ES1036A: Programming Fundamentals for Engineers
Course Outline 2020-21

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 Java and MATLAB) 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. Abdelkader Ouda, Ph.D., P.Eng.
ACEB 4452, 519-661-2111 ext. 81299, aouda@uwo.ca
Consultation hours: Wednesdays 10:30am – 11:30am EST via Zoom
(Please sign-up in advance)

Academic Calendar Copy:
Designing, implementing and testing computer programs using Java and MATLAB to fulfill given specifications for small problems using sound engineering principles and processes. Awareness of the engineering aspects of the process of constructing a computer program.

Contact Hours: 3 lecture hours, 2 laboratory hours, 0.5 course.

Antirequisite: Computer Science 1025A/B, Computer Science 1026A/B.

Prerequisites:

Co-requisite:
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 100%.

Required Textbook: None

Other Required References: Course notes and supplementary material that are available at the Course Web site (OWL)

Reference Book (Not required):
• In addition, any introductory level MATLAB textbook would be enough.

General Learning Objectives (CEAB Graduate Attributes)

| 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: Introductory, 2: Intermediate, 3: Advanced) at which the attribute is assessed. |

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Course Objectives and Specific Learning Outcomes

1. **Introduction to Computers and Java**: Introduces the field of software engineering, and covers the fundamentals of hardware, software, programming languages, and the software development process. Discussed through the examination of a simple program the elements of a program, such as key words, variables, operators, and punctuation. Present an overview of entering source code, compiling it, and executing it. Give a brief history of Java as well.

   At the end of this section, students will be able to:
   a. identify different components of a computer system,
   b. identify different steps in software development process,
   c. compile and run a Java program with or without using IDE,
   d. relate the history and the releases of Java language.

2. **Java Fundamentals**: Introduces data types, identifiers, variable declarations, constants, comments, program output, and arithmetic operations. This introduction also includes the conventions of programming style.

   At the end of this section, students will be able to:
   a. understand different types of variable/constant declarations, different JAVA operators and standard input/output statements
   b. solve simple problems by writing the program (code) in JAVA language.

3. **Classes and Objects**: Introduces the student to classes. Once the student learns about fields and methods, UML diagrams are introduced as a design tool.
Arguments and parameters are also discussed. Finally, the concept of the default constructor is discussed.

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

- write simple methods, constructors and understand the concept of the default constructors,
- understand the concept of the Object-Oriented design,
- write classes and create objects,
- understand the static methods and fields, interaction between objects, passing objects as arguments, and returning objects from methods.

4. Decision Structures: Explores relational operators and relational expressions and shows how to control the flow of a program with the conditional and switch statements. In addition, discusses the objects comparison.

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

- write if, if/else, if/else if and switch statements,
- understand the concept of objects comparison with the equals, compareTo, equalsIgnoreCase, and compareToIgnoreCase methods.

5. Loops and Files: Covers Java’s repetition control structures. Counters, accumulators, running totals, sentinels, and other application-related topics are discussed. Simple file operations for reading and writing text files are also covered.

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

- write while loop, do-while loop, and for loop,
- find the common uses for the repetition control techniques.

6. Arrays: Shows students how to create and work with single and multidimensional arrays. Demonstrate the most common array-processing techniques.

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

- create single and multidimensional arrays, and an array to a method,
- calculate the sum of the elements in an array, finding the highest and lowest values, and sequentially search an array.

7. Inheritance and polymorphism: Covers superclass and subclass constructors, method overriding, polymorphism and dynamic binding, protected and package access, class hierarchies, abstract classes and methods, and interfaces.

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8. **Introduction to MATLAB:** Explores the basic features of MATLAB that are useful for engineering classes.

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**Online Quizzes:** To help the students follow with the material there will be a quiz every week, starting September 23rd except weeks 8 and 12. These are 8 quizzes in total that need to be done during the timeslot of the Wednesday class. All Quizzes will be graded with equal weights, however only the top 6 marks will be considered toward the quiz portion (20%) of the course. No late submission will be accepted.

**Online Laboratory Activities:** There will be online lab activities every week (starting September 21st except weeks 8 and 12) in which students will implement the covered course material to solve and submit eight assignments online. Each assignment will be posted on Monday on OWL, students can work on it immediately and they can submit their answer anytime during the week until the end of Friday of the same week. No late submissions will be accepted.

**Midterm Exam:** Online one-hour programming exam on Wednesday Oct. 21st from 4:30pm to 5:30pm.

**Final Examination:** Online (will take place during the regular examination period).
Grading and Feedback:

- The quizzes are graded automatically or manually, and grades will be posted on OWL gradebook within a week.
- All labs assignments and exams submissions will be graded manually, and the code similarity check will be made using the similarity-detection software system "Moss". More information about this system is available at the following link: https://theory.stanford.edu/~aiken/moss/.
- Midterm and final examinations in this course will be conducted using the remote proctoring service, Proctortrack. By taking this course, you are consenting to the use of this software and acknowledge that you will be required to provide personal information (including some biometric data), and the session will be recorded. More information about this remote proctoring service is available in the Online Proctoring Guidelines at the following link: https://www.uwo.ca/univsec/pdf/onlineproctorguidelines.pdf.
- Completion of this course will require you to have a reliable internet connection and a device that meets the technical requirements for this service. Information about the technical requirements are available at the following link: https://www.proctortrack.com/tech-requirements/.

Online Lectures and Labs: A synchronous learning mode (via Zoom) will be offered to the students as online drop-in sessions during the scheduled lecture and lab times, mainly for Q&A, discussions about course topics and lab assignments and their assessments. These sessions will be recorded and then posted on OWL. Please note that, the data captured during these recordings may include your image, voice recordings, chat logs and personal identifiers (name displayed on the screen). The recordings will be used for educational purposes related to this course, including evaluations. The recordings may be disclosed to other individuals participating in the course for their private or group study purposes. Please contact the instructor if you have any concerns related to session recordings. Participants in this course are not permitted to record the sessions, except where recording is an approved accommodation, or the participant has the prior written permission of the instructor.

Pre-recorded Lectures: Pre-recorded modules will be offered as an asynchronous learning mode such that each week new materials will be added on OWL that include lecture slides, mini lecture videos (recorded by the instructor) to cover the course core objectives, mini lab/tutorial videos (reordered by the instructor and/or the TAs) to cover the lab requirements, grading policy and the expected outcomes.

Online Discussions Board: An asynchronous online discussion forum will be available on OWL to promote communication and collaboration among students, TAs and the instructor. Students can post any questions, concerns or comments that they may have about the course subject matter or the course itself. The Instructor and several TAs will be monitoring this board. Bonus points will be added to the students' final marks who would participate (for example, read questions, post questions, or respond to peers' questions) in this forum through the discussion board. To ensure the best experience for all, please honour the following etiquettes:

- Be careful of what you say, this is a public place. Student found abusive may be subject to disciplinary measures under the Code of Student Conduct.
- Share your knowledge. If you can help someone, go right ahead
- Be forgiving, we all make mistakes
Hope you will make good use of this valuable resource.

Online activities Protocols:
Some components of this course will involve online interactions. To ensure the best experience for both you and your classmates, please honour the following rules of etiquette:

- please "arrive" to class on time
- please use your computer and/or laptop if possible (as opposed to a cell phone or tablet)
- ensure that you are in a private location to protect the confidentiality of discussions in the event that a class discussion deals with sensitive or personal material
- to minimize background noise, kindly mute your microphone for the entire class until you are invited to speak, unless directed otherwise
- In order to give us optimum bandwidth and web quality, please turn off your video camera for the entire class unless you are invited to speak
- unless invited by your instructor, do not share your screen in the meeting

The course instructor will act as moderator for the class and will deal with any questions from participants. To participate please consider the following:

- if you wish to speak, use the “raise hand” function and wait for the instructor to acknowledge you before beginning your comment or question
- remember to unmute your microphone and turn on your video camera before speaking
- self-identify when speaking.
- remember to mute your mic and turn off your video camera after speaking (unless directed otherwise)

General considerations of “netiquette”:
- Keep in mind the different cultural and linguistic backgrounds of the students in the course.
- Be courteous toward the instructor, your colleagues, and authors whose work you are discussing.
- Be respectful of the diversity of viewpoints that you will encounter in the class and in your readings. The exchange of diverse ideas and opinions is part of the scholarly environment. “Flaming” is never appropriate.
- Be professional and scholarly in all online postings. Cite the ideas of others appropriately.

Note that disruptive behaviour of any type during online classes, including inappropriate use of the chat function, is unacceptable. Students found guilty of Zoom-bombing a class or of other serious online offenses may be subject to disciplinary measures under the Code of Student Conduct.

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.

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 their department within 24 hours of the missed test. The department 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.

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:** Students may use laptops, tablet computers, or smart phones only to access the course OWL site during lectures and tutorials. Use of nonprogrammable calculators only is permitted during quizzes and examinations. No other electronic devices may be used at any time during lectures, tutorials, or examinations.

**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.

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.