GNU/Linux Operating Systems I

Information and Communications Technology

Course Number:	Co-Requisites:	Pre-Requisites:
CST8207	N/A	N/A
Applicable Program(s):	**AAL:**	**Core/Elective:**
0150X01FWO - Computer Systems Technician	1	Core
0150X03FWO - Computer Systems Technician	1	Core
0156X01FWO - Computer Systems Technology - Security	1	Core
Prepared by:	Ian Allen, Professor of ICT	
Approved by:	Andrew Pridham, Academic Chair, ICT	
Approval Date:	Tuesday, August 28, 2018	
Approved for Academic Year:	2018-2019	
Normative Hours:	75.00	

Course Description

Students learn the basic concepts and features of the GNU/Linux operating system and utilities, the world's most well-known Free/Libre Open Source Software (FLOSS) project and the underlying technology supporting Google, Facebook and Android smart phones. Students examine the power of the GNU/Linux command line and the basics of shell scripting and task automation. Students perform file system searches, full-text searches, and data-mine system log files to generate analyses of network attacks and intrusion attempts. Students also customize their shell programming environment to simplify repetitive tasks and support system administration functions.

Relationship to Vocational Learning Outcomes

This course contributes to your program by helping you achieve the following Vocational Learning Outcomes:

0150X01FWO - Computer Systems Technician

VLO 1	Analyze and resolve information technology problems through the application of systematic approaches and diagnostic tools (T, A,)
VLO 2	Support the implementation and administration of computer systems. (T, A,)
VLO 6	Use a variety of scripting tools and languages to automate routine tasks. (T, A,)
VLO 7	Follow, monitor, and document data storage procedures designed to ensure the integrity of

	information. (T, A,)
VLO 10	Conform to workplace expectations found in information technology (IT) environments. (T, A,)
VLO 12	Identify and apply discipline-specific practices that contribute to the local and global community through social responsibility, economic commitment and environmental stewardship. (T, A,)

0150X03FWO - Computer Systems Technician

VLO 1	Analyze and resolve information technology problems through the application of systematic approaches and diagnostic tools. (T, A,)
VLO 2	Support the implementation and administration of computer systems. (T, A,)
VLO 6	Use a variety of scripting tools and languages to automate routine tasks. (T, A,)
VLO 7	Follow, monitor, and document data storage procedures designed to ensure the integrity of information. (T, A,)
VLO 10	Conform to workplace expectations found in information technology (IT) environments. (T, A,)
VLO 12	Identify and apply discipline-specific practices that contribute to the local and global community through social responsibility, economic commitment and environmental stewardship. (T, A,)

0156X01FWO - Computer Systems Technology - Security

VLO 1	Analyze and resolve information technology problems through the application of systematic approaches and diagnostic tools. (T, A,)
VLO 2	Analyze, plan, design, and implement computer systems. (T, A,)
VLO 6	Use a variety of scripting tools and languages to automate routine tasks. (T, A,)
VLO 8	Plan, develop, and be responsible for data storage to ensure the integrity of information. (T, A,)
VLO 12	Articulate, defend, and conform to workplace expectations found in information technology (IT) environments. (T, A,)
VLO 16	Identify and apply discipline-specific practices that contribute to the local and global community through social responsibility, economic commitment and environmental stewardship. (T, A,)

Relationship to Essential Employability Skills

This course contributes to your program by helping you achieve the following Essential Employability Skills:

EES 2	Respond to written, spoken or visual messages in a manner that ensures effective communication. (T, A,)
EES 4	Apply a systematic approach to solve problems. (T, A,)
EES 5	Use a variety of thinking skills to anticipate and solve problems. (T, A,)
EES 6	Locate, select, organize and document information using appropriate technology and information systems. (T, A,)
EES 7	Analyze, evaluate and apply relevant information from a variety of sources. (T, A,)
EES 10	Manage the use of time and other resources to complete projects. (A,)
EES 11	Take responsibility for one's own actions, decisions and consequences. (A,)

Course Learning Requirements/Embedded Knowledge and Skills

When you have earned credit for this course, you will have demonstrated the ability to:

1.) Operate a GNU/Linux system remotely over a network using the command line (CLI).

Use remote terminal programs to connect securely to remote systems.

Use file transfer programs to move files between systems.

2.) Use the GNU/Linux command line (shell) along with commands and programs to support user-level and unprivileged systems monitoring and administration tasks.

Identify the steps involved in parsing the GNU/Linux command line (shell).

Use on-line manual (**man**) pages to learn the syntax of commands. Write correct command lines based on documentation.

Use command-line I/O redirection, including pipes. Avoid overwriting files.

List, set, unset, and use shell variables.

Use shell file GLOB patterns ("wildcard" characters) to selectively match pathnames.

Perform command substitution using both new and traditional syntax.

Use quoting and escaping to protect special characters from the shell.

Use shell aliases and shell history to simplify typing.

3.) Edit text files from the command line.

Choose a command-line text editor.

Read text into a text editor. Change the text. Save the text to the same file or a different file.

When available, recover text from an aborted or crashed text editor session.

4.) View and manipulate GNU/Linux files and directories by pathname (e.g. from the command line or inside a shell script).

Specify pathnames in both absolute and relative format.

Choose the correct command-line tools to manipulate pathnames.

5.) Manage permissions in a GNU/Linux-based environment.

Translate between symbolic **rwx** and numeric (octal) permission specifications.

Set file system permissions to implement specified access rights.

6.) View and control GNU/Linux processes.

Start processes in the foreground and the background.

List processes; pause processes; terminate processes.

7.) Schedule tasks for repeated or later execution.

Specify tasks to be run at multiple intervals using the **crontab** command.

Specify tasks to be run once at a future time using the **at** command.

8.) Automate tasks using scripting.

Order tasks in a logical manner amenable to programming.

Use basic flow control structures of the shell.

Use command-line positional parameters (shell arguments).

Learning Resources

Mobile Device Required for all Lectures and Labs

This course is part of the **Bring Your Own Device** (BYOD) program initiative at Algonquin College.

Students are required to have a functioning mobile device at all lecture and lab classes, including the first.

Almost all work in this course is done via remote login over the network to a central server using a terminal program running on your mobile device. Very little course work is created or stored on the mobile device itself in this course. ***Without a functioning device and terminal program, you cannot do in-cass quizzes or lab period assignment work.***

The device must be capable of running a simple text editor, an SSH-compatible command-line terminal emulator, and an SSH-compatible file transfer program. These programs are free downloads for most mobile devices.

Almost any laptop or portable computer or large-screen tablet with keyboard will work to run the required terminal and file transfer programs. All course work is done on a remote server; the local device only needs to be powerful enough to run the little terminal program; anything will do. The larger the screen, the better.

An external disk and enclosure are *already purchased* for you with your incidental fees. This disk is useful for back-ups but is *not required* as part of this course.

The above minimal requirements are *for this course only*. Other courses in your program of study will have other requirements.

Web (Internet) Notes

Learning Management System Policy AA42 outlines the requirements for professors in posting class notes or information via the learning management system (LMS). (As of August 23 2018, the AA42 Policy still incorrectly refers to the previous LMS named "Blackboard" instead of the current LMS named "Brightspace". We assume that the LMS for this term is "Brightspace".) Any such information made available by professors is done solely to assist students in understanding the material presented and is ***not intended to replace attendance or personal note-taking during classes and labs***. Take notes in class.

Optional Textbooks (not required)

No textbooks are required for this course. The textbooks below are **optional**, reliable, comprehensive sources of

accurate GNU/Linux information. Motivated students may choose to discover and use free Internet resources instead of a purchased textbook.

Optional: The bookstore may sell an **optional** *CST8207 Textbook Package* (ISBN: 0-132-37382-3) that contains:

Optional*: A Practical Guide to Fedora and Red Hat Enterprise Linux*, by Mark Sobell, Prentice Hall

Optional*: Linux Phrasebook*, by Scott Granneman, Prentice Hall

N.B.: This optional two-book textbook package deal is ONLY available in the Algonquin Bookstore. All these books are **optional**. They are **not required**.

Optional: *Linux Administration Handbook*, by Evi Nemeth et al, Prentice Hall

Optional: *Linux Administration, A Beginner's Guide,* by Wale Soyinka, McGraw Hill

Optional: *Linux in a Nutshell,* Jessica Perry Hekman, O'Reilly

No textbooks are required for this course. Motivated students may choose to discover and use free Internet resources instead of a purchased textbook.

Learning Activities

Reading, Hearing, Doing, Asking

Course topics will be outlined in the course notes each week. The principal way to learn the course material is by reading the provided course notes, attending lectures to review the highlights of the material and ask questions, and then doing the assignments related to the material. Small-group laboratory periods can be used for individual assistance with either the theory or the assignments. If you run out of one-on-one time in your lab periods, your professor can usually assist you during office hours.

Read All The Words

The course curriculum is presented fully in the course notes. **Read all the words.** Unix/Linux gave birth to the Internet; you can also find your own online learning resources to augment the course notes.

Attend Lectures and Ask Questtions

Lectures will present highlights from the theoretical material of the course and show you tips on how to understand it. You are expected to either attend the lectures or else *get detailed notes from other students who attended*. **Not everything that is presented in lectures appears in the course notes.** Ask questions during lectures and consult with the professors on topics that you do not clearly understand. Use your classroom time wisely; it's the part of the course you can't get anywhere else.

Laboratory Hours ("Labs")

Laboratory hours ("labs") are weekly classes where you can interact with your professor in a small-group setting. Usually, you can use the time to work on your assignments, with your professor readily at hand to answer questions one-on-one. *Read and begin work on your assignments before you come to your lab period*. If you spend your lab period reading the assignment instead of actively working on it, you won't be ready to ask questions of your professor and your lab period will be wasted.

Do the Assignments

Course assignments are hands-on opportunities to experiment with the theoretical material that you will have learned through reading the notes and attending the lectures. Assignments will be closely integrated with the weekly course notes and lectures.

Your ability to successfully complete the assignments will directly correlate with your level of success on tests and the final exam. Tests and exams are largely based on work learned by doing the assignments.

All assignment work that you submit must be your own work. Unless explicity stated in the assignment, there are *no group assignments*. Individual work only.

Consultation

Your principal source of consultation time with your instructor is during your lab period each week. If that weekly lab time is not sufficient, additional office hours can be arranged. At the beginning of the course you will be told how to arrange consultation times (office hours) with your instructors. Some consultation may be done using online resources (e.g. email), rather than in-person office hours.

Since office hours are scarce and may not be available, you must first make good use of your weekly lab times to consult with your professor, before requesting office hours. Only if the in-lab consultation times prove insufficient will office hours be arranged.

Samples of learning activities include:

- Reading the weekly online course notes.
- Attending and taking detailed notes during lectures, to reinforce the weekly readings.
- Completing hands-on practical assignments based on the readings and lectures.
- Completing practice tests and quizzes in preparation for midterm tests and the final exam.
- Asking questions during lectures and the weekly lab periods.

Evaluation/Earning Credit

The following list provides evidence of this course's learning achievements and the outcomes they validate:

Final Exam (40%)

Validates Outcomes: CLR 1, CLR 2, CLR 3, CLR 4, CLR 5, CLR 6, CLR 7, CLR 8, EES 2, EES 4, EES 5, EES 6, EES 7, EES 10, EES 11

Assignment(s) (30%)

Validates Outcomes: CLR 1, CLR 2, CLR 3, CLR 4, CLR 5, CLR 6, CLR 7, CLR 8, EES 2, EES 4, EES 5, EES 6, EES 7, EES 10, EES 11

Midterm Exam(s) (25%)

Validates Outcomes: CLR 1, CLR 2, CLR 3, CLR 4, CLR 5, CLR 6, CLR 7, CLR 8, EES 2, EES 4, EES 5, EES 6, EES 7, EES 10, EES 11

Quiz(zes)/Test(s) (5%)

Validates Outcomes: CLR 1, CLR 2, CLR 3, CLR 4, CLR 5, CLR 6, CLR 7, CLR 8, EES 2, EES 4, EES 5, EES 6, EES 7, EES 10, EES 11

Students are expected to meet evaluation and completion deadlines as stated in course outline and course section information documents. In circumstances where evaluation and/or completion deadlines are missed or student performance has been affected by a temporary or permanent disability (including mental health), interim or retroactive accommodations may be considered. In such instances, please consult your course faculty member. For other situations where deferral of evaluations may be warranted, please refer to college policy AA21.

Prior Learning Assessment and Recognition

Students who wish to apply for prior learning assessment and recognition (PLAR) need to demonstrate competency at a post-secondary level in all of the course learning requirements outlined above. Evidence of learning achievement for PLAR candidates includes:

- Challenge Exam
- Performance Test
- Project/Assignment

Course Related Information

There is no "group work" or "working together" in this course. (Your job interview won't be group work, either.) You can share your ideas but never your answers. Students copying answers from anywhere will be charged with academic fraudunder College DirectiveAA20: PlagiarismorAA18: Academic Discipline.**You must create and type your own answers; no copying-and-pasting from other sources.**

Students loaning out assignment solutions will also be penalized. Never loan your solutions; the student receiving the solution submits the copy and you both get penalized.

Program Related Information

0150X01FWO - Computer Systems Technician

Theory Evaluation:

Theory evaluation is conducted by the Professor, and submitted to the final grade roll-up.

Theory attendance, in-class quiz and tests may be a part of the course requirements, will be identified by your professor, and is unique to each individual course.

All students are encouraged to prepare before class, attend class regularly, and actively participate while in class to enrich their learning experience.

Policy AA42 outlines the requirements for posting class notes or information to Blackboard. Any such information made available by professors is done solely to assist students in understanding the material presented ***and is not intended to replace attendance to theory class.***

Any and all information presented in class is considered testable material, be it presented verbally, written on the

whiteboard, on-screen, or in a document - whether students were in attendance or not.

It remains the student's responsibility to attend class. listen and take adequate notes, as needed.

Lab Evaluation:

Lab evaluation is conducted by the Lab Professor, and submitted to the final grade roll-up. In this program, the following criteria may be required in order to obtain a non-zero lab mark:

Satisfactory attendance and participation in the lab;

N.B: *lab attendance requirements will be identified by your professor, and is specific to each individual course.*

Satisfactory workmanship and behavior in the lab;

Satisfactory adherence to rules prescribed for the lab facility;

Being properly equipped & prepared for lab work prior to attending the lab;

N.B.: *coming to your lab period* ***without*** *the required equipment/tools or being prepared may result in you being marked as absent, at your professor's discretion.*

Timely completion of individual labs and required work therein on the student's assigned lab computer, as prescribed by lab handouts.

Late submission or extended deadlines may be afforded, along with associated penalties - these will be identified by your professor, and are specific to each individual course.

Work done outside of the lab environment may not be counted, unless indicated otherwise by your lab teacher.

The lab Professor reserves the right to suspend or deny access to the lab at any time if the above criteria are not being met. No allowances are made in the course for students whose access in the lab are suspended or denied.

Final Examination

All students are expected to write the final exam. 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 the your program coordinator no later than one week before final exams start, to allow for any special arrangements.

0150X03FWO - Computer Systems Technician

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Theory evaluation is conducted by the Professor, and submitted to the final grade roll-up.

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All students are encouraged to prepare before class, attend class regularly, and actively participate while in class to enrich their learning experience.

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Lab Evaluation:

Lab evaluation is conducted by the Lab Professor, and submitted to the final grade roll-up. In this program, the following criteria may be required in order to obtain a non-zero lab mark:

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0156X01FWO - Computer Systems Technology - Security

Theory Evaluation:

Theory evaluation is conducted by the Professor, and submitted to the final grade roll-up.

Theory attendance, in-class quiz and tests may be a part of the course requirements, will be identified by your professor, and is unique to each individual course.

All students are encouraged to prepare before class, attend class regularly, and actively participate while in class to enrich their learning experience.

Policy AA42 outlines the requirements for posting class notes or information to Blackboard. Any such information made available by professors is done solely to assist students in understanding the material presented and is not intended to replace attendance to theory class.

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Lab Evaluation:

Lab evaluation is conducted by the Lab Professor, and submitted to the final grade roll-up. In this program, the following criteria may be required in order to obtain a non-zero lab mark:

Satisfactory attendance and participation in the lab;

N.B: lab attendance requirements will be identified by your professor, and is specific to each individual course.

Satisfactory workmanship and behavior in the lab;

Satisfactory adherence to rules prescribed for the lab facility;

Being properly equipped & prepared for lab work prior to attending the lab;

N.B.: coming to your lab period without the required equipment/tools or being prepared may result in you being marked as absent, at your professor's discretion.

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Department Related Information

STUDENT ACADEMIC RESPONSIBILITIES

Each student is responsible for:

• Knowing the due dates for marked out-of-class assignments.

• Attending all classes and knowing the dates of in-class marked assignments and exercises.

• Maintaining a folder of all work done in the course during the semester for validation claims in cases of disagreement with faculty.

• Keeping both paper and electronic copies of all assignments, marked and unmarked, in case papers are lost or go missing.

• Regularly checking both Blackboard announcements as well as one's Algonquin e-mail account for important messages from both professors and college administration.

• Participating in on-line and classroom exercises and activities as required.

• Retaining course outlines for possible future use to support applications for transfer of credit to other educational institutions.

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 Policies - HR22 and SA07.
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.

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://laws.justice.gc.ca/en/C-42 . 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 terms and conditions covering its use, installation and distribution (where applicable). Any infringement of licensing agreement makes you liable under the law.

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 Policies AA32, SA07 and IT01 in your Instaguide.

College Related Information

Email

Algonquin College provides all full-time students with an e-mail 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 e-mail using your Algonquin account and to check it regularly.

Students with Disabilities

If you are a student with a disability, you are strongly encouraged to make an appointment at the Centre for

Accessible Learning to identify your needs. Ideally, this should be done within the first month of your program, so that a Letter of Accommodation (LOA) can be provided to your professors. If you are a returning student, please ensure that professors are given a copy of your LOA each semester.

Retroactive Accommodations

Students are expected to meet evaluation and completion deadlines as stated in course outline and course section information documents. In circumstances where evaluation and/or completion deadlines are missed or student performance has been affected by a temporary or permanent disability (including mental health), interim or retroactive accommodations may be considered. In such instances, please consult your course faculty member. For other situations where deferral of evaluations may be warranted, please refer to college policy AA21.

Academic Integrity & Plagiarism

Adherence to acceptable standards of academic honesty is an important aspect of the learning process at Algonquin College. Academic work submitted by a student is evaluated on the assumption that the work presented by the student is his or her own, unless designated otherwise. For further details consult Algonquin College Policies AA18: Academic Dishonesty and Discipline and AA20: Plagiarism

Student Course Feedback

It is Algonquin College's policy to give students the opportunity to share their course experience by completing a student course feedback survey for each course they take. For further details consult Algonquin College Policy AA25: Student Course Feedback

Use of Electronic Devices in Class

With the proliferation of small, personal electronic devices used for communications and data storage, Algonquin College believes there is a need to address their use during classes and examinations. During classes, the use of such devices is disruptive and disrespectful to others. During examinations, the use of such devices may facilitate cheating. For further details consult Algonquin College Policy AA32: Use of Electronic Devices in Class

Transfer of Credit

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

Note: *It is the student's responsibility to refer to the Algonquin College Policies website for the most current information at http://www.algonquincollege.com/policies/*

Legend

Terms

•ALO: Aboriginal Learning Outcome
•Apprenticeship LO: Apprenticeship Learning Outcome
•CLR: Course Learning Requirement
•DPLO: Degree Program Learning Outcome

•EES: Essential Employability Skill
•EOP: Element of Performance
•GELO: General Education Learning Outcome
•LO: Learning Outcome
•PC: Program Competency
•PLA: Prior Learning Assessment
•PLAR: Prior Learning Assessment and Recognition
•VLO: Vocational Learning Outcome

Assessment Levels

•T: Taught
•A: Assessed
•CP: Culminating Performance