COURSE SYLLABUS

CAMOSUN COLLEGE

COURSE TITLE:	ECET 190 – Electronics Project
CLASS SECTION:	X01
TERM:	2024 Winter
COURSE CREDITS:	3
DELIVERY METHOD(S):	in-person

Camosun College requires mandatory attendance for the first class meeting of each course. If you do not attend, and do not provide your instructor with a reasonable explanation in advance, you will be removed from the course and the space offered to the next waitlisted student.

INSTRUCTOR DETAILS

NAME:	Ryan Lidstone
EMAIL:	lidstoner@camosun.ca
OFFICE:	TEC206

As your course instructor, I endeavour to provide an inclusive learning environment. However, if you experience barriers to learning in this course, do not hesitate to discuss them with me. Camosun College is committed to identifying and removing institutional and social barriers that prevent access and impede success.

CALENDAR DESCRIPTION

Students will create an electronics project that integrates skills and knowledge of analog and digital circuits and C programming. Students will be given instruction and practice in soldering and shop skills. Students will learn high reliability soldering, non-destructive de-soldering, tinning wires, soldering and de-soldering of surface mount components, electrostatic discharge (ESD) protection, safe and correct use of basic hand and power tools commonly used in the electronics industry, basic metal work, and the design, maintenance and repair of electronic packaging and assemblies.

PREREQUISITE(S):	see calendar
CO-REQUISITE(S):	see calendar
EXCLUSION(S):	see calendar

COURSE LEARNING OUTCOMES / OBJECTIVES

Through lecture, reading material and project construction the student will be introduced to some basic construction shop skills commonly required by employers in the electronics industry. Emphasis is on safe and correct use of basic hand and small power tools. The student will construct projects and learn some basic drafting and design techniques to produce a final working project from specifications that demonstrates quality soldering and shop skills. Evaluation will be based on the competency demonstrated by the student.

Upon successful completion of this course a student will be able to:
- work safely in a shop environment with both hand and power tools
- design and produce sheet metal panels for mounting electronic devices
- produce working drawings suitable for production by commercial shops
- tap threads and/or use threaded inserts to produce threads
- specify and use various fasteners
- safely use a grinder for producing tools and sharpening
- name and describe the characteristics of materials commonly used in the electronics industry
- demonstrate the correct use of Vernier calipers and micrometers
- comply with health and safety legislation and industry standards when using shop equipment and soldering
- describe hazards related to soldering chemicals and materials
- describe the procedures used for avoiding ESD damage to electronic components
- demonstrate high reliability soldering and de-soldering techniques to military standards
- produce a working project from specifications that demonstrates quality soldering and shop skills

REQUIRED MATERIALS & RECOMMENDED PREPARATION / INFORMATION

Provided in-class and via D2L.

COURSE SCHEDULE, TOPICS, AND ASSOCIATED PREPARATION / ACTIVITY / EVALUATION

The following schedule and course components are subject to change with reasonable advance notice, as deemed appropriate by the instructor.

1. **Soldering**   20hrs
    1.1. Introduction
        1.1.1. Toolbox check
        1.1.2. Outline hazardous chemicals, materials used in this course.
    1.2. Soldering Fundamentals
        1.2.1. Definitions and background information
        1.2.2. Soldering fundamentals
        1.2.3. Hand tool Recommendations
        1.2.4. Soldering standards
        1.2.5. Making the solder connection - considerations
    1.3. Stripping and tinning wires
        1.3.1. Wire strippers
        1.3.2. Wire preparation
        1.3.3. Tinning
    1.4. Soldering to turret terminals
        1.4.1. Lead wraps

1.4.2. Multiple lead connections

1.4.3. Soldering turret terminals

1.5. Soldering to cup terminals

1.5.1. Wire preparation

1.5.2. Solder cup preparation

1.5.3. Soldering to solder cups

1.6. Soldering axial lead components

1.6.1. Lead preparation

1.6.2. Lead bending tools

1.6.2.1. Pliers

1.6.2.2. forming tools

1.6.3. Clinches

1.6.4. Straight through

1.6.5. Semi clinch

1.6.6. Full clinch

1.6.7. Mounts

1.6.8. Flush

1.6.9. Vertical

1.6.10. Strain relief

1.6.11. Component alignment

1.6.12. Soldering axial lead components - using combinations of c. and d.

1.7. Soldering TH IC's

1.7.1. Lead preparation

1.7.2. Insertion techniques

1.7.2.1. Methods

1.7.2.2. Clinches

1.7.2.3. Considerations

1.7.3. Soldering IC's to printed circuit boards

1.8. Desoldering TH components from printed circuit boards

1.8.1. Common extraction methods

1.8.1.1. Braid

1.8.1.2. Solder pump

1.8.1.3. Heat and pull

1.8.1.4. Continuous vacuum de-soldering machines

1.8.2. Demonstration of continuous vacuum de-soldering tool

1.8.3. De-soldering IC's from printed circuit board

1.9. Wire wrapping

1.9.1. Tools

1.9.2. Wrapping techniques

1.9.3. Wire wrapping eight pin DIP sockets

1.10. Surface mount soldering

1.10.1. Introduction to Solder paste and re-flow method

1.10.2. Resistors

1.10.3. Capacitors

1.10.4. Transistors

1.10.5. SOIC 's

1.11. Surface mount desoldering

1.11.1. Resistor

1.11.2. SOIC

1.11.3. Various other parts

1.12. ESD Introduction

1.13. Test

2. Drafting and CAD   10hrs
    2.1. Introduction to Drafting
        2.1.1. Drafting tools
        2.1.2. Orthographic Projection
        2.1.3. Multiview drawing
        2.1.4. Isometric drawing
        2.1.5. Third Angle drawings
        2.1.6. Line Types
        2.1.7. Dimensioning
        2.1.8. Title Block, Revision History, Border
        2.1.9. Drawing Scale
        2.1.10. Assignment: Complete hand drawings of shop skills practice parts
        2.1.11. Intro to CAD drawing software
        2.1.12. Assignment: Complete CAD drawings of shop skills practice parts
3. Shop skills   20hrs
    3.1. Safety rules
    3.2. Shop rules
    3.3. Aluminum block project
    3.4. Hack sawing
    3.5. Filing
    3.6. Drilling using drill press
        3.6.1. Cutting oil
        3.6.2. Feed
        3.6.3. Cutting speed
        3.6.4. Pilot holes
    3.7. Sheet metal shear and brake
    3.8. Tool bins
    3.9. Tapping
    3.10. Helicoils
    3.11. Tin Snips
    3.12. Cutting D connector holes
    3.13. Pop rivets
    3.14. Drilling sheet metal
    3.15. Nibblers
    3.16. Switch project
    3.17. Chassis punches
    3.18. Specifying machine screws and bolts
        3.18.1. Unified thread standards: UNF, UNC, metric
        3.18.2. Head style
        3.18.3. Drive style
        3.18.4. Diameter
        3.18.5. Thread style
        3.18.6. Length
        3.18.7. Drive type
    3.19. Drilling through a round rod
    3.20. Grinding
    3.21. Grinding project
    3.22. Removing broken bolts
    3.23. Tapping
        3.23.1. Tap drill selection
        3.23.2. Tap drill sizing
            3.23.2.1. Numbered drill

                  3.23.2.2.   Fractional drill
           3.23.3. Tapping hard materials
           3.23.4. Tapping acrylic plastic
     3.24.   Common Materials
           3.24.1. Steel
           3.24.2. Stainless steel
           3.24.3. Aluminum
           3.24.4. Plastics
           3.24.5. Bend allowance
     3.25.   Test

4. **Decade Box Project**   20hrs
    4.1. Kit Check
    4.2. Drawing and Design
    4.3. Full scale cardboard prototype
    4.4. Solder components to project PCB
    4.5. Testing PCB and Graphing
    4.6. Fabricating flattened enclosure
    4.7. Folding enclosure, finishing, and assembling
    4.8. Final enclosure assembly and retesting
    4.9. Project Report

Total   **(5hrs per week x 14 weeks) = 70hrs**

Students registered with the Centre for Accessible Learning (CAL) who complete quizzes, tests, and exams with academic accommodations have booking procedures and deadlines with CAL where advanced noticed is required. Deadlines scan be reviewed on the [CAL exams page](http://camosun.ca/services/accessible-learning/exams.html). http://camosun.ca/services/accessible-learning/exams.html

EVALUATION OF LEARNING

DESCRIPTION			WEIGHTING
Soldering			25%
	Quizzes	5%	
	Exercises	15%	
	Test	5%	
Shop Skills			30%
	Quizzes/Assignments	5%	
	Skill Building Projects	20%	
	Test	5%	
Drafting			10%
	Assignments	10%	
Final Project			30%
	Soldering (PCB)	5%	
	Enclosure Fabrication	15%	
	Project Report	5%	
	Project Drawing	5%	
Attendance/Equipment			5%
		TOTAL	100%

If you have a concern about a grade you have received for an evaluation, please come and see me as soon as possible. Refer to the Grade Review and Appeals policy for more information. http://camosun.ca/about/policies/education-academic/e-1-programming-and-instruction/e-1.14.pdf

COURSE GUIDELINES & EXPECTATIONS

All labs, assignments, and quizzes must be completed to pass the course. Late submissions will lose 10 percentage points per day they are late. You must receive a passing grade on the final exam to pass the course. Lab attendance is mandatory.

These requirements will be applied at the instructor's discretion. Please advise well in advance if you anticipate difficulty with any of these requirements (that is, talk to your instructor if, for example, you cannot attend a lab, or you will be handing an assignment in late).

SCHOOL OR DEPARTMENTAL INFORMATION

In addition to the evaluation scheme addressed above, courses that are a prerequisite must meet the following overriding criteria to pass a course. The reason for these additional criteria is to ensure your success in subsequent courses with a balance of skills in both theory and practice.

The following criteria must be met:

- Students must obtain a minimum weighted average of 60% in theory evaluations (tests, examinations, etc.) in any course that is a pre-requisite for subsequent courses.

- Students must obtain a minimum weighted average of 60% in lab evaluations (lab performance, reports, etc.) in any course that is a pre-requisite for subsequent courses.

- Students must obtain a minimum of 50% on the final examination for a course to receive a passing grade.

STUDENT RESPONSIBILITY

Enrolment at Camosun assumes that the student will become a responsible member of the College community. As such, each student will display a positive work ethic, assist in the preservation of College property, and assume responsibility for their education by researching academic requirements and policies; demonstrating courtesy and respect toward others; and respecting expectations concerning attendance, assignments, deadlines, and appointments.

SUPPORTS AND SERVICES FOR STUDENTS

Camosun College offers a number of services to help you succeed in and out of the classroom. For a detailed overview of the supports and services visit http://camosun.ca/students/.

Support Service	Website
Academic Advising	http://camosun.ca/advising
Accessible Learning	http://camosun.ca/accessible-learning
Counselling	http://camosun.ca/counselling
Career Services	http://camosun.ca/coop
Financial Aid and Awards	http://camosun.ca/financialaid
Help Centres (Math/English/Science)	http://camosun.ca/help-centres
Indigenous Student Support	http://camosun.ca/indigenous
International Student Support	http://camosun.ca/international/
Learning Skills	http://camosun.ca/learningskills
Library	http://camosun.ca/services/library/
Office of Student Support	http://camosun.ca/oss

Support Service	Website
Ombudsperson	http://camosun.ca/ombuds
Registration	http://camosun.ca/registration
Technology Support	http://camosun.ca/its
Writing Centre	http://camosun.ca/writing-centre

If you have a mental health concern, please contact Counselling to arrange an appointment as soon as possible. Counselling sessions are available at both campuses during business hours. If you need urgent support after-hours, please contact the Vancouver Island Crisis Line at 1-888-494-3888 or call 911.

COLLEGE-WIDE POLICIES, PROCEDURES, REQUIREMENTS, AND STANDARDS

Academic Accommodations for Students with Disabilities

The College is committed to providing appropriate and reasonable academic accommodations to students with disabilities (i.e. physical, depression, learning, etc). If you have a disability, the Centre for Accessible Learning (CAL) can help you document your needs, and where disability-related barriers to access in your courses exist, create an accommodation plan. By making a plan through CAL, you can ensure you have the appropriate academic accommodations you need without disclosing your diagnosis or condition to course instructors. Please visit the CAL website for contacts and to learn how to get started: http://camosun.ca/services/accessible-learning/

Academic Integrity

Please visit http://camosun.ca/about/policies/education-academic/e-1-programming-and-instruction/e-1.13.pdf for policy regarding academic expectations and details for addressing and resolving matters of academic misconduct.

Academic Progress

Please visit http://camosun.ca/about/policies/education-academic/e-1-programming-and-instruction/e-1.1.pdf for further details on how Camosun College monitors students' academic progress and what steps can be taken if a student is at risk of not meeting the College's academic progress standards.

Course Withdrawals Policy

Please visit http://camosun.ca/about/policies/education-academic/e-2-student-services-and-support/e-2.2.pdf for further details about course withdrawals. For deadline for fees, course drop dates, and tuition refund, please visit http://camosun.ca/learn/fees/#deadlines.

Grading Policy

Please visit http://camosun.ca/about/policies/education-academic/e-1-programming-and-instruction/e-1.5.pdf for further details about grading.

Grade Review and Appeals

Please visit http://camosun.ca/about/policies/education-academic/e-1-programming-and-instruction/e-1.14.pdf for policy relating to requests for review and appeal of grades.

Mandatory Attendance for First Class Meeting of Each Course

Camosun College requires mandatory attendance for the first class meeting of each course. If you do not attend, and do not provide your instructor with a reasonable reason in advance, you will be removed from the course and the space offered to the next waitlisted student. For more information, please see the "Attendance" section under "Registration Policies and Procedures" (http://camosun.ca/learn/calendar/current/procedures.html) and the Grading Policy at http://camosun.ca/about/policies/education-academic/e-1-programming-and-instruction/e-1.5.pdf.

Medical / Compassionate Withdrawals

Students who are incapacitated and unable to complete or succeed in their studies by virtue of serious and demonstrated exceptional circumstances may be eligible for a medical/compassionate withdrawal. Please visit http://camosun.ca/about/policies/education-academic/e-2-student-services-and-support/e-2.8.pdf to learn more about the process involved in a medical/compassionate withdrawal.

Sexual Violence and Misconduct

Camosun is committed to creating a campus culture of safety, respect, and consent. Camosun's Office of Student Support is responsible for offering support to students impacted by sexual violence. Regardless of when or where the sexual violence or misconduct occurred, students can access support at Camosun. The Office of Student Support will make sure students have a safe and private place to talk and will help them understand what supports are available and their options for next steps. The Office of Student Support respects a student's right to choose what is right for them. For more information see Camosun's Sexualized Violence and Misconduct Policy: http://camosun.ca/about/policies/education-academic/e-2-student-services-and-support/e-2.9.pdf and camosun.ca/sexual-violence. To contact the Office of Student Support: oss@camosun.ca or by phone: 250-370-3046 or 250-3703841

Student Misconduct (Non-Academic)

Camosun College is committed to building the academic competency of all students, seeks to empower students to become agents of their own learning, and promotes academic belonging for everyone. Camosun also expects that all students to conduct themselves in a manner that contributes to a positive, supportive, and safe learning environment. Please review Camosun College's Student Misconduct Policy at http://camosun.ca/about/policies/education-academic/e-2-student-services-and-support/e-2.5.pdf to understand the College's expectations of academic integrity and student behavioural conduct.

Changes to this Syllabus: Every effort has been made to ensure that information in this syllabus is accurate at the time of publication. The College reserves the right to change courses if it becomes necessary so that course content remains relevant. In such cases, the instructor will give the students clear and timely notice of the changes.