

**Western University
Faculty of Engineering
Department of Electrical and Computer Engineering**

**SE 2250B: Software Construction
Course Outline 2016-17**

Description:

This course based on scientific foundation of object-oriented programming (OOP) and its various applications in software engineering. We use C# programming language and Unity Game Engine as the graphics platform. Many powerful features and algorithms will be introduced for data analysis and visualization, simulations, implementation of classes, methods and objects. That makes the language an ideal platform for software construction, deploying high-performance algorithms, and explore game prototyping environment with 3D Unity and C#.

Instructor: Dr. Zinovi Krougly

TEB 380, zkrougly@uwo.ca

Consultation hours: Wed 11:30 AM – 1:00 PM, Fri 10:00 AM – 11:30 AM in TEB 380

Academic Calendar Copy: Provides an in depth look at the implementation and test phases of the software construction process. This project based course provides hands-on experience on various aspects of software construction including practical experience on software construction tool chain, testing and debugging tools as well as change management tools.

Contact Hours: 2 lecture hours, 2 laboratory hours, 0.5 course.

Antirequisite: None

Prerequisites: [Computer Science 1026A/B](#) or [ES 1036A/B](#),

Co-requisite: [Computer Science 1037A/B](#).

Unless you have either the requisites for this course or written special permission from your Dean to enroll in it, you will be removed from this course and it will be deleted from your record. This decision may not be appealed. You will receive no adjustment to your fees in the event that you are dropped from a course for failing to have the necessary prerequisites.

CEAB Academic Units: Engineering Science 80%, Engineering Design 20%.

Required Textbook: None

Other Required References: Course notes and supplementary material will be given on the course website <http://owl.uwo.ca>

Recommended References:

1. Jeremy Gibson, Introduction to Game Design, Prototyping, and Development: From Concept to Playable Game with Unity and C#, Addison-Wesley, 2015.
2. Alex Okita, Learning C# Programming with Unity 3D, CRC Press, 2014.
3. Ben Tristem, Mike Geig, Unity Game Development in 24 Hours, Sams Publishing, 2016.
4. Arthur Gittleman, Computing with C# and the .NET Framework, 2nd Ed., Jones & Bartlett Learning, 2012
5. Joyce Farrell, Microsoft Visual C# 2015: An Introduction to Object-Oriented Programming, Cengage Learning, 2016.

Unity 5.2, including Unity tools for Visual Studio 2015, available in the computer lab. You can download the free version of Unity from <http://unity3d.com/download>

General Learning Objectives (CEAB Graduate Attributes)

Knowledge Base		Use of Engineering Tools	3/2	Impact on Society and the Environment	
Problem Analysis	2/2	Individual and Team Work		Ethics and Equity	
Investigation		Communication Skills		Economics and Project Management	
Design	2/1	Professionalism	1/1	Life-Long Learning	

Notation: x/y , where x is the cognitive level (1: Remember, 2: Understand, 3: Apply) at which the attribute is assessed and y is the academic level (1: Beginner, 2: Intermediate, 3: Advanced) at which the attribute is assessed.

Topics and Specific Learning Objectives

1. Introduction to Unity and C#

At the end of this section, students will be able to:

- a. Exposure scientific OOP concepts in the .NET Framework, data types, a library of mathematical functions, and Unity game objects
- b. Develop C# windows form applications, understand general syntax and coding process
- c. Create first Unity project.

2. Learning C# programming techniques with Unity

At the end of this section, students will be able to:

- a. Create a new project in Unity 2D and 3D, making a new C# script, examine the graphics concepts
- b. Use scripting language to manipulate and animate the game objects
- c. Testing, debugging and handling exceptions procedures.

3. Computing with C# and Unity

At the end of this section, students will be able to:

- a. Design mathematical models for component simulations, random numbers generators, and Monte Carlo simulation
- b. Implement numerical methods for integration, iterative algorithms for solving nonlinear equations and optimization.

4. Introduction to 3D game development

At the end of this section, students will be able to:

- a. Develop mathematical models for 3D Unity objects, establish component and parameters through code
- b. Effectively use C# programming language to produce outputs to meet specified requirements.

5. C# programming in Unity for simulations

At the end of this section, students will be able to:

- a. Simulate probability distributions, provide statistical data analysis and visualization
- b. Modify an existing application to add interface component that allows to interact through input, commands and visual indicators.

6. Group Design Project with C# and Unity

At the end of this section, students will be able to:

- a. Create small game project with 2D and 3D graphics, produce correct results with ability to manage codes with different objects and modifications
- b. Describe the result through the script attached, identify properties and parameters that can be used to control the game and outputs
- c. Group collaboration using campus computer network and computer lab.

Evaluation

Course Component	Weight
Pop Quizzes	10%
Laboratory Assignments, 4 written programming assignments	40%
Final Project	50%

To obtain a passing grade in the course, a mark of 50% or more must be achieved on the final project as well as on the laboratory assignments. A final project or laboratory assignments mark < 50% will result in a final course grade of 48% or less.

Pop Quizzes: This will consist of written response to a short questions given on random days throughout the term without prior notice

Laboratory Assignments: Four laboratory assignments with variable amounts of marks will be given. The reports include an electronic submission and a demonstration in the computer lab. You must complete both parts to get credit for each assignment.

Late Submission Policy: Laboratory assignments will be penalized by 4% per day for the late submission. The assignments submitted more than 3 days late will not be graded.

Assignment Submission Locker: Locker 222 located on the second floor of TEB.

Use of English: In accordance with Senate and Faculty Policy, students may be penalized up to 10% of the marks on all assignments, tests, and examinations for improper use of English. Additionally, poorly written work with the exception of the final examination may be returned without grading. If resubmission of the work is permitted, it may be graded with marks deducted for poor English and/or late submission.

Attendance: Any student who, in the opinion of the instructor, is absent too frequently from class, laboratory, or tutorial periods will be reported to the Dean (after due warning has been given). On the recommendation of the department, and with the permission of the Dean, the student will be debarred from taking the regular final examination in the course.

Absence Due to Illness or Other Circumstances: Students should immediately consult with the instructor or department Chair if they have any problems that could affect their performance in the course. Where appropriate, the problems should be documented (see the attached “Instructions for Students Unable to Write Tests or Examinations or Submit Assignments as Scheduled”). The student should seek advice from the instructor or department Chair regarding how best to deal with the problem. Failure to notify the instructor or department Chair immediately (or as soon as possible thereafter) will have a negative effect on any appeal.

For more information concerning medical accommodations, see the relevant section of the Academic Handbook:

http://www.uwo.ca/univsec/pdf/academic_policies/appeals/accommodation_medical.pdf

For more information concerning accommodations for religious holidays, see the relevant section of the Academic Handbook:

http://www.uwo.ca/univsec/pdf/academic_policies/appeals/accommodation_religious.pdf

Cheating and Plagiarism: Students must write their essays and assignments in their own words. Whenever students take an idea or a passage from another author, they must acknowledge their debt both by using quotation marks where appropriate and by proper referencing such as footnotes or citations. University policy states that cheating, including plagiarism, is a scholastic offence. The commission of a scholastic offence is attended by academic penalties, which might include expulsion from the program. If you are caught cheating, there will be no second warning.

All required papers may be subject to submission for textual similarity review to commercial plagiarism-detection software under license to the University for the detection of plagiarism. All papers submitted will be included as source documents on the reference database for the purpose of detecting plagiarism of papers subsequently submitted to the system. Use of the service is subject to the licensing agreement, currently between the University of Western Ontario and Turnitin.com (<http://www.turnitin.com>).

Scholastic offences are taken seriously and students are directed to read the appropriate policy, specifically, the definition of what constitutes a Scholastic Offence, in the relevant section of the Academic Handbook:

http://www.uwo.ca/univsec/pdf/academic_policies/appeals/scholastic_discipline_undergrad.pdf

Use of Electronic Devices:

Use of Personal Response Devices (“Clickers”):

Policy on Repeating All Components of a Course: Students who are required to repeat an Engineering course must repeat all components of the course. No special permissions will be granted enabling a student to retain laboratory, assignment, or test marks from previous years. Previously completed assignments and laboratories cannot be resubmitted by the student for grading in subsequent years.

Internet and Electronic Mail: Students are responsible for regularly checking their Western e-mail and the course web site (<https://owl.uwo.ca/portal/>) and making themselves aware of any information that is posted about the course.

Accessibility: Please contact the course instructor if you require material in an alternate format or if any other arrangements can make this course more accessible to you. You may also wish to contact Services for Students with Disabilities (SSD) at 519-661-2111 ext. 82147 for any specific question regarding an accommodation.

Support Services: Office of the Registrar, <http://www.registrar.uwo.ca/>
Student Development Centre, <http://www.sdc.uwo.ca/>
Engineering Undergraduate Services, <http://www.eng.uwo.ca/undergraduate/>
USC Student Support Services, <http://westernusc.ca/services/>

Students who are in emotional/mental distress should refer to Mental Health @ Western, http://www.health.uwo.ca/mental_health/, for a complete list of options about how to obtain help.