Western University
Faculty of Engineering
Department of Electrical and Computer Engineering

ES1036A: Programming Fundamentals for Engineers

Course Outline 2023-24

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) 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.

Academic Calendar Copy:

Designing, implementing, and testing computer programs using Java 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 (None):

Other Required Resources:
- Course notes and supplemental materials are available on course website (OWL)

References (Not required):
- **Section 001**: https://bookstore.uwo.ca/textbook-search?campus=UWO&term=W2023A&courses%5B0%5D=001_UW/EGS1036A
- **Section 002**: https://bookstore.uwo.ca/textbook-search?campus=UWO&term=W2023A&courses%5B0%5D=002_UW/EGS1036A

General Learning Objectives (CEAB Graduate Attributes)

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

Notation: *where x be I = Introduced (Introductory), D = Developed (Intermediate), A = applied (Advanced), or empty*. I – The instructor will introduce the topic at the level required. It is not necessary for the student to have seen the material before. D – There may be a reminder or review, but the student is expected to have seen and been tested on the material before taking the course. A – It is expected that the student can apply the knowledge without prompting (e.g. no review).

Course Objectives and Specific Learning Outcomes	CEAB GA Indicators (for Internal use)

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. understand the evolution of Java language and its important aspects of modern life.
	IESE1

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.
  c. understand the major coding guidelines that lead to sustainable and readable code development, such as naming convention, curly braces, indentation, and comments.
	KB 4
	
	KB 4
	
	IESE2

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:
  a. write simple methods, constructors and understand the concept of the default constructors,
  b. understand the concept of the Object-Oriented design,
  c. write classes and create objects,
  d. understand the static methods and fields, interaction between objects, passing objects as arguments, and returning objects from methods.
  e. understand the concept of Java standard libraries and the needs for developing custom libraries.
	ET 2
	KB 4
	ET 2
	KB 4
	
	P1

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:
  a. write if, if/else, if/else if and switch statements,
  b. understand the concept of objects comparison with the equals, compareTo, equalsIgnoreCase, and compareToIgnoreCase methods.
	ET 1
	KB 4

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:
  a. write while loop, do-while loop, and for loop,
  b. find the common uses for the repetition control techniques.
	ET 2
	ET 1

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:
 	
   a. create single and multidimensional arrays, and pass an array to a method,
 	
   b. calculate the sum of the elements in an array, finding the highest and lowest values, and sequentially search an array.
	KB 4
	
	KB 4

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.
 	
At the end of this section, students will be able to:
 	
   a. understand the concept of generalization and specialization relationships,
 	
   b. create a new class to be based on an existing class, call the superclass constructor, and override superclass methods,
 	
   c. define abstract classes, abstract methods, and interfaces,
 	
   d. understand the concepts of polymorphism.
	KB 4
	
	KB 4
	
	KB 4
	
	KB 4

Evaluation

Course Component	Weight
Bonus – On-line quizzes, mostly multiple-choice questions using OWL Tests & Quizzes (5 quizzes).	5%
In-person Programming Quizzes (4 quizzes)	20%
Laboratory Activities (8 assignments)	15%
Midterm Test	25%
Final Examination	40%

In-Person Programming Quizzes: To help the students follow with the material there will be 4 quizzes to be completed in-person during laboratory times and supervised by the TAs. Students will be given a question written on a piece of paper asking them to write small-size Java program(s). Students are required to write their programs (Java code) on the same paper without access to the computer or the Internet and then hand-in their solutions to the TA immediately. The quizzes schedule will be posted on the course website (OWL). The four quizzes will be graded manually with equal weights, 5% each.

Online Quizzes: Students may receive up to 5% bonus marks if they attempt to complete the online quizzes. The quizzes (5 in total) are open-book multiple choice questions evaluating students' competence of the course material covered during the class lectures. The quizzes will be available on OWL Tests & Quizzes and will be graded automatically. The schedule of the online quizzes will be included within the laboratory assignments instructions.

Laboratory Activities: There will be in person lab activities every week (starting September 18th except weeks 7, 9, 13, and 14) in which students will implement the covered course material to solve and submit eight programming 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 Sunday (11:55 PM) of the same week. The TAs will be available in person in the computer labs during the lab hours to help the students with any questions related to the lab requirements. **No late submissions will be accepted**.

Midterm Exam: A closed book on-campus written exam (mostly programming). The time and the place will be announced in OWL.

Final Examination: the final examination is a closed book on-campus exam for three hours and 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 on-campus exams.

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.

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/

STATEMENT ON GENDER-BASED AND SEXUAL VIOLENCE

Western is committed to reducing incidents of gender-based and sexual violence and providing compassionate support to anyone who has gone through these traumatic events. If you have experienced gender-based or sexual violence (either recently or in the past), you will find information about support services for survivors, including emergency contacts, here. To connect with a case manager or set up an appointment, please contact support@uwo.ca.

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.

A. *GENERAL REGULATIONS & PROCEDURES*

1. All first-year students will report to the Undergraduate Services Office by submitting the Academic Consideration Request Form, for all instances.

2. If you are an upper year student and you are missing a test/assignment/lab or examination you will report the absence by submitting Academic Consideration Request Form. Absences worth LESS THAN 10% of your mark, will be processed by your department office. If your course work is worth 10% OR MORE of your final grade, your request will be processed by the Undergraduate Services Office.

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/MIDTERM TESTS*

1. If you are in first year and you are unable to write a midterm/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 midterm/term test, inform your instructor PRIOR to the scheduled date of the test and request relief through the Academic Consideration Request Form. If the instructor is not available, leave a message for him/her at the department office. If the test is worth LESS THAN 10% of your mark, your request for relief will be processed by your department office. If the test is worth MORE THAN 10% of your final grade your request for relief will be processed by the Undergraduate Services Office.

3. Be prepared to attach supporting documentation to the Department Chair and/or the Undergraduate Services Office through the online form (see next page for information on documentation).

4. Discuss with the instructor if and when the test can be rescheduled. The approval of the Chair or the Undergraduate Services Office is required when rescheduling midterm/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 report your absence using the [Academic Consideration Request Form](#) and request permission to write a Special Final Examination. If no one is available in the Undergraduate Services Office, leave a message <u>clearly</u> 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, headache, sleeping in, misreading timetable and travel arrangements.

3. In order to receive permission to write a Special Examination, you <u>must</u> obtain the approval of the Chair of the Department **and** the Associate Dean and in order to apply you <u>must</u> submit an "[Application for a Special Exam](#)" form. The Undergraduate Services Office will then notify the course instructor(s) and reschedule the examination on your behalf.

   PLEASE NOTE: **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 submit the [Academic Consideration Request Form](#) and 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 Assistant Dean, First Year Studies, 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, Undergraduate Studies. 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, Undergraduate Studies.

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 are strongly encouraged to seek advice from your Academic Counsellor in the Undergraduate Services Office.

G. ***DOCUMENTATION***

If you consulted an off-campus doctor or Student Health Services regarding your illness or personal problem, **you <u>must</u> 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 directions.

**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 2023 Western Academic Calendar available at www.westerncalendar.uwo.ca.

Absences Due to Illness:
https://www.westerncalendar.uwo.ca/PolicyPages.cfm?Command=showCategory&PolicyCategoryID=1&SelectedCalendar=Live&ArchiveID=#Page_135

Academic Accommodations for Students with Disabilities:
http://www.westerncalendar.uwo.ca/PolicyPages.cfm?Command=showCategory&PolicyCategoryID=1&SelectedCalendar=Live&ArchiveID=#Page_10

Academic Accommodations for Religious or Holy Days:
http://www.westerncalendar.uwo.ca/PolicyPages.cfm?Command=showCategory&PolicyCategoryID=1&SelectedCalendar=Live&ArchiveID=#Page_16

Course Withdrawals:
http://www.westerncalendar.uwo.ca/PolicyPages.cfm?Command=showCategory&PolicyCategoryID=6&SelectedCalendar=Live&ArchiveID=#Page_75

Examinations:
http://www.westerncalendar.uwo.ca/PolicyPages.cfm?PolicyCategoryID=5&command=showCategory&SelectedCalendar=Live&ArchiveID=

Scheduling of Term Assignments:
http://www.westerncalendar.uwo.ca/PolicyPages.cfm?Command=showCategory&PolicyCategoryID=5&SelectedCalendar=Live&ArchiveID=#SubHeading_78

Scholastic Offences:
http://www.westerncalendar.uwo.ca/PolicyPages.cfm?Command=showCategory&PolicyCategoryID=1&SelectedCalendar=Live&ArchiveID=#Page_20

Student Medical Certificate:
https://www.eng.uwo.ca/files/undergraduate/student-medical-certificate.pdf

Engineering Academic Regulations:
http://www.westerncalendar.uwo.ca/PolicyPages.cfm?Command=showCategory&PolicyCategoryID=4&SelectedCalendar=Live&ArchiveID=#Page_86

**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.

**Add Deadlines:**	First term half course (i.e. "A" or "F")	September 15, 2023
	Full courses and full-year half course (i.e. "E", "Y" or no suffix)	September 15, 2023
	Second term half course (i.e. "B" or "G")	January 16, 2024
**Drop Deadlines****:**	First term half course without penalty (i.e. "A" or "F")	November 13, 2023
	Full courses and full-year half courses without penalty (i.e. "E","Y" or no suffix)	November 30, 2023
	Second term half or second term full course without penalty (i.e. "B" or "G")	March 7, 2024

**Contact Information:**

Undergraduate Services Office: SEB 2097   Phone: 519-661-2130   E-mail: engugrad@uwo.ca

Chemical & Green Process Engineering: TEB 477   Phone: 519-661-2131   E-mail: cbeugrad@uwo.ca
Civil Engineering: SEB 3005   Phone: 519-661-2139   E-mail: civil@uwo.ca
Computer, Electrical, Mechatronic Systems & Software Engineering   TEB 279   Phone: 519-661-3758   E-mail: eceugrad@uwo.ca
Integrated Engineering   ACEB 2410 Phone: 519-661-6725   E-mail: engceli@uwo.ca
Mechanical Engineering: SEB 3002   Phone: 519-661-4122   E-mail: mmeundergraduate@uwo.ca