



**CAMOSUN COLLEGE**  
*Trades and Technology*  
*Electronics and Computer Engineering*

**ECET 233**  
**Industrial Data Communications Networks**

**COURSE OUTLINE 2020-Fall**

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**Calendar description on the web @** <http://camosun.ca/learn/calendar/current/web/ecet.html#ECET233>

*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.*

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**Instructor Information**

<b>(a) Instructor</b>	Lindsay Stretch
<b>(b) Office hours</b>	Book by email
<b>(c) Location</b>	TEC216
<b>(d) Phone</b>	250-370-4650 <b>Alternative:</b> _____
<b>(e) E-mail</b>	<a href="mailto:stretch@camosun.ca">stretch@camosun.ca</a>

Students will gain an in-depth knowledge of fundamental serial protocols used in industry. They will learn about serial link characteristics and communications protocols, and be able to discuss data network technologies including LANs, WANs, and WLAN systems. Students will explore the operation and characteristics of copper and fiber-based data communications media and study interfacing and terminations of both copper and fiber-based data communications media. Students will have the skills to correctly install various network devices and be able to troubleshoot network related problems.

Upon successful completion of this course a student will be able to:

- Describe the elements of a serial communications link, and analyze communications protocols in order to choose appropriate serial communication systems.
- Describe LAN and WLAN networks and relate networking models to LAN operation;
- Configure and troubleshoot networked devices used in an industrial system;
- Describe the operation and characteristics of copper, wireless, and fiber optic communication links in industrial systems
- Describe the different categories of automation networks used in industry.

**Required Materials**

- (a) Text: Course notes provided.
- (b) Access to ECET 233 Camosun D2L online course materials as required

## **Course Content: Lecture 3 hours per week (online only)**

### **WEEK1**

#### **1.0 Introduction**

- 1.1 Data Communications Overview
- 1.2 Network Types

### **WEEK2**

#### **2.0 Network Protocols and Communications**

- 2.1 Network Protocols and Standards
- 2.2 Network Models
- 2.3 Data Transfer in the Network

### **WEEK3**

#### **3.0 Network Access I**

- 3.1 Physical Layer Protocols
  - 3.1.1 Signaling
  - 3.1.2 Encoding
- 3.2 Network Media
  - 3.2.1 Copper
  - 3.2.2 Optical Fiber
  - 3.2.3 Wireless
- 3.3 Media Interfacing
  - 3.3.1 Specifications of UTP
  - 3.3.2 Specifications of Optical Fiber
  - 3.3.3 Specifications of Wireless

### **WEEK4**

#### **4.0 Network Access II**

- 4.1 Data Link Layer Protocols
- 4.2 Media Access Control
- 4.3 Data Link Frame

### **WEEK5**

#### **5.0 Ethernet**

- 5.1 Ethernet Protocol
- 5.2 Ethernet Frame Types
- 5.3 LAN Switching

### **WEEK6**

#### **6.0 Network Layer**

- 6.1 Network Layer Protocols
- 6.2 Routing and Routing Protocols
- 6.3 Network Routers

### **WEEK7**

#### **7.0 IP Addressing**

- 7.1 IPv4 Network Addresses
- 7.2 IPv6 Network Addresses
- 7.3 IP Tools

## **WEEK8**

### **8.0 Serial Data Communications**

- 8.1 Overview
- 8.2 RS 232 / RS 422
- 8.3 RS 485

## **WEEK9**

### **9.0 Industrial Control Systems**

- 9.1 Overview
- 9.2 Control Systems Operations

## **WEEK10**

### **10.0 Building Applications**

- 10.1 Overview
- 10.2 Components of a Building Control System
- 10.3 Building ICS Protocols

## **WEEK11**

### **11.0 Vehicle Applications**

- 11.1 Overview
- 11.2 CAN Bus Overview
- 11.3 CAN Bus Architecture
- 11.4 LIN Bus
- 11.5 Future Developments

## **WEEK12**

### **12.0 Marine Applications**

- 12.1 Overview
- 12.2 NMEA 0183 / 2000
- 12.3 interfacing

## **WEEK13**

### **13.0 Security**

- 13.1 Overview
- 13.2 Security Strategies
- 13.3 Industrial Internet of Things (IIoT)

## **WEEK14**

### **14.0 Trends**

- 14.1 Overview

## **Review**

**Lab Schedule: 2.5 hours per week**

Week 1 – Introduction and Industrial Systems Tour

Week 2 – OSI Model Assignment

Week 3 – Cabling Testing

Week 4 – Network Signal Capture

Week 5 – Wireshark Data Capture

Week 6 – Network Device Overview

Week 7 – IP Tools

Week 8 – Term Test (during lab period)

Week 9 – Serial Communications

Week 10 – PLC Interfacing

Week 11 – PLC Communications

Week 12 – Device Interfacing

Week 13 – Troubleshooting

Week 14 – Review

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*Note: Due to the COVID-19/Novel Coronavirus pandemic, please accept this outline as a guide that is subject to change as conditions change or present themselves. Some sections will be modified for online delivery or edited for time due to limited contact and lab accessibility.*

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### Basis of Student Assessment (Weighting)

Evaluation for this course will be a combined total of theory and laboratory marks as given below:

#### Marking Criteria

##### Theory

D2L Assignments -----	10%
Quizzes In-class via D2L -----	15%
Term Test -----	20%
Final Exam -----	35%
<b>Total Theory</b> -----	<b>80 %</b>

##### Laboratory

In-class Labs Completion-----	20%
<b>Total Lab</b> -----	<b>20 %</b>

**Total Mark** ----- **100 %**

**D2L Assignments** are weekly assignments that must be completed and submitted to the correct dropbox by Friday 11:55 pm each week. As the solutions to assignments are provided the next day, absolutely **no late assignments will be accepted.**

**Chapter quizzes** will be based on the course material completed in class via D2L. There will be no opportunity to make up missed quizzes.

There will be one **term test** spaced near the middle of the course (week 8 lab period) covering topics up to the end of Week 7.

A written **3-hour final** covering all topics will be given at the end of the term during exam week.

**Lab attendance is mandatory.** The lab mark will consist of:

**Completion of Labs** – In-class labs must be completed by the end of the lab period and submitted to the correct dropbox by Friday midnight each week.

**NOTE: Any late assignments, labs, missed quizzes will result in a mark of zero. Only the term test may be made up due to illness as long as an acceptable doctor's note is provided.**

Please also note the following:

1. A grade of 50% or better is required in all assessment items above to be able to pass the course.
2. A grade of 60% or better is required in all assessment items above to qualify as a prerequisite.
3. No late materials will be accepted past 11:55 PM of the weekly due date – Fridays.
4. No opportunity will be available to write missed quizzes.
5. Attendance and completion of all lab material is mandatory to pass the course.

## Grading System

Standard Grading System (GPA)

Competency Based Grading System

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

The following grading system is used at Camosun College:

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

## Recommended Materials or Services to Assist Students to Succeed Throughout the Course:

### LEARNING SUPPORT AND SERVICES FOR STUDENTS

There are a variety of services available for students to assist them throughout their learning. This information is available in the College Calendar, Student Services or the College web site at <http://www.camosun.bc.ca>

### STUDENT CONDUCT POLICY

There is a Student Conduct Policy. It is the student's responsibility to become familiar with the content of this policy. The policy is available in each School Administration Office, Registration, and on the College web site in the Policy Section.  
<http://www.camosun.bc.ca/policies/policies.html>