not be marked, and will incur a penalty of up to 100%. See the Course Home Page for details.

All students are required to write the final exam. There are no provisions for “making up” a missed final exam. All material covered in this course, including the Assignments, is examinable during tests and/or the 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 your course professors 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 matter, consult the Algonquin College Directives E43 and 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, 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.