Toronto Metropolitan University

Department of Electrical, Computer, & Biomedical Engineering
Faculty of Engineering & Architectural Science

Course Outline (W2025)

COE528: Object Oriented Eng Analysis and Design

Instructor(s)	Dr. Olivia Das [Coordinator] Office: ENG464 Phone: (416) 979-5000 x 556114 Email: odas@torontomu.ca Office Hours: TBA Boujemaa Guermazi Office: TBA Phone: TBA Email: bguermazi@torontomu.ca Office Hours: TBA
Calendar Description	This course deals with the analysis and design of complex engineering systems. In particular, students will be asked to create requirement specifications prior to the design and implementation of such engineering systems. Case studies from software development projects will be used to illustrate the design process. Development of expertise in analyzing, designing, implementing, and testing industrial-quality, reusable software systems. Project work include practice with an object-oriented programming language. (Formerly COE 618)
Prerequisites	COE 318
Antirequisites	None
Corerequisites	None
Compulsory Text(s):	1. Program Development in Java: Abstraction, Specification, and Object-Oriented Design, Barbara Liskov and John Guttag, 2000, Addison-Wesley, ISBN: 0201657686.
Reference Text(s):	1. Object-Oriented Software Engineering Using UML, Patterns, and Java, Bernd Bruegge and Allen H. Dutoit, 2009, Prentice Hall, Third edition, ISBN 0136061257. 2. Design Patterns Explained: A New Perspective on Object-Oriented Design, Alan Shalloway and James R. Trott, 2004, Addison-Wesley Professional, Second Edition, ISBN 0321247140. 3. Design Patterns: Elements of Reusable Object-Oriented Software, Erich Gamma, Richard Helm, Ralph Johnson, John Vlissides, 1995, Addison-Wesley Professional, First Edition, ISBN 0201633612. 4. Head First Design Patterns, Eric Freeman, Elisabeth Freeman, Kathy Sierra, Bert Bates, 2004, O'Reilly, First Edition, ISBN 0596007124. 5. A Concise Introduction to Software Engineering, Pankaj Jalote, (Undergraduate topics in Computer Science) ISBN-10:1848003013 | ISBN-13:978-1848003019 | Edition: 2008.
Learning Objectives (Indicators)	At the end of this course, the successful student will be able to:

	1. Demonstrates an in-depth understanding of key concepts related to object-oriented engineering fundamentals. (**1c**) 2. Apply the knowledge of object-oriented engineering principles to a software problem. (**4a**) 3. Integrate the existing design patterns into the software design where applicable. (**4b**) 4. Select the most appropriate design pattern to address a software design problem. (**4c**) 5. Manages time effectively to achieve the goals. (**6b**) 6. Produce course project report using appropriate format. (**7a**) 7. Demonstrate the project through oral communication. (**7b**) 8. Understands project scope and desired deliverables. (**11b**) **NOTE:***Numbers in parentheses refer to the graduate attributes required by the Canadian Engineering Accreditation Board (CEAB).*
Course Organization	3.0 hours of lecture per week for 13 weeks 2.0 hours of lab per week for 12 weeks 0.0 hours of tutorial per week for 12 weeks
Teaching Assistants	TBA
Course Evaluation	<table><tr><th colspan="2">Theory</th></tr><tr><td>Midterm Exam</td><td>20 %</td></tr><tr><td>Final Exam</td><td>45 %</td></tr><tr><th colspan="2">Laboratory</th></tr><tr><td>Labs</td><td>15 %</td></tr><tr><td>Project</td><td>20 %</td></tr><tr><td>TOTAL:</td><td>100 %</td></tr></table> **Note:** In order for a student to pass a course, a minimum overall course mark of 50% must be obtained. In addition, for courses that have both **"Theory and Laboratory"** components, the student must pass the Laboratory and Theory portions separately by achieving a minimum of 50% in the combined Laboratory components and 50% in the combined Theory components. Please refer to the **"Course Evaluation"** section above for details on the Theory and Laboratory components (if applicable).
Examinations	Midterm exam (covers weeks 1-6, tentative). Final exam (covers weeks 1-13).
Other Evaluation Information	None
Teaching Methods	D2L Brightspace will be used. Zoom may be used if necessary.
Other Information	None

Course Content

Week	Hours	Chapters / Section	Topic, description
1	3		Understanding Objects in Java. (Chapter 2 of "Program Development in Java: Abstraction Specification and Object-Oriented Design". Sections 2.1-2.8. Lecture notes. Slides).
2	3		Abstraction and Decomposition. (Chapter 1 of "Program Development in Java: Abstraction Specification and Object-Oriented Design". Sections 1.1-1.3. Lecture notes. Slides).
3	3		Procedural Abstraction. (Chapter 3 of "Program Development in Java: Abstraction Specification and Object-Oriented Design". Sections 3.1-3.6. Lecture notes. Slides).
4	3		Data Abstraction. (Chapter 5 of "Program Development in Java: Abstraction Specification and Object-Oriented Design". Sections 5.1-5.10. Lecture notes. Slides).
5	3		Modeling with UML. (Chapter 2 of "Object-Oriented Software Engineering Using UML Patterns and Java". Lecture notes. Slides).
6-9	12		Design Patterns. (Information taken from "Design Patterns Explained: A New Perspective on Object-Oriented Design" and "Design Patterns: Elements of Reusable Object-Oriented Software" and "Head First Design Patterns"). (Lecture notes. Slides). Decoupling and Specifications (Lecture notes. Slides).
10	3		Requirements Elicitation and Analysis. (Chapters 4 and 5 of "Object-Oriented Software Engineering Using UML Patterns and Java"). (Lecture notes. Slides).

11	3		System Design and Object Design. (Chapters 6 and 7 and 8 and 9 of "Object-Oriented Software Engineering Using UML Patterns and Java"). (Lecture notes. Slides).
12	3		Testing and Debugging. (Chapter 10 of "Program Development in Java: Abstraction Specification and Object-Oriented Design". Sections 10.1 and 10.2 and 10.4 and 10.7. Lecture notes. Slides).
13	3		Course Review.

Laboratory(L)/Tutorials(T)/Activity(A) Schedule

Week	L/T/A	Description
2-3	Lab1	Review Java programming and JUnit (for testing) using NetBeans IDE. (4 marks)
4	Lab2	Procedural Abstraction - Implement and specify procedures with requires/modifies/effects clauses. (3 marks)
5	Lab3	Data Abstraction - Provide and implement the abstract function and rep invariant for each given class. (4 marks)
6-7	Lab4	Given a software design problem, apply and implement the most appropriate design pattern to solve the problem. (4 marks)
8-11	Project	Analyze, design and implement a software system: Analyze the system requirements. Design with UML diagrams. Use design pattern(s) in the system design. Implement the system.

University Policies & Important Information

Students are reminded that they are required to adhere to all relevant university policies found in their online course shell in D2L and/or on the Senate website

Refer to the Departmental FAQ page for furhter information on common questions.

Important Resources Available at Toronto Metropolitan University

- The Library provides research workshops and individual assistance. If the University is open, there is a Research Help desk on the second floor of the library, or students can use the Library's virtual research help service to speak with a librarian.
- Student Life and Learning Support offers group-based and individual help with writing, math, study skills, and transition support, as well as resources and checklists to support students as online learners.
- You can submit an Academic Consideration Request when an extenuating circumstance has occurred that has significantly impacted your ability to fulfill an academic requirement. You may always visit the Senate website and select the blue radio button on the top right hand side entitled: **Academic Consideration Request (ACR)** to submit this request.

  For Extenuating Circumstances, Policy 167: Academic Consideration allows for a once per semester ACR request without supporting documentation if the absence is less than 3 days in duration and is not for a final exam/final assessment. Absences more than 3 days in duration and those that involve a final exam/final assessment, require documentation. Students must notify their instructor once a request for academic consideration is submitted. See Senate Policy 167: Academic Consideration.
- If taking a remote course, familiarize yourself with the tools you will need to use for remote learning. The Remote Learning Guide for students includes guides to completing quizzes or exams in D2L Brightspace, with or without Respondus LockDown Browser and Monitor, using D2L Brightspace, joining online meetings or lectures, and collaborating with the Google Suite.
- Information on Copyright for Faculty and students.

Accessibility

- Similar to an accessibility statement, use this section to describe your commitment to making this course accessible to students with disabilities. Improving the accessibility of your course helps minimize the need for accommodation.
- Outline any technologies used in this course and any known accessibility features or barriers (if applicable).
- Describe how a student should contact you if they discover an accessibility barrier with any course materials or technologies.

Academic Accommodation Support

Academic Accommodation Support (AAS) is the university's disability services office. AAS works directly with incoming and returning students looking for help with their academic accommodations. AAS works with any student who requires academic accommodation regardless of program or course load.

- Learn more about Academic Accommodation Support.
- Learn how to register with AAS.

Academic Accommodations (for students with disabilities) and Academic Consideration (for students faced with extenuating circumstances that can include short-term health issues) are governed by two different university policies. Learn more about Academic Accommodations versus Academic Consideration and how to access each.

Wellbeing Support

At Toronto Metropolitan University, we recognize that things can come up throughout the term that may interfere with a student's ability to succeed in their coursework. These circumstances are outside of one's control and can have a serious impact on physical and mental well-being. Seeking help can be a challenge, especially in those times of crisis.

If you are experiencing a mental health crisis, please call 911 and go to the nearest hospital emergency room. You can also access these outside resources at anytime:

- **Distress Line:**24/7 line for if you are in crisis, feeling suicidal or in need of emotional support (phone: 416-408-4357)
- **Good2Talk:**24/7-hour line for postsecondary students (phone: 1-866-925-5454)
- **Keep.meSAFE:** 24/7 access to confidential support through counsellors via My SSP app or 1-844-451-9700

If non-crisis support is needed, you can access these campus resources:

- **Centre for Student Development and Counselling:** 416-979-5195 or email csdc@torontomu.ca
- **Consent Comes First - Office of Sexual Violence Support and Education:** 416-919-5000 ext 3596 or email osvse@torontomu.ca
- **Medical Centre:** call (416) 979-5070 to book an appointment

We encourage all Toronto Metropolitan University community members to access available resources to ensure support is reachable. You can find more resources available through the Toronto Metropolitan University Mental Health and Wellbeing website.