

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

ES1036A: Programming Fundamentals for Engineers

Course Outline Winter 2018 (January 8/Monday, 2018 – April 11/Wednesday, 2018)

[<http://www.westerncalendar.uwo.ca/operations/sessionaldates/2017v2.pdf>]

No classes/labs/Exams on the following dates:

Family day and Spring Reading Week: 19-23/Monday-Friday, February 2018

Good Friday: 30 March 2018

Description: 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.

Instructor: Dr. Quazi M. Rahman, P.Eng., SMIEEE
TEB 361, 519-661-2111 ext. 81399, UWO e-mail address: qraman3@uwo.ca
Consultation hours: Available on the OWL course-site.

Academic Calendar Copy: <http://www.westerncalendar.uwo.ca/2017/pg907.html#34456>

Contact Hours per week: 3 lecture hours, 2 laboratory hours, 0.5 course

Antirequisite: Computer Science 1025A/B, 1026A/B, the former Computer Science 036a/b

Prerequisites:

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 prerequisites.

CEAB Academic Units: Engineering Science 100%

Required Textbook: None

Other Required References: None

Reference book (NOT required): Introduction to Programming with C++, 3/E, Y. Daniel Liang, ISBN-10: 0133252817, ISBN-13: 9780133252811, Prentice Hall, 2012. [One can use any older/newer version too.]

General Learning Objectives (CEAB Graduate Attributes)

Knowledge Base	2/1	Use of Engineering Tools	1/2	Impact on Society and the Environment	
Problem Analysis	3/1	Individual and Team Work		Ethics and Equity	
Investigation		Communication Skills	2/2	Economics and Project Management	
Design		Professionalism		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. Topic 1: Introduction to Computer Programming. (2 hours)

- a) Computing system
- b) Hardware
- c) Software
- d) Simple program

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

- a. identify different components of a computer system
- b. get an idea about high level language

2. Topic 2: software development process. (1 hour)

- a) Algorithm
- b) Pseudocode
- c) Flowchart
- d) The software development cycle

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

- a. identify different steps in software development process
- b. can analyze simple problem by applying these steps.

3. Topic 3: C++ Programming basics (4 hours)

- a) Constants and variable
- b) Data types
- c) C++ operators
- d) Standard input output operations

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

- a. understand different types of variable/constant declarations, different C++ operators and standard input/output statements
- b. solve simple problems by writing the program (code) in C++ language

4. Topic 4: Statements, Syntax, and Control Structures (5 hours)

- a) Conditional statements
- b) Selection statements

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

- a. solve program related problems by exploiting the ideas of conditional statements and different loop structures
- b. use all of the loop structures interchangeably

5. Topic 5: Modular programming with functions (6 hours)

- a) Programmer defined functions
- b) Parameter passing

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

- a. create modular solution of a problem by defining and using different functions
- b. understand the scope and storage criteria of any identifier

6. Topic 6: 1D, 2D arrays, and Matrices (4 hours)

- a) Array implementation
- b) Arrays and functions

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

- a. create 1D and 2D arrays and use those inside and outside different user defined functions
- b. pass an array to a function and use it

7. Topic 7: An introduction to address variables and pointers (6 hours)

- a) Address and pointer variables
- b) Dynamic Memory Allocation
- c) Pointers and Arrays
- d) Functions and Pointers
- e) Functions and address variables
- f) Functions, pointers and arrays

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

- a. create pointer and reference identifiers and use dynamic memory,
- b. use pointers within array structure and use pointers, reference identifiers and array of pointers in functions

8. Topic 8: An introduction to Classes and Objects (6 hours)

- a) Introduce Class and object
- b) Implementation of Classes

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

- a. apply the concepts of Object Oriented Programming by using Class theories
- b. use an Object in all possible scenarios discussed in the previous topics

Evaluation

Course Component	Weight
Attendance	5%
Quizzes (Maximum 10)	10%
Laboratory Assignments (Maximum 10)	15% (10%+5%)
Midterm Test	20%
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.

Attendance: Class attendance will be recorded, and the attendance-grade will be assigned based on the following breakdown:

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

Important Note: Any student has the option to make a request to the instructor via email (qrahman@eng.uwo.ca) by the end of the day on Friday, January 26th/2018 to allocate the attendance weight to the final exam weight. In this case, the final exam for that student will be weighted out of 55% instead of 50%, and the attendance will not be graded.

Laboratory Assignments (Maximum 10):

- A new lab assignment will be available in each week
- The assignment will be available at least one week prior to the lab day
- **There won't be any lab before the Lab-0 week (week of 29th of January)**
- Here are the dates:
 1. Week of 29th of January. Quiz 0 / **Lab-0** practice and demo, and Lab 1 discussion.
 2. Week of 5th of February: Lab 1 discussion/demo/submission by the end of the lab; Quiz on lab 1 topics; if you're done with the previous lab start working on Lab 2
 3. Week of 12th of February: Lab 2 discussion/demo/submission by the end of the lab; Quiz on lab 2 topics; if you're done with the previous lab start working on Lab 3
 4. **Week of 19th of February: NO LABS**
 5. Week of 26th of February: Lab 3 discussion/demo/submission by the end of the lab; Quiz on lab 3 topics; if you're done with the previous lab start working on Lab 4
 6. Week of 5th of March: Lab 4 discussion/demo/submission by the end of the lab; Quiz on lab 4 topics; if you're done with the previous lab start working on Lab 5
 7. Week of 12th of March: Lab 5 discussion/demo/submission by the end of the lab; Quiz on lab 5 topics; if you're done with the previous lab start working on Lab 6

8. Week of 19th of March: Lab 6 discussion/demo/submission by the end of the lab; Quiz on lab 6 topics; if you're done with the previous lab start working Lab 7
9. **NO LABS on the 26th and 28th of March**
10. 29th of March, 2nd of April and 4th of April: Lab 7 quiz/discussion/demo/submission by the end of the lab, and if you're done with the previous lab start working on Lab 8
11. 5th of April, 9th of April and 11th of April: Lab 8 quiz/discussion/demo/submission by the end of the lab
 - You MUST submit your source code (.cpp files only) to Owl course site (electronically) within the deadline (will be available on Owl); **zero grade will be assigned (for the whole lab) for no electronic submission and/or no demonstration.**
 - Grades will be assigned based on the submitted working code; zero grade will be assigned (for the whole lab) for no demonstration even though the working code is submitted.
 - **Three worst lab grades (including lab 0) will be taken out of the lab average.**

Quizzes (maximum 10):

- Every lab will start with a 15-minute long lab quiz.
- The quiz questions will be taken from the course components used in the lab-assignment
- On the quiz, the student might be asked to write the lab-code, s/he just submitted.
- **Three worst quiz grades (including quiz 0) will be taken out of the final quiz average.**

Midterm Test: March 3/Saturday/2018 at 10am (two hours) in FNB (Room Numbers: 1200, 1220, 1240, 1250, 3210 and 3220)

Final Examination: The final examination will take place during the regular examination period April 14 – April 30 (TBD by the registrar's office).

Late Submission Policy: No late assignment will be accepted.

Assignment Submission Locker: Not required.

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: 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.

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

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.

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

Use of Personal Response Devices (“Clickers”): Not required.

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.

Class Schedule: *Labs will be held in SEB lab locations 1004, 1011, 1012, 1015 (Seating assignments with lab locations will be available on OWL.)*

Section	Component	Class Nbr	Days	Start Time	End Time	Location	Instructor	Requisites and Constraints
001	LEC	2455	M	10:30 AM	11:30 AM	MC-110	Rahman	RESTRICTED TO ENGINEERING STUDENTS.
001	LEC	2455	W	10:30 AM	11:30 AM	NSC-1	Rahman	RESTRICTED TO ENGINEERING STUDENTS.
001	LEC	2455	F	10:30 AM	11:30 AM	NS-145	Rahman	RESTRICTED TO ENGINEERING STUDENTS.
002	LEC	2456	M W F	10:30 AM	11:30 AM		Rahman	RESTRICTED TO ENGINEERING STUDENTS. HELD MON MC 110, WED NS 1, FRI NS 145.
003	LAB	2457	Th	10:30 AM	12:30 PM	SEB-1004	Rahman	ALSO HELD IN SEB 1004/1015.
004	LAB	2458	M	8:00 PM	10:00 PM	SEB-1015	Rahman	ALSO HELD IN SEB 1012/1015.
005	LAB	2459	M	6:00 PM	8:00 PM	SEB-1015	Rahman	ALSO HELD IN SEB 1004/1012.
006	LAB	2460	W	6:30 PM	8:30 PM	SEB-1004	Rahman	ALSO HELD IN SEB 1012/1015.

INSTRUCTIONS FOR STUDENTS UNABLE TO WRITE TESTS OR EXAMINATIONS OR SUBMIT ASSIGNMENTS AS SCHEDULED

IF, ON MEDICAL OR COMPASSIONATE GROUNDS, YOU ARE UNABLE TO WRITE TERM TESTS OR FINAL EXAMINATIONS OR COMPLETE COURSE WORK BY THE DUE DATE, YOU SHOULD FOLLOW THE INSTRUCTIONS LISTED BELOW. YOU SHOULD UNDERSTAND THAT ACADEMIC RELIEF WILL NOT BE GRANTED AUTOMATICALLY ON REQUEST. YOU MUST DEMONSTRATE TO YOUR DEPARTMENT (OR THE UNDERGRADUATE SERVICES OFFICE) THAT THERE ARE COMPELLING MEDICAL OR COMPASSIONATE GROUNDS THAT CAN BE DOCUMENTED BEFORE ACADEMIC RELIEF WILL BE CONSIDERED. DIFFERENT REGULATIONS APPLY TO TERM TESTS, FINAL EXAMINATIONS AND LATE ASSIGNMENTS. PLEASE READ THE INSTRUCTIONS CAREFULLY. (SEE THE 2017 UWO ACADEMIC CALENDAR).

A. GENERAL REGULATIONS & PROCEDURES

1. All first year students will report to the Undergraduate Services Office, SEB 2097, for all instances.
2. If you are an upper year student and you are missing a test/assignment/lab or exam that is worth MORE THAN 10% of your final grade, you will report to the Undergraduate Services Office, SEB 2097. Otherwise, you will report to your department office to request relief.
3. Check the course outline to see if the instructor has a policy for missed tests, examinations, late assignments or attendance.
4. Documentation must be provided as soon as possible. If no one is available in your Department office or the Undergraduate Services Office, leave a message clearly stating your name & student number and reason for your call. The department telephone numbers are given at the end of these instructions.
5. If you decide to write a test or an examination you should be prepared to accept the mark you earn. Rewriting tests or examinations or having the value of a test or examination reweighted on a retroactive basis is not permitted.

B. TERM TESTS

1. If you are in first year and you are unable to write a term test, contact the Undergraduate Services Office, SEB 2097 PRIOR to the scheduled date of the test.
2. If you are an upper year student and you are unable to write a term test, inform your instructor PRIOR to the scheduled date of the test. If the instructor is not available, leave a message for him/her at the department office. If the test is worth MORE THAN 10% of your final grade you will report to the Undergraduate Services Office, SEB 2097 to request relief. Otherwise, you will report to your department office to request relief.
3. Be prepared to provide supporting documentation to the Department Chair and/or the Undergraduate Services Office (see next page for information on documentation).
4. Discuss with the instructor if and when the test can be rescheduled. **N.B.** The approval of the Chair or the Undergraduate Services Office is required when rescheduling term tests.

C. FINAL EXAMINATIONS

1. If you are unable to write a final examination, contact the Undergraduate Services Office **PRIOR TO THE SCHEDULED EXAMINATION TIME** to request permission to write a Special Final Examination. If no one is available in the Undergraduate Services Office, leave a message clearly stating your name & student number.
2. Be prepared to provide the Undergraduate Services Office with supporting documentation (see next page for information on documentation) the next day, or as soon as possible (in cases where students are hospitalized). The following circumstances are not considered grounds for missing a final examination or requesting special examinations: common cold, sleeping in, misreading timetable and travel arrangements.
3. In order to receive permission to write a Special Examination, you must obtain the approval of the Chair of the Department **and** the Associate Dean and in order to apply you must sign a "Recommendation for a Special Examination Form" available in the Undergraduate Services Office. The Undergraduate Services Office will then notify the course instructor(s) and reschedule the examination on your behalf.

N.B. It is the student's responsibility to check the date, time and location of the Special Examination.

D. LATE ASSIGNMENTS

1. Advise the instructor if you are having problems completing the assignment on time (**prior** to the due date of the assignment).
2. Be prepared to provide documentation if requested by the instructor (see reverse side for information on documentation).
3. If you are granted an extension, establish a due date. The approval of the Chair of your Department (or the Associate Dean if you are in first year) is not required if assignments will be completed prior to the last day of classes.
4.
 - i) Extensions beyond the end of classes must have the consent of the instructor, the department Chair and the Associate Dean. Documentation is mandatory.
 - ii) A Recommendation of Incomplete Form must be filled out indicating the work to be completed and the date by which it is due. This form must be signed by the student, the instructor, the department Chair and the Associate Dean.

E. SHORT ABSENCES

If you miss a class due to a minor illness or other problem, check your course outlines for information regarding attendance requirements and make sure you are not missing a test, laboratory or assignment. Cover any readings and arrange to borrow notes from a classmate.

F. EXTENDED ABSENCES

If you are absent more than one week or if you get too far behind to catch up, you should consider reducing your workload by dropping one or more courses. (Note drop deadlines listed below). You may want to seek advice from the academic counsellor in your Department or Ms. Karen Murray in the Undergraduate Services Office, if you are in first year.

G. DOCUMENTATION

If you consulted an off-campus doctor or Student Health Services regarding your illness or personal problem, **you must provide the doctor with a Student Medical Certificate** to complete at the time of your visit and then bring it to the Department (or the Undergraduate Services Office). **This note must contain the following information: severity of illness, effect on academic studies and duration of absence. Regular doctor's notes will not be accepted; only the Student Medical Certificate will be accepted.**

In Case of Serious Illness of a Family Member: Provide a Student Medical Certificate to your family member's physician to complete and bring it to the Department (or the Undergraduate Services Office if you are in first year).

In Case of a Death: Obtain a copy of the death certificate or the notice provided by the funeral director's office. You must include your relationship to the deceased and bring it to the Department (or the Undergraduate Services Office if you are in first year).

For Other Extenuating Circumstances: If you are not sure what documentation to provide, ask the Departmental Office (or the Undergraduate Services Office if you are in first year) for direction.

Note: Forged notes and certificates will be dealt with severely. To submit a forged document is a scholastic offence (see below).

H. ACADEMIC CONCERNS

1. You need to know if your instructors have a policy on late penalties, missed tests, etc. This information may be included on the course outlines. If not, ask your instructor(s).
2. **You should also be aware of attendance requirements in some courses. You can be debarred from writing the final examination if your attendance is not satisfactory.**
3. If you are in academic difficulty, check out the minimum requirements for progression in the calendar. If in doubt, see your academic counsellor.

Calendar References: Check these regulations in your 2017 Western Academic Calendar available at www.westerncalendar.uwo.ca.

Absences Due to Illness: <http://westerncalendar.uwo.ca/2017/pg117.html>
Academic Accommodations for Students with Disabilities: <http://westerncalendar.uwo.ca/2017/pg118.html>
Academic Accommodations for Religious or Holy Days: <http://westerncalendar.uwo.ca/2017/pg119.html>
Course Withdrawals: <http://westerncalendar.uwo.ca/2017/pg157.html>
Examinations: <http://westerncalendar.uwo.ca/2017/pg129.html>
Scheduling of Term Assignments: <http://westerncalendar.uwo.ca/2017/pg135.html>
Scholastic Offences: <http://www.westerncalendar.uwo.ca/2017/pg111.html>
Student Medical Certificate: http://www.uwo.ca/univsec/pdf/academic_policies/appeals/medicalform.pdf
Engineering Academic Regulations: <http://www.westerncalendar.uwo.ca/2017/pg1442.html>

Note: These instructions apply to all students registered in the Faculty of Engineering regardless of whether the courses are offered by the Faculty of Engineering or other faculties in the University.

Drop Deadlines:

First term half course (i.e. "A" or "F"):	November 5, 2017
Full courses and full-year half courses (i.e. "E", "Y" or no suffix):	November 30, 2017
Second term half or second term full course (i.e. "B" or "G"):	March 7, 2017

Contact Information:

Undergraduate Services Office:	SEB 2097	Telephone: (519) 661-2130	E-mail: engugrad@uwo.ca
Dept. of Chemical and Biochemical Engineering & Green Process Engineering:	TEB 477	Telephone: (519) 661-2131	E-mail: cbeugrad@uwo.ca
Dept. of Civil and Environmental Engineering:	SEB 3005	Telephone: (519) 661-2139	E-mail: civil@uwo.ca
Dept. of Electrical and Computer Engineering, Software Engineering & Mechatronics Engineering:	TEB 279	Telephone: (519) 661-3758	E-mail: eceugrad@uwo.ca
Dept. of Mechanical and Materials Engineering:	SEB 3002	Telephone: (519) 661-4122	E-mail: mmeundergraduate@uwo.ca