

**Course Outline**

**Course Name:** Software Development  
COMP 303 – Fall 2018

**Instructor:** Joseph Vybihal  
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Website: MyCourses                      Office hours: T, W, Th, F 10:30-11:30 or by appointment

**Credits:** 3 credits

**Course Description:** Principles, mechanisms, techniques, and tools for software development, with a focus on software design.

Principles = Separation of concerns, encapsulation, substitutability, interface segregation.  
Mechanisms = Exception-handling, serialization, concurrency, synchronization, & reflection.  
Techniques = Design patterns, design by contract, unit testing, refactoring.  
Tools = Integrated software development environment, automatic testing tools, coverage analyzers and static checkers.

**Course Objectives:** The student will be able to use the proper terminology when speaking about Principles, Mechanisms, Techniques, and Tools. The student will be able to describe and explain in what context each principle is best expressed, how each mechanism can be implemented, the timely application of each technique, and how each tool's underlying mechanisms function.

**Primary learning outcome:** The student will be able to look at a problem and determine the best principles, mechanisms, techniques and tools to use.

**Secondary learning outcomes:** Create a complete object-oriented application based on the principles of object-oriented software development, the structured use of programming language mechanisms, the application of software development techniques, and the use of software engineering tools.

**Required Text:** Object-oriented Design & Patterns, Cay Horstmann, Wiley, ISBN 0-471-74487-5  
(available on MyCourses as a PDF book)

**Additional Text:** <https://github.com/prmr/SoftwareDesign> (Textbook)  
<https://github.com/prmr/Solitaire> (Sample project)

<b>Evaluation:</b>	Mini Assignments	16%	8 minis
	Test 1	20%	~ week 4 or 5
	Test 2	20%	~ week 7 or 8
	Final Exam	44%	or 84% or 100%
	Weekly TA-led tutorials/labs	0%	Optional

Final course grade is the best grade from the above marking schemes.

**Course Prerequisite:** COMP-206, COMP-250

**Course Co-Requisite:** N/A

### Tentative Course Schedule

Week	Module	Section	Description	Activity
1	Well Designed Algorithms	Concept of being well designed	Simplicity, optimality, correctness, writing style, commenting as documentation	Mini 1 + Lab 1
2		Well designed objects	Class design, encapsulation, polymorphism, inheritance, and abstract classes	Mini 2 + Lab 2
3		Well designed objects 2	Object identity, life-cycle, object model, generic types	Mini 3 + Lab 3
4		Well designed objects 3	Design by contract, <a href="#">Swing</a> , + GUI Programming	Test 1 (online) Lab 4
5	Tools That Aid Good Design	Testing, Docs, Errors ( <a href="#">JUnit</a> & <a href="#">javadoc</a> )	State validation, the idea of being true, software quality checking & interface quality + Error handling	Mini 4 + Lab 5
6		UML ( <a href="#">UMLet</a> )	Class diagrams, sequence diagrams, activity diagrams	Mini 5 + Lab 6
7		Overflow time	Examples	Test 2 (in class) Lab 7 (review)
8	Design Patterns	Intro to DP	Composite, Decorator, Iterator, Singleton	Lab 8
9		DP 1	MVC, Observer	Mini 6 + Lab 9
10		DP 2	Strategy, Template Method	Mini 7 + Lab 10
11		Threads & Synchronization	Producer, Consumer, Locks	Mini 8 + Lab 11
12		DP 3	Visitor, Factory Method (Adaptor, Command)	Lab 12

### Tentative Lab Schedule

Week	Topic
1	Simplicity, correctness, style
2	Good OO constructs
3	The object model and generics
4	Contracts
5	JUnit and Javadoc lab
6	UML
7	Review for class test 2
8	Design pattern basics
9	MVC
10	Template and Strategy
11	Synchronization
12	Factory and Visitor
13	Review for final exam

Labs are:

- Optional
- Not for points
- Held every Thu & Fri
- Schedule on myCourses

Teaching Assistants:

- Triage (email)
- Labs
- Regular (office hours)

## Organization of the Course

Communication	<p>Since this is a large class, all student communication will be triaged by the TA XXXXXX. This TA will help you. If the TA decides that I need to answer the email then the TA will forward the email to me.</p> <p>For emergency or private communication, you can email me directly or come to my office hours. You do not need to communicate with the Triage TA.</p>
Tutorials	<p>Some of the material in this course is complex. A series of tutorials have been created to help the student understand the material. There are no grades for these tutorials. They are provided as a study aid to the student. All tutorials are posted on myCourses. A tutorial TA YYYYYY will give weekly tutorials, as per the Tentative Lab Schedule. These labs are optional. Check the location and time schedule on myCourses, if you want to attend. The labs have solutions attached for you to try at home.</p>
Lectures	<p>All lectures are given by the professor. If the room has the technology, then the lecture will be recorded. All lecture slides are provided ahead of time on myCourses.</p>
Assignments	<p>Assignments are given out on myCourses and submitted to myCourses. Every assignment has a due date and 2 late days. Each late day deducts 5% of the total grade. After the two late days the assignment is not accepted, unless you have a valid medical note.</p>
Tests / Exams	<p>The course has two class tests and one final exam. If you have a conflicting text/exam/lecture/event, there will be no makeup, unless you have a valid medical note.</p>
Office Hours	<p>See the schedule on myCourses for the professor and TA office hours.</p>

## About Assignments and Class Tests

Assignments are original works created by the student alone. You are permitted to have conversations with other students concerning the contents of the assignments and how to do them, but your work must be original. If two or more assignments are found to be identical (or portions of assignments) then all parties will receive zero. This includes the student who permitted their assignment to be copied. This includes written solutions and software source code.

All software solutions must compile with zero errors and must run to be graded. It does not need to run correctly for grading but it must run. If your program compiles with errors or does not run at all then you will receive zero points. The grader will not fix your code or look at the source code to give you partial grades.

Class tests are 1 hour long and take place in class. You are not permitted any material during these tests other than something to write with and something to erase with. You may bring a non-programmable non-internet/network capable calculator.

The course textbook is very important to the course. Students are responsible for the material in the textbook in assignments, tests, and exams. Students are responsible for all the material in the textbook regardless of what was covered during the lecture. Material covered during the lectures and assignments are more important for the student but this does not restrict the use of assigned reading material from appearing in assignments, tests, or exams, even when they were not explicitly covered during lecture time.

## About Grading

Points are awarded following this template:

- Program does not compile . . . . . No points
- Program runs incorrectly . . . . . No points
- Program runs correctly . . . . . No points
- Program runs correctly with style OR proper use of design concepts . . . . . Half points
- Program runs correctly with style AND proper use of design concepts . . . . . Full points
- Special case:
  - Program run incorrectly but with style and/or proper design . . . . . Half points

Assignments:

- Writing style 5 points
- Documentation 5 points
- Simple solution 5 points
- Optimal solution 5 points
- Good algorithm 5 points (defined as good selection of algorithm & design pattern)
- Assumed: program runs
- Assumed: correctness

Notice how “program runs correctly” awards zero points and “program run incorrectly but with style and/or proper design” awards half points. This course assumes you know how to program and does not award points based on a running program but on well-designed programs written with good style.

This course will be anal when it comes to well designed and well written source code and algorithms. Please spend time developing those important, but often neglected, skills. Every element of this course attempts to introduce the student to some facet of this concept, writing software that is well designed and in style.

## Misc. Instructions

### Right to submit in English or French written work that is to be graded

In accord 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.

**Classroom Rules:** All electronic devices (cell phones and beepers) must be turned off or left on silent mode during class time.

**Assignments Pickup:** All assignments are submitted to and picked-up from My Courses.

**Computing Resources:** Trottier 3<sup>rd</sup> floor.

### Examinations and Grading:

Students are responsible for all materials for the tests and exams, whether or not it is covered in class. Exams will be a combination of all types of questions based on all sources, and students may be required to integrate theoretical concepts from the text to substantiate their arguments.

No make-up tests or make-up assignments are allowed in this course.

If you are not satisfied with the grading of an assignment or mid-term test, you may request a review within 7 days of return. Indicate in writing or during a meeting with the instructor where and why you feel the marks are unjustified and give it back to your instructor for re-grading. Note that the entire assignment or mid-term test will be re-graded and your grade can go up or down (or stay the same) accordingly.

#### *Calculators*

Only non-programmable, no-tape, noiseless calculators are permitted. Calculators capable of storing text are not permitted in tests and examinations.

#### *Dictionaries*

Dictionaries are not permitted, but translation dictionaries are.

#### *Handheld Devices*

Handheld devices capable of storing text and having calculator functionality (e.g. Palm, etc.) are not permitted.

**Additional Information:** The course slides are not meant as a complete set of notes or a substitute for a textbook, but simply constitute the focus of the lecture. Important gaps are left in the slides that are filled in during class, thus lecture attendance should be considered essential.

The material covered in the classroom will be used to supplement textbook readings.

**Academic Integrity:** *Code of Student Conduct*

McGill University values academic integrity. Therefore 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 [www.mcgill.ca/integrity](http://www.mcgill.ca/integrity) for more information).

L'université McGill attache une haute importance à l'honnêteté académique. Il incombe par conséquent à tous les étudiants de comprendre ce que l'on entend par tricherie, plagiat et autres infractions académiques, ainsi que les conséquences que peuvent avoir de telles actions, selon le Code de conduite de l'étudiant et des procédures disciplinaires (pour de plus amples renseignements, veuillez consulter le site [www.mcgill.ca/integrity](http://www.mcgill.ca/integrity)).

**Final Exam Policy:**

#### *Regulations*

Students should not make other commitments during the final exam period. Vacation plans do not constitute valid grounds for the deferral or the rescheduling of examinations. See the Centre Calendar for the regulations governing Examinations:

<http://www.mcgill.ca/student-records/exams/regulations/>

Students are required to present their I.D. Card (with photo) for entrance to their examination.

#### *Conflicts*

If you are unable to write your final examination due to scheduling conflicts, you must submit a Final Exam Conflict Form with supporting documentation at least **one month** before the start of the final examination period. Late submissions will not be accepted. For details, see

<http://www.mcgill.ca/student-records/exams/conflicts/>

#### *Exam Timetable*

Examination schedules are posted at the Centre and on the following page approximately 6-8 weeks before the examination period commences

<http://www.mcgill.ca/student-records/exams/>

The Centre cannot provide examination dates over the telephone.

**Email Policy:**

E-mail is one of the official means of communication between McGill University and its students. As with all official University communications, it is the student's responsibility to ensure that time-critical e-mail is accessed, read, and acted upon in a timely fashion. If a student chooses to forward University e-mail to another e-mail mailbox, it is that student's responsibility to ensure that the alternate account is viable.

Please note that to protect the privacy of the students, the University will only reply to the students on their McGill e-mail account.

**Students Rights and Responsibilities:**

Regulations and policies governing students at McGill University can be downloaded from the website:

<http://www.mcgill.ca/deanofstudents/rights/>

**Students Services and Resources:**

Various services and resources, such as email access, walksafe, library access, etc., are available to students:

<http://www.mcgill.ca/student-records>

**Minerva for Students:** <http://www.mcgill.ca/minerva-students/>

**Note:** In the event of extraordinary circumstances beyond the University's control, the content and/or evaluation scheme in this course is subject to change.