



ECET 130 - Engineering Applications in C

Fall 2020 – Course Outline

THE CALENDAR DESCRIPTION IS AVAILABLE ON THE WEB @ <http://camosun.ca/learn/calendar/current/web/ecet.html#ECET130>

Ω **Please note:** This outline will not be kept indefinitely. It is recommended students keep this outline for their records, especially to assist in transfer credit to post-secondary institutions.

1. Instructor Information

(a) Instructor	Phil Vreugdenhil
(b) Office hours	
(c) Location	CBA – 122A
(d) Phone	250-370-4622 Alternative: _____
(e) E-mail	VreugdenhilP@camosun.bc.ca
(f) Website	

OFFERED:	Semester 1 (fall)
CREDIT:	3
IN-CLASS WORKLOAD:	2 lecture, 2 lab /week
OUT-OF-CLASS WORKLOAD:	~6 hours /week

PREREQUISITES: C+ in Pre-Calc 12 **OR** C in MATH 097, 107, 115

Intended Learning Outcomes

Upon successful completion of this course, students will be able to:

- write, modify, debug and analyze procedural programs written in C using industry-standard software development tools;
- write C programs using arrays, structures, arrays of structures and pointers;
- demonstrate use of standard and user-defined library interfaces;
- demonstrate correct use of standard C constructs, and standard and user-defined functions;
- write programs in modular form;
- demonstrate correct formatting and commenting of code;
- use console-based user interfaces to an embedded microcontroller;
- write C programs that perform low-level input and output to devices like switches and LEDs;
- perform bit-wise operations on data;
- debug and test embedded microcontroller C programs;
- use a microcontroller integrated development environment (IDE).

REQUIRED MATERIALS

1. ECET 130 Parts kit (or equivalent) – available through Electronics prep-room. Please refer to new COVID protocols when attempting to purchase and pick up.
2. Computer capable of running Arduino IDE, preferably with webcam, microphone, printer, etc.
3. Internet access to participate in D2L collaborative environments (text chat at min, prefer audio, maybe video).

TEXTBOOKS AND REFERENCES

1. See D2L – Texts are available for download.
 2. **Arduino Notebook, Brian W. Evans**
 3. **Lecture Notes for Embedded Controllers Using C and Arduino , James M. Fiore**
 4. **Beej's Guide to C Programming, Brian “Beej” Hall**
 5. <http://computer.howstuffworks.com/c.htm/printable>
 6. <http://www.eskimo.com/~scs/cclass/cclass.html>
 7. <http://www.bloodshed.net/dev/index.html>
- } For those who want to print out resources
- } For those who prefer resources online

COURSE CONTENT & TENTATIVE SCHEDULE

1. Introduction → week #1
 - 1.1 Programming languages
 - 1.2 A simple C program
 - 1.3 Statements and expressions
 - 1.4 Integrated development environments (IDEs)
 - 1.5 Compiling and debugging
 - 1.6 Embedded development
2. Variables and constants → week #1 - #2
 - 2.1 C data types
 - 2.2 Storage requirements
 - 2.3 Format specifiers
 - 2.4 Data type modifiers
 - 2.5 Introduction to formatted input/output (I/O)
 - 2.5.1 Character strings
 - 2.5.2 Escape sequences
3. Flow of control: sequence, selection, repetition → week #3-#4
 - 3.1 C control structures
 - 3.2 Evaluating conditions
 - 3.3 Repetition
 - 3.3.1 The “for” loop
 - 3.3.2 The “while” loop
 - 3.3.3 The “do while” loop
 - 3.4 Selection
 - 5.3.1 The “if” construct
 - 5.3.2 The “switch” construct
4. Operators, expressions and statements in C → week #5
 - 4.1 Assignment operators
 - 4.2 Boolean and bit operators

ECET 130 course outline

- 4.3 Math operators
- 4.4 Modulus operators

- 5. Arrays → week #6 - #7
 - 5.1 The array in memory
 - 5.2 Declaring and referencing an array
 - 5.3 Strings as arrays of characters
 - 5.4 Examples of arrays
 - 5.5 Searching and sorting arrays
 - 5.6 Multidimensional arrays

- 6. Modular programming and functions → week #8 - #9
 - 6.1 Standard C library functions
 - 6.2 Functions and I/O parameters
 - 6.3 Arrays and array elements as function arguments
 - 6.4 Scope of names
 - 6.5 Pointers
 - 6.6 Program arguments

- 7. Structures → week #10 - #11
 - 7.1 The structure as a user-defined data type
 - 7.2 Using structures as input and output parameters for functions
 - 7.3 Parallel arrays and arrays of structures

- 8. Strings → week #12
 - 8.1 A brief look at string library functions
 - 8.2 Arrays of strings (arrays of pointers)

- 9. Bytes, characters and file I/O → week #13
 - 9.1 Bytes and characters
 - 9.2 Input and output files
 - 9.3 Text files and binary files
 - 9.4 The serial port as a device file

- 10. Review, practice final exam, loose ends, etc. → week #14

Lab Topics by Approximate Lab Number:

- 1. Introduction to the Arduino microcontroller
- 2. C development environment for Arduino
- 3. Simple C programs using formatted I/O
- 4. Flow control programs 1
- 5. Flow control programs 2
- 6. Operators: Boolean, bit, math and modulus
- 7. Arrays and pointers 1
- 8. Arrays and pointers 2
- 9. Functions
- 10. Structures 1
- 11. Structures 2
- 12. Strings
- 13. Bytes and characters

EVALUATION

- Labs (11) 40%
- Assignments and Quizzes (~5) 20%
- Midterm Exam (wk #8/9 - TBD) 20%
- Final Exam 20%

College Supports, Services and Policies



Immediate, Urgent, or Emergency Support

If you or someone you know requires immediate, urgent, or emergency support (e.g. illness, injury, thoughts of suicide, sexual assault, etc.), **SEEK HELP**. Resource contacts @ <http://camosun.ca/about/mental-health/emergency.html> or <http://camosun.ca/services/sexual-violence/get-support.html#urgent>

College Services

Camosun offers a variety of health and academic support services, including counselling, dental, disability resource centre, help centre, learning skills, sexual violence support & education, library, and writing centre. For more information on these services, visit the **STUDENT SERVICES** link on the College website at <http://camosun.ca/>

College Policies

Camosun strives to provide clear, transparent, and easily accessible policies that exemplify the college's commitment to life-changing learning. It is the student's responsibility to become familiar with the content of College policies. Policies are available on the College website at <http://camosun.ca/about/policies/>. Education and academic policies include, but are not limited to, Academic Progress, Admission, Course Withdrawals, Standards for Awarding Credentials, Involuntary Health and Safety Leave of Absence, Prior Learning Assessment, Medical/Compassionate Withdrawal, Sexual Violence and Misconduct, Student Ancillary Fees, Student Appeals, Student Conduct, and Student Penalties and Fines.

GRADING SYSTEMS <http://www.camosun.bc.ca/policies/policies.php>

The following grading systems is used for ECET 130: **Standard Grading System (GPA)**

Percentage	Grade	Description	Grade Point Equivalency
90-100	A+		9
85-89	A		8
80-84	A-		7
77-79	B+		6
73-76	B		5
70-72	B-		4
65-69	C+		3
60-64	C		2
50-59	D		1
0-49	F	Minimum level has not been achieved.	0

Temporary Grades

Temporary grades are assigned for specific circumstances and will convert to a final grade according to the grading scheme being used in the course. See Grading Policy at <http://www.camosun.bc.ca/policies/E-1.5.pdf> for information on conversion to final grades, and for additional information on student record and transcript notations.

Temporary Grade	Description
I	<i>Incomplete:</i> A temporary grade assigned when the requirements of a course have not yet been completed due to hardship or extenuating circumstances, such as illness or death in the family.
IP	<i>In progress:</i> A temporary grade assigned for courses that are designed to have an anticipated enrollment that extends beyond one term. No more than two IP grades will be assigned for the same course.
CW	<i>Compulsory Withdrawal:</i> A temporary grade assigned by a Dean when an instructor, after documenting the prescriptive strategies applied and consulting with peers, deems that a student is unsafe to self or others and must be removed from the lab, practicum, worksite, or field placement.

NOTE: A minimum of 50% (average) must be achieved in each of the theory and lab portions to pass the course.

**Less than 50% in either portion will result in a failure of the entire course.

ALSO, in order to pass this course, you must meet the following criteria:

- pass the Final Exam with a minimum grade of 50%
- obtain an average of 60% on Assignments/Quizzes & Midterm Exam
- submit all lab reports and achieved a minimum grade of 60% average
- score an overall course mark of 60% using the weighting above

PROPOSED WEEKLY ONLINE SCHEDULE:

(A) = asynchronous, (S) = synchronous

Mon (S) - Office hours @ 11am - 12pm

Mon (A) - Lecture @ 4:30pm - 5:20pm

Tues (S) - Lab Help X01C @ 8:30am - 10:30am

Wed (S) - Lab Help X01A @ 8:30am - 10:30am

Wed (S) - Lecture @ 2:30pm - 3:20pm

Thur (S) - Lab Help X01B @ 8:30am - 10:30am