UNIVERSITY of GUELPH

ENGG*1410 Introductory Programming for Engineers

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Fall 2023
Section(s): C01

School of Engineering
Credit Weight: 0.50
Version 1.00 - September 07, 2023

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1 Course Details

1.1 Calendar Description

This course is for students requiring an introduction and understanding of programming. The goal of this course is to introduce students to the basics of computer software and understand how to use it for problem solving. Topics include the structure of computers, developing and debugging software, data representation and manipulation, functions and program modularization, complex data types, pointers, strings, recursion, file I/O, and simple data structures. Students planning to take additional CIS courses require this course. Previous programming experience is recommended. Students lacking programming experience should consult with their program counsellor.

Restrictions: This is a Priority Access Course. Enrolment may be restricted to the CENG, ESC and Undeclared specializations in the BENG and BENG:C programs. See department for more information. Non-BENG students may take a maximum of 4.00 ENGG credits.

1.2 Course Description

This course is an introductory course to Programming, which is a basic course in most Electrical and Computer Engineering programs. The course is designed to provide complete knowledge of C language. Students will be able to develop logics which will help them to create programs, applications in C. Also by learning the basic programming constructs they can easily switch over to any other language in future.

1.3 Timetable

Lectures:

- Monday, Wednesday, and Friday 08:30 AM - 09:20 AM, Location: ROZH Room 103, Prof. Mohamad Abou El Nasr

Seminars (Tutorials):

- Monday 02:30PM - 03:20PM, Location THRN Room 1313, GTA: Names will be posted on courselink.
- Tuesday 10:30AM - 11:20AM, Location THRN Room 2313, GTA: Names will be posted on courselink.
- Wednesday 09:30AM - 10:20AM, Location THRN Room 1313, GTA: Names will be posted on courselink.
- Thursday 04:30PM - 05:20PM, Location THRN Room 1313, GTA: Names will be posted on courselink.

Laboratory:

- Monday, Time: 11:30AM - 01:20PM, Location: THRN 2313, GTA: Names will be posted on courselink.
- Tuesday, Time: 11:30AM - 01:20PM, Location: THRN 2313, GTA: Names will be posted on courselink.
- Thursday, Time: 12:30 PM - 02:20 PM, Location: THRN 2313, GTA: Names will be posted on courselink.
- Friday, Time: 11:30AM - 01:20PM, Location: THRN 2313, GTA: Names will be posted on courselink.

Timetable is subject to change. Please see WebAdvisor for the latest information.

1.4 Final Exam

Date/Time: Dec. 13,2023 W 8:30 AM - 10:30 AM

Location: TBA

Please see WebAdvisor for the latest information.

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2 Instructional Support

2.1 Instructional Support Team

Instructor:	Mohamad Abou El Nasr
Email:	maboueln@uoguelph.ca
Telephone:	+1-519-824-4120 x52447
Office:	RICH 1513
Office Hours:	TBA and by appointment -In office and could be conducted online via Teams / Zoom.

2.2 Teaching Assistants

Teaching Assistant (GTA):	Anton Naim Ibrahim
Email:	anaimibr@uoguelph.ca
Teaching Assistant (GTA):	Fatemeh Haghighi
Email:	fhaghigh@uoguelph.ca
Teaching Assistant (GTA):	Mohammad Dara
Email:	dara@uoguelph.ca
Teaching Assistant (GTA):	Shimpli Borkar
Email:	sborkar@uoguelph.ca

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3 Learning Resources

3.1 Required Resources

Programming in C, 4th edition (Textbook) (Textbook)
https://www.pearson.com/us/higher-education/program/Kochan-Programming-in-C-4th-Edition/PGM153468.htm

3.2 Recommended Resources

The C Programming Language - Kernighan, Brian W., and Ritchie, Dennis M. (Prentice-Hall, 1978) (Textbook)

3.3 Additional Resources

C Programming: Absolute Beginner's Guide, 3rd Edition, Pearson Education, 2014. (Textbook)
https://www.pearson.com/us/higher-education/program/Perry-C-Programming-Absolute-Beginner-s-Guide-3rd-Edition/PGM13859.html

3.4 Lecture Information

All the lecture notes will be posted on courselink web page (week #1-#12)

3.4 Assignments

Weekly assignments will be posted on courselink.

3.4 Lab Information

The handouts for all the lab sessions will be posted within the lab section in the courselink website. All types of resources regarding tutorials, links to web pages can be found in this section.
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4 Learning Outcomes

4.1 Course Learning Outcomes

By the end of this course, you should be able to:
1. Design and implement a solution for a given problem.
2. Write a structured program in C to solve many Engineering problems.
3. Debug and correct the syntax, semantics and logic of a written program in C
4. Manage storage by statically and dynamically allocating and freeing space for arrays, strings, structs etc.
5. Use most aspects and constructs in C including flow control, structures and File I/O.
6. Understand the scope of variables and functions and the usage of the stack.

4.2 Engineers Canada - Graduate Attributes (2018)

Successfully completing this course will contribute to the following:

#	Outcome	Learning Outcome
1	Knowledge Base	1, 3, 5
1.1	Recall, describe and apply fundamental mathematical principles and concepts	1, 3
1.3	Recall, describe and apply fundamental engineering principles and concepts	3, 5
2	Problem Analysis	1, 4
2.1	Formulate a problem statement in engineering and non-engineering terminology	1

#	Outcome	Learning Outcome
2.2	Identify, organize and justify appropriate information, including assumptions	1, 4
2.3	Construct a conceptual framework and select an appropriate solution approach	1, 4
2.4	Execute an engineering solution	1, 4
4	Design	1, 2, 3, 4, 5
4.1	Describe design process used to develop design solution	1, 2, 4, 5
4.2	Construct design-specific problem statements including the definition of criteria and constraints	1, 4
4.3	Create a variety of engineering design solutions	1, 2, 3, 5
5	Use of Engineering Tools	1, 2, 3, 4, 5, 6
5.2	Demonstrate proficiency in the application of selected engineering tools	1, 2, 3, 4, 5, 6
6	Individual & Teamwork	1
6.2	Understand all members' roles and responsibilities within a team	1
6.3	Execute and adapt individual role to promote team success through, for example, timeliness, respect, positive attitude	1
6.4	Apply strategies to mitigate and/or resolve conflicts	1
7	Communication Skills	1
7.2	Interpret technical documentation such as device specification sheets, drawings, diagrams, flowcharts, and pseudocode	1
7.3	Construct the finished elements using accepted norms in English, graphical standards, and engineering conventions, as appropriate for the message and audience	1

5 Teaching and Learning Activities

The topics presented, and the schedule, are tentative, and all effort will be given to cover them all.

Instructor holds the right to adjust and change topics order and coverage in preference to fully and thoroughly cover the actually selected ones.

5.1 Lecture

Week #1 - Week #12

Topics:	Topic 1: Introduction to Programming
	Reference: Chapter 1 in Textbook
Topics:	Topic 2: Variables, Data Types & Arithmetic Operations
	Reference: Chapter 3 in Textbook
Topics:	Topic 3: Input/Output Operations in C
	Reference: Chapter 15 in Textbook
Topics:	Topic 4: Program Looping and Decision Making
	Reference: Chapter 4 in Textbook
Topics:	Topic 5: Functions in C
	Reference: Chapter 7 in Textbook
Topics:	Topic 6: Arrays and String
	Reference: Chapter 6, 9 in Textbook
Topics:	Topic 7: Pointers in C
	Reference: Chapter 10 in Textbook
Topics:	Topic 8: User Define Data Types (Structures)

Reference: Chapter 8, 13 in Textbook

Topics:	Topic 9: Files in C

Reference: Chapter 15 in Textbook

Topics:	Topic 10: Operations on Bits

Reference: Chapter 11 in Textbook

Topics:	Topic 11: Makefile and Debugging Programs

Reference: Chapter 17 in Textbook

Topics:	Topic 12: Abstract Data Types

Reference: Chapter 13 in Textbook

Topics:	Topic 13: Introduction to Object Oriented Programming

Reference: Chapter 18 in Textbook

5.2 Lab

Week #1 - Week #11

Topics:	L1: Compiling and Executing Programs

Start Date: Week #1, Due Date: posted on courselink.

Topics:	L2: Debugging Programs (Syntax/Semantic Errors)

Start Date: Week #3, Due Date: posted on courselink.

| **Topics:** | L3: Revision Control (Github) |

Start Date: Week #5, Due Date: posted on courselink.

| **Topics:** | L4: Mini Project #1 (Encryption/Decryption) |

Start Date: Week #7, Due Date: Week #9 Exact date will be posted on courselink.

| **Topics:** | L5: Mini Project #2 (Machine Learning) |

Start Date: Week #9, Due Date: Week #11 exact date will be posted on courselink.

5.3 Important Dates

Thursday, September 7, 2023: Classes Start.
Friday, October 6, 2023: Fall Break begins at end of classes this day.

Monday, October 9, 2023: Holiday -- No Classes Scheduled -- Classes rescheduled to Friday, December 1
Wednesday, 11th October 2023: Fall Break ends and classes resume.

Saturday, October 21, 2023: *Midterm*, Time: 09:00AM - 12:00PM; Location: G MCLN 102

Friday, December 1, 2023: Classes rescheduled from Monday October 9.

Wednesday, December 13, 2023: *Final*, Time 08:30AM - 10:30AM; Location: TBA

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6 Assessments

6.1 Marking Schemes & Distributions

There will be no makeup for a missed midterm. In case a student can't write the midterm due to valid and acceptable reasons, the grades for the midterm will be transferred to the final and scheme B will be in effect.

Student must obtain a grade of 50% or higher on the exam portion of the course in order to

pass.

Name	Scheme A (%)	Scheme B (%)
Assignments	5	5
Labs & Mini Projects	20	20
Midterm Exam	25	0
Lab Programming Exam	15	15
Final Exam	35	60
Total	100	100

6.2 Assessment Details

Course Assignment (5%)
Date: Weekly
Learning Outcome: 1, 2, 5, 6
Assignments are to be solved then uploaded to coursleink dropbox by the due date given for each. Partial / full solutions will be posted in a week or 10 days period after original posting.

You are encouraged to discuss the problems with your class mates, however, whatever you submit should be your own and not a mere copy of someone else's solutions.

While the assignments are coarsely graded, without fine or detailed scrutiny and the grading process involving broader categories or criteria rather than a nuanced evaluation of individual aspects of the assignments. You should try to solve them and discuss / understand the problems in the assignments as the midterm, Lab final and final exam will be of similar nature to these assignments.

Labs and Mini Projects (25%)
Date: Weekly Labs
Learning Outcome: 1, 2, 3, 4, 5, 6
The first 6 weeks (L1, L2, and L3) are preparatory hands-on labs and are worth 9% (based on Lab completion / lab reports / demo of acquired skill).

Weeks #7 to #11 are devoted to two mini-projects, each will be graded as 8% of the course grade.

Mini-projects might be done individually but advised to be done in groups of 2 students.

Lab Work: You must complete all laboratories. If you miss a laboratory due to grounds for granting academic consideration or religious accommodation, arrangements must be

made with the teaching assistant to complete the lab work and demonstration (With TA and Instructor consent online demonstration or online makeup lab might be accepted).

Late Lab / mini-project Reports: Late submissions of lab or mini-projects reports will be penalized unless you have good reasons. Explain to your teaching assistant the circumstances of why your lab report is submitted late.

Midterm Exam (25%)
Date: Sat, Oct 21, 9:00 AM - , 12:00 PM, G MCLN 102
Learning Outcome: 1, 2, 3, 5, 6
The C Programming midterm and final exams are conducted using a traditional paper and pencil format, providing students with an opportunity to showcase their mastery of the C programming language concepts through written assessment. The exams are designed to evaluate both theoretical understanding and practical application of C programming principles. Exams consist of a combination of multiple-choice questions, short-answer questions, and coding problems. Notably, students will not be required to write complete programs. Instead, they will be asked to provide code snippets and segments that address specific programming tasks. The exams are structured to encompass various levels of complexity, allowing students to demonstrate their knowledge across the range of topics covered throughout the course.

Lab Programming Final (15%)
Date: Week 11
Learning Outcome: 1, 2, 3, 4, 5, 6
The lab final programming exam is designed to assess students' practical application of concepts learned throughout the course. This comprehensive assessment measures students' ability to conceptualize, code, and implement solutions to small problems. The exam will likely include programming tasks that mirror the challenges encountered in assignments, lab sessions and lectures. Students will be expected to demonstrate their understanding of programming principles, algorithms, and debugging techniques. The focus will be on producing functional and efficient code while paying attention to coding standards and best practices. The exam aims to evaluate students' problem-solving skills and C coding proficiency, within a limited timeframe.

Final Exam (35%)
Date: Wed, Dec 13, 8:30 AM - , 10:30 AM, TBA
Learning Outcome: 1, 2, 3, 4, 5, 6
Please check webadvisor for specific date and time.

The C Programming midterm and final exams are conducted using a traditional paper and pencil format, providing students with an opportunity to showcase their mastery of the C programming language concepts through written assessment. The exams are designed to evaluate both theoretical understanding and practical application of C programming principles. Exams consist of a combination of multiple-choice questions, short-answer questions, and coding problems. Notably, students will not be required to write complete programs. Instead, they will be asked to provide code snippets and segments that address specific programming tasks. The exams are structured to encompass various levels of complexity, allowing students to demonstrate their knowledge across the range of topics covered throughout the course.

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7 School of Engineering Statements

7.1 Instructor's Role and Responsibility to Students

The instructor's role is to develop and deliver course material in ways that facilitate learning for a variety of students. Selected lecture notes will be made available to students on Courselink but these are not intended to be stand-alone course notes. Some written lecture notes will be presented only in class. During lectures, the instructor will expand and explain the content of notes and provide example problems that supplement posted notes. Scheduled classes will be the principal venue to provide information and feedback for tests and labs.

7.2 Students' Learning Responsibilities

Students are expected to take advantage of the learning opportunities provided during lectures and lab sessions. Students, especially those having difficulty with the course content, should also make use of other resources recommended by the instructor. Students who do (or may) fall behind due to illness, work, or extra-curricular activities are advised to keep the instructor informed. This will allow the instructor to recommend extra resources in a timely manner and/or provide consideration if appropriate.

7.3 Lab Safety

Safety is critically important to the School and is the responsibility of all members of the School: faculty, staff and students. As a student in a lab course you are responsible for taking all reasonable safety precautions and following the lab safety rules specific to the lab you are working in. In addition, you are responsible for reporting all safety issues to the laboratory supervisor, GTA or faculty responsible.

8 University Statements

8.1 Email Communication

As per university regulations, all students are required to check their e-mail account regularly: e-mail is the official route of communication between the University and its students.

8.2 When You Cannot Meet a Course Requirement

When you find yourself unable to meet an in-course requirement because of illness or compassionate reasons please advise the course instructor (or designated person, such as a teaching assistant) in writing, with your name, id#, and e-mail contact. The grounds for Academic Consideration are detailed in the Undergraduate and Graduate Calendars.

Undergraduate Calendar - Academic Consideration and Appeals
https://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-ac.shtml

Graduate Calendar - Grounds for Academic Consideration

https://www.uoguelph.ca/registrar/calendars/graduate/current/genreg/index.shtml

Associate Diploma Calendar - Academic Consideration, Appeals and Petitions
https://www.uoguelph.ca/registrar/calendars/diploma/current/index.shtml

8.3 Drop Date

Students will have until the last day of classes to drop courses without academic penalty. The deadline to drop two-semester courses will be the last day of classes in the second semester. This applies to all students (undergraduate, graduate and diploma) except for Doctor of Veterinary Medicine and Associate Diploma in Veterinary Technology (conventional and alternative delivery) students. The regulations and procedures for course registration are available in their respective Academic Calendars.

Undergraduate Calendar - Dropping Courses
https://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-drop.shtml

Graduate Calendar - Registration Changes
https://www.uoguelph.ca/registrar/calendars/graduate/current/genreg/genreg-reg-regchg.shtml

Associate Diploma Calendar - Dropping Courses
https://www.uoguelph.ca/registrar/calendars/diploma/current/c08/c08-drop.shtml

8.4 Copies of Out-of-class Assignments

Keep paper and/or other reliable back-up copies of all out-of-class assignments: you may be asked to resubmit work at any time.

8.5 Accessibility

The University promotes the full participation of students who experience disabilities in their academic programs. To that end, the provision of academic accommodation is a shared responsibility between the University and the student.

When accommodations are needed, the student is required to first register with Student Accessibility Services (SAS). Documentation to substantiate the existence of a disability is required; however, interim accommodations may be possible while that process is underway.

Accommodations are available for both permanent and temporary disabilities. It should be noted that common illnesses such as a cold or the flu do not constitute a disability.

Use of the SAS Exam Centre requires students to make a booking at least 14 days in advance, and no later than November 1 (fall), March 1 (winter) or July 1 (summer). Similarly, new or changed accommodations for online quizzes, tests and exams must be approved at least a week ahead of time.

For Guelph students, information can be found on the SAS website
https://www.uoguelph.ca/sas

For Ridgetown students, information can be found on the Ridgetown SAS website
https://www.ridgetownc.com/services/accessibilityservices.cfm

8.6 Academic Integrity

The University of Guelph is committed to upholding the highest standards of academic integrity, and it is the responsibility of all members of the University community-faculty, staff, and students-to be aware of what constitutes academic misconduct and to do as much as possible to prevent academic offences from occurring. University of Guelph students have the responsibility of abiding by the University's policy on academic misconduct regardless of their location of study; faculty, staff, and students have the responsibility of supporting an environment that encourages academic integrity. Students need to remain aware that instructors have access to and the right to use electronic and other means of detection.

Please note: Whether or not a student intended to commit academic misconduct is not relevant for a finding of guilt. Hurried or careless submission of assignments does not excuse students from responsibility for verifying the academic integrity of their work before submitting it. Students who are in any doubt as to whether an action on their part could be construed as an academic offence should consult with a faculty member or faculty advisor.

Undergraduate Calendar - Academic Misconduct
https://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-amisconduct.shtml

Graduate Calendar - Academic Misconduct
https://www.uoguelph.ca/registrar/calendars/graduate/current/genreg/index.shtml

8.7 Recording of Materials

Presentations that are made in relation to course work - including lectures - cannot be recorded or copied without the permission of the presenter, whether the instructor, a student, or guest lecturer. Material recorded with permission is restricted to use for that course unless further permission is granted.

8.8 Resources

The Academic Calendars are the source of information about the University of Guelph's procedures, policies, and regulations that apply to undergraduate, graduate, and diploma programs.

Academic Calendars
https://www.uoguelph.ca/academics/calendars

8.9 Illness

Medical notes will not normally be required for singular instances of academic consideration, although students may be required to provide supporting documentation for multiple missed

assessments or when involving a large part of a course (e.g.. final exam or major assignment).

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