Western University

Faculty of Engineering

Department of Electrical and Computer Engineering

Course Outline
ES1036: Programming Fundamentals for Engineers

Summer Intersession of 2018 (May 14, 2018 - June 22, 2018)

1 Course Description and Information

This course is intended to establish a foundation for Computer Programming with specific emphasis on Engineering problems and applications. The course will cover the introductory aspects of Object-Oriented Analysis, Design, and Implementation (using C++) techniques, along with Testing according to the specified requirements of the program. Computer Programming will be treated as part of the Engineering Process, and as such will be contextualized through the course according to the Engineering Profession.

1.1 Instructor

Khaled Badawy, Ph.D. Candidate in Electrical and Computer Engineering, Western University (U.W.O.), London, Ontario, Canada, **e-mail:** kkamalmo@uwo.ca

1.2 Consultation hours

By appointment only

1.3 Contact hours per week

6 hours lecture (Tue and Thu, 10 AM - 1 PM), 4 hours laboratory (Wed, 1 PM - 5 PM), 0.5 course

1.4 Antirequisite

Computer Science 1025 A/B, 1026 A/B

1.5 Prerequisites

N/A

1.6 Co-requisite

Unless you have either the requisites for this course or written special permission from your Dean to enrol 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.

1.7 CEAB Academic Units

Engineering Science 100%

1.8 Textbook and References

None are required. However, the following texbook is recommended: *Introduction to Programming with C++*, 3/E, Y. Daniel Liang, ISBN-10: 0133252817, ISBN-13: 9780133252811, Prentice Hall, 2012. [**Older versions can also be used**]

2 General Learning Objectives (CEAB Graduate Attributes)

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

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

3 Topics and Specific Learning Objectives

3.1 Introduction to Computer Programming. (2 hours)

- Computing system
- Hardware
- Software
- Simple program

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

- Identify different components of a computer system
- Get an idea about high level language

3.2 Software development process. (1 hour)

- Algorithm
- Pseudocode
- Flowchart
- The software development cycle

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

- Identify different steps in software development process
- Can analyze simple problem by applying these steps

3.3 C++ Programming basics. (4 hours)

- Constants and variable
- Data types
- C++ operators
- Standard input output operations

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

- Understand different types of variable/const ant declarations, different C++ operators and standard input/output statements
- Solve simple problems by writing the program (code) in C++ language

3.4 Statements, Syntax, and Control Structures. (5 hours)

- Conditional statements
- Selection statements

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

- Solve program related problems by exploiting the ideas of conditional statements and different loop structures
- Use all of the loop structures interchangeably

3.5 Modular programming with functions. (6 hours)

- Programmer defined functions
- Parameter passing

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

- Create modular solution of a problem by defining and using different functions
- Understand the scope and storage criteria of any identifier

3.6 1D, 2D arrays, and Matrices (4 hours)

- Array implementation
- Arrays and functions

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

- Create 1D and 2D arrays and use those inside and outside different user defined functions
- Pass an array to a function and use it

3.7 An introduction to address variables and pointers (6 hours)

- Address and pointer variables
- Dynamic Memory Allocation
- Pointers and Arrays
- Functions and Pointers
- Functions and address variables
- Functions, pointers and arrays

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

- Create pointer and reference identifiers and use dynamic memory
- Use pointers within array structure and use poi nters, reference identifiers and array of pointers in functions

3.8 An introduction to Struct, Classes and Objects (6 hours)

- Introduce Struct
- Implementation of Struct
- Introduce Class and object
- Implementation of Classes

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

- Apply the concepts of Object Oriented theories Programming by using Strut and Class theories
- Use an Object in all possible scenarios discussed in the previous topics

4 Evaluation

Course Component	Weight
Attendance	5%
Laboratory Assignments	10%
Midterm Test	20%
Project	15%
Final Examination	50%

To obtain a passing grade in the course, a mark of 50% or more must be achieved on the final examination as well as on the laboratory. A final examination or laboratory mark $< 50\%$ will result in a final course grade of 48% or less. Also, after adding all the course component marks, if someone gets $< 50\%$, it will be deemed as a failing grade in the course.

4.1 Attendance

Class attendance will be recorded on an attendance sheet and the attendance-grade will be assigned based on the following breakdown:

Percentage of Attendance %	Grade (Out of 5)
$01 - 30$	1
$31 - 55$	2
$56 - 72$	3
$73 - 89$	4
90 and above	5

4.2 Laboratory Assignments

Two new lab assignments will be available in each week, and they will be posted at least one week prior to the lab day. The following details how lab assignments will be carried out.

- Week of May 21, 2018: Lab assignments 1 & 2
  - Source codes (.cpp files only) for lab assignments 1 & 2 **must** be submitted to Owl course site (electronically) one day before your lab session (check the deadline on Owl); zero grade will be assigned (for the whole lab) for no electronic submission and demonstration.
  - Grades will be assigned based on the lab demonstration and the submitted working code; zero grade will be assigned (for the whole lab) for no demonstration even though the working code is submitted.
  - Lab demonstration carries 2/3 of the respective lab grade, while the OWL-submitted lab code carries 1/3 of the respective lab grade.
  - Labs 3 and 4 will be available online. Students are expected to start working with the help of the instructor on labs 3 and 4 after the in-class lab demonstration of labs 1 and 2.

Please note that there will be no lab session during the week of May 14, 2018. Occasionally, lab exercises will be available on OWL for practice purposes only; no solution needs to be submitted.

4.3 Midterm Test

Tentative date: Saturday June 2, 2018 from 10 AM till 12 PM.

4.4 Project

The project will be posted Online on Monday May 25, 2018. It will consist of three seperate problems and each student will have to submit their own original work. Rules and deadline for submitting the project will be provided on the project's post date.

4.5 Final Examination

The final examination will take place during the regular examination period (TBD by the registrars office).

5 Late Submission Policy

No late submissions will be accepted.

6 Assignment Submission Locker

Not required.

7 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.

8 Attendance

All classes, laboratories, and tutorials are mandatory unless otherwise stated. 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.

9 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 OWL-posted "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

10 Missed Midterm Examinations

If a student misses a midterm examination, the exam will not be rescheduled. The student must follow the Instructions for Students Unable to Write Tests and provide documentation to the Undergraduate Services Office in SEB 2097 (http://www.eng.uwo.ca/undergraduate/) within 24 hours of the missed test. This office will decide whether to allow the reweighting of the test, where reweighting means the marks normally allotted for the midterm will be added to the final exam. If no reasonable justification for missing the test can be found, then the student will receive a mark of zero for the test.

If a student is going to miss the midterm examination for religious reasons, they must inform the instructor in writing within 48 hours of the announcement of the exam date or they will be required to write the exam.

11 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 student s 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

12 Use of Electronic Devices

No electronic device will be required during the class lectures. Also, No electronic device will be permitted during labs and other exams.

13 Use of Personal Response Devices (Clickers)

Not required.

14 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.

15 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.

16 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.

17 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.