

# COURSE SYLLABUS



COURSE TITLE: CSNT 160 IoT Connect and Secure

CLASS SECTION:

TERM: Fall 2023

COURSE CREDITS: 3

DELIVERY METHOD(S): Blended Learning

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

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*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

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NAME: Ian Cameron

EMAIL: [cameron@camosun.bc.ca](mailto:cameron@camosun.bc.ca)

OFFICE: TEC211

HOURS:

*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

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Students will learn in this course how to connect and secure “Internet of Things” devices. It starts with a brief introduction to basic electronic theory, component identification, and lab equipment usage. Next IoT theory explores the methods for remotely controlling and monitoring mechanical systems in industrial, commercial and home applications. Students then move on to IoT system architecture design and security, followed by specific vulnerabilities within the devices themselves, their communication protocols, and applications they run. Students will get hands-on practice setting up and configuring various automated systems.

PREREQUISITE(S):

CO-REQUISITE(S):

EQUIVALENCIES:

## COURSE LEARNING OUTCOMES / OBJECTIVES

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Students who successfully complete this course will be able to:

- describe basic electronic theories and components;
- practice building simple electronic circuits and demonstrate the use of electronic test equipment;
- discuss trends, terms and concepts relating to Internet of Things devices;
- describe the concepts of industrial, commercial, and home automation/control;
- use interfacing software to configure and provision an automated environment;
- describe IoT system architectures and their security vulnerabilities;
- perform risk and vulnerability assessments on IoT devices and systems; and
- apply threat mitigation procedures to IoT devices and systems.

**REQUIRED MATERIALS & RECOMMENDED PREPARATION / INFORMATION**

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- (a) Access to CSNT 160 Camosun D2L online course materials as required
- (b) Access to Cisco Netacad and Skills for All sites
- (c) IoT Lab Kit – to be signed out to the student

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

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

WEEK	ACTIVITY or TOPIC	OTHER NOTES
1	<p><b><u>Week 1 – Introduction: Intro to IoT</u></b> <span style="float: right;"><b><u>Reading</u></b></span></p> <p>Seminar - Cisco Netacad overview <span style="float: right;">IoT Intro Chapter 1</span>  - <b>Chapter 1</b> – Everything is Connected  - Introduction to Packet Tracer (PT)</p> <p>Lab  - PT 1.1.1.8 – Deploying and Cabling Devices  - PT 1.1.2.5 – Create a Simple Network  - PT 1.2.2.1 – Adding IoT Devices to a Smart Home  - PT 1.2.2.3 – Connect and Monitor IoT Devices</p>	
2	<p><b><u>Week 2 – Introduction: IoT Programming and Data</u></b></p> <p>Seminar - <b>Chapter 2</b> – Everything Becomes Programmable <span style="float: right;">IoT Intro Chapter 2</span>  - Python Programming</p> <p>- <b>Chapter 3</b> – Everything Generates Data <span style="float: right;">IoT Intro Chapter 3</span>  - Big Data</p> <p>Lab  - Lab 2.1.3.6 – Setting Up a Virtualized Server  - Lab 2.1.3.7 – Basic Python Programming  - Lab 2.1.3.8 – Create a Simple Game with Python</p>	



WEEK	ACTIVITY or TOPIC	OTHER NOTES
7	<p><b><u>Week 7 – Connecting Things: Networks, Fog and Cloud Computing</u></b></p> <p>Seminar - <b>Chapter 4</b> – Networks, Fog &amp; Cloud Computing IoT Connect Ch. 4 - Network characteristics</p> <p>Lab - Lab 3.2.6.4 – Interfacing Arduino Code and Python Code - Lab 3.2.6.6 – Control LEDs from the PL-App Dashboard - PT 4.2.3.3 – Securing Cloud Services in the IoT</p>	
8	<p><b><u>Week 8 – Connecting Things: Digitization of the Business   IoT Applications in Business</u></b></p> <p>Seminar - <b>Chapter 5</b> – Digitization   IoT Apps in Business IoT Connect Ch. 5 - Industrial IoT, Real World IoT</p> <p>Lab - PT 5.3.2.8 Smart City - PT 5.3.3.4 Smart Grid</p>	
9	<p><b><u>Week 9 – Connecting Things: Create an IoT Solution</u></b></p> <p>Seminar - <b>Chapter 6</b> – Create an IoT Solution IoT Connecting Chapter 6 - Create an IoT Solution</p> <p>Lab - PT 6.3.2.3 Prototype &amp; Test the Solution</p>	
10	<p><b><u>Week 10 – IoT Fundamentals: IoT Security: IoT Under Attack, Systems and Architectures</u></b></p> <p style="text-align: center;"><b>FINAL EXAM for Connecting Things</b></p> <p>Seminar - <b>Chapter 1</b> – The IoT Under Attack IoT Security Chapter 1 - Security Challenges and Uses</p> <p>- <b>Chapter 2</b> – IoT Systems and Architectures IoT Security Chapter 2 - IoT Models and Threat Modeling</p> <p>Lab - Lab 1.2.3.1 Set Up PL-App on a Raspberry Pi - Lab 1.2.3.2 Set up the IoT Security Lab Topology - Lab 1.2.3.3 Harden a Raspberry Pi</p>	
11	<p><b><u>Week 11 – IoT Security: The IoT Device Layer Attack Surface</u></b></p> <p>Seminar - <b>Chapter 3</b> – IoT Device Layer Attack Surface IoT Security Ch. 3 - Security Challenges and Uses</p> <p>Lab - Lab 1.2.3.4 Investigate Vulnerability Assessment Tools</p>	

WEEK	ACTIVITY or TOPIC	OTHER NOTES
	<ul style="list-style-type: none"> <li>- Lab 3.2.2.7 Compromise IoT Device Firmware</li> <li>- PT 3.3.2.5 Threat Modeling at the IoT Device Layer</li> </ul>	
12	<p><b><u>Week 12 – IoT Security: IoT Communication Layer Attack Surface</u></b></p> <p>Seminar - <b>Chapter 4</b> – IoT Communication Layer Attack IoT Security Ch. 4 - Protocol Vulnerabilities and Security</p> <p>Lab - Lab 4.1.2.3 Sniffing Bluetooth with the Raspberry Pi - Lab 4.2.2.5 Port Scanning an IoT Device - Lab 4.2.2.6 Packet Crafting to Exploit Unsecured Ports - PT 4.3.1.6 Threat Modeling at the IoT Comms Layer</p>	
13	<p><b><u>Week 13 – IoT Security: IoT Application Layer Attack Surface</u></b></p> <p>Seminar - <b>Chapter 5</b> – IoT Application Layer Attack IoT Security Chapter 5 - Web and Cloud Vulnerabilities</p> <p>Lab - Lab 5.1.2.8 Challenge Passwords with Kali Tools - Lab 5.1.2.9 Web Application Vulnerability - PT 5.2.1.6 Threat Modeling at the IoT App Layer</p>	
14	<p><b><u>Week 14 – IoT Security: Vulnerability and Risk Assessment in an IoT System</u></b></p> <p>Seminar - <b>Chapter 6</b> – Vulnerability / Risk Assessment IoT Security Ch. 6 - Assessing Vulnerabilities and Risk</p> <p>Lab - PT 6.2.4.4 Threat Modeling to Assess Risk - Lab 6.2.3.6 Assess Risk with DREAD - Lab 6.3.2.7 Blockchain Demo 2.0</p>	
15	<b>FINAL EXAM for Securing Things</b>	

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 can be reviewed on the [CAL exams page](http://camosun.ca/services/accessible-learning/exams.html). <http://camosun.ca/services/accessible-learning/exams.html>

DESCRIPTION	WEIGHTING
Quizzes	15%
Course Finals (3)	55%
Completion of Lab Activities	30%
<b>TOTAL</b>	<b>100%</b>

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

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Evaluation for this course will be a combined total of quizzes, course finals, assignments, and lab marks. There is no final exam in this course. Attendance and completion of all material is mandatory to pass the course. Late submissions will be not graded.

**Quizzes** will be based on current week’s material from both seminar and lab content and delivered through D2L.

**A Course Final** will be completed at the end of each course covering all of the content in each course. There will be no overall final exam covering all of the three courses material.

**Completion of Lab Activities** will be based on finishing weekly Lab / Packet Tracer exercises and submission of lab reports to the D2L Dropbox by **Sunday 11:59 PM** of the corresponding week – no late labs will be graded.

Please 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. No late materials will be accepted past midnight of the last day of the course.
3. No opportunity will be available to write missed quizzes.
4. Attendance and completion of all lab material is mandatory to pass the course.

### SCHOOL OR DEPARTMENTAL INFORMATION

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### STUDENT RESPONSIBILITY

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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

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

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

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### Academic Integrity

Students are expected to comply with all College policy regarding academic integrity; which is about honest and ethical behaviour in your education journey. The following guide is designed to help you understand your responsibilities: <https://camosun.libguides.com/academicintegrity/welcome>

Please visit <http://camosun.ca/about/policies/education-academic/e-1-programming-and-instruction/e-1.13.pdf> for Camosun's Academic Integrity policy and details for addressing and resolving matters of academic misconduct.

### 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 Progress

Please visit <https://www.camosun.ca/sites/default/files/2021-05/e-1.10.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" (<https://camosun.ca/registration-records/policies-and-procedures-students/registration-policies-students>) 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://www.camosun.ca/sites/default/files/2021-05/e-2.9.pdf> and [camosun.ca/sexual-violence](http://camosun.ca/sexual-violence). To contact the Office of Student Support: [oss@camosun.ca](mailto:oss@camosun.ca) or by phone: 250-370-3046 or 250-370-3841

### 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.

### Looking for other policies?

The full suite of College policies and directives can be found here: <https://camosun.ca/about/camosun-college-policies-and-directives>

**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.