McGill | School of Computer Science

COMP 303

Software Design

Course Outline
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1 Overview

Welcome to COMP 303! Please read this document carefully and keep it for reference throughout the term.

This course provides an in-depth introduction to the discipline of software design for building realistic and high-quality software applications. It will focus on object-oriented programming techniques, and cover topics related to managing software complexity and verifying that they work as expected.

1.1 Primary Learning Objectives

By the end of this course, you should be able to:

- Properly explain and apply general Design Principles (separation of concerns, encapsulation, substitutability, interface segregation, etc.) and important Design patterns.
- Properly explain and apply design techniques such as UML Diagrams and Design by Contract.
- Effective use programming language mechanisms such as exception handling and reflection.
- Analyze and evaluate the quality of design solutions; correctly identify design smells and apply appropriate refactoring to eliminate them.
- Gain experience on software development tools such as modern IDEs, automatic documentation and testing tools, and version control system.

1.2 Course prerequisites

Students must have taken the following pre-requisite courses before taking this course:

- COMP 250
- COMP 206

Students are also encouraged to take a self-assessment test to check if they have the necessary competencies.

2 Course materials

2.1 Recordings, slides and exercises

Lecture recordings and slides will be made available to students on myCourses. Note that recording quality is on a best-effort basis, and students are strongly encouraged to attend the lectures in person.

2.2 Textbook and other references

Readings will be assigned at the end of most lectures from **Introduction to Software Design with Java, 2nd ed.**, by Prof. Martin Robillard, available at no cost to McGill students through the McGill Library. There is also a companion website for the textbook which contains source code, exercises and solutions, and another which contains solutions annotated with extra explanations.

We may also cite from The Pragmatic Programmer by David Thomas and Andrew Hunt and Effective Java by Joshua Bloch.

2.3 Copyright policy

You are not allowed to post any course materials online, including but not limited to GitHub, Course Hero, or any other websites. Course materials include but are not limited to video recordings, PDFs of lecture slides, tutorials, recommended exercises, assignment questions, project code or anything else provided to you during the course.

Stated more formally: Instructor/TA-generated course materials are protected by law and may not be copied or distributed in any form or in any medium without explicit permission of the instructor/TA. Infringements of copyright can be subject to follow up by the University under the Code of Student Conduct and Disciplinary Procedures.

3 Communication policies

3.1 Office hours

Teaching Assistants (T.A.s) and the instructor will be available for office hours each week to help you with your work and answer questions about the course material.

Office hours will be held either in person or through Zoom and will be individual (one-on-one). The office hour schedule will be shared with you in the first weeks of the term. Feel free to attend as many of these office hours as you like, whichever best fit with your schedule.

3.2 Ed Discussion board

We will be using Ed Discussions for class discussion. The system is designed to get you help fast and efficiently from classmates, the TAs and the instructor. ***Please post all your questions related to the course content and homework on Ed, rather than emailing questions to the teaching staff.*** By using the discussion board, you will receive an answer faster, and everyone in the class will be able to benefit from it.

Ed Discussion allows you to post privately, if you are unsure that your post should be read by other students (e.g., because it might give away a solution). It also allows you to post anonymously if you do not wish to be identified for some reason.

You may freely answer other students' questions as well, with one important exception: you may not provide solution code (although you are permitted to provide one or two lines of code to illustrate a point).

You can access Ed Discussions through a link on our class' myCourses navigation bar.

3.2.1 Discussion board guidelines

We encourage you to share your knowledge and help each other out by answering your peers' questions on the discussion board. The instructor and TAs will try to moderate the discussion board, but it works best when students help each other out.

When posting to the discussion board, please obey the following guidelines. *Postings that do not conform may be deleted.*

- Search to see if your question has been asked before. Do **not** make duplicate posts.
- Choose a suitable subject line, so that others know what the post is about.
- If you have multiple unrelated questions, then use multiple postings.
- Proofread before posting. Take an extra minute to ensure what you wrote makes sense.
- Be polite and respectful.

Formally and officially: The University is committed to maintaining teaching and learning spaces that are respectful and inclusive for all. To this end, offensive, violent, or harmful language arising in contexts such as the following may be cause for disciplinary action:

- Zoom sessions, including username (use only your legal or preferred name), virtual backgrounds, 'chat' boxes, whiteboard annotations, breakout rooms.
- Ed Discussion board.
- Other in-course venues of discussion.

3.3 Contacting the instructor and teaching assistants

For private matters, you can send email to a TA or to your instructor directly with 'COMP 303' in the subject header. Be sure to send your email from your `@mail.mcgill.ca` address, and include your student ID. Email sent from non-McGill accounts may be spam-filtered or simply ignored. A private matter may be, for example, if you are anxious about your performance in the class and would like to discuss it.

When emailing a TA or instructor, please follow the guidelines on etiquette described in the video here and on this website.

3.4 Course announcements

Important course information will be announced in class and/or on myCourses and Ed Discussion. Please subscribe now to myCourses Announcements if you have not already done so. *You are expected to monitor your McGill email, myCourses, and Ed Discussion for course-related news and information.*

4 Methods of Evaluation & Grades

Our course grading scheme is as follows:

- **Midterm:** 25%
- **Final Exam:** 45%
- **Project:** 30%

Rounding: Final course grades will be rounded off to the nearest integer. If your grade is 84.4 then it will round to 84 (A-), whereas if it is 84.6 then it will round to 85 (A). If your grade is 84.5, our formula will round it up to 85. The same rounding procedure holds for low grades. If your calculated final course grade is 49.4 then it will round to 49 (F). We draw a very hard line here, so if you don't want to fail then you should stay far away from that line.

4.1 Midterm

The midterm will take place in the middle of the term, likely during the week after the Study Break (March 10-14). The exact date and time will be conveyed to you closer to the date.

4.2 Final exam

The final exam will take place during the final exam period. It will be worth 45%, but if you do better on it than you do on the midterm, then the midterm will be worth 0% and the final exam will be worth 70%.

4.2.1 Supplemental/deferred exam

Under certain conditions, you may be eligible to write the Supplemental/Deferred exam. This exam will cover the same material as the Final Exam. For those writing the Deferred Exam, the exam grade will simply replace the Final Exam grade. For those writing the Supplemental Exam, a new grade will appear on your transcript which is calculated as follows: the Supplemental exam grade will replace the Final Exam grade, and your pre-existing midterm/project grades will be used (and hence double counted in the GPA). For more information on Supplemental and Deferred exams, see here.

4.3 Project

The project will be done in teams of 3, though it will be possible to work alone or in a team of 2. The project will be worth 30% of your grade and will have deadlines that must be met throughout the term.

The first deadline will be Monday, January 20, at which point teams must be registered. The registration process will be detailed to you in class in the days leading up to the deadline. Teams must work together for the remainder of the term, and all partners in the team will typically receive the same grade.

Here are approximate weeks during which work will be due. Exact deadlines will be communicated to you on the posting of each part.

- Week of Jan. 20: Team forming deadline
- Week of Feb. 3: Project proposal deadline
- Week of Feb. 10: Reviews of project proposal due
- Week of Mar. 10: Halfway mark
- Week of Mar. 31/Apr. 7: Final demo and project submision

4.3.1 Project submissions

Project submission will take place through a system to be described by the instructor at or around the posting of the project proposal guideline document.

You are responsible for verifying that your submissions are successful. If you believe the content of your submission is different from what you have submitted, you must email your instructor preferably within a few days of the deadline and provide evidence of your correct submission.

Furthermore, once grades for an assessment are released, it is your responsibility to check that your grades are correct and to notify your instructor of any errors.

4.3.2 Late policy

Unforeseen events may arise that prevent you from submitting work on time. For example, you might be sick for several days in the week before the deadline. Our standard late policy is that you may submit up to two days after the deadline, but with a small penalty: we will deduct 10% each day for which they are late, including weekends and holidays; that is, work that is between 0 and 24 hours late will be deducted 10 points, and work that is between 24 and 48 hours late will be deducted 20 points. We are willing to waive this penalty in cases of *extended* illness or other unforeseen personal circumstances. However, you must make a formal request (see section 3.3 for email policy).

Examples of invalid requests are:

- Your laptop broke or was stolen. This is not a valid excuse. You should be using a cloud backup system, e.g., Dropbox, Google Drive, etc., to be able to access a version of your file.
- You have other exams, a job interview, etc. These are invalid because they are not unexpected and you have two weeks to complete your assigned work. It is your responsibility to plan accordingly.

Work submitted more than 2 days after the deadline will not be accepted, nor graded, and will therefore receive a grade of 0.

*Plan appropriately and do **not** submit only minutes before the deadline. Requests for waiving the late penalty because the system was busy or your machine/internet was too slow will not be accepted.* Individual exceptions to the lateness policy will not be granted without appropriate justification submitted in writing and supported by documentary evidence.

4.4 Regrade requests

If you believe that you have been assigned an incorrect grade for one of your assessments, you can request a regrade. Only well-argumented requests will be considered. *You may request a regrade within only 7 days from when your grade was published.* Requests after the deadline will not be considered.

4.5 Additional work

Students who receive unsatisfactory final grades will **NOT** have the option to submit additional work to improve their grades.

4.6 McGill Language Policy

In accordance with McGill University's Charter of Students' Rights, students in this course have the right to submit in English or in French any written work that is to be graded.

Conformément à la Charte des droits de l'étudiant de l'Université McGill, chaque étudiant a le droit de soumettre en français ou en anglais tout travail écrit devant être noté.

4.7 Extraordinary circumstances beyond the University's control

In accordance with section 3.2.3 of the *University Student Assessment Policy*, in the event of extraordinary circumstances beyond the University's control, the evaluation scheme in a Course is subject to change, provided that there be timely communications to the students regarding the change.

5 Policies on Academic Integrity

Official policy: McGill University values academic integrity. All students must understand the meaning and consequences of cheating, plagiarism, and other academic offences under the Code of Student Conduct and Disciplinary Procedures (see https://www.mcgill.ca/integrity/ for more information).

5.1 Plagiarism policy

You must include your name and McGill ID number at the top of each code file that you implement and submit. By doing so, you are certifying that the program or module is entirely your own, and represents only the result of your own efforts.

Work submitted for this course must represent your own efforts. The project *must* be done with your registered team; you *must not* work with anyone else. Do not ask friends or tutors to do your work for you. You *must not* copy any other person's work in any manner (electronically or otherwise), even if this work is in the public domain or you have permission from its author to use it and/or modify it in your own work (obviously, this prohibition does not apply to source code supplied by the instructor explicitly for this purpose). To be clear, you must not copy or view any code from any source, online or otherwise, except the code written by the instructor during lectures. Furthermore, you **must not** give a copy of your work to any other person.

The plagiarism policy is not meant to discourage interaction or discussion among students. You are encouraged to discuss course and/or project questions with the instructor, TAs and your fellow students. There is no better way to learn than through discussion with your peers. You are also encouraged to help each other out with debugging problems, especially with the basic mechanics of debugging, such as how to make the best use of an IDE. Finally, you are highly encouraged to post questions on Ed and to answer each other's questions there as well. However, there is a difference between discussing ideas and working in groups or copying someone else's solution. Your discussion should never go so far that you are revealing the solutions to each other. *Sharing code is absolutely forbidden.* The solution code that you submit must be your own work. A good rule of thumb is that when you

discuss projects with your fellow students, you should not leave the discussion with written notes. Also, when you write your solution, you *must* do it on your own.

5.2 Getting help and partial credit

Students who require assistance should see a TA or the instructor during office hours or make use of the Ed discussion board. If you have only partially finished part of the project, *comment out the parts that do not work*, and submit what you managed to complete for partial credit.

Code files that do not run at all (syntax or runtime errors) will be heavily penalized and almost certainly result in a grade of zero, so make sure to submit only working code, even if it does not fully satisfy the project requirements.

5.3 Plagiarism detection

We will be using automated code similarity detection tools to compare your project submissions to that of all other students registered in the course. These tools are cutting-edge and are very effective at their job. However, we will not accuse anyone of copying based solely on the output of these tools. Rather, we will use these tools to determine which submissions should be manually checked for similarity by the TA and instructor.

When the instructor suspects that plagiarism has occurred, the instructor will report the case to the Disciplinary Officer in the student's Faculty (Science, Arts, Engineering, etc). For more details on the process, see Section III Articles A.37 (p. 10) and A.48 (p. 13) of the Code of Student Conduct and Disciplinary Procedures, which can be found here.

5.4 Posting solutions on a website

You must not share your solutions by posting them on a public space such as GitHub, CourseHero, etc. This rule extends beyond the duration of the course. The reason for the rule is that instructors occasionally recycle assignments from previous years, and if the old versions are easily accessible then such posting can lead to plagiarism by others.

6 Land acknowledgement

McGill University is on land which has long served as a site of meeting and exchange amongst Indigenous peoples, including the Haudenosaunee and Anishinabeg nations. We acknowledge and thank the diverse Indigenous people whose footsteps have marked this territory on which people of the world now gather. Please see here for more details.

7 Accommodations

7.1 Student Accessibility and Achievement Office

If you require accommodations, the Accessibility and Achievement Office is here to help. This Office liaises with your instructor on your behalf to ensure that your accommodations are met and that you can succeed in your studies.

7.2 Pregnancy and caregiving

Students who are pregnant and/or caring for a dependent may find it helpful to receive academic accommodations. McGill's guidelines for accommodations for students who are pregnant and/or caring for a dependent may be found here.

7.3 Health and Wellness resources

The academic environment at McGill is challenging. Our terms are intensive, and classes are not the only demanding part of your life. Student well-being is a priority for McGill. If you need to access services for health and wellness, or if you want to get more information, please consult our Student Wellness Hub at here, or drop by the Brown Student Services Building (downtown) or Centennial Centre (Macdonald Campus). Within your faculty, you can also connect with your Local Wellness Advisor (to make an appointment, visit here).

8 Campus Computer Laboratories

All students registered in COMP 303 may use the School of Computer Science (SOCS) computer laboratory facilities to do their work regardless of the program in which they are registered. These facilities are located on the third floor of the Trottier building. You can refer to here for more information on the SOCS computer laboratory facilities.

You may also use other computer laboratory facilities on campus to do your work. Most facilities are available to all students, but there are facilities which grant usage privileges only to students registered in a course or program offered by the faculty or department which manages the facility. Students should contact the work area of their choice to inquire about access requirements, opening hours, or any further information such as software availability.

9 Course Topics

The following is a tentative and non-exhaustive schedule of topics. The exact ordering and number of weeks per topic will likely shift as the semester unfolds.

Week	Topics	Notes
1-2	Encapsulation	
2-3	Types & polymorphism	
4	Object state	
5	Design for robustness	
6	Unit testing	
7-8	Composition	
9-10	Inheritance	Midterm
10-11	Inversion of control	
12	Concurrency	
13	Review Project demos	