The University of Western Ontario
London, Canada

Department of Computer Science

Computer Science 2211a
Software Tools and Systems Programming
Course Outline - September 2018

Course Description

This course provides an introduction to software tools and systems level programming. Topics include: understanding how programs run (compilation, linking, and loading), an introduction to a complex operating system (UNIX), scripting languages, and the C programming language. As time permits, other topics will be chosen from: system calls, memory management, libraries, multi-component program organization and builds, version control, debuggers and profilers.

Prerequisite: Either Computer Science 1027a/b, 1037a/b, or 2101a/b with a grade of at least 65%; Or Integrated Science 1001X with a grade of at least 60%.

Unless you have either the requisites for this course or written special permission from your Dean to enroll in it, you may be removed from this course and it will be deleted from your record. This decision may not be appealed. You will receive no adjustment to your fees in the event that you are dropped from a course for failing to have the necessary prerequisites.

Antirequisites: Software Engineering 2250a/b and the former Software Engineering 201a/b

Lecture Hours: Tuesday 10:30am - 11:30am and Thursday 10:30am - 12:30pm, in SSC room 2050.

Instructor: Kaizhong Zhang
Office: Middlesex College 372
Office Hours: Monday 1:30-3:30pm
Email: kzhang <at> uwo.ca
Course Email: cs2211a <at> uwo.ca
Phone: 661-2111 x 83826

Required Texts

- S. Das, *Your UNIX/Linux: The Ultimate Guide*. McGraw-Hill: 3rd edition, 2013.
- K.N. King, *C Programming: A Modern Approach*. Norton: 2nd edition, 2008.

Course Topics

The course will address as many of the following topics as time will allow:

- **UNIX Fundamentals:** UNIX vs. Windows; logging on; files and directories; path names, and directory and file structure; editors; shells; I/O redirection; UNIX concurrency (processes); utilities; file permissions and security; regular expressions; shell programming.

- **C programming:** compiling, linking and loading; data types and operators; control structures; formatted I/O; file I/O; connections between I/O and the underlying operating system; function calls; structs; enumerations; arrays; pointers (pointer arithmetics, pointers and arrays, arrays of pointers, pointers to functions); memory management; linked lists and other dynamically allocated data structures; strings; calling C from UNIX; general libraries; standard libraries and headers; the C preprocessor; C program organization.
- **UNIX Tools:** building and managing multi-component programs; the make utility; version control and configuration management; debuggers; code performance and profiling.

Course Website

The CS2211a website is accessible through OWL: http://owl.uwo.ca/portal. Lecture notes, assignments, and class information will be posted on this website. Students should check OWL (http://owl.uwo.ca) on a regular basis for news and updates. This is the primary method by which information will be disseminated to all students in the class. Students are responsible for checking OWL on a frequent and regular basis.

Lecture Notes

Course lecture notes will be made available in PDF on the course website. They are provided as a courtesy by the course instructor. Possessing (and even reading) these notes is not a suitable substitute for attending lectures.

TA Consulting Schedule: to be arranged

Computing Facilities

Each student will be given an account on the Computer Science Department senior undergraduate computing facility, GAUL. GAUL accounts are automatically created and the username/password emailed to each student within 7 days of enrolment. If a student does not know his/her password, he/she can request a new one at https://app.sci.uwo.ca/password. In accepting the GAUL account, a student agrees to abide by the department's *Rules of Ethical Conduct*.

After-hours access to Computer Science lab rooms is by student card. If a student card is lost, you will need to visit the Student Services Building to obtain a replacement. Students enrolled in Computer Science courses will be granted access to the labs within 7 days of enrolment. If you do not have access to the labs after 7 days, please open a ticket with Science Technology Services at https://helpdesk.sci.uwo.ca.

Email Contact

We will occasionally need to send email messages to the whole class, or to students individually. Email will be sent to your UWO email address. You must make sure that you read your email on a frequent and regular basis, or have it forwarded to an alternative email address if you prefer to read it there.

Note that UWO and most other email providers establish quotas or limits on the amount of space available to you. If you let your email accumulate, your mailbox may fill up and you may lose important email from your instructors. Losing email is not an acceptable excuse for not knowing about the information that was sent.

Emails related to the course should be directed to the course email at cs2211a@uwo.ca which will be attended by the instructor and, possibly, designated TAs. Students can ask questions via email, however if there are any large, somewhat complicated issues, it is recommended to discuss them during office hours. If for some non-course related matters, you want to write to the instructor directly, you must include "CS2211" in the subject line in your email to the instructor. Moreover, you MUST use your UWO account in order to write to the course and the instructor.

Student Evaluation

Grades will be based on 12 labs worth a total of 5%, five assignments worth a total of 40%, a midterm exam worth 20%, and a final exam worth 35%.

If for any reason the assignment schedule given below cannot be adhered to, the assignment marks will be prorated. (The assignments are worth 40% of the overall mark for the course. If an assignment has to be canceled for any reason, the remaining assignment weights will be prorated (scaled) to add up to 40%.)

If for any reason a lab has to be canceled, the remaining lab weights will be prorated to 5%.

To be eligible to receive a passing grade in the course, your mark on the final exam must be at least 40%, and your weighted average on the assignments must be at least 40%. To be eligible to receive a grade of C or higher, your mark on the final exam must be at least 50%, and your weighted average on the assignments must be at least 50%.

Assignment and Test Feedback

Every effort will be made to have assignments marked and handed back within 2 weeks of the hand-in date. Midterm exam marks will be posted within 2 weeks of the exam. If we are unable to comply with our intended return dates, revised dates will be posted on the course website.

Test and Exams

Midterm: 1 hr 50 minutes, Thursday November 8, during class time.
Final: 3 hours during the December exam period; exact time to be announced.

There will be no makeup midterm exam. If you miss the midterm exam for any reason, follow the university procedure for Academic Accommodation. If accommodation is approved by your Dean's office, your final exam mark will be reweighted to include the weight of the midterm exam, which will then be worth 55%. You must notify the course instructor within a week of the missed midterm exam, and documentation must be received by your Dean's office within 2 weeks of the missed exam.

Lab

- There will be 12 equal weight one-hour labs.
- Eleven lab sessions are scheduled each week in room MC-244.
- Lab session 2 on Tuesday 11:30am - 12:30pm,
  Lab session 3 on Tuesday 3:30pm - 4:30pm,
  Lab session 4 on Tuesday 5:30pm - 6:30pm,
  Lab session 5 on Thursday 12:30pm - 1:30pm,
  Lab session 6 on Wednesday 12:30pm - 1:30pm,
  Lab session 7 on Wednesday 1:30pm - 2:30pm,
  Lab session 8 on Wednesday 4:30pm - 5:30pm,
  Lab session 9 on Thursday 3:30pm - 4:30pm,
  Lab session 10 on Wednesday 5:30pm - 6:30pm,
  Lab session 11 on Thursday 5:30pm - 6:30pm, and
  Lab session 12 on Wednesday 3:30pm - 4:30pm.
- Lab sessions begin the week of September 10-14.
- Lab descriptions will be posted on the course website by the dates listed above.
- Any changes, updates, and clarifications to labs will also be posted on the website. It is your responsibility to monitor these pages closely.
- Labs act as practice/tutorial sessions where you can solve a problem and interact with the TA and other students.

- To be eligible for full marks, you must participate and complete at least 10 out of 12 labs, however participating and completing all 12 labs is recommended.

Assignments

Due Dates (tentative)

Asn 1 - 1% (light) - assigned between Sep. 10 and Sep. 14, due Sep. 25
Asn 2 - 7% (medium) - assigned Sep. 25, due Oct. 16
Asn 3 - 7%(medium) - assigned Oct. 16, due Oct. 30
Asn 4 - 7%(medium) - assigned Feb. 30, due Nov. 13
Asn 5 - 18% (heavy) - assigned Nov. 13, due Nov. 29

About the Assignments

- Assignment descriptions will be posted on the course website by the dates listed above.
- Any changes, updates, and clarifications to assignments will also be posted on the website. It is your responsibility to monitor these pages closely.
- Assignments may involve programming in C, the use of UNIX operating system utilities, programming using shell scripts, and concept questions (non-programming) related to the lecture material.
- To be eligible for full marks, individual C assignments must run under UNIX on the departmental computing equipment. You may develop assignments on your home computer, but you must allow for the amount of time it will take to get the final product working on Computer Science's machines.
- All assignments are individual assignments. You may discuss approaches to problems among yourselves; however, the actual details of the work (assignment coding, answers to concept questions, etc.) must be your individual effort. Assignments that are judged to be the result of academic dishonesty will, for the student's first offense, be given a mark of zero with an additional penalty equal to the weight of the assignment also being applied.

Submission of Assignments

- Your assignment solutions are expected to be your own individual work, not the products of group effort. On occasion, you may be allowed to make use of code from an outside source, such as your textbook. Check with your instructor if you are uncertain about the places in which you can use code written by another person.

- Assignments will be submitted electronically. Details will be given on the course website and/or in the assignment descriptions. We reserve the right to use similarity detection software to detect possible cheating cases.

- With each assignment, your submission is required to include an *Assignment Submission Form*, on which you certify that the material you've submitted is exclusively your own work. This form can be downloaded from course website.

- Assignments are due by 11:55pm on the due date. The time stamp on the electronic submission will be used to determine any late penalty.

Late Assignment Policy

- Late assignments will be accepted for up to three days after the due date, with weekends (Saturday and Sunday) counting as a single day; the late penalty is 5% of the available marks per day. Lateness is based on the time stamp on the electronic submission, not on the time it was printed or last modified.
- **Late Coupons**
  - The intent of late coupons is to give you some free days in case of minor illness, work overload, etc. No other extensions will be given in such cases.
  - Each student is given 5 *late coupons*. These are *virtual* (as opposed to physical) coupons maintained by the instructor. Late coupons may be applied toward any of assignments 2 through 5.
  - Each coupon can be thought of as a potential one-day assignment extension. It's entirely up to you to decide when to use your coupons; but no more than three coupons could be used per assignment. If you wish to use any coupons with an assignment, simply note that fact on your *Assignment Submission Form*.
  - Coupons are not transferable to another student.
  - Once a coupon has been used, you cannot ``take it back'' to use for another assignment instead.
  - Unused coupons are not redeemable for extra marks.
  - Using a late coupon does not change the final date on which an assignment will be accepted. Whether or not coupons are used, the assignment must be handed in within three days of the original due date.

- Extensions will be granted only on serious medical or compassionate grounds. You should take supporting documentation to the office of the Dean of your faculty, who will contact the instructor.

Assignment Marking

- Assignments are marked by the Teaching Assistant(s), who follow marking schemes provided by instructors.
- When assignment marking has been completed, you will be informed via the course website.
- A request for adjustment of an assignment mark must be made within 2 weeks of the date on which it was first available. Beyond that date, regrading will not be considered. You should direct such request in the first instance to your TA, and then to the course instructor if the discussion with the TA is not satisfactory.
- Assignment marks will be available via course website periodically throughout the term. It is your responsibility to check that your marks have been recorded correctly.

Assignment Backups

It is your responsibility to keep up-to-date backups of assignment files in case of system crashes or inadvertently erased files. Retain disk copies of all material submitted, as well as the actual graded assignment, to guard against the possibility of lost assignments or errors in recording marks. It is not safe to discard these materials until you are satisfied that your final mark for the course has been computed properly.

Tutoring

The role of tutoring is to help students understand course material. Tutors should not write assignments or tests for the students who hire them. Submitting an assignment that contains material written by a tutor is an academic offense. Having employed the same tutor as another student is not a legitimate defense against an accusation of collusion, should two students hand in assignments judged similar beyond the possibility of coincidence.

Accommodation and Accessibility
If you are unable to meet a course requirement due to illness or other serious circumstances, you must provide valid medical or supporting documentation to the Academic Counselling Office of your home faculty as soon as

possible. If you are a Science student, the Academic Counselling Office of the Faculty of Science is located in NCB 280, and can be contacted at scibmsac@uwo.ca.

For further information, please consult the university's medical illness policy http://www.uwo.ca/univsec/pdf/academic_policies/appeals/accommodation_medical.pdf.

If you miss the Final Exam, please contact your faculty's Academic Counselling Office as soon as you are able to do so. They will assess your eligibility to write the Special Exam (the name given by the university to a makeup Final Exam).

You may also be eligible to write the Special Exam if you are in a "Multiple Exam Situation" (see http://www.registrar.uwo.ca/examinations/exam_schedule.html).

Academic Policies

The website for Registrarial Services is http://www.registrar.uwo.ca .

In accordance with policy, , http://www.uwo.ca/its/identity/activatenonstudent.html, the centrally administered e-mail account provided to students will be considered the individual's official university e-mail address. It is the responsibility of the account holder to ensure that e-mail received from the University at his/her official university address is attended to in a timely manner.

Scholastic offences are taken seriously and students are directed to read the appropriate policy, specifically, the definition of what constitutes a Scholastic Offence, at the following site: http://www.uwo.ca/univsec/pdf/academic_policies/appeals/scholastic_discipline_undergrad.pdf. You are also responsible for reading and respecting the Computer Science Department's policy on Scholastic Offenses and Rules of Ethical Conduct.

Support Services

Please contact the course instructor if you require lecture or printed material in an alternate format or if any other arrangements can make this course more accessible to you. You may also wish to contact Student Accessibility Services (SAS) at 661-2147 if you have any questions regarding accommodations.

The policy on Accommodation for Students with Disabilities can be found here: http://www.uwo.ca/univsec/pdf/academic_policies/appeals/accommodation_disabilities.pdf

The policy on Accommodation for Religious Holidays can be found here: http://www.uwo.ca/univsec/pdf/academic_policies/appeals/accommodation_religious.pdf

Learning-skills counsellors at the Student Development Centre (http://www.sdc.uwo.ca) are ready to help you improve your learning skills. They offer presentations on strategies for improving time management, multiple-choice exam preparation/writing, textbook reading, and more. Individual support is offered throughout the Fall/Winter terms in the drop-in Learning Help Centre, and year-round through individual counselling.

Students who are in emotional/mental distress should refer to Mental Health@Western (http://www.health.uwo.ca/mental_health) for a complete list of options about how to obtain help.

Additional student-run support services are offered by the USC, http://westernusc.ca/services.