



Cmpt214

Programming Principles and Practice

Term 1 (Fall), 2014/15

Syllabus

Index

- [Description](#)
 - [Prerequisites](#)
 - [Scheduling](#)
 - [Website](#)
 - [Instructor Information](#)
 - [Course Objectives](#)
 - [Student Evaluation](#)
 - [Texts and Library Materials](#)
 - [Topic Outline](#)
 - [LectureSchedule](#)
 - [Instructional Laboratory](#)
 - [Assignments](#)
 - [Laboratory Resources](#)
 - [Policies](#)
-

Description

The purpose of this course is to broaden the student's view of software development. Topics include an scripting languages, libraries, and tools and techniques for program development and maintenance.

A theme for this course is "quality programming in the small". The idea is to teach the tools and techniques to write a quality component, whether it is a stand-alone program to do some small task, or it is to be a part of a larger project. These are fundamental principles/skills required by professional programmers.

The University course calendar description of the class is as follows:

A hands-on approach to software development at the individual and small-team level. Application of software tools — including scripting languages, system utilities and libraries — for construction of small software systems. Integrated with and motivated by programming practices, system development, testing and maintenance issues.

Prerequisites

Cmpt115 or Cmpt117, and Math 110

Scheduling

Class day & time: Tuesday and Thursday, 11:30 a.m. to 12:50 p.m.

Class Location: Arts 146

Class duration: September 3 through December 5, 2014

Midterm in class, October 16, 2014

Exam: (the last day for withdrawals is November 15)

Labs: Section T01, Fridays, 09:00 - 10:20

Section T03, Tuesdays, 16:00 - 17:20

Section T05, Thursdays, 13:00 - 14:20

Lab Location: All tutorials are held in room S311 in the Spinks Addition of the Thorvaldson Building.

Labs start: week of September 8

Guest lecture: the instructor will be at a conference on September 23 and the class on that day will be taught by a guest lecturer.

Website

The website for this course is on the [moodle server of the Department of Computer Science](https://moodle.cs.usask.ca/course/view.php?id=147). The URL is <https://moodle.cs.usask.ca/course/view.php?id=147>

Instructor Information

Dr. Tony Kusalik, Computer Science

email: kusalik@cs.usask.ca (do not cut-and-paste this address as it has hidden, "garbage" characters in it)

office: Thorv S424 (in the Spinks Addition)

telephone: 966-4904

Office Hours

The professor is typically available immediately before and after the class for questions, advice, etc.

The professor has combined advising time / office hour every Friday between 11:30 and 12:30. At this time, he can be found in his office, Thorv S424. You can set up an appointment during this time, or you can just "drop in". Priority will be given to students who have made an appointment.

The prof is available to meet students at other times. Simply send an email message and set up an appointment!

Finally, remember that, if you need help, e-mail works 24 hours a day — and you'll probably even get a response in short order! Alternatively post something to one of the class forums on [moodle](#).

Teaching Assistant

Scott Johnston, gsj601@mail.usask.ca

Course Objectives

By the completion of this course, students will be expected to:

- be familiar with many common UNIX/LINUX commands;
- understand fundamental concepts regarding operating systems, version control systems, the software build process via compilation and linking, portable representation of characters, representation and storage of program variables in memory, UNIX processes, and the UNIX file system.

By the completion of this course, students will be expected to be able to:

- skillfully use complex UNIX/LINUX shell commands;
- write non-trivial scripts in UNIX shell (*bash*) and *awk*;
- search files using the *grep* command and regular expressions;
- effectively utilize test-driven design to write non-trivial programs;
- effectively use SVN commands to manage the evolution of a non-trivial program;
- decompose a large program into cohesive, separately compiled modules and to manage the compilation and linking of those modules into a single executable using a "makefile";
- use a line-oriented C/C++ debugger to examine the execution of a program and identify bugs in the code;
- use more sophisticated debugging and testing techniques than used in first year;
- build and use an object module library;
- recognize and use improved styles of programming.

Note that the above two lists are not exclusive.

Student Evaluation

Grading Scheme

participation 2%

lab exercises	8%
assignments	20%
midterm exam	25% (scheduled for October 16, 2014)
final exam	45%

Important Notes

- The participation grade will be based on evidence of any constructive and/or contributive involvement in the on-line discussion forums for the class. If it is impossible for the instructor to get participation statistics from the moodle server, then this 2% will be re-assigned to lab exercises.
- There will be 12 lab exercises, the first being made available during the week of September 8 - 12. There will also be 4 assignments, the first being made available in the 4th week of September. See sections of this syllabus on [Instructional Laboratory](#) and [Assignments](#), respectively, for more information.
- If a student does not write the midterm exam, the corresponding portion of the final grade allocation will be re-assigned to the final exam.
- If students know in advance that they will miss a lab, an assignment, or exam due to extenuating circumstances, they should contact the professor well in advance so that alternate arrangements can be made.
- The midterm exam will be a closed book. The final exam will be "open cheat sheet". This means that students may bring to the exam a single 8.5×11-inch quick reference sheet ("cheat sheet") of their **own** compilation. Students needing special aids for writing exams (e.g. DSS students) must make arrangements prior to the exam with the instructor for presence of these aids. Other than the aforementioned items, no calculators or other supplementary resources will be permitted at the exams.
- Late assignments and labs will be accepted, though they will be docked a penalty. The penalties will be determined by exponential functions, the specifics of which are given under the Assignments and Labs sections, respectively, of the [moodle pages](#) for the class.

Criteria That Must Be Met To Pass

- Laboratory exercises and assignments are required (mandatory) elements of the class. Therefore, in accordance with the University's ["academic courses policy on course delivery, examinations & assessment of student learning"](#) lab exercises and assignments must be completed in order to achieve a passing grade. For instance, students who skip the labs or don't bother doing the assignments will not pass the class no matter how well they "ace" the final exam. However, students may be exempted from having to complete a particular lab or assignment due to extenuating circumstances on a case-by-case basis (e.g. for medical reasons or serious personal matters). Students should contact the instructor to set up special provisions for the lab or assignment as soon as they are able.

For the purposes of the University's ["academic courses policy on course delivery, examinations & assessment of student learning"](#), if more than one assignment is missed and no exemptions have been arranged, a student will be deemed to have not successfully completed a required element of the class (the assignment portion). This, in turn, will mean that the student will not receive a passing grade in the course. That is, unless special provisions have been arranged, no more than one assignment can be missed for a student to pass the class.

For the purposes of the University's "[academic courses policy on course delivery, examinations & assessment of student learning](#)", if more than three labs are missed and no exemptions have been arranged, a student will be deemed to have not successfully completed a required element of the class (the laboratory exercises) and will not receive a passing grade in the course. That is, unless special provisions have been arranged, no more than three labs can be missed for a student to pass the class.

- The final exam is another required element of the class. Failure to write the final exam will result in failure of the course.

Final Exam Scheduling

The Registrar schedules all final examinations, including deferred and supplemental examinations. Students are advised not to make travel arrangements for the exam period until the official exam schedule has been posted.

Texts and Library Materials

- Required: [Practical Guide To Linux Commands, Editors, And Shell Programming](#) , by Sobell, 2012, ISBN: 978-0-13-308504-4. The [Library also has this publication as E-book](#).
- Recommended: [C++: The Complete Reference, 4th Edition](#), by Schildt, 2002, ISBN: 978-0-07-222680-5. The [Library has this publication as an E-book](#).
[The Elements of C++ Style](#), by Misfeldt, Bumgardner, and Grey, ISBN: 978-0-521-89308-4.
- Alternatives: [UNIX: The complete reference, 2nd Ed.](#), by Rosen, 2007, ISBN: 978-0-072-26336-7. [Available as an E-Book through the UofS library web site](#).
[C/C++ programmer's reference, 3rd Ed.](#), by Schildt, 2003, ISBN 978-0-072-22722-2. [Available as an E-Book through the UofS library web site](#).
[Practice Of Programming](#), by Kernighan & Pike, 1999, ISBN: 978-0-201-61586-9. [Available from the UofS Library](#).

Note that the Sobell and Schildt texts have been listed as texts for this class for several years, so used copies may be available. Earlier editions would be more than sufficient.

Topic Outline

The following is an outline of the main topics to be covered in the class

- LINUX/UNIX commands
- Bourne shell scripting
- Regular Expressions
- AWK programming
- Good Programming Style
- Testing
- Debugging
- Test-driven development
- Separate compilation
- Version control systems

- Profiling and performance optimization
- Regular expressions
- Portability

Lecture Schedule

The following is a tentative class schedule. It lists at what stage in the class a specific topic will be covered. Note that the schedule is approximate and subject to change.

Week	Topic
1 (partial)	Class Introduction
	Introduction to UNIX
2	Introduction to UNIX Shell and UNIX Commands
	More Sophisticated Use of Unix
	UNIX File System Fundamentals
	File-Oriented Commands
3	Input/Output Redirection
	UNIX Process Abstraction
	Process-Oriented Commands
	Programming Practise: Good Programming Style
4	Programming Practise: Good Programming Style
	Compound UNIX Shell Commands
	Preventing Shell Interpretation
	Regular Expressions and the <i>grep</i> command
5	Regular Expressions versus File Name Wildcards
	Extended Regular Expressions
	Programming Practise: Defensive Programming
	Programming Practise: Testing
6	Programming Practise: Testing
	Software Development Techniques
	Software Development: Introduction to Test-Driven Design
	Programming Practise: Programming Guidelines
	Programming Practise: Data Representations in Memory
7	Software Development: Test-Driven Design
	Midterm Exam
8	Software Development: Test-Driven Design
	Software Development: Multi-File Development
	Programming Practise: Steps in a Program Build

	Software Development: Makefiles
9	Software Development: Makefiles
	Software Development: Version Control
	Software Development: Version Control with SVN
	Programming Practise: Debugging
10	Programming Practise: Debugging
	Programming Practise: Storage Allocation in Memory
	Programming Practise: Debugging
	Shell Programming and Shell Scripts
11	Shell Programming and Shell Scripts
	Complex Shell Commands
12	Shell Programming and Shell Scripts
	<i>awk</i> and <i>awk</i> Scripts
	Software Development: Object Module Libraries
13	Software Development: Object Module Libraries
	Programming Practise: Performance and Profiling
	Software Development: Software Distribution
	Programming Practise: Portability

Instructional Laboratory

Laboratory sections and times are as follows:

Section	Day	Time
---------	-----	------

T01	Fri	09:00-10:20
-----	-----	-------------

T03	Tues	16:00-17:20
-----	------	-------------

T05	Thur	13:00-14:20
-----	------	-------------

All tutorials are held in room S311 in the Spinks Addition of the Thorvaldson Building. If there are insufficient seats in S311, Cmpt214 may use the workstations in S315. Cmpt 214 students have priority for access to the latter workstations during Cmpt 214 lab times. Labs will start on the week of September 8, and there will be 12 lab exercises.

The laboratory session is for practical experience in the application of concepts introduced in the lectures. The lab exercises themselves are designed such that students should be able to complete them in a relatively short amount of time. They are for less work than the assignments in class, for instance.

Lab periods are 80 minutes in length. An initial portion of the lab time may be devoted to providing introductory information. The remainder of the period will be for completion of the laboratory exercise. The lab instructor will be available during this time to provide assistance as necessary.

Students are to attend one laboratory session each week. Each week's lab component is to be completed in the time period specified and a lab submission will be required. The submissions will typically be due on the weekend following the lab. Each student's lab solution is to be submitted electronically.

Important Notes

- Laboratory exercises are a required (mandatory) element of the class. Therefore, in accordance with the University's "[academic courses policy on course delivery, examinations & assessment of student learning](#)" lab exercises must be completed and submitted in order to achieve a passing grade. However, students may be exempted from having to complete a particular lab due to extenuating circumstances on a case-by-case basis (e.g. for medical reasons or serious personal matters). Alternatively, the student may be given an extension on the due date. Students should contact the instructor to set up special provisions for the lab as soon as they are able.
 - For the purposes of the University's "[academic courses policy on course delivery, examinations & assessment of student learning](#)", if more than three labs are missed and no exemptions have been arranged, a student will be deemed to have not successfully completed a required element of the class (the laboratory exercises) and will not receive a passing grade in the course. That is, unless special provisions have been arranged, no more than three labs can be missed for a student to pass the class.
 - Late labs will be accepted, though they will be docked a penalty. The penalties will be determined by an exponential function, the specifics of which are given under the Labs section of the [moodle pages for the class](#).
-

Assignments

There will be approximately 4 assignments in the class. They will be harder and take more effort than the exercises in the Laboratory. Students will typically have 2 to 3 weeks to complete each assignment. Assignment solutions will be submitted electronically.

Important Notes

- Assignments are required (mandatory) element of the class. Therefore, in accordance with the University's "[academic courses policy on course delivery, examinations & assessment of student learning](#)", assignments must be completed in order to achieve a passing grade. However, students may be exempted from having to complete a particular assignment due to extenuating circumstances on a case-by-case basis (e.g. for medical reasons or serious personal matters). Alternatively, the student may be given an extension on the due date. Students should contact the instructor to set up special provisions for the assignment as soon as they are able.
 - For the purposes of the University's "[academic courses policy on course delivery, examinations & assessment of student learning](#)", if more than one assignment is missed and no exemptions have been arranged, a student will be deemed to have not successfully completed a required element of the class (the assignment portion). This, in turn, will mean that the student will not receive a passing grade in the course. That is, unless special provisions have been arranged, no more than one assignment can be missed for a student to pass the class.
 - Late assignment submissions will be accepted, though they will be docked a penalty. The penalties will be determined by an exponential function, the specifics of which are given under the Assignments section of the [moodle pages for the class](#).
-

Laboratory Resources

The main computation resource for this course will be the LINUX operating system as provided by the tuxworld (tuxworld.usask.ca) set of computational servers and the Mac OS X operating system provided by the workstations in the [Computer Science instructional laboratory](#) in rooms Thorv S311 and S315. The LINUX workstations in rooms Thorv S315 and S360 may also be used. Often, students will be able to use either LINUX or Mac OS X. Students may [access tuxworld remotely from any of the workstations in Thorv S311, S315, S320, or S360; from a computer elsewhere on campus; or from off-campus.](#)

Policies

Late Assignments and Labs

- Policies on late assignments are outlined in the [Student Evaluation](#) section of this document, and re-iterated in the [Assignments](#) section.
- Policies on late labs are outlined in the [Student Evaluation](#) section of this document, and re-iterated in the [Instructional Laboratory](#) section.

Missed Assignments and Labs

- Policies on missed assignments are outlined in the [Student Evaluation](#) section of this document, and re-iterated in the [Assignments](#) section.
- Policies on missed labs are outlined in the [Student Evaluation](#) section of this document, and re-iterated in the [Instructional Laboratory](#) section.

Missed Examinations

The following Arts & Science policies apply in this course:

1. "Students who have missed an exam or assignment must contact their instructor as soon as possible. Arrangements to make up the exam may be arranged with the instructor. Missed exams throughout the year are left up to the discretion of the instructor if a student may make up the exam or write at a different time. If a student knows prior to the exam that she/he will not be able to attend, they should let the instructor know before the exam."
2. "Final exams — a student who is absent from a final examination through no fault of his or her own, for medical or other valid reasons, may apply to the College of Arts and Science Dean's office. The application must be made within three days of the missed examination along with supporting documentary evidence. Deferred exams are written during the February mid-term break for Term 1 courses and in early June for Term 2 and full year courses."

Incomplete Course Work and Final Grades

The following [University policy](#) applies to this class.

"When a student has not completed the required course work, which includes any assignment or examination including the final examination, by the time of submission of the final grades, they may be granted an extension to permit completion of an assignment, or granted a deferred examination in the case of absence from a final examination. Extensions for the completion of assignments must be approved by the Department Head, or Dean in non-departmentalized Colleges, and may exceed thirty days only in unusual circumstances. The student must apply to the instructor for such an extension and furnish satisfactory reasons for the deficiency. Deferred final examinations are granted as per College policy."

"In the interim, the instructor will submit a computed percentile grade for the course which factors in the incomplete course work as a zero, along with a grade comment of INF (Incomplete Failure) if a failing grade. In the case where the instructor has indicated in the course outline that failure to complete the required course work will result in failure in the course, and the student has a computed passing percentile grade, a final grade of 49% will be submitted along with a grade comment of INF (Incomplete Failure)."

"If an extension is granted and the required assignment is submitted within the allotted time, or if a deferred examination is granted and written in the case of absence from the final examination, the instructor will submit a revised computed final percentage grade. The grade change will replace the previous grade and any grade comment of INF (Incomplete Failure) will be removed."

For provisions governing examinations and grading, students are referred to the University Council Regulations on Examinations.

Academic Honesty

The University of Saskatchewan is committed to the highest standards of academic integrity and honesty. Students are expected to be familiar with these standards regarding academic honesty and to uphold the policies of the University in this respect. Students are particularly urged to familiarize themselves with the provisions of the Student Conduct & Appeals section of the University Secretary Website and avoid any behaviour that could potentially result in suspicions of cheating, plagiarism, misrepresentation of facts and/or participation in an offence. Academic dishonesty is a serious offence and can result in suspension or expulsion from the University.

All students should read and be familiar with the Regulations on Academic Student Misconduct (<http://www.usask.ca/secretariat/student-conduct-appeals/StudentAcademicMisconduct.pdf>) as well as the Standard of Student Conduct in Non-Academic Matters and Procedures for Resolution of Complaints and Appeals (<http://www.usask.ca/secretariat/student-conduct-appeals/StudentNon-AcademicMisconduct.pdf>). Academic honesty is also defined and described in the Department of Computer Science Statement on Academic Honesty (<http://www.cs.usask.ca/undergrad/honesty.php>).

For more information on what academic integrity means for students see the Student Conduct & Appeals section of the University Secretary Website at: <http://www.usask.ca/secretariat/student-conduct-appeals/forms/IntegrityDefined.pdf>.

In Cmpt 214 all assignments and laboratory exercises are to be completed on an individual basis, unless specified otherwise. For the purposes of this class, and this class only, the interpretation of what constitutes "an individual basis" is:

- You may work on certain aspects of an assignment or laboratory as a member of a group. However, other aspects of your work must be done independently. Which aspects must be done independently are described below. In any event, it is good practice to clearly identify the other members of the group in your submission, and acknowledge the contributions of those group members (who contributed what).
- You may work within a group to verify that the members of the group have understood the problem. You may even confirm your design and results together. However, each of you must perform the implementation phase independently. Failure to perform an independent implementation constitutes academic dishonesty.
- You may work within a group on testing strategies and criteria for the selection of test cases. However, each of you must perform the testing phase independently. Failure to perform an independent test constitutes academic dishonesty.
- Each of you must compose your documentation (internal documentation, external documentation, and testing documentation) independently. Failure to compose your own documentation constitutes academic dishonesty.

Please understand that students without the practical experience gained when performing their own implementation, testing, and documentation will be at a significant disadvantage in their examinations when compared to those students who did. It will also be a serious detriment to those students in subsequent courses, and in an employment situation.

Examinations with Disability Services for Students (DSS)

Students who have disabilities (learning, medical, physical, or mental health) are strongly encouraged to register with Disability Services for Students (DSS) if they have not already done so. Students who suspect they may have disabilities should contact DSS for advice and referrals. In order to access DSS programs and supports, students must follow DSS policy and procedures. For more information, check <http://www.students.usask.ca/disability/>, or contact DSS at 966-7273 or dss@usask.ca.

Students registered with DSS may request alternative arrangements for midterm and final examinations. Students must arrange such accommodations through DSS by the stated deadlines. Instructors shall provide the examinations for students who are being accommodated by the deadlines established by DSS.

Other Policies

- All students must be properly registered in order to attend lectures and receive credit for this course.
- Students activities involving University computational facilities are governed by the [Department of Computer Science Laboratory Policies](#).

kusalik@cs.usask.ca