Western University
Faculty of Engineering
Department of Electrical and Computer Engineering

ECE 9013A: Programming for Engineers

Course Outline 2018-19

Description:
Programming for Engineering ECE 9013A is intended for MEng students with little programming experience. It aims to provide students with an understanding of the role computation can play in solving problems and to help students, regardless of their major, feel justifiably confident of their ability to write small programs that allow them to accomplish useful goals. The class uses the Python programming language along with code version control.

Instructor:	Khaled Badawy
	TEB 240, kkamalmo@uwo.ca
	Consultation hours: by appointment

Contact Hours: 3 hours/week

Prerequisites: None

Recommended References:
[1] Course notes
[2] Guttag, John. *Introduction to Computation and Programming Using Python: with Application to Understanding Data*. The MIT Press, 2016.

Topics and Specific Learning Objectives

1. **What is computation?**

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

   a. Declare and use variables in different types in Python language.

   b. Apply mathematical operation in Python.

2. **Branching and Iteration**

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

   a. Do branching and conditions in Python

   b. Do loops and iterations in Python

3. **String Manipulation, Guess and Check, Approximations, Bisection**

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

   a. Use and manipulate strings in Python

   b. Develop guess & check, and approximation algorithms using Python.

c. Develop bisection search using Python

4. **Decomposition, Abstractions, Functions**

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

a. Declare and develop functions in Python.

b. Structure Python programs using functions

5. **Tuples, Lists, Aliasing, Mutability, Cloning**

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

a. Declare and use compound data types such as (tuples and lists)

b. Understand the idea of aliasing, mutability and cloning and how to apply them in Python.

6. **Recursion, Dictionaries**

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

a. Develop recursive algorithm using divide/decrease and conquer technique

b. Use dictionaries in Python.

7. **Testing, Debugging, Exceptions, Assertions**

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

a. Apply different types of testing such as unit, regression, and integration testing.

b. Apply black and white box testing.

c. Handle exceptions in Python

8. **Object Oriented Programming**

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

a. Understand the importance of object-oriented programming.

b. Declare classes and methods in Python.

9. **Python Classes and Inheritance**

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

a. Develop and use 'getter and setter' in Python classes.

b. Define and use the class variables in Python.

c. Use and apply some of OOP techniques such as (information hiding and inheritance).

10. **Program Efficiency**

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

a. Measure the algorithm complexity using big "oh"
b. Classify the programs and algorithms into different complexity classes.

11. Searching and Sorting

a. Use and apply searching algorithms such as (liner search, bisection search), and analyze and calculate their complexities

b. Use and apply sorting algorithms such as (monkey sort, bubble sort, selection sort, merge sort), and analyze and calculate their complexities

Course Evaluation

The final course grades will be determined based on the performances in four components:

Course Component	Weight
Assignments	30%
Final Examination	40%
Final Project	30%

In order to pass the course, a student must obtain a mark of 60% or more in each component. A mark less than 60% in any component will result in a final course grade of 58% or less.

Assignments: The course will include 6 assignments using Python that will cover all the topics of the course. All submission will require code version control.

Final Examination : This test will cover all the course material. It will measure the student understanding of different programming techniques that given in the course.

Project: The course will have final project which is Python program that solving specific problem by applying different methodologies and techniques that given in the course classes.

Late Submission Policy: There will be strict deadlines for the project and assignments. Marks will be deducted for a late assignment. 10% per day will be subtracted for a late assignment, to a maximum of 4 days late.

Final Examination: The final examination will cover all course content and will be closed book.

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

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.