

COURSE SYLLABUS



COURSE CODE: **ELEN 163**
COURSE TITLE: **Digital Logic Fundamentals**
CLASS SECTION:
TERM: **Winter 2024**
COURSE CREDITS: **4**
DELIVERY METHOD(S): **In-Person**

Camosun College campuses are located on the traditional territories of the Ləkʷəŋən and W̱SÁNEĆ peoples. We acknowledge their welcome and graciousness to the students who seek knowledge here.
Learn more about Camosun's [Territorial Acknowledgement](#).

For COVID-19 information please visit <https://camosun.ca/about/covid-19-updates>

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: **John Yang**
EMAIL: **yang@camosun.ca**
OFFICE: **TEC 268**
HOURS: **To Be Determined**

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

PREREQUISITE(S): **Reserved for DND ELSP program**
CO-REQUISITE(S):
EXCLUSION(S):

COURSE LEARNING OUTCOMES / OBJECTIVES

- Explain the Principles of Digital Logic
- Compare Number Systems and Codes
- Analyze Logic Gates and Boolean Algebra
- Compare Combinational Logic
- Explain Flip-Flop and Related Devices
- Conduct Digital Arithmetic Operations and Circuits
- Analyze Sequential Logic (Registers and Counters)
- Analyze MSI Logic Circuits

REQUIRED MATERIALS & RECOMMENDED PREPARATION / INFORMATION

- 1) Course Notes
- 2) Labs and materials
- 3) Access to Camosun D2L online helps

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.

Time: 94 hours including lectures, labs, and exams (Lecture: 4hrs/week; Lab: 2.5hrs/week; Final exam: 3hrs)

WEEK	ACTIVITY or TOPIC	NOTES
1	1. Explain Concepts of Digital Logic - (Ref. EO 003.06, TP1) a. History of Digital Technology b. Introduction to Digital Functions	Lab 01
2	2. Compare Number Systems and Codes - (Ref. EO 003.06, TP2) a. Number Systems and Conversions b. Binary Math Operations* (will be introduced in CH6) c. Digital Codes and Error Detection (Binary Parity) 3. Analyze Logic Gates and Boolean Algebra - (Ref. EO 003.06, TP3) a. OR and AND Gate Circuit Operation	Lab 02
3	b. OR and AND Gate Truth Tables c. Inverters (NOT Gate) d. NAND and NOR Gate Circuit Operation e. NAND and NOR Gate Truth Tables	Lab 03
4	f. XOR and XNOR Logic Gates g. XOR and XNOR Truth Tables h. Alternate Logic Gate Representation	Lab 04 Test 1
5	4. Compare Combinational Logic Circuits - (Ref. EO 003.06, TP4) a. Combinational Logic Circuits b. Simplification of Combinational Logic Circuits c. Encoder and Decoder ** (will be introduced after CH5)	Lab 05
6	Week 6 or Week 7 schedule depending on when the “ Reading Break ” is	Lab 06
7	5. Explain Flip-Flop and Related Devices - (Ref. EO 003.06, TP5) a. RS Flip-Flops (Un-clocked) b. RS Flip-Flop (Clocked) c. D-Type Flip-Flops d. JK Flip-Flops	Lab 07
8	e. Flip-Flop Triggering f. Debounce switches	Lab 08

WEEK	ACTIVITY or TOPIC	NOTES
9	<ul style="list-style-type: none"> g. Master Slave Flip-Flops h. Flip-Flop Timing Considerations 	Lab 09 Test 2
10	6. Conduct Digital Arithmetic Operations and Circuits - (Ref. EO 003.06, TP6) <ul style="list-style-type: none"> a. Binary Arithmetic b. Hexadecimal Arithmetic c. 4-Bit Adders d. Binary Subtractors e. 4-Bit Subtractors f. Binary Division 	Lab 10
11	7. Analyze Sequential Logic (Registers and Counters) - (Ref. EO 003.06, TP7) <ul style="list-style-type: none"> a. Data Registers and Memory b. 4-Bit storage Registers c. 4-Bit shift Registers d. 8-Bit shift Registers e. Digital Counting and Frequency Division 	Lab 11
12	<ul style="list-style-type: none"> f. Asynchronous Counters g. Synchronous Counters h. Shift Register Counters i. Digital Counter Applications 	Lab 12
13	8. Analyze MSI Logic Circuits - (Ref. EO 003.06, TP8) <ul style="list-style-type: none"> a. Integrated Circuit Registers b. Universal Logic Gates c. Digital Multiplexers d. Digital Demultiplexers 	Lab 13
14	<ul style="list-style-type: none"> e. Magnitude Comparators f. Magnitude Comparator Circuits g. Open-Collector and Tri-State Devices h. Tri-State Registers and Bus Structures 9. Course Review/Final Exam Preparation	(Makeup)
15	FINAL EXAM	

LABS		2.5 hrs/Lab
Lab 01	Introduction to ELEN 163 Labs	
Lab 02	Logic Signal Levels	
Lab 03	Introduction to TTL Logic Gates	
Lab 04	Gate Duality and LED Circuits	
Lab 05	Boolean Minimization	
Lab 06	Tutorial session / Lab07 / Reading Break	
Lab 07	Combinatorial Logic Circuits (I) / Reading Break	
Lab 08	Combinatorial Logic Circuits (II)	
Lab 09	Flip-flops Circuits and Debounce switches	
Lab 10	Decoders	
Lab 11	Sequential Logic Circuits (I)	
Lab 12	Sequential Logic Circuits (II)	
Lab 13	Digital Multiplexers/De-multiplexers	

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 notice is required. Deadlines can 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
Quizzes and Assignments	20%
Term Test 1	10%
Term Test 2	10%
Final exam	40%
Labs	20%
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](http://camosun.ca/about/policies/education-academic/e-1-programming-and-instruction/e-1.14.pdf) policy for more information. <http://camosun.ca/about/policies/education-academic/e-1-programming-and-instruction/e-1.14.pdf>

COURSE GUIDELINES & EXPECTATIONS

A passing grade must meet following three criteria:

- 1) Overall lab mark is equal to or greater than 60%;
- 2) Overall theoretical mark (assignments, tests, final exam) is equal to or greater than 60%;
- 3) The final exam mark is equal to or greater than 50%.

SCHOOL OR DEPARTMENTAL INFORMATION

- [Electronics and Computer Engineering Department \(link\)](#)
- [School of Trades & Technology \(link\)](#)

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	<u>http://camosun.ca/advising</u>
Accessible Learning	<u>http://camosun.ca/accessible-learning</u>
Counselling	<u>http://camosun.ca/counselling</u>
Career Services	<u>http://camosun.ca/coop</u>
Financial Aid and Awards	<u>http://camosun.ca/financialaid</u>
Help Centres (Math/English/Science)	<u>http://camosun.ca/help-centres</u>
Indigenous Student Support	<u>http://camosun.ca/indigenous</u>
International Student Support	<u>http://camosun.ca/international/</u>
Learning Skills	<u>http://camosun.ca/learningskills</u>
Library	<u>http://camosun.ca/services/library/</u>
Office of Student Support	<u>http://camosun.ca/oss</u>
Ombudsperson	<u>http://camosun.ca/ombuds</u>
Registration	<u>http://camosun.ca/registration</u>
Technology Support	<u>http://camosun.ca/its</u>
Writing Centre	<u>http://camosun.ca/writing-centre</u>

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.