



Title: MCSC Sky Skills

Description: The drone micro-credential provides students with the technical skills to introduce and integrate drones into the construction sector.

Target Audience: Drone enthusiasts interested in a career in the construction sector.

Entrance Requirements:

- Background and/or interest in construction
- Background and/or interest in surveying, aerial photography, and cartography
- Pilot Certificate – Basic Operations (optional)

Length:

- 25 hours of instruction (excluding the Pilot Certification – Basic Operations and collective execution of Module 5)
- ~2 Hours per iteration of the Pilot Certification – Basic Operations
- If students are combined for Modules 4 and 5 (e.g., all students come to the same location concurrently rather than independent meetings per student), there is an additional hour per student for the course

Type of Instruction: Online and in-person

Methods:

- Facilitated Instruction
- Self-study
- Quizzes
- Case Studies
- Presentations
- Business Applications/Mentorship
- Practical Application

Course Materials:

- Drones (provided)
- iPads (provided)
- CAR Part IX (Remotely Piloted Aircraft Systems) (provided via digital materials)
- Canadian AIM (Aviation Information Manual) (provided via digital materials)
- TP 15263E Knowledge Requirements for Pilots of RPAS (provided via digital materials)
- Practicum SMS checklists and scenarios (developed and provided in the course)

Certificate of Completion Requirements:

- Minimum grade of 70% on total student evaluation
- Successful completion of the practicum

- Pilot Certificate – Basic Operations (optional)

Background: Uncrewed Aircraft Systems (UAS) development and integration are rapidly progressing. As technology improves, opportunities for implementation into daily aviation protocols increase exponentially. Increased opportunities for UAS usage require a robust training regimen for customers and users. Additionally, safe integration into the existing aviation community is paramount.

Description: This course, while not intended to replace operator certification protocols, is designed specifically for the needs of the construction industry. It has been demonstrated that UAS technology is vital in future construction concepts. UAS technology can improve safety for participating and non-participating personnel while cutting costs, improving efficiency, and minimizing environmental impact. Students completing this course will be well-suited to join the construction community by providing these added efficiencies and safety protocols through remotely piloted vehicles.

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

- Learn and apply CAR Part IX rules and Canadian AIM concepts in safe UAS operations
- Understand comprehensive risk management
- Identify risk factors
- Identify and Implement Safety Management Systems (SMS), flight rules, and protocols
- Identify worksite resource availability
- Pair aircraft performance characteristics and mission profiles to ensure successful task completion
- Examine various mission types and analyze multiple scenarios with the intent of using appropriate UAS protocols
- Experience “hands-on” UAS operations
- Engage with a mentor to practice UAS maneuvers using applicable rules, SMS protocols, and mission-type scenarios

Student Evaluation:

Type of Evaluation	Percentage of Grade	Date Due/Assessed
Class Participation	10%	Ongoing
Case Studies and Quizzes	15%	Module 1
Presentations	45%	Modules 2, 3 and 4
Practicum and Basic UAS Online Exam	30%	Module 5

- The quiz is provided with an answer guide.
- Presentations are evaluated on the following scales: 1) yes/no for execution and 2) demonstrated understanding of the materials. The course facilitator is responsible for both assessment areas.

Evaluation Details for Participation

Category	Excellent (4 – 80-100%)	Good (3 – 60-80%)	Fair (2 – 50-60%)	Unacceptable (1 < 50 %)
Participates Willingly	Student routinely volunteers answers to questions and willingly tries to answer questions s/he is asked.	Student volunteers once or twice and willingly tries to all questions s/he is asked.	Student does not volunteer answers, but willing tries to answer questions s/he is asked.	Student does not willingly participate.
Respects Others	Student listens quietly, does not interrupt, and stays in assigned place without distracting fidgeting.	Student listens quietly and does not interrupt. Moves a couple of times, but does not distract others.	Student interrupts once or twice, but comments are relevant. Stays in assigned place without distracting movements.	Student interrupts often by whispering, making comments or noises that distract others OR moves around in ways that distract others.
Attendance	Has attended 100% of instruction	Has attended 80% of instruction	Has attended 60% of instruction	Has attended 50% or less of instruction

Tests: None

Virtual Reality: None

Work Practicum: Module 5

Certifications: None required to attend; ideally, graduates will acquire a Pilot Certificate – Basic Operations

Credit Transfer Opportunities: None

Course Schedule: Instructors reserve the right to adjust the course schedule without prior notification to meet changing needs. It is the responsibility of the student to coordinate receipt of missed instruction and course materials.

Module and Topic	Hours	Activity	Assessment
Module 1: Canadian Aviation Regulations (CARs) and Canadian Airspace Classifications and Utilizations (AIM)	7 Hours	NAV Drone Exploration	Quiz
Module 2: Safety Management Systems and Protocols	3 Hours, 20 Mins	Case Studies and Risk Factors in Minimum, Medium and High Complexity Missions	Presentation
Module 3: UAS Mission Requirements and Aircraft Capabilities	3 Hours, 30 Mins	Create and Present Checklists	Presentation
Module 4: UAS Mission Types and Notional Scenarios	7 (or 9) Hours, 10 Mins ~2 Hours for the Pilot Certification – Basic Operations Exam	Notional Scenarios and Business Application Interviews with Presentations	Presentation Students should be preparing to take the Pilot Certificate – Basic Operations Exam
Module 5: UAS Practicum and Field Demonstrations	3 Hours Classroom + 1 Hour (Minimum) per Student	Practicum	Flight Proficiencies

Module 1: Canadian Aviation Regulations (CARs) and Canadian Airspace Classifications and Utilizations (AIM)

A comprehensive knowledge of rules governing flight operations is essential in the conduct of flight safety. This module is not intended to replace requirements for operator certifications but instead reinforce regulatory concepts for daily, recurrent use. Canadian flight rules are designed to ensure the safety of participating and non-participating persons and property. The student will learn and apply CAR Part IX rules and Canadian Aviation Information Manual (AIM) concepts in safe UAS operations in this module.

Learning Objectives:

- Canadian Airspace Classifications and Utilizations (AIM)

- CARs Part IX Remotely Piloted Aircraft Systems

Module 2: Safety Management Systems and Protocols

Safety Management Systems (SMS) have become an industry standard for all aviation operations. SMS allows users and customers to anticipate and mitigate safety concerns before operational necessity dictates. The need for aviation users and customers to have an SMS became apparent as safety cultures have shifted away from reactive risk management toward proactive and predictive risk management. As a result, SMS has been integrated into every aspect of aviation operations. Students will learn comprehensive risk management in this module, identify risk factors, and implement appropriate safety protocols.

Learning Objectives:

- Safety Management System (SMS)
 - Defined SMS policy
 - A process for setting SMS parameters and goals
 - A process to identify hazards
 - A process for training personnel and ensuring proficiency
 - A process for reporting and analyzing hazards
 - A process for documenting and reporting accidents, incidents for corrective actions
 - Documentation outlining the SMS process and individual responsibilities
 - A process for conducting audits and reviews
- Risk Management
- Mission Complexities

Module 3: UAS Mission Requirements and Aircraft Capabilities

Knowledge of mission requirements pertaining to aircraft performance capabilities is essential in safe and efficient worksite tasking. In this module, students will learn how to identify worksite resource availability. With that knowledge, users will pair aircraft performance characteristics and mission profiles to ensure successful task completion. Students will also be able to identify applicable requirements that integrate flight rules with SMS protocols.

Learning Objectives:

- UAS Mission Requirement, Applications and Resource Capabilities
 - Tasking order descriptions
 - Parameters for successful mission completion
- Industry Focus on UAS Application to Construction Projects
 - Aircraft Performance Capabilities
- Equipment Types, Capabilities, and Additional Operational Resources
 - Matching aircraft capabilities to mission parameters
 - Implementing effective flight safety protocols
- Asset and Resource Availability
 - Analysis of existing UAS infrastructure and resources

- Worksite preparation to ensure effective use of available infrastructure and resource materials
- Checklist Development

Module 4: UAS Mission Types and Notional Scenarios

Understanding the scope of worksite mission requirements and tasking is paramount to successful project completion. In this module, students will examine various mission types while applying all learning outcomes to date. Students will analyze multiple scenarios with the intent of using appropriate UAS protocols. Additionally, students will develop their notional scenario(s) to put lessons learned to task in a controlled environment.

Learning Objectives:

- UAS Mission Requirements, Processes, and Protocols in Notional Scenarios
 - Topographical mapping and site surveys
 - Equipment tracking and resource management
 - Remote monitoring and work progress reporting
 - Security surveillance monitoring
 - Personnel safety monitoring
 - Infrastructure inspection and documentation
- Analysis of notional scenarios
 - New Structure Construction
 - Existing Structure Maintenance
 - Critical Infrastructure Inspection
 - Archeological Survey
 - Wildlife Management
 - Agriculture Application
- Creation of student led notional scenarios and protocols
- Introduction to aerodynamics and operational protocols

Module 5: UAS Practicum and Field Demonstrations (Modifiable to completion of basic UAS test).

A field demonstration of learned skills is integral to effectively utilizing UAS resources and infrastructure. In this module, students will experience hands-on UAS operations. Through a mentoring approach, students will have ample opportunity to apply course learning outcomes. Students will practice UAS maneuvers using applicable rules, SMS protocols, and mission-type scenarios.

Learning Objectives:

- UAS flight characteristics and capabilities (classroom and hands on)
 - Flight dynamics
 - Basic flight operations
- UAS flight rules and safety measures (hands on)

- Training operations
- Obstacle course
- Racing
- Scavenger Hunt
- Dexterity Challenges
- Optional: Student created missions applying learned skills to complete worksite tasking (hands on)