

CAMOSUN COLLEGE

ELECTRONICS ENGINEERING DEPARTMENT

ECET 130 Engineering Applications in C

COURSE OUTLINE

Instructor: Justin Curran
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CALENDAR DESCRIPTION

Students in this course will be introduced to C language computer programming for electronics. They will learn software problem specification, algorithm development, program development, debugging and testing. Students will complete laboratory assignments that emphasize control of electronic devices using embedded microcontrollers.

OFFERED:	Semester 1 (fall)
CREDIT:	3
IN-CLASS WORKLOAD:	2 lecture, 2 lab /week
OUT-OF-CLASS WORKLOAD:	6 hours /week
PREREQUISITES:	None

OBJECTIVE

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).

TABLE OF CONTENTS

1.	Introduction	1 hour
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	2 hours
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	3 hours
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	
3.4.1	The “if” construct	
3.4.2	The “switch” construct	
4.	Operators, expressions and statements in C	2 hours
4.1	Assignment operators	
4.2	Boolean and bit operators	
4.3	Math operators	
4.4	Modulus operators	
5.	Arrays	4 hours
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	5 hours
6.1	Standard C library functions	
6.2	Functions and I/O parameters	

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6.3	Arrays and array elements as function arguments	
6.4	Scope of names	
6.5	Pointers	
6.6	Program arguments	
7.	Structures	4 hours
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	2 hours
8.1	A brief look at string library functions	
8.2	Arrays of strings (arrays of pointers)	
9.	Bytes, characters and file I/O	2 hours
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	
	Tests and review	3 hours
	Total:	28 hours

Labs:

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

TEXTBOOKS AND REFERENCES

1. See D2L
2. arduino notebook v1-1, 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>

EVALUATION

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|---------------------------|-----|
| • Labs (12) | 30% |
| • Assignments and Quizzes | 10% |
| • Midterm Exam | 20% |
| • Final Exam | 40% |

GRADING In accordance with College policy

Letter Grades:

A+	90 – 100%	B-	70 - 72%
A	85 - 89%	C+	65 – 69%
A-	80 - 84%	C	60 - 64%
B+	77 - 79%	D	50 - 59%
B	73 - 76%	F	0 - 49%

A minimum of 50% 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.