



SENG371: Software Evolution

Course Dates

CRN(s):	Section A01 CRN: 22933 Section A02 CRN: 22934
Term:	2024
Course Start:	2024-01-08
Course End:	2024-04-26
Withdrawal with 100% reduction of tuition fees:	2024-01-21
Withdrawal with 50% reduction of tuition fees:	2024-02-11
Last day for withdrawal (no fees returned):	2024-02-29

Scheduled Meeting Times (M=Mon, T=Tue, W=Wed, R=Thu, F=Fri)

Section:	Location:	Classes Start:	Classes End:	Days of week:	Hours of day:	Instructor:
A01	ECS 123	2024-01-08	2024-04-08	TWF	08:30-09:20	Roberto Bittencourt
A02	ECS 123	2024-01-08	2024-04-08	TWF	08:30-09:20	Roberto Bittencourt
B01	ELW B220	2024-01-15	2024-04-08	R	15:30-17:20	
B02	ELW B220	2024-01-15	2024-04-08	F	10:30-12:20	
B03	ELW B220	2024-01-15	2024-04-08	F	13:30-15:20	

Instructor(s)

Name: **Roberto Bittencourt**
Office: ECS 458
Phone: (250) 472-5762
Email: rbittencourt at uvic dot ca

Office Hours: Comments
Tue 09:30am-11:20am

Course Overview

Introduces problems and solutions of long-term software maintenance/evolution and large-scale, long-lived software systems. Topics include software engineering techniques for programming-in-the-large, programming-in-the-many, legacy software systems, software architecture, software evolution, software maintenance, reverse engineering, program understanding, software visualization, advanced issues in object-oriented programming, design patterns, antipatterns, and client-server computing. Culminates in a team project.

Topics

- Software evolution and maintenance
- Changes, concepts and concept location
- Impact analysis and actualization
- Software verification and testing
- Issue tracking
- Software refactoring
- Open source software development
- Software design and models
- Reverse engineering and architecture recovery
- Version control, continuous integration and deployment
- Software comprehension
- Laws of software evolution

Course Objectives And Learning Outcomes

The main goal of this course is:

- to be able to satisfactorily carry out software evolution and maintenance activities through the use of methods, tools and techniques, and based on a theoretical framework and on the software engineering state-of-the-practice.

At the end of this course, students will be able to:

- understand and apply methods, techniques and tools to support software evolution;
- perform incremental changes to middle sized software systems with growing complexity;
- recognize software patterns and anti-patterns and refactor program code;
- critically assess various methods, techniques and tools to support software evolution, and choose the most appropriate to different contexts of software development;
- from the background gained in this course and with continued practice, take part in software development and maintenance teams;
- understand the challenges and tools for software configuration management, continuous integration and continuous deployment;
- apply software reverse engineering methods and tools to support software architecture and design recovery;
- analyze software evolution history to support software comprehension and decision making;
- understand the fundamental laws of software evolution and the various software life span models.

Course Delivery, Attendance and Safety

This course will be delivered in-person. Therefore students are expected to be physically present in the lecture room and in the lab room for their registered lab.

All students are expected to fully participate in lectures and labs of this course. This course requires reliable and consistent access to a relatively new computer (desktop or laptop, with at least 8GB of DRAM and at least 256 GB of disk space). You must also have a reliable internet connection, although we will do our best to ensure work on assignments can be completed on your computer. It will not be possible to adjust the course expectations, due dates or learning outcomes for students who do not have the technological resources available to complete this course. Information on student numbers, student grades, submitted work will be stored in file systems and computers under the physical control of UVic.

Students can use their own computers in the lab. The use of the University computer lab is also available during the lab section you are registered in.

Textbooks and Readings

There is no prescribed textbook for this course, even though there is a recommended one. Readings will be assigned based on papers and chapters available online.

Recommended textbook (optional):

Rajlich, V. (2011). Software engineering: The current practice. CRC Press. available online through the McPherson library, at https://search.library.uvic.ca/permalink/01VIC_INST/8ggp8f/alma9957591407207291

Other optional complementary books:

Tripathy, P., & Naik, K. (2014). Software evolution and maintenance: a practitioner's approach. John Wiley & Sons. available online through the McPherson library, at https://search.library.uvic.ca/permalink/01VIC_INST/8ggp8f/alma9957708351707291

Demeyer, S., & Mens, T. (2008). Software Evolution. Springer. available online through the McPherson library, at [https://link.springer-com.ezproxy.library.uvic.ca/book/10.1007%2F978-3-540-76440-3](https://link.springer.com.ezproxy.library.uvic.ca/book/10.1007%2F978-3-540-76440-3)

Mens, T. (2014), A. Serebrenik, & A. Cleve (Eds.). Evolving Software Systems. Heidelberg: Springer. available online through the McPherson library, at <http://ezproxy.library.uvic.ca/login?url=http://link.springer.com/openurl?genre=book&isbn=978-3-642-45397-7>

Assignments

There will be **3** group assignments which, together, will comprise **45%** of the total course mark. This schedule is subject to change. Please consult the course webpage for accurate due dates.

Assignment	Weight	Tentative Due Dates
Assignment 1	15%	February 16
Assignment 2	15%	March 15
Assignment 3	15%	April 5

You and your group should start assignments early enough to allow time to seek help if you encounter difficulties. **Late Assignments will not be accepted.**

The use of an editor or tutor, either paid or unpaid, to correct or augment your work is strictly prohibited.

Exams

In this course, there will be one midterm exam (worth 12% of the course grade). There will be a final exam (worth 25%) scheduled by the university during the final exam period. All exams will be written in-person.

Exam	Weight	Exam Date
Midterm	12%	February 28
Final Exam	25%	Final Exam Period

Students are strongly advised not to make final plans for travel or employment during the final exam period since special arrangements will not be made for examinations that may conflict with such plans.

Missed exams: A missed exam will be given a zero grade.

Concession for a missed exam is granted in extenuating circumstances (ie. illness) **only if** the following is provided to the instructor:

- notification by email (rbittencourt@uvic.ca) **before the date/time of the exam**
- Concession cannot be granted for more than one missed exam.

Plagiarism detection software will be used on exam submissions. During the exam, collaboration with other students in any form and the solicitation of answers from any outside source (electronically, visually, orally or by any other means) is strictly prohibited. Any instance of impersonation during an exam is considered a serious academic offence by both the student being impersonated and the impersonator.

Labs

There will be **10** labs of equal weight which. From those labs, the **8** best lab grades will be used to compute a lab average grade, which will comprise **8%** of the total course mark. **See the course syllabus on Brightspace for the lab schedule.**

For most labs, there will be a set of exercises to work through. You must demonstrate your work to a TA during your registered lab time. If so required in the lab instructions, you should also submit your work by the end of the lab. Labs will also be used for agile group meetings to direct your group work, and attendance to those meetings will also be graded.

You are encouraged to elicit help from your TA during your allocated lab time. We also encourage you to augment your learning with external resources (e.g., textbooks, educational websites, forums).

You will receive a grade of zero for a given lab if you either do not demonstrate the lab work during your scheduled lab time or do not participate in the group meeting.

Quizzes

One weekly lecture will be reserved for a class discussion of a paper or book chapter. There will be mandatory pre-lecture work (quizzes) for those lectures.

There will be **12** quizzes of equal weight which. From those quizzes, the **10** best quiz grades will be used to compute a quiz average grade, which will comprise **10%** of the total course mark. **See the course syllabus on Brightspace for the quiz schedule.**

The pre-lecture work will require you to read a paper or book chapter. A quiz will assess your comprehension of this material, particularly: the problem introduced, the work's goal, the solution provided (both in short and in detail), and its consequences. This work is to be completed and submitted on your own but we encourage you to use office hours and the forum to clarify concepts. Working with a classmate to explain concepts to each other can help to solidify understanding.

This pre-lecture content will be posted before each weekly discussion lecture on Brightspace and must be completed **before** the associated lecture.
Late submissions will not be accepted.

Lectures

Lectures will be run in a dialogued format described below.

What you can expect in a lecture:

- The instructor presents a topic;
- Students may actively pose questions or comments during the presentation;
- The instructor may also present examples of problem solving;
- If needed, the instructor may pose questions on a particular topic, and students may present their opinions on the topic.

One weekly lecture will be based on reading a paper or book chapter: the format for those lectures will be based on whole class discussion.

Privacy Notice

I use a variety of educational technology in this course including internet-based technologies or web-based applications, and cloud services. The use of technology is part of your engagement at the University. Some of these learning tools may collect, use and/or disclose your personal information and store or access that information outside of Canada.

UVic cannot require students to disclose personal information to technologies or organizations which may store information on servers located outside of Canada because disclosure of personal information to vendors, systems or services storing or accessing that personal information outside of Canada is restricted by Section 30.1 of BC's Freedom of Information and Protection of Privacy Act (FIPPA). Personal information is information about an identifiable individual; for example, your name or your email address.

The following educational technologies, which stores or accesses your personal information outside Canada, is required for this course: GitHub. I will make you aware if this list changes.

I use these technologies to enhance your educational experience at UVic. The personal information is required by the service. The privacy policy and the terms of use list the personal information stored outside of Canada and are available at

- <https://docs.github.com/en/github/site-policy/github-privacy-statement>

I encourage you to read these documents.

If you are not comfortable with your personal information being stored outside of Canada, please speak to me within the first week of class about using an alternative (such as using an alias or nickname). Otherwise, by continuing in this course, you agree to the use of the educational technology in the course and the storage of personal information outside of Canada.

Grading

Coursework	Weight (out of 100%)
Assignments	45%
Exams	37%
Labs	8%
Quizzes	10%

In order to pass the course, students must **obtain a passing grade on the weighted average of all assignments and obtain a passing mark on the final exam.**

Students are strongly advised not to make final plans for travel or employment during the exam period since special arrangements will not be made for examinations that may conflict with such plans.

Regrade policy

At times, you may feel that marks were unfairly deducted during an assignment, lab or exam. In this situation, you can submit your work for a regrade.

We will only take regrades if they are submitted within **7 days** of the marks for that assessment being released. Also note that we reserve the right to regrade the entirety of any submission. When requesting a regrade, your old grade will be removed and your new grade could be higher or lower.

To submit a regrade request, you must email the Instructor with the following information (requests missing any of this information will not be considered):

- Your name and student number;
- The submission that you would like regraded;
- The part you would like regraded;
- The reason for requesting a regrade. You must specify which parts of the grading rubric/tests you feel was graded incorrectly.
- Regrade requests need to point to a specific, clear error in grading not an argument about the allocation of marks in the rubric. We can only apply a consistent rubric and standard across all assignments.

Grading System

The University of Victoria follows a percentage grading system in which the instructor will submit grades in percentages. The University will use the following Senate approved standardized grading scale to assign letter grades. Both the percentage mark and the letter grade will be recorded on the academic record and transcripts.

F	D	C	C+	B-	B	B+	A-	A	A+
0-49	50-59	60-64	65-69	70-72	73-76	77-79	80-84	85-89	90-100

Grades	Description
A+, A, A-	Exceptional, outstanding or excellent performance. Normally achieved by a minority of students. These grades indicate a student who is <i>self-initiating</i> , <i>exceeds expectation</i> and has an <i>insightful</i> grasp of the subject matter.
B+, B, B-	Very good, good or solid performance. Normally achieved by the largest number of students. These grades indicate a <i>good</i> grasp of the subject matter or <i>excellent grasp in one area balanced with satisfactory grasp in the other areas</i> .
C+, C	Satisfactory, or minimally satisfactory . These grades indicate a <i>satisfactory performance and knowledge</i> of the subject matter.
D	Marginal Performance . A student receiving this grade demonstrated a <i>superficial grasp</i> of the subject matter.
F	Unsatisfactory performance . Wrote final examination and completed course requirements; no supplemental.

Posting of Grades

Typically marks for assignments, examinations, and provisional final grades are made available through a Learning Management System (LMS) like Brightspace, where each student will be able to view only their own grades. Sometimes numerical marks/grades may be posted publicly to the entire class. In that case, full student numbers or names will not be included with the posted information.

Course Experience Survey (CES)

I value your feedback on this course. Towards the end of term you will have the opportunity to complete a confidential course experience survey (CES) regarding your learning experience. The survey is vital to providing feedback to me regarding the course and my teaching, as well as to help the department improve the overall program for students in the future. When it is time for you to complete the survey, you will receive an email inviting you to do so. If you do not receive an email invitation, you can go directly to the [CES site](#)

You will need to use your UVic NetLink ID to access the survey, which can be done on your laptop, tablet or mobile device. I will remind you closer to the time, but please be thinking about this important activity, especially the following three questions, during the course.

- What strengths did your instructor demonstrate that helped you learn in this course?
- Please provide specific suggestions as to how the instructor could have helped you learn more effectively.
- Please provide specific suggestions as to how this course could be improved.

Csc Student Groups

The Engineering & Computer Science Students' Society (ECSS) serves all students registered in an Engineering and Computer Science degree program, including Software Engineering (BSEng). For information on ECSS activities, events and services navigate to <https://onlineacademiccommunity.uvic.ca/ess/>.

Course Policies And Guidelines

Late Assignments: No late assignments will be accepted unless prior arrangements have been made with the instructor **at least 48 hours before** the assignment due date.

Coursework Mark Appeals: All marks must be appealed **within 7 days** of the mark being posted. **Attendance:** We expect students attend all lectures and labs. It is entirely the students' responsibility to recover any information or announcements presented in lectures from which they were absent. **Electronic devices in labs and lectures:** No unauthorized *audio* or *video* recording of lectures is permitted. **Electronic devices in midterms and exams:** Calculators are only permitted for examinations and tests if explicitly authorized and the type of calculator permitted may be restricted. No other electronic devices (e.g. cell phones, pagers, PDA, etc.) may be used during examinations or tests *unless explicitly authorized*. **Plagiarism:** Submitted work may be checked using plagiarism detection software. Cheating, plagiarism and other forms of academic fraud are taken very seriously by both the University and the Department. You should consult the link given below for the UVic policy on academic integrity. Note that the university policy includes the statement that "A largely or fully plagiarized assignment should result in a grade of F for the course."

The Faculty of Engineering and Computer Science Standards for Professional Behaviour are at https://www.uvic.ca/ecs/_assets/docs/student-forms/professional-behaviour.pdf U.Vic guidelines and policy concerning fraud and academic integrity are at <http://web.uvic.ca/calendar/undergrad/info/regulations/academic-integrity.html> **U. Vic Privacy Policy:** If any student has concerns about their private information being stored or accessed outside of Canada, they are required to inform the course instructor about their concerns before the end of second week of classes.

Equality

This course aims to provide equal opportunities and access for all students to enjoy the benefits and privileges of the class and its curriculum and to meet the syllabus requirements. Reasonable and appropriate accommodation will be made available to students with documented disabilities (physical, mental, learning) in order to give them the opportunity to successfully meet the essential requirements of the course. The accommodation will not alter academic standards or learning outcomes, although the student may be allowed to demonstrate knowledge and skills in a different way. It is not necessary for you to reveal your disability and/or confidential medical information to the course instructor. If you believe that you may require accommodation, the course instructor can provide you with information about confidential resources on campus that can assist you in arranging for appropriate accommodation. Alternatively, you may want to contact the [Centre for Accessible Learning](#) located in the Campus Services Building.

The University of Victoria is committed to promoting, providing, and protecting a positive, and supportive and safe learning and working environment for all its members.

Copyright Statement

All course content and materials are made available by instructors for educational purposes and for the exclusive use of students registered in their class. The material is protected under copyright law, even if not marked with a ©. Any further use or distribution of materials to others requires the written permission of the instructor, except under fair dealing or another exception in the Copyright Act. Violations may result in disciplinary action under the Resolution of Non-Academic Misconduct Allegations policy (AC1300).