



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

**ELEN 163**  
**Apply Digital Theory**

**Winter 2020**

**COURSE OUTLINE**

---

The calendar description is available on the web @ <http://camosun.ca>

*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.*

---

**1. Instructor Information**

(a) Instructor	Ian Browning
(b) Office hours	Mon. 1.30-2.20, Thur. 2.30-3.20 or by appointment
(c) Location	TEC 267
(d) Phone	250-370-4015 <b>Alternative:</b> _____
(e) E-mail	browning@camosun.ca
(f) Website	_____

**2. Intended Learning Outcomes**

- Explain the Principles of Digital Logic
- Explain the Principles of Number Systems and Codes
- Explain the Principles of Logic Gates and Boolean
- Explain the Principles of Combinational Logic
- Explain the Principles of Combinational Logic
- Explain the Principles of Digital Arithmetic
- Explain the Principles of Counters and Registers
- Explain the Principles of MSI Logic Circuits

**3. Required Materials**

1. Access to Camosun D2L online course materials – Notes, labs, and assignments
2. Lab components – Digital ICs, breadboards, logic probes, connecting wire
3. Exams and quizzes – provided as the course progresses

**4. Course Content and Schedule**

Time: 94 hours including lectures, labs and exam.

- Week 1. Introduction to Digital Systems**
- a. Analog vs Digital
  - b. Types of Digital Systems

**Week 2. Describing Combinatorial Logic Systems**

- a. Number Systems and Conversions
- b. Logic Variables
- c. The Truth Table

**Week 3. Logic Families and Signals**

- a. Digital ICs and Logic Families
- b. Introduction to Digital ICs
- c. Logic Voltage Levels
- d. Variable Names, Signal Names, and Active Levels
- e. The State Indicator
- f. The Logic Probe
- g. Providing Logic Levels with Switches

**Week 4. Logic Operations and Gates**

- a. Basic Gate Operations – AND, OR, NOT
- b. Logic Symbols for Real Devices
- c. IEEE Symbols
- d. Naming Gates
- e. Gate Duality
- f. LEDs
- g. Hardware Examples
- h. Truth Table vs Function Table

**Week 5. Analysis of Combinational Logic Circuits**

- a. Describing Logic Circuits Algebraically
- b. Evaluating Circuit Outputs
- c. Boolean Theorems
- d. Sum-of-Products
- e. Truth Tables from SOP

**Week 6 – Analysis of Combinational Logic Circuits cont.**

- f. Use of Alternate Symbols
- g. Fault Finding Combinational Logic Circuits

**Term Exam #1**

**Week 7. Reading Break**

**Week 8. Common Circuit Configurations**

- a. Encoders / Decoders
- b. Multiplexers
- c. De-Multiplexers
- d. Data Bussing and Tri-State Logic

**Week 9. Digital Arithmetic**

- a. Binary Arithmetic
- b. 2's Complement
- c. Binary Adders
- d. Binary Subtractors
- e. 4-Bit Variations

**Week 10 IC Parameters / Sequential Logic Concepts**

- a. Current Demand
- b. IC Voltage and Current Parameters
- c. IC Specifications and Fan-Out
- d. Sequential Logic Definition
- e. Clock Signals
- f. One-Shots

- Week 11. Flip Flops**
- a. RS Flip-Flop
  - c. D-Type Flip-Flops
  - d. JK Flip-Flops
  - e. Switch Debounce
  - f. Flip-Flop Timing Considerations
  - g. Examples

- Week 12. Registers**
- a. Data Registers and Memory
  - b. Register Data Transfer
  - c. Load and Circulate Operations
  - d. IC Registers

**Term Exam #2**

- Week 13. Counters**
- a. Asynchronous Counters
  - b. Frequency Division
  - c. Synchronous Counters
  - d. Cascaded Counters
  - e. Digital Counter Applications
  - f. IC Counters

- Week 14 Review for Final**

**5. Basis of Student Assessment (Weighting)**

a) Assignments	10
b) Quizzes	10
c) Term Tests	30
d) Final Exam	40
e) Labs	10

Please note the following:

1. A grade of 60% or better is required in all assessment items above for this course pass.
2. Labs are due at the end of the lab period. A grade of 0% will be awarded to late labs.
3. Assignments are due by Sunday midnight of the current week through D2L Dropbox.
4. No late materials will be accepted past midnight of the last day of the course.
5. No opportunity will be available to write missed quizzes.
6. A student is required to inform the instructor prior to being late or missing a class, or as soon as possible.

## 6. Grading System

- Standard Grading System (GPA)
- Competency Based Grading System

## 7. 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>

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

The following two grading systems are used at Camosun College:

### 1. Standard Grading System (GPA)

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

### 2. Competency Based Grading System (Non GPA)

This grading system is based on satisfactory acquisition of defined skills or successful completion of the course learning outcomes

Grade	Description
COM	The student has met the goals, criteria, or competencies established for this course, practicum or field placement.
DST	The student has met and exceeded, above and beyond expectation, the goals, criteria, or competencies established for this course, practicum or field placement.
NC	The student has not met the goals, criteria or competencies established for this course, practicum or field placement.

## B. Temporary Grades

Temporary grades are assigned for specific circumstances and will convert to a final grade according to the grading scheme being used in the course. See Grading Policy at <http://www.camosun.bc.ca/policies/E-1.5.pdf> for information on conversion to final grades, and for additional information on student record and transcript notations.

Temporary Grade	Description
I	<i>Incomplete:</i> A temporary grade assigned when the requirements of a course have not yet been completed due to hardship or extenuating circumstances, such as illness or death in the family.
IP	<i>In progress:</i> A temporary grade assigned for courses that are designed to have an anticipated enrollment that extends beyond one term. No more than two IP grades will be assigned for the same course.
CW	<i>Compulsory Withdrawal:</i> A temporary grade assigned by a Dean when an instructor, after documenting the prescriptive strategies applied and consulting with peers, deems that a student is unsafe to self or others and must be removed from the lab, practicum, worksite, or field placement.