ORIGINAL COURSE IMPLEMENTATION DATE: September 2020

REVISED COURSE IMPLEMENTATION DATE:

COURSE TO BE REVIEWED (six years after UEC approval)**:** January 2026

Course outline form version: 05/18/2018

OFFICIAL UNDERGRADUATE COURSE OUTLINE FORM

Note: The University reserves the right to amend course outlines as needed without notice.

Course Code and Number: ELTR 252	**Number of Credits:** 3 Course credit policy (105)

Course Full Title: Microcontrollers II

Course Short Title: Microcontrollers II

(Transcripts only display 30 characters. Departments may recommend a short title if one is needed. If left blank, one will be assigned.)

Faculty: Faculty of Applied and Technical Studies	**Department (or program if no department):** Electronics

Calendar Description:

Learn to operate LCD screens, servos and stepper motors with the ATMega328 Microcontroller. Students will learn to integrate the microcontroller with a variety of sub-systems and write programs to interpret analog or digital inputs from sensors (ultrasonic, light, and heat sensors).

Prerequisites (or NONE):	ELTR 202.
Corequisites (if applicable, or NONE):	NONE
Pre/corequisites (if applicable, or NONE):	NONE

Antirequisite Courses *(Cannot be taken for additional credit.)*

Former course code/number:

Cross-listed with:

Dual-listed with:

Equivalent course(s):

(If offered in the previous five years, antirequisite course(s) will be included in the calendar description as a note that students with credit for the antirequisite course(s) cannot take this course for further credit.)

Typical Structure of Instructional Hours

Lecture/seminar hours	30
Tutorials/workshops	
Supervised laboratory hours	15
Experiential (field experience, practicum, internship, etc.)	
Supervised online activities	
Other contact hours:	
Total hours	**45**

Labs to be scheduled independent of lecture hours: ☐ No ☒ Yes

Special Topics *(Double-click on boxes to select.)*

This course is offered with different topics:

☒ No ☐ Yes *(If yes, topic will be recorded when offered.)*

Independent Study

If offered as an Independent Study course, this course may be repeated for further credit: *(If yes, topic will be recorded.)*

☒ No ☐ Yes, repeat(s) ☐ Yes, no limit

Transfer Credit

Transfer credit already exists: *(See **bctransferguide.ca**.)*

☒ No ☐ Yes

Submit outline for (re)articulation:

☒ No ☐ Yes *(If yes, fill in transfer credit form.)*

Grading System

☒ Letter Grades ☐ Credit/No Credit

Maximum enrolment (for information only): 20

Expected Frequency of Course Offerings:

Winter only *(Every semester, Fall only, annually, etc.)*

Department / Program Head or Director:	**Date approved:**	November 2019
Faculty Council approval	**Date approved:**	November 14, 2019
Dean/Associate VP: John English	**Date approved:**	November 14, 2019
Campus-Wide Consultation (CWC)	**Date of posting:**	January 17, 2020
Undergraduate Education Committee (UEC) approval	**Date of meeting:**	January 31, 2020

Learning Outcomes

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

- Read and understand code written in C.
- Operate the Arduino IDE software.
- Write programs in C that employ variables, arrays, loops, conditionals, pointers and functions.
- Integrate the ATMega328 microcontroller (Arduino) with a variety of sub-systems (shields).
- Use the C programming language and the ATMega328 microcontroller to operate LCD screens.
- Use the C programming language and the ATMega328 microcontroller to operate servos and stepper motors.
- Write a program that interprets analog and/or digital inputs in order to operate external devices using analog and/or digital outputs.
- Use the C programming language and the ATMega328 microcontroller to interpret signals from ultrasonic, light, and heat sensors. .

Prior Learning Assessment and Recognition (PLAR)

☒ Yes ☐ No, PLAR cannot be awarded for this course because

Typical Instructional Methods *(Guest lecturers, presentations, online instruction, field trips, etc.; may vary at department's discretion.)*

Lecture and Lab Work

NOTE: The following sections may vary by instructor. Please see course syllabus available from the instructor.

Typical Text(s) and Resource Materials *(If more space is required, download Supplemental Texts and Resource Materials form.)*

	Author (surname, initials)	Title (article, book, journal, etc.)	Current ed.	Publisher	Year
1.	Delores M. Etter	Engineering Problem Solving with C	☒	Pearson	2012
2.			☐		
3.			☐		
4.			☐		
5.			☐		

Required Additional Supplies and Materials *(Software, hardware, tools, specialized clothing, etc.)*

Typical Evaluation Methods and Weighting

Final exam:	30%	Assignments:	20%	Field experience:		Portfolio:	%
Midterm exam:	%	Project:	%	Practicum:	%	Other:	%
Quizzes/tests:	20%	Lab work:	30%	Shop work:	%	Total:	100%

Details (if necessary):

Typical Course Content and Topics

- Intermediate programming concepts in C
- Hardware interface: shields and sub-system circuits
- Hardware interface: LCD screens
- Hardware interface: servos and stepper motor controllers
- Hardware interface: sensors - ultrasonic, light, and heat
- Hardware interface: relays and higher voltage systems
- Hardware interface: ethernet and wireless communications