

University of Maine
School of Computing and Information Science

Course Name: Introduction to Software Engineering **Number:** COS420 **Semester:** Spring 2019
Class room: Shibles Hall 202 **Class Hours:** 1:00 – 1:50 PM (MWF)

Instructor: Sepideh Ghanavati **Office:** Boardman Hall234 **Email:** sepideh.ghanavati@maine.edu
Instructor Office Hours: Wednesdays 3:00 – 4:30 PM or by appointments.

TA: Sanonda Gupta **TA-Office:** TBA **TA-Email:** TBA
TA-Office Hours: TBA

Catalogue Listing: Introduces theory and practice for software engineering. Topics include software life cycle, requirements, specification and analysis, software architecture and detailed design, project management, configuration management, testing and quality assurance.

Reading Materials (required): The main textbook of the course is:
Software Engineering - Ian Sommerville - 10th Edition, 2016
Chapters to read will be mentioned every week, under the mandatory part.

Reading Materials (optional): The optional/complementary textbook of the course is:
Object-oriented Software Engineering – An Agile Unified Methodology – David C. Kung, 2014
Chapters to read will be mentioned every week, under the optional part.

All other required reading list will be provided in another document. The instructor will include the required reading material from the list, at the end of each lecture slides.

Course Prerequisites: COS226 and COS331

Expected prior knowledge and skills in: The successful student should have introductory knowledge of software engineering including requirements, design, and testing, as well as proficiency in programming.

Key Topics:

1. Software Development Lifecycle
2. Requirements Elicitation
3. Requirements Analysis
4. Project Management
5. Modeling Techniques
6. Architectural Design
7. Design Patterns
8. Configuration Management
9. Verification and Validation/Testing and Quality Assurance

Course objectives:

The purpose of this course is to introduce theories, methods, and tools in software engineering for developing software systems. Students who succeed in this course will:

- Understand basic principles of Software Engineering
- Be able to practice advanced software engineering techniques.
- Be able to model with the Unified Modeling Language (UML).
- Be able to apply software engineering management principles

Learning Outcomes & Assessment Methods:

Students who have completed this course should have the ability to:

Objectives	ABET Outcomes	Assessment Methods
1. Ability to elicit and analyze customer requirements	b, f	P, A, E, D
2. Ability to design software systems using modeling techniques.	c	P, A, E, D
3. Understanding of verification and validation techniques.	c	P, A, E, D
4. Understand project management concepts and teamwork.	d, e, i	P, A, E, D
5. Professionalism and ethics.	d, e	P, A, E, D
6. Understanding the use of software engineering tools, templates, and references.	h	P, A, E, D

Activities and Evaluation:

Students' performance will be evaluated based on class participation/discussions, assignments, a project and three exams.

- **Lectures** – There will be 150 minutes of lectures every week, Monday, Wednesday and Friday, in which students will learn about topics in software engineering.
- **Readings** – Students will be assigned readings from the course textbook or academic papers to learn establish methods based on a strong engineering foundation. Additional readings will be selected and developed by the course instructor as well.
- **(D) – Class Participation and Discussion Forum (5%)** – Students reflect on reading materials and discussions in the class as well as on the discussion forum which is worth 2.5%. We discuss different subjects related to the course in class and the participation is required. In addition, students must assess and give feedback on other students' projects. This part is also worth 2.5%. Discussions are an **individual** assessment.
- **(A) – Assignments (30%)** – Students have 3 take-home assignments during the semester whereby students apply methods taught in class to sample problems. All assignments are **individual** efforts.
- **(P) – Term Project (40%)** – Students will work in a group of 4 or 5 students on a project from the topics given by the instructor. The detail of the topics must be approved by the instructor by the deadline specified below. The aim of these projects is to understand advanced software development processes and engineering topics and to develop software applications that are secure and have measures to protect the privacy of the users. The students will give two presentations for the project. The first presentation which introduces their project must not be more than 10 minutes. The second presentation discusses the results of their project and demo the tool and it is given at the end of the semester in the time slot booked by the students. For the project, the students also need to write several documents. The detail of the project is given in other documents.
- **(E) - Exams (30%)** – There will be three exams in this class. Each exam is 10% of the final mark. Exams are done **individually** and in the classroom. The topics of each exam is given in the course schedule. It is the duty of the students to attend the exams. Under only emergency situations, the instructor may decide to give a makeup exam as case-by-case.
- **Attendance Policy** – Students are allowed to have 5 free absences (whether excused or not). More than 5 absences will be penalized. The 6th missed class will have 2 marks (2%) deduction of the overall final grade. After that, each absence, except on the days of students' presentations, will count as 1% deduction of the overall final grade. For example, if your total mark at the end of the semester is 90% and you have missed 6 classes, your final mark will be 88%. On the days of students' presentations, each absence, unless having a valid excuse, will have 3% deduction of the overall final grade, regardless of having any free absence left. If a student comes late to their own presentation, the presentation's mark will be deducted by 20% for that specific student. Note that, if the students show up more than 10 minutes later than the start of the class (i.e. after 1:10pm), they will also be marked as absent. More details are given in the section, Class Attendance, below.
- **Note that, the total of possible mark in this class is 105 which includes 5% bonus mark.**

Course Schedule: The table (below) provides the initial distribution of topics discussed over the weeks in the semester. **This schedule is tentative and subject to change during the semester at the instruction discretion.** All changes will be announced in class or on the course website (Blackboard). Students are responsible for making sure they are informed about announcements.

Week	Class (MWF)	Activity	Material
1	01/23	L0	Syllabus and Introduction
	01/25	L1	Introduction to Software Engineering
2	01/28	L2	Software Process – Overview – Assignment 1 (Posted)
	01/30	L3	Software Process – Improvement
	02/01	L4	Software Project Management – Agile Methodology
3	02/04	L5	Software Project Management – Agile Methodology
	02/06	L6	Software Requirements – Overview – Deliverable 0 Due Date
	02/08	L7	Lab – Introduction to GitHub
4	02/11	L8	Software Requirements – More Details
	02/13	L9	Use Case Modeling
	02/15	P1	Proposal Presentation – All Teams
5	02/18	-	No Class – President Day
	02/20	L10	Use Case Modeling
	02/22	L11	Lab – Introduction to Android Dev. – Assignment 1 (Due Date)
	02/24	-	Project Deliverable 1 (Due Date)
6	02/25	L12	Object Interaction Modeling – Assignment 2 (Posted)
	02/27	L13	Object Interaction Modeling
	03/01	E1	Exam 1 – Topics from L1 – L11
7	03/04	L14	Domain Modeling
	03/06	L15	Domain Modeling
	03/08	L16	Lab – More Detail to Android Dev.
8	03/11	L17	Architecture Design
	03/13	L18	Architecture Design
	03/15	-	No Class – Assignment 2 (Due Date)
	03/17	-	Project Deliverable 2 (Due Date)
9	03/18	-	Spring Break
	03/22	-	Spring Break
10	03/25	L19	Configuration Management – Assignment 3 (Posted)
	03/27	L20	Configuration Management
	03/29	E2	Exam 2 – Topics from L 12 – L18
11	04/01	L21	Design Patterns
	04/03	L22	Design Patterns
	04/05	L23	Lab – Design Patterns Exercise
12	04/08	L24	Software Testing
	04/10	L25	Software Testing
	04/12	L26	Software Testing – Project Deliverable 3 (Due Date)
13	04/15	L27	Lab – Introduction to Android Testing
	04/17	P2	Students’ Presentations
	04/19	P3	Students’ Presentations – Assignment 3 (Due Date)
14	04/22	P4	Students’ Presentations
	04/24	P5	Students’ Presentations
	04/26	E3	Exam 3 – Topics from Lecture 19 – 27
15	04/29	P6	Students’ Presentations
	05/01	-	No Class – Maine Day
	05/03	L28	Placeholder
	05/05	-	Project Deliverable 4 (Due Date)

Grading Policy:

The grading scale for the final mark is as follows:

Letter Grades	Numerical Range
A+	97 – 100
A	94 - 96.99
A-	90 - 93.99
B+	87 - 89.99
B	84 - 86.99
B-	80 - 83.99
C+	77 - 79.99
C	74 - 76.99
C-	70 - 73.99
D+	67 - 69.99
D	64 - 66.99
D-	60 - 63.99
F	0 - 59.99

This scale may be curved to raise student grades at the instructor's discretion.

- Submitted work is due when specified. **With the instructor's permission and only in special cases**, you may be able to submit 1-3 days late (with a penalty). For every 12 hours of late submission, 5% marks will be deducted. That is, if you are late by 3 full days, 30% mark will be deducted. After the 3rd full day, your assignment, project and reports will be marked as 0, **with no exception**.
- Every submission has to be done through Blackboard in a digital format. Submissions via email or in person will be marked as 0. If you encounter any problems with Blackboard, it is your own duty to inform the instructor **in a timely manner, before the due date**. Blackboard problems can't be used as an excuse for late submission.

Academic Honesty Statement:

Academic honesty is very important. It is dishonest to cheat on exams, to copy term papers, to submit papers written by another person, to fake experimental results, or to copy or reword parts of books or articles into your own papers without appropriately citing the source. Students committing or aiding in any of these violations may be given failing grades for an assignment or for an entire course, at the discretion of the instructor. In addition to any academic action taken by an instructor, these violations are also subject to action under the University of Maine Student Conduct Code. The maximum possible sanction under the student conduct code is dismissal from the University.

Students Accessibility Services Statement:

If you have a disability for which you may be requesting an accommodation, please contact Student Accessibility Services, 121 East Annex, 581.2319, as early as possible in the term. Students who have already been approved for accommodations by SAS and have a current accommodation letter should meet with me, Dr. Sepideh Ghanavati, privately as soon as possible.

Course Schedule Disclaimer (Disruption Clause):

In the event of an extended disruption of normal classroom activities, the format for this course may be modified to enable its completion within its programmed time frame. In that event, you will be provided an addendum to the syllabus that will supersede this version.

UMaine Student Code of Conduct:

All students are expected to conform to [the UMaine Student Code of Conduct](#).

Classroom Civility:

Civility should be conveyed to all others through courteous expression, politeness, esteem and regard for others, and a general respect for others, regardless of differences from self.

Inclusive and Non-Sexist Language:

The University of Maine, as an equal opportunity educational institution, is committed to both academic freedom and the fair treatment of all individuals. It therefore discourages the use of sexist language. Language that reinforces sexism can arise from imprecise word choices that may be interpreted as biased, discriminatory, or demeaning even if they are not intended to be. Accordingly, all University communications, whether delivered orally or in writing, shall be free of sexist language.

This policy shall apply to all future University publications, whether produced through Public Affairs or elsewhere, that are intended for distribution to students, parents, faculty, staff, or other people interested in the University of Maine. University publications shall include, but not necessarily be limited to: University printing office publications; promotional materials distributed by all units of the University both academic and nonacademic; and policy booklets prepared for students and faculty. Inventory on hand of existing publications may be used until exhausted or a publication is revised.

Each member of the University community is urged to be sensitive to the impact of language and to make a personal commitment to eliminate sexist language. Supervisory personnel have a particular responsibility to discuss this policy with faculty and staff and to make available to them guidelines on nonsexist language. Guidelines of the American Psychological Association on the use of nonsexist language provide direction and are recommended because they are brief and list examples, but others may be used. Consult the Communications and Marketing Department or Women's Gender and Sexuality Studies Program for alternatives (<https://umaine.edu/womensgenderandsexualitystudies/>).

Observance of Religious Holidays/Events:

The University of Maine recognizes that when students are observing significant religious holidays, some may be unable to attend classes or labs, study, take tests, or work on other assignments. If they provide adequate notice (at least one week and longer if at all possible), these students are allowed to make up course requirements as long as this effort does not create an unreasonable burden upon the instructor, department or University. At the discretion of the instructor, such coursework could be due before or after the examination or assignment. No adverse or prejudicial effects shall result to a student's grade for the examination, study, or course requirement on the day of religious observance. The student shall not be marked absent from the class due to observing a significant religious holiday. In the case of an internship or clinical, students should refer to the applicable policy in place by the employer or site.

Sexual Discrimination Reporting:

The University of Maine is committed to making campus a safe place for students. Because of this commitment, if you tell a teacher about an experience of **sexual assault, sexual harassment, stalking, relationship abuse (dating violence and domestic violence), sexual misconduct or any form of gender discrimination** involving members of the campus, **your teacher is required to report** this information to the campus Office of Sexual Assault & Violence Prevention or the Office of Equal Opportunity.

If you want to talk in confidence to someone about an experience of sexual discrimination, please contact these resources:

For confidential resources on campus: **Counseling Center: 207-581-1392** or **Cutler Health Center: at 207-581-4000**.

For confidential resources off campus: **Rape Response Services: 1-800-310-0000** or **Partners for Peace: 1-800-863-9909**.

Other resources: The resources listed below can offer support but may have to report the incident to others who can help:

For support services on campus: **Office of Sexual Assault & Violence Prevention: 207-581-1406, Office of Community Standards: 207-581-1409, University of Maine Police: 207-581-4040 or 911.** Or see the OSAVP website for a complete list of services at <http://www.umaine.edu/osavp/>

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1. Unless the “fair use” provisions of copyright law apply or language is contained in a work permitting its use, permission should be obtained from the copyright holder for copying the work.
2. Use of the instructor prepared web pages and the slides affiliated with each lecture on the syllabus may be assumed to be controlled by the University of Maine System Broad Application Copyleft License (proposed, current, or future) or through a similar license that may be posted at the bottom of each web page.
3. All class videos (lectures) should be assumed to be copyright protected in accordance with the University of Maine System Statement of Policy Governing Patents and Copyrights.

Contingency Plans in the Event of an Epidemic:

In the event of an influenza or similar epidemic that precludes the ability to meet in face-to-face sessions, assume that the instructor will either (1) host the course on our usual ConnectPro url for the class at the normal time and everyone will participate at a distance or (2) record a video of the lecture I would have otherwise presented in person and post it for viewing by downloading from the syllabus and/or from a web streaming video site (example: recorded on ConnectPro or recorded and then posted on the Spatial Information Science and Engineering YouTube Channel). All other reading and module assignments should proceed as usual. If you yourself become sick, simply inform the instructor and the instructor will arrange appropriate extensions based on your particular circumstances.

Additional References:

Recommended Readings:

- [1] UML Distilled: A Brief Guide to the Standard Object Modeling Language – M. Fowler – 3rd Edition
- [2] Design patterns: Elements of reusable object-oriented software – E. Gamma, R. Helm, R. Johnson, J. Vlissides, 1994.

Additional Resources:

- [1] Object Oriented Software Engineering: Practical Software Development Using UML and Java – T. C. Lethbridge and R. Laganière – 2nd Edition, 2004.
- [2] Object-Oriented Design with UML and Java – Kenneth Barclay & John Savage– 1st Edition, 2004.
- [3] Object-Oriented Analysis and Design for Information Systems: Modeling with UML, OCL, and IFML – Raul Sidnei Wazlawick, 2014.
- [4] An Integrated Approach to Software Engineering – P. Jalote – 3rd Edition, 2006.
- [5] A Concise Introduction to Software Engineering – P. Jalote, 2008.
- [6] Software Engineering: A Lifecycle Approach – Pratap K.J. Mohapatra, 2010.
- [7] Software Engineering: A Hands-On Approach – Roger Y. Lee, 2013.
- [8] Software Engineering: A Methodical Approach – E. Foster, 2014.
- [9] An Introduction to Requirements Engineering – I.K. Bray, 2002.
- [10] Model-Driven Software Engineering in Practice – M. Brambilla, J. Cabot, M. Wimmer, 2013.

- [11] Continuous Integration: Improving Software Quality and Reducing Risk – P.M. Duvall, S. Matyas, A. Glover, 2007.
- [12] Software Testing – R. Patton – 2nd Edition, 2005.
- [13] Continuous Delivery: Reliable Software Releases through Build, Test, and Deployment Automation – J. Humble, D. Farley, 2010.
- [15] Code Complete: A Practical Handbook of Software Construction – S. McConnell – 2nd Edition, Microsoft Press, 2004.
- [16] Clean Code: A Handbook of Agile Software Craftsmanship – Robert C. Martin – 1st Edition, 2008.