MENG 283: Control Systems
Course Outline

Instructor: Mr. Imtehaze Heerah, BEng. (Hons), MASc.
Office: TEC 117
Phone: 250 370 4510
Email: heerah@camosun.ca
Website: sites.camosun.ca/imtehazeheerah

Lectures (Online) :	M (10.30 – 11.20), W (10.30 – 11.20)
Labs (Online):	**Grp A** – Tu (10.30 – 13.20); **Grp B** – Th (10.30 – 13.20)
Labs (F2F) in TEC 110:	**Grp A1** – Tu (10.30 – 13.20), **Grp A2** – Tu (13.30 – 16.20)
	Grp B1 – Th (10.30 – 13.20), **Grp B2** – Th (13.30 – 16.20)
Office Hours (Online):	M (11.30 – 12.20), W (11.30 – 12.20)

Course Description: Students will be introduced to the terminology, concepts, principles, procedures and computations used by engineers and technologists to analyze, select, specify, design and maintain a variety of control systems. Laboratories and assignments will consider computer, electronic, mechanical, and electro-mechanical elements and be used to construct working microcontroller-based control systems. As well, students will gain experience using purchased industrial control modules. Computer software will be used to model and simulate the control systems. PID control modes will be detailed.

Offered:	Academic Term 3 (Fall)
Credit:	3
In-class workload:	2 hrs Lecture, 3 hrs Lab
Out-of-class workload:	5 hrs
Prerequisites:	MENG 181, ECET 149, MATH 193

Course Objectives:

Upon successful completion of this course, the student should be able to:

1. Understand various fundamental types of control systems and describe how they work using block diagrams and transfer functions
2. Apply analog and digital principles to control system operation and design
3. Mathematically analyze control systems
4. Program a microcontroller to control both discrete and continuous processes
5. Understand how various types of industrial controllers operate

Course Outline:

1. Introduction to Control Systems
    a. Block Diagrams and Transfer Functions
    b. Open-loop & Closed-loop control
    c. Benefits & Objectives of good control system
    d. Load and Set-point changes
    e. Instability and Damping

2. Types of Control
    a. Event-driven Control
    b. Sequential Control
    c. Process Control
    d. Regulator and Follow-up Systems
    e. Servo Control
    f. Analog and Digital Control
3. Digital Fundamentals & Applications in Control
    a. Numerical Systems & Conversion
    b. Logic Elements and Boolean Algebra
    c. Data Acquisition
    d. Analog to Digital Conversion (ADC)
    e. Digital to Analog (DAC) conversion and Pulse Width Modulation (PWM)
4. System Modeling & Analysis
    a. Water level control system
    b. Mass-Spring system
    c. Mass Spring-Damper system
5. Control of continuous processes
    a. Proportional Integral Derivative (PID) controllers
    b. Advanced controllers
6. Introduction to Motion control systems

TEXTBOOKS:

No textbook is required for this course. All necessary material will be provided in class notes and handouts on the course website.

IMPORTANT NOTES:

- Refer to course website on a regular basis for updates and deadlines
- All assignments & lab reports are to be submitted prior to working on the final project
- **Students are responsible for obtaining their own Lab kits to be used for online and Face to Face labs every week. Failure to do so may result in loss of Lab privileges.**

MARKING SCHEME:

1.	Assignments:	20%	2.	Midterms:	35%
3.	Lab work:	20%	4.	Final Project:	25%

GRADING SCHEME (COLLEGE POLICY):

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%

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 each of 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