WILFRID LAURIER UNIVERSITY

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Course Syllabus

CP317B Software Engineering
Department of Physics and Computer Science, Faculty of Science, Waterloo
2024 Fall Semester

I acknowledge that in Kitchener, Waterloo, Cambridge and Brantford we are on the traditional territory of the Neutral, Anishnawbe, and Haudenosaunee peoples.

Instructor Information

Name: Lunshan (Shaun) Gao, Ph.D., P.Eng.
Email: lgao@wlu.ca
Office Location: N2091
Weekly Office Hours: by Appointment

Course Information

Pre-réquisits: CP213, CP217 or CP264
Course location: Room 2-106 (Dr. Alvin Woods Building)
Meeting times: 4:00 pm – 5:20 pm, Tuesdays and Thursdays

Course Overview and Approach

Software engineering is to study software development activities including requirements analysis, system design, software design specification, implementation, testing, maintenance and project managements. This course will discuss software engineering methodologies and techniques such that process models, object-oriented design, requirement elicitation, unified modeling language (UML), software testing, software development metrics, the deployment of software products, and software maintenance.

The teaching approach will be class lectures and group project. The lectures will discuss main topics in software engineering. Practical skills and techniques relevant to the main topics are discussed in the lectures. The evaluation of group projects consists of a project presentation and a project report.

Course Goals and Learning Outcomes

On the successful completion of this course, students will be able to:

1. Explain the concept of software engineering and the relationship between software engineering and engineering.
2. Understand the differences between software engineering and programming.
3. Explain major process models that are used in software engineering such as waterfall, iterative, spiral, and unified process model.
4. Compare and contrast the differences and similarities among the process models of software engineering.
5. Explain software development life cycle.
6. Understand techniques used in requirement elicitation, architecture design, and detailed design

7. Explain the features of object-oriented design methods including inheritance, polymorphism, encapsulation and abstraction.
8. Understand major diagrams in unified modeling language (UML) such as class diagram, use case diagram, state machine diagram, and sequence diagram.
9. Explain testing methodologies in software engineering and understand white box testing and black box testing.
10. Understand project management tools and methods such that software version control, bug tracking, and software products deployment procedures.

Course Tools and Learning Materials

1. Recommended textbooks:

   (1). Beginning Software Engineering, by R. Stephens. Publisher: John Wiley and Sons, Inc. 2015
   (2). Software Engineering: A Practitioner's Approach by R.S. Pressman (Seventh Edition) Publisher: McGraw-Hill, 2010

2. Lecture PowerPoint slides will be posted in MyLearningSpace

Student Evaluation

Assessment	Weighting	Due Date
Project presentation	15%	Please refer to weekly schedules
Project report	15%	Please refer to weekly schedules
Test 2x15%	30%	Please refer to weekly schedules
Final Exam	40%	Please refer to weekly schedules
Total	100%	

Learning Activities, Assignments, Tests, Quizzes and Examinations

- All tests will be close book test and performed online with MyLearningSpace. The purpose of the quizzes is to foster students critical thinking skills and the understanding of software engineering.
- The group project consists of two parts: presentation and writing report. The purpose of this group project is to foster students' communication skills and the ability of academic writing. The project work including project report and presentation materials will be delivered into MyLearningSpace. The project work will be evaluated in MyLearnigSpace. The originality check will be performed by using TurnItIn tool in MyLearningSpace.

Weekly Schedule(s) (Tentative and subject to changes)

Week	Topics and chapters	Lesson Outcomes	Tests
Week 1 – Sept.10	Introduction to software engineering	Concept of SE, overview of SE, relationship with traditional engineering	
Sept 12	Project managements	How to manage documents, PERT charts, critical path method, Gantt charts, COCOMO	

Week 2 – Sept.17	Requirement gathering	MOSCOW method and requirements prioritization, FURPS+ and requirement categorization	
Sept.19	More requirement gathering	Requirement decomposition and refinement, UML, concepts of validation and verification	
Week 3 – Sept.24	High-level design	Concept, variety of architecture design techniques: monolithic, client/server, service-oriented, data-centric, event-driven, and etc.	
Sept.26	More high-level design	UML, design principles: decomposition, cohesion, and coupling	
Week 4 – Oct. 1	Low-level design	Concept, key tasks in detailed design, detailed design techniques,	
Oct. 3	More low-level design	Object-oriented design: abstraction, inheritance, polymorphism.	
Week 5 – Oct. 8	Review main topics covered in week 1-4		Test 1 (cover week 1-4 contents)
Oct. 10	More low-level design	encapsulation; association, aggregation	
Week Oct. 15 – Oct. 18	**Reading week, no class**		
Week 6 – Oct.22	Implementation	Tools, coding standard and its benefit, source code control systems, programming techniques	
Oct. 24	Testing	Concept, test plan, levels of software testing, testing techniques: black-box testing, white-box testing	
Week 7 - Oct. 29	Deployment	Concept, deployment tasks, deployment plan, types of deployment strategies	
Oct. 31	Metrics	Concept, defect analysis, Ishikawa diagram, function point metrics, software complexity	
Week 8 – Nov. 5	Waterfall models	Waterfall model, and variety of waterfall models, advantages and disadvantages of waterfall model, V-model	
Nov. 7	Iterative models	Iterative model, comparison between iterative model and waterfall model, difference between iterative model and incremental model	

Week 9 – Nov. 12	Review main topics covered in week 5-8		Test 2 (cover week 5-8 contents)
Nov. 14	More iterative models	Spiral model, concept, advantages and disadvantages of spiral model, unified process model, rational unified process.	
Week 10–Nov. 19	Combined models-RAD	introduction to RAD. Four essential aspects of RAD, Agile development method, 12 principles	
Nov. 21	Group presentation		Project report due Nov.22 at 11:59 pm
Week 11–Nov. 26	Group presentation		
Nov. 28	Group presentation		
Week 12– Dec.3	Group presentation		
Dec.5	Group presentation		

Intellectual Property

The educational materials designed and developed for this course that are posted to MyLearningSpace are the intellectual property of the course instructor. These materials are for students use only and they are not intended for wider dissemination outside of a given course. Recording lectures in any way is prohibited in this course unless permission has been granted by the instructor. Posting or providing unauthorized audio or video material of lecture content to third-party websites violates the instructor's intellectual property rights and the Canadian Copyright Act.

University and Course Policies (proposed and required text)

Laurier has several senate approved policy statements it requires instructors to include in their syllabus. Those with specific wording approved by senate are indicated specifically below.

1. **Academic Calendars:** Students are encouraged to review the Academic Calendar for information regarding all important dates, deadlines, and services available on campus.

2. **Special Needs:** Students with disabilities or special needs are advised to contact Laurier's Accessible Learning Centre for information regarding its services and resources.

3. **Plagiarism:** The University has approved the following wording for inclusion on all course syllabi about the use of the institutionally supported plagiarism software tool. "Wilfrid Laurier University uses software that can check for plagiarism. If requested to do so by the instructor, students are required to submit their written work in electronic form and have it checked for plagiarism." (Approved by Senate May 14, 2002) .

   The project work including project report and presentation materials must be delivered into MyLearningSpace for academic plagiarism check.

4. **Academic Integrity:** Laurier is committed to a culture of integrity within and beyond the classroom. This culture values trustworthiness (i.e., honesty, integrity, reliability), fairness, caring, respect, responsibility and citizenship. Together, we have a shared responsibility to uphold this culture in our academic and nonacademic behaviour. The University has a defined

policy with respect to academic misconduct. As a Laurier student you are responsible for familiarizing yourself with this policy and the accompanying penalty guidelines, some of which may appear on your transcript if there is a finding of misconduct. The relevant policy can be found at Laurier's academic integrity website along with resources to educate and support you in upholding a culture of integrity. Ignorance is not a defense.

5. **Classroom Use of Electronic Devices:** State your classroom practice and any consequences for student failure to comply – see Policy 9.3 (Approved by Senate March 8, 2012).

6. **Late Assignment Policy:** MyLearningSpace changed, and it does not late submissions. As a result, any late submissions of project reports will be graded zero. **If you missed midterm tests without any reasonable reasons, you would not have another chance for the midterms.**

7. **Final Examinations:** Students are strongly urged not to make any commitments (i.e., vacation) during the examination period. Students are required to be available for examinations during the examination periods of all terms in which they register. Refer to the Handbook on Undergraduate Course Management for more information.

8. **Foot Patrol, the Wellness Centre, and the Student Food Bank:** The University approved the inclusion of information about select wellness and safety services and supports on campus in the course information provided to students. (Approved by Senate November 28, 2011.) Specific language (by campus) is provided below.

   Multi-campus Resource:

   - Good2Talk is a postsecondary school helpline that provides free, professional and confidential counselling support for students in Ontario. Call 1-866-925-5454 or through 2-1-1. Available 24-7.

   Kitchener/Waterloo Resources:

   - Waterloo Student Food Bank: All students are eligible to use this service to ensure they're eating healthy when overwhelmed, stressed or financially strained. Anonymously request a package online 24-7. All dietary restrictions accommodated.

   - Waterloo Foot Patrol: 519.886.FOOT (3668). A volunteer operated safe-walk program, available Fall and Winter daily from 6:30 pm to 3 am. Teams of two are assigned to escort students to and from campus by foot or by van.

   - Waterloo Student Wellness Centre: 519-884-0710, x3146. The Centre supports the physical, emotional, and mental health needs of students. Located on the 2nd floor of the Student Services Building, booked and same-day appointments are available Mondays and Wednesdays from 8:30 am to 7:30 pm, and Tuesdays, Thursdays and Fridays from 8:30 am to 4:15 pm. Contact the Centre at x3146, wellness@wlu.ca or @LaurierWellness. After hours crisis support available 24/7. Call 1-844-437-3247 (HERE247).

   Brantford Resources:

- Brantford Student Food Bank: All students are eligible to use this service to ensure they're eating healthy when overwhelmed, stressed or financially strained. Anonymously request a package online 24-7. All dietary restrictions accommodated.

- Brantford Foot Patrol: 519-751-PTRL (7875). A volunteer operated safe-walk program, available Fall and Winter, Monday through Thursday from 6:30 pm to 1 am; Friday through Sunday 6:30 pm to 11 pm. Teams of two are assigned to escort students to and from campus by foot or by van.

- Brantford Wellness Centre: 519-756-8228, x5803. Students have access to support for all their physical, emotional, and mental health needs at the Wellness Centre. Location: Student Centre, 2nd floor. Hours: 8:30 am to 4:15 pm Monday through Friday. After hours crisis support available 24/7. Call 1-884-437-3247 (HERE247).

Appendix A

CP317A Grading Rubric for Project Report

The project report will be evaluated with the following measures.

Items	A (4)	B (3)	C (2)	D (1)
Main idea	Clearly presents a main idea and supports it throughout the paper.	There is a main idea supported throughout most of the paper.	Vague sense of a main idea, weakly supported throughout the paper.	A little main idea
Organization:	Well-planned and well-thought out. Includes title, introduction and conclusion. All paragraphs have clear ideas.	Good overall organization, includes title. Most paragraphs have clear ideas.	There is a sense of organization. Some paragraphs have clear ideas.	There is somewhat organization. Some paragraphs have ideas.
Content	Exceptionally well-presented and argued; ideas are detailed, well-developed, supported with specific evidence & facts, as well as examples and specific details.	Well-presented and argued; ideas are detailed, developed and supported with evidence and details, mostly specific.	Content is sound and solid; ideas are present but not particularly developed or supported.	Content is fair, but not well developed. Or Content is not sound.
Reference	Sources are exceptionally well-integrated and they support claims argued in the report very effectively. Quotations and works cited conform to APA style.	Sources are integrated and support the claims. There may be occasional errors, but the sources and works cited conform to APA style.	Sources are not integrated well. They are not cited correctly according to APA style.	The report does not use adequate reference. They are not cited correctly according to APA style.

Note 1: APA stands for American Psychological Association. Please refer to https://library.wlu.ca/help/activity/citing-sources/styles for details.

Note 2: The writing report must be written with your own sentences and ideas. If you would like to cite other's work, please use citation in APA style properly. The originality of your report will be checked in MyLearningSpace. Academic plagiarism is not tolerated.
If you have any questions, please ask me at lgao@wlu.ca

Appendix B

CP317A Rubric for the Project Presentation

The presentation will be evaluated with the following rubric. Please refer to the project requirements in MyLearningSpace.

Items	**A (4)**	**B (3)**	**C (2)**	**D (1)**	Assigned points
Design and implement	Excellent design and superb implementation. Meets all functional requirements;	Satisfactory, flexible design meeting all functional requirements. Good bug-free implementation;	Acceptable design that meets most functional requirements. Implementation mostly bug-free;	Poor design focused on minimally meeting the functional requirements. Implementation seems buggy	
Test and verification	Well-designed, systematic test suite providing excellent coverage.	Team's testing approach provides basic essential coverage of possible cases.	Carefully designed set of test cases to cover a suitable range of situations.	No systematic testing of software to ensure reasonable coverage of possible cases.	
Oral communication.	The presentation was excellent. The team addresses questions in the right level.	Presentation adequate at providing a basic explanation of the problem being addressed	Presentation was Effective. Responses to questions were reasonable.	Presentation not effective and not clear.	
Effective written communication Outcome	Excellent documentation of all aspects of the system including design and implementation.	Documentation partly effective at conveying the technical aspects of system.	documentation clearly presented all important aspects of project.	Documentation consisted of little more than (poorly commented) system code.	