UNIVERSITY OF
SOUTHERN MAINE

Object-Oriented Design

COS 420/520

Spring 2025

Instructor Info

Dr. David B. Levine
Phone: (207) 228-8440 <not preferred>
Email: david.b.levine@maine.edu
Zoom: <link sent per meeting>
Office: Science Building 232
     (Portland Campus)
Hours: Mon 11 a.m. – 12 p.m.
     Wed 2 p.m. – 3 p.m.

Course Meetings

MW 12:30 a.m. – 1:45 p.m., Luther Bonney 326
(Portland Campus)
M 2:00 p.m.-2:50 p.m., Luther Bonney 202   (Portland Campus)

Services & Policies that Support You

Academic Services & Policies[1]

Contents

1. Course Information

Course Description

COS 420 is one of two capstone courses is software design required for the undergraduate major in computer science. COS 520 is the graduate version of the course. The focus of the -course is on the construction of object-oriented software. Students will learn conceptual models for organizing objects and object hierarchies, object-oriented design notation, and the application of design patterns in software development. This theoretical knowledge will be used to create software products as part of software development teams.

---

[1] https://mycampus.maine.edu/group/usm/common-syllabus

Course Materials & Books

Texts

- Larman, Craig, <u>Applying UML and Patterns: An Introduction to Object-Oriented Analysis and Design and Iterative Development</u>, third edition, Pearson Publishing), ISBN 978-0-13-148906-6.

- <u>For Brightspace tech requirements, see the</u> [Academic Services & Policies page](#)[2].

Technology

- Students will write Java code throughout the semester. While the use of the Eclipse IDE is encouraged, students may make use of any IDE of which they choose.

- At different times during the course, students will be expected to make use of AI tools (large language models in particular,) Students will be given wide latitude in the choice of tools, including some that require paid subscriptions – but free versions of tools will be sufficient to complete all coursework.

- Students will be expected to maintain (free) accounts on GitHub. These may be public or private as long as the instructor is granted access to work for evaluation purposes.

Course Format

The course is offered as an in-person course in a lecture/lab format. See attendance policies for the associated rules.

Program Learning Outcomes

For primary learning outcome, see the department's website.

Course Learning Outcomes

Successful completion of this course will provide students with the ability to:

- analyze a problem, and identify and define the computing requirements appropriate to its solution;
- to function effectively on reams to accomplish a common goal;
- to use current techniquess, skills, and tools necessary for computing practice;
- to apply design and software development principles in the construction of software systems of varying complexity; and,
- to understand different software development methodologies including Agile Development and others.

2. Coursework & Grading

Grade Scale

Grades will be assigned roughly according to the following scheme. The instructor reserves the right to adjust an individual student's grade upward on this scale should he believe that extraordinary circumstances merit it. A score would only ever be adjusted downward as a result of adjudicated academic dishonesty.

100-93%	=	A	79-77%	=	C+
92-90%	=	A-	76-73%	=	C
89-87%	=	B+	72-70%	=	C-
86-83%	=	B	69-60%	=	D
82-80%	=	B-	59% or lower	=	F

Course Grade Breakdown

Assessment Name	Value
Laboratory and Homework Exercises (some may be done in pairs)	32%
Project work	32%
Best five (out of eight) quizzes	18%
Final Exam	18%
Other extra credit that may (or may not) be announced during the semester	(???)
Total:	**100%**

Assessment Descriptions & Requirements

- There are three types of assignments involving coding this semester:
  - At the beginning of the semester, there will be a set of three lab exercises involving the use of GitHub; these must be completed individually, but students may use any tools they wish (short of electronic copying of others work) while they complete them.
  - There will be a set of assignments involving a game called Bulldog. These assignments will be used to evaluate the effectiveness of AI tools in software development. These assignments must be completed individually; the degree to which AI (and other) tools may or must be used will be specified in each assignment.
  - The course will involve a group project. For the duration of the project, all members of a given team are considered to be working collaboratively and are considered to be the same individual. AI (and other) tools will be permitted during this assignment although their use must be properly documented – as specified in each stage.
- There will be several times during the semester when students will be expected to write analyses of code produced by themselves or others; these are to be completed individually (unless explicitly stated otherwise) and must be self-generated, i.e. no use of AI tools. (The use of grammar and spelling checkers that make only minimal changes to

UNIVERSITY OF
SOUTHERN MAINE

text is permitted and need not be cited unless otherwise specified.)

- There will be eight quizzes given throughout the semester. The dates for these quizzes will be announced during lecture and through BrightSpace. A student's five best grades will be used to compute their quiz average. Quizzes will take place at the end of the lecture period on the scheduled days and will consist of a combination of short answer questions that may involve vocabulary testing, code tracing, or writing code snippets. Since three quizzes will be dropped for all students, *makeup quizzes will not generally be given!*

Final Examination

The final examination will be an in-person, written, comprehensive examination. Per the registrar's schedule, it will be given on Monday, May 5, from 11:00 a.m. to 1:00 p.m.

3. Class Schedule

As this version of the course will involve new explorations of the use of AI in software development, it is very challenging (to say the least) to schedule the work of the semester at a fine-grained level. The table below gives an overview of how I anticipate our time to be spent.

When	Topics	Text coverage	Assessment-Based Work
Weeks 1-3	Design Processes and artifact	Larman, Chapters 1-13	Git / Bulldog program / Use of AI tools / Short reaction "papers" / Quizzes
Weeks 4-8	Object Design	Larman, Chapters 14-26	Rewriting of Bulldog / Explorations of technologies, e.g. Swing / Start of group project / Short reaction "papers" / Quizzes
Weeks 9-12	Real world (technological) interfaces	Various online resources	Group project work / Short reaction "papers" / Quizzes
Week 13	Project Presentations	n/a	Oral Presentations / Last Quiz

4. Course-Specific Policies

Attendance

- Lecture meetings will cover most, if not all, of the material in this course. In addition to the technical aspects of the material, there will be considerable discussion of trade-offs and philosophy that will be assessed but not found in any text. There will also be eight days when quizzes are given and those quizzes **have no make-ups**. In keeping with the belief that you are all mature decision makers, attendance at lecture is not required although **strongly encouraged**. Note that while PowerPoint presentations given during lecture will be available (after lecture) on BrightSpace, these presentations are not meant to be complete reflections of the material covered; not all material tested on quizzes or exams will be found in these files.

- At the level of this course, students are expected to have the ability to perform technical work without the direct supervision of faculty. Therefore, lab attendance is generally optional. That said, the course involves a good bit of group work and the lab period represents a time when all students in the class are free – and therefore guarantees that every group has a time (the lab period) when all members can get together. Therefore, although attendance at lab is optional, students should refrain from scheduling other commitments during that hour.

- During the course of the semester, we will make explicit use of AI tools; indeed, evaluating the effectiveness of such tools will be a direct objective of many assignments.

- Note that in all cases of a student's absence, it is the student's responsibility, not the instructor's to get caught up on work. You may borrow/copy notes from another student, ask questions, etc.

Late Work

The fastest way to a poor grade, or even failure, in a computer science course is to fall behind. Studies have shown that falling behind in any mathematics, science, or computing course has a much more deleterious effect on one's grade than doing so in a humanities or social science

course.   Sadly, significant penalties for late work have been shown to be the best deterrent to students falling behind.   Late work that is turned in by midnight of the day after the assignment is due will be subject to a 5% penalty.   An additional 5% penalty will be applied for each subsequent day (starting at midnight) that the work is late. Saturday and Sunday (and any adjacent days of break as defined by the USM calendar) together will count as one day for computation of a late penalty.   The penalty is also capped at 50%.   [The penalty is applied to the score earned so an assignment four days late (20%) that earned a score of 85 points would be recorded as 68 points, as 20% or 85 is 17, and 85 points minus 17 points (the 20% penalty) would result in a recorded score of 68 points.]

Lateness "Cap"

Late penalties will not – in and of themselves – cause a student to fail.   Likewise, penalties will be minimized/discounted for students whose "raw" average is below a C. Students who are likely to be affected by this are encouraged to discuss the details with the professor.

Class Cancellation

In the event that my personal circumstances unexpectedly cause class to be cancelled, I will – to the best of my ability – place a notice on BrightSpace as soon as I am aware of the cancellation. Cancellations due to professional travel, etc., will be announced in class and published on BrightSpace at least a week in advance – probably more. Obviously, any announcements from the university about in-person classes being cancelled would apply to both lecture and lab meetings.   How any cancellations affect quiz dates or due dates will be posted on BrightSpace as soon as the situation allows.

Inclement Weather Contingencies

Nobody should risk life or limb to attend class when it is unsafe to do so.   In the event of a major inclement weather situation, class may be cancelled (see above).   Should class be held, but situations prevent individual students from attending, accommodations to the above policies will be made.

UNIVERSITY OF SOUTHERN MAINE

Personal Device Usage in the Classroom

Several studies have shown that use of personal devices during lectures diminishes student learning. The general exception to this rule is if the device is being used actively to support (and even better, in a public way) the lecture. [Clickers used for "group poll questions" are an example of such a device although we will not be using them.] The studies also show that knowledge retention is reduced when notes are taken on an electronic device rather than on paper. Once again, I appeal to your judgment as mature students in this matter. Under NO circumstances, however, may you use a device in a manner, e.g. with audible sounds or disturbing images, that negatively affects the learning of those around you.

Academic Integrity

The University of Southern Maine has its own academic integrity policy (see the link below), but sometimes students are unsure how it applies to computer science courses. At least for COS 420/520 this semester, the following guidelines may help you understand expectations. For individual assignments, it is permissible to *discuss* general problems and solutions with others – be they classmates, friends, experts that you can find either personally or online. If, however, it is necessary for a person to perform a "close reading" of your code in order to render assistance, then that is inappropriate assistance. Similarly, it is permissible to google general ideas, such as, "how do I convert between Celsius and Fahrenheit?" or "how many comparisons does selection sort generally make?", but not specific ones, such as "what code will convert total seconds to hh:mm:ss format?" or "how do I identify SelectionSort in the SortDetective program?" In any case, if it is necessary – or even beneficial – to copy/paste code from one source to your answer, then the inquiry would be inappropriate. If there is any concern about what level of assistance is permitted, you should ask the instructor. [Note: persons working in pairs to complete a lab exercise are considered to be the same person for purposes of this discussion.]

Borrowing or copying of lecture notes from classmates is expressly permitted as is joint studying for quizzes or exams. During such study sessions, the above restrictions do not apply.

AI and other Aids

As noted above, the course will explicitly study the capabilities of AI tools and you are welcome (and will sometimes be required) to make use of them. That said, ANY time use is made of outside resources, be they large language models, web searches, or personal consultations, it is incumbent upon the party receiving such assistance to acknowledge such aid through some form of citation; specifics will be discussed in class.

5. Academic Services & Policies

For USM's most current information on services available to students and academic policies, see [The Academic Services & Policies Overview webpage](#)[3] where you will find specifics on the following:

- **Services to help you succeed**
  - Disability Accommodations, Plan for Academic Success, Access Textbooks and Technology, Work with a Trained Peer, Access Wellness Resources, Find Community.
- **University Policies**
  - Academic Integrity, Disability Accommodations, Acceptable Conduct In Class Settings, Course Evaluations, Covid Face Covering Requirement, Dropping/Withdrawal from the Course, Inclement Weather, Online Conduct,, Nondiscrimination Policy And Bias Reporting, Statement On Religious Observance For USM Students, and Title IX Statement, and Technology Requirements.

Scan the QR Code to go to the [Academic Services & Policies webpage](#)[4]