

Course Outline

School:	Eng. Tech. & Applied Science
Department:	Information and Communication Engineering Technology (ICET)
Course Title:	Software Engineering Fundamentals
Course Code:	COMP 120
Course Hours/Credits:	56
Prerequisites:	N/A
Co-requisites:	N/A
Eligible for Prior Learning, Assessment and Recognition:	Yes
Originated by:	Bhim Harlal
Creation Date:	Fall 2007
Revised by:	Mohamed Khan, Vijayalakshmi Tiruchengode Angamuthu
Revision Date:	Summer 2023
Current Semester:	Fall 2024
Approved by:	

*ppesikan
c/o*

Predrag Pesikan, Associate Dean/Dean,
Eng. Tech. & Applied Science

Students are expected to review and understand all areas of the course outline.

Retain this course outline for future transfer credit applications. A fee may be charged for additional copies.

This course outline is available in alternative formats upon request.

Acknowledgement of Traditional Lands

Centennial is proud to be a part of a rich history of education in this province and in this city. We acknowledge that we are on the treaty lands and territory of the Mississaugas of the Credit First Nation and pay tribute to their legacy and the legacy of all First Peoples of Canada, as we strengthen ties with the communities we serve and build the future through learning and through our graduates. Today the traditional meeting place of Toronto is still home to many Indigenous People from across Turtle Island and we are grateful to have the opportunity to work in the communities that have grown in the treaty lands of the Mississaugas. We acknowledge that we are all treaty people and accept our responsibility to honor all our relations.

Course Description

This introductory course introduces students to the common terminologies, methodologies, tools, and techniques used in software engineering. Coursework includes computer fundamentals, software engineering principles, software development process and process models. The Agile development process is highlighted as the transition approach is subsequent courses such COMP 225 and COMP 246. Fundamental concepts of related topics such as team and teamwork, software testing, and software engineering code of ethics and professional practices are also introduced. The course use several example scenarios to illustrate the concepts.

External Standard Information (ESI)

N/A

Program Outcomes

Successful completion of this and other courses in the program culminates in the achievement of the Vocational Learning Outcomes (program outcomes) set by the Ministry of Colleges and Universities in the Program Standard. The VLOs express the learning a student must reliably demonstrate before graduation. To ensure a meaningful learning experience and to better understand how this course and program prepare graduates for success, students are encouraged to review the Program Standard by visiting <http://www.tcu.gov.on.ca/pepg/audiences/colleges/progstan/>. For apprenticeship-based programs, visit <https://www.skilledtradesontario.ca/about-trades/trades-information/>.

Course Learning Outcomes

The student will reliably demonstrate the ability to:

1. Explain the basics of computer organization & architecture and how software interacts with computer hardware.
2. Explain the Software Engineering discipline and Software Engineering Principles.
3. Distinguish between various software process flows and models.
4. Compare and contrast software engineering methodologies.
5. Assess the importance of teamwork in software development projects.
6. Categorize the various types of software tests and explain how and why each is used.
7. Assess the importance of software engineering code of ethics and professional practice in making software engineering a beneficial and respected profession (ACM/IEEE-CS, and Canadian Information Processing Society (CIPS) codes of ethics).

8. Relate software engineering Code of Ethics and Professional Conduct to Global Citizenship and Equity initiatives of equity, social justice, respect, and care for human well-being at the local, national, and global levels.
9. Apply a variety of tools to produce and present deliverables of the problem solution/implementation as specified in the project plan and scope.
10. Identify and assess health & safety implications as they relate to the design and testing of software based systems.

Essential Employability Skills (EES)

The student will reliably demonstrate the ability to*:

1. Communicate clearly, concisely and correctly in the written, spoken, and visual form that fulfills the purpose and meets the needs of the audience.
2. Respond to written, spoken, or visual messages in a manner that ensures effective communication.
5. Use a variety of thinking skills to anticipate and solve problems.
6. Locate, select, organize, and document information using appropriate technology and information systems.
7. Analyze, evaluate, and apply relevant information from a variety of sources.
8. Show respect for diverse opinions, values belief systems, and contributions of others.
9. Interact with others in groups or teams in ways that contribute to effective working relationships and the achievement of goals.
10. Manage the use of time and other resources to complete projects.

**There are 11 Essential Employability Skills outcomes as per the Ministry Program Standard. Of these 11 outcomes, the following will be assessed in this course.*

New Essential Skills (NES)

N/A

Global Citizenship and Equity (GC&E) Outcomes

The student will reliably demonstrate the ability to*:

1. Identify one's roles and responsibilities as a global citizen in personal and professional life.

**There are 6 institutional Global Citizenship & Equity outcomes. Of these 6 outcomes, the following will be assessed in this course.*

Methods of Instruction

Interactive lectures and lab sessions

Text and Other Instructional/Learning Materials

Text Book(s):

Required:

Pressman R., Maxim B., Software Engineering: A Practitioner's Approach, 9th Edition, ISBN 9781260569650, Published by McGraw, 2020.

References:

SWEBOK v3.0 Guide to Software Engineering Body of Knowledge, IEEE Computer Society, 2014.

Python Crash Course, 2nd Edition, By Eric Matthes, Published by No Starch Press, 2019

Online Resource(s):

https://www.tutorialspoint.com/computer_fundamentals/index.htm

http://highered.mheducation.com/sites/0078022126/student_view0/index.html

<http://proquestcombo.safaribooksonline.com/book/office-and-productivity-applications/9780735678293>

<https://www.computer.org/web/swebok/v3>

<https://learnxinyminutes.com/docs/python/>

<https://realpython.com/python-iterators-iterables/>

<https://www.geeksforgeeks.org/difference-between-iterator-vs-generator/>

<https://docs.python.org/3/library/itertools.html>

Material(s) Required for Completing this Course:

PPT slides, Lecture handouts, Web references, etc.

Classroom and Equipment Requirements

Lab component should be in one of Software Engineering labs.

Evaluation Scheme

- ✧ Lab Assignment 1: Computer Fundamentals
- ✧ Lab Assignment 2: Software process structure and models
- ✧ Lab Assignment 3: Agile Development
- ✧ Group Project: This is a group project based on course contents.
- ✧ Test 1: Theory and Practical Component
- ✧ Test 2: Theory
- ✧ Quiz 1: Chapter 1 & 2
- ✧ Quiz 2: Chapter 3 & 4
- ✧ Quiz 3: Chapter 5 & 6
- ✧ Quiz 4: Chapter 19
- ✧ Weekly Smart Book/Connect Assignments: Weekly Smart Book/Connect Assignments: Reading of smart book and answering the questions related to the main concepts of each topic

Evaluation Name	CLO(s)	EES Outcome(s)	NES Outcome(s)	GCE Outcome(s)	Weight/100
Lab Assignment 1	1, 9	1, 2, 5, 6, 7, 10			5
Lab Assignment 2	2, 3	1, 2, 5, 6, 7, 10			5
Lab Assignment 3	4, 5, 9	1, 2, 5, 6, 8, 9			5
Group Project	1, 2, 3, 4, 5, 6, 7, 8, 9, 10	1, 2, 5, 6, 7, 8, 9, 10		1	15
Test 1	1, 2, 3	1, 2, 5, 10			20
Test 2	4, 5, 6, 7, 8, 9, 10	1, 2, 5, 10			20
Quiz 1	2	1, 2, 5, 10		1	5
Quiz 2	3	1, 2, 5, 10			5
Quiz 3	4, 5	1, 2, 5, 10			5
Quiz 4	6	1, 2, 5, 10			5
Weekly Smart Book/Connect Assignments	1, 2, 3, 4, 5, 6, 7, 8, 9, 10				10
Total					100%

If students are unable to write a test they should immediately contact their professor or program Associate Dean for advice. In exceptional and well documented circumstances (e.g. unforeseen family problems, serious illness, or death of a close family member), students may be able to write a make-up test.

All submitted work may be reviewed for authenticity and originality utilizing College approved plagiarism prevention software. Students who do not wish to have their work submitted to College approved plagiarism prevention software must, by the end of the second week of class, communicate this in writing to the instructor and make mutually agreeable alternate arrangements.

When writing tests, students must be able to produce official Centennial College photo identification or they may be refused the right to take the test or test results will be void.

Tests or assignments conducted remotely may require the use of online proctoring technology where the student's identification is verified and their activity is monitored and/or recorded, both audibly and visually through remote access to the student's computer and web camera. Students must communicate in writing to the instructor as soon as possible and prior to the test or assignment due date if they require an alternate assessment format to explore mutually agreeable alternatives.

Student Accommodation

The Centre for Accessible Learning and Counselling Services (CALCS) (<http://centennialcollege.ca/calcs>) provides programs and services which empower students in meeting their wellness goals, accommodation and disability-related needs. Our team of professional psychotherapists, social workers, educators, and staff offer brief, solution-focused psychotherapy, accommodation planning, health and wellness education, group counselling, psycho-educational workshops, adaptive technology, and peer support. Walk in for your first intake session at one of our service locations (Ashtonbee Room L1-04,

Morningside Room 190, Progress Room C1-03, The Story Arts Centre Room 285, Downsview Room 105) or contact us at calcs@centennialcollege.ca, 416-289-5000 ext. 3850 to learn more about accessing CALCS services.

Use of Dictionaries

- Any dictionary (hard copy or electronic) may be used in regular class work.

Program or School Policies

N/A

Course Policies

N/A

College Policies

Students should familiarize themselves with all College Policies that cover academic matters and student conduct.

All students and employees have the right to study and work in an environment that is free from discrimination and harassment and promotes respect and equity. Centennial policies ensure all incidents of harassment, discrimination, bullying and violence will be addressed and responded to accordingly.

Academic Honesty

Academic honesty is integral to the learning process and a necessary ingredient of academic integrity. Forms of academic dishonesty include cheating, plagiarism, and impersonation, among others. Breaches of academic honesty may result in a failing grade on the assignment or course, suspension, or expulsion from the college. Students are bound to the College's AC100-11 Academic Honesty and Plagiarism policy.

To learn more, please visit the Libraries information page about Academic Integrity

<https://libraryguides.centennialcollege.ca/academicintegrity> and review Centennial College's Academic Honesty Module:

https://myappform.centennialcollege.ca/centennial/articulate/Centennial_College_Academic_Integrity_Module_%202/story.html

Use of Lecture/Course Materials

Materials used in Centennial College courses are subject to Intellectual Property and Copyright protection, and as such cannot be used and posted for public dissemination without prior permission from the original creator or copyright holder (e.g., student/professor/the College/or third-party source). This includes class/lecture recordings, course materials, and third-party copyright-protected materials (such as images, book chapters and articles). Copyright protections are automatic once an original work is created, and applies whether or not a copyright statement appears on the material. Students and employees are

bound by College policies, including AC100-22 Intellectual Property, and SL100-02 Student Code of Conduct, and any student or employee found to be using or posting course materials or recordings for public dissemination without permission and/or inappropriately is in breach of these policies and may be sanctioned.

For more information on these and other policies, please visit www.centennialcollege.ca/about-centennial/college-overview/college-policies.

Students enrolled in a joint or collaborative program are subject to the partner institution's academic policies.

PLAR Process

This course is eligible for Prior Learning Assessment and Recognition (PLAR). PLAR is a process by which course credit may be granted for past learning acquired through work or other life experiences. The PLAR process involves completing an assessment (portfolio, test, assignment, etc.) that reliably demonstrates achievement of the course learning outcomes. Contact the academic school to obtain information on the PLAR process and the required assessment.

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Topical Outline (subject to change):

ORIGINAL TOPICAL

Week	Topics	Readings/Materials	Weekly Learning Outcome(s)	Instructional Strategies	Evaluation Name and Weight	Evaluation Date
1-3	Course Overview Computer Fundamentals	Lecture handout Online resources	Explain a basic computer architecture. Explain computer functionalities, functionalities, types, and generations. Describe computer components (CPU, IO devices, memory, memory units, motherboard, ports) Explain the information processing cycle. Differentiate between Data and information Distinguish between Application Software and Systems Software. Distinguish between Explain operating systems, networking, and internet.	Lecture Demonstration Lab Session Class Discussion	Lab Assignment 1: Computer Fundamentals	Week 3
4	What is Software Engineering	Chapter 1 Pressman book Web References	Define the discipline. Differentiate between software engineering and other computing disciplines. Explain the Software Process and process framework. Distinguish between five framework activities - communication, planning, modeling, construction, and deployment. Explain the software engineering practice and general principles.	Lecture Demonstration Lab Session Using MS Visio to create various diagrams Lab Assignment 2 Requirements provided.	Smart Book Reading Assignment	
5	Software Process Structure	Chapter 2 Pressman book Web References	Explain the generic process model for software engineering and differentiate between linear, iterative, parallel, and evolutionary process flows. Define activity actions and develop a set of actions for an activity. Create a task set. Distinguish between different process patterns. Describe software assessment and process improvement Methods.	Lecture Demonstration Lab Session Introduction to Python Language, Install Visual Studio Code Python Data-types, using variables and operators (logical and comparison)	Quiz 1	Week 5
6	Process Models	Chapter 3 Pressman	Define process models and differentiate	Lecture	Lab	Week 6

Week	Topics	Readings/Materials	Weekly Learning Outcome(s)	Instructional Strategies	Evaluation Name and Weight	Evaluation Date
		book Web References	between Waterfall, Incremental, Evolutionary, and Concurrent process models. Differentiate between specialized process models. Explain the Unified process model and its phases. Describe Process Modeling tools.	Demonstration Lab Session Python Lab- Strings and List	Assignment 2 Software process structure and models Smart Book Reading Assignment	
7	Test 1	Week 1-5 materials	Week 1-5 CLOs	Theory and practical component. The Practical component covers the design of various diagrams	Test 1	Week 7
8	Agile Development	Chapter 3,4 Pressman book Web References	Explain agile software engineering. Explain agility and agile process. Explain Extreme Programming. Write a simple XP user story. Differentiate between XP and other agile process models. E.g. Scrum, etc. Explain agile modeling. Recommend an agile tool set.	Lecture Demonstration Lab Session Python Lab-Dictionaries Group Project Requirements Provided	Quiz 2	Week 8
9	Human Aspects of Software Engineering Teams and Teamwork	Chapter 5 Pressman book Web References	Describe the characteristics and psychology of a software engineer. Explain the software team. Explain the challenges of large software projects and the need for teamwork. Explain the management issues arising from team-based software development. Describe the different ways of organizing Teams. Explain the common principles of team organization. Discuss collaboration tools.	Lecture Demonstration Lab Session Python Lab-control structures (decision making, loops) Group Discussion/Debate	Smart Book Reading Assignment	
10	Software Engineering Practice and General Principles	Chapter 6 Pressman book Web References	Define the software engineering practice. Explain Core principles. Explain principles that guide each framework activity. Explain work practices. Assess the importance of eight core	Lecture Demonstration Lab Session Python Lab-Functions	Quiz 3 Lab Assignment 3 Agile Development	Week 10

Week	Topics	Readings/Materials	Weekly Learning Outcome(s)	Instructional Strategies	Evaluation Name and Weight	Evaluation Date
			principles.			
11	Software Testing	Chapter 19 Pressman book Web References	Explain the various types of software tests and explain how and why each is used. Differentiate between validation and verification and explain the importance of these two activities throughout the software engineering process. Differentiate between different test strategies. Describe System testing and debugging.	Lecture Demonstration Lab Session Python Lab- Modules, OS Module, importing libraries Work on Group Project Report and Presentation	Smart Book Reading Assignment	
12	ACM/IEEE-CS, CIPS Code of Ethics Health & Safety implications	ACM, IEEE-CS materials Lecture handout	Explain the moral and ethical principles that guide software engineers in their practices. Explain the importance of software engineering code of ethics and professional practice in making software engineering a beneficial and respected profession. Explain and evaluate health & safety implications as they relate to the design and testing of software based systems	Lecture Demonstration Lab Session Python Lab- Iterators and Generators , Control Structures(for,while loops), Functions creating iterators- itertools(), count(), repeat (), Zip functions Work on Group Project Report and Presentation	Quiz 4 Work on Group Project Report and Presentation	Week 12
13	Group Project Presentations	n/a	n/a	Lab Session Python Lab User Stories-Read files	Group Project Presentation Project Report	Week 13
14	Test 2	Week 6-12 materials	Week 6-12 CLOs	Theory and practical component	Test 2	Week 14