

| COURSE OUTLINE | | | |
|--------------------------|---------------|--|---------------------|
| TERM: SPRING 2026 | | COURSE NO: APSC 151 | |
| INSTRUCTOR: | | COURSE TITLE: DRONE ENGINEERING WITH APPLICATIONS | |
| OFFICE: | LOCAL: | SECTION NO(S): | CREDITS: 3.0 |
| E-MAIL: | @capilanou.ca | | |
| OFFICE HOURS: | | | |
| COURSE WEBSITE: | | | |

Capilano University acknowledges with respect the Lil'wat7úl (Lil'wat), x^wməθk^wəyám (Musqueam), shísháhl (Sechelt), Sk̓wxwú7mesh (Squamish), and Səlílwətaʔ/Selilwitulh (Tsleil-Waututh) people on whose territories our campuses are located.

COURSE FORMAT

Three hours of class time, plus an additional hour delivered through on-line or other activities for a 15-week semester, which includes two weeks for final exams.

COURSE PREREQUISITES

Precalculus 12 or BMTH 054 or MATH 105 or Calculus MPT

CALENDAR DESCRIPTION

In this course, students will be introduced to modern drone technology and applications. The course will cover various topics including the history of drone development, and the current regulatory environment in Canada. The major elements of drone systems will be discussed, including all elements of the drone platform and sensors, and the associated ground station technology. Key payload technologies will be explored, including exposure to radio control link design. Mission planning activities as well as major applications, including use of drones by Indigenous Communities, will also be discussed. The course will also help prepare students for the Basic Transport Canada Drone Pilot exam.

COURSE NOTE

APSC 151 is an approved Numeracy course for Cap Core requirements.

APSC 151 is an approved Science and Technology course for Cap Core requirements.

APSC 151 is an approved Quantitative/Analytical course for baccalaureate degrees.

APSC 151 is an approved Science course.

REQUIRED TEXTS AND/OR RESOURCES

Texts

No texts required. References to be provided by Instructor.

Required Technology

To participate in this course, you will need to have access to a device (laptop or computer) and WIFI.

COURSE STUDENT LEARNING OUTCOMES

On successful completion of this course, students will be able to do the following:

- Trace the development of drones and related technology
- Identify the main national regulations related to deploying drone technology and related safety considerations
- Articulate the benefits and importance of drone mission planning and field operations
- Describe the key elements of Drone System Design, including key technical aspects of drones, including limitations and differences in payload and platform technologies
- Describe various user applications and constraints
- Define key terms, understand basic flight rules in preparation for the Transport Canada basic drone pilot exam.

Students who complete this Numeracy course will be able to do the following:

- Apply both analytical and numerical skills to solve problems.
- Summarize and analyze data in quantitative forms.
- Interpret and draw conclusions from an analysis of quantitative data
- Represent quantitative information in a variety of forms (e.g., symbolically, visually, numerically, and verbally).
- Incorporate quantitative evidence in support of an argument.

Students who complete this Science and Technology course will be able to do the following:

- Apply numerical and computation strategies to solve problems
- Assess the cultural, economic, and political effects of technology
- Assess the impacts of human activity on natural systems and articulate ways in which environmental sustainability may be achieved
- Evaluate scientific information (e.g., distinguish primary and secondary sources, assess credibility and validity of information).
- Demonstrate how a problem, concept, or process can be modelled numerically, graphically, or algorithmically.
- Explain how scientific inquiry is based on investigation of evidence and evolves based on new findings.
- Participate in scientific inquiry and communicate the elements of the process, including making careful and systematic observations, developing and testing a hypothesis, analyzing evidence, and interpreting results.

COURSE CONTENT

The following topics will be covered in the course, not necessarily in the listed order:

| Topics | Weeks (approx.) |
|---|-----------------|
| History of Drone Development | 1.0 |
| Regulatory Environment in Canada including Ethical Considerations | 1.0 |
| Drone system design (major system elements) | 2.0 |
| Drone platform (mechanical, power systems, control) | 2.0 |
| Payloads and Sensor Technology (video, thermal, LIDAR, Radar) | 2.0 |
| Mission planning and field operations (GIS, safety, weather) | 2.0 |
| Applications (Commercial, Government and Military) | 1.0 |
| Future Technologies | 1.0 |
| Transport Canada Pilot Exam Preparation (Basic) | 1.0 |
| Final Exam Period (week 14 and 15) | 2.0 |
| Total | 15.0 |

EVALUATION PROFILE

Final grades for the course will be computed based on the following schedule:

| | |
|---------------------|------|
| Class Participation | 10% |
| Mid Term | 20% |
| Report | 25% |
| Oral Presentation | 15% |
| Final Exam | 30% |
| TOTAL | 100% |

Participation grades are based on the consistency, quality, and frequency of contributions to class discussions and in-class group activities. A detailed rubric will be provided by the instructor.

GRADING PROFILE

| | | | |
|-------------|------------|------------|-----------|
| A+ = 90-100 | B+ = 77-79 | C+ = 67-69 | D = 50-59 |
| A = 85-89 | B = 73-76 | C = 63-66 | F = 0-49 |
| A- = 80-84 | B- = 70-72 | C- = 60-62 | |

Students should refer to the University Calendar for the effect of the above grades on grade point average.

Incomplete Grades

Grades of Incomplete "I" are assigned only in exceptional circumstances when a student requests extra time to complete their coursework. Such agreements are made only at the request of the student, who is responsible to determine from the instructor the outstanding requirements of the course.

Late Assignments

Late assignments will receive a late penalty of 10% per day. Assignments are due at the beginning of the class on the due date listed. If you anticipate handing in an assignment late, please consult with your instructor beforehand.

Missed Exams/Quizzes/Labs etc.

Make-up exams, quizzes and/or tests are given at the discretion of the instructor. They are generally given only in medical emergencies or severe personal crises. Some missed labs or other activities may not be able to be accommodated. Please consult with your instructor.

*** Accommodations can be made to honour community needs and traditional practices.

Attendance

Students are expected to attend all classes and associated activities.

English Usage

Students are expected to proofread all written work for any grammatical, spelling and stylistic errors. Instructors may deduct marks for incorrect grammar and spelling in written assignments.

Electronic Devices

Students may use electronic devices during class for note taking only.

On-line Communication (email, elearn etc.)

Outside of the classroom, instructors will (if necessary) communicate with students using either their official Capilano University email or eLearn; please check both regularly. Official communication between Capilano University and students is delivered to students' Capilano University email addresses only.

UNIVERSITY OPERATIONAL DETAILS**Tools for Success**

Many services are available to support student success for Capilano University students. A central navigation point for all services can be found at: <https://www.capilanou.ca/student-services/>

Capilano University Security: download the [CapU Mobile Safety App](#)

Policy Statement (S2009-06)

Capilano University has policies on Academic Appeals (including appeal of final grade), Student Conduct, Academic Integrity, Academic Probation and other educational issues. These and other policies are available on the University website.

Academic Integrity (S2017-05)

Any instance of academic dishonesty or breach of the standards of academic integrity is serious and students will be held accountable for their actions, whether acting alone or in a group. See policy and procedures S2017-05 Academic Integrity for more information:

<https://www.capilanou.ca/about-capu/governance/policies/>

Violations of academic integrity, including dishonesty in assignments, examinations, or other academic performances, are prohibited and will be handled in accordance with the Student Academic Integrity Procedures.

Academic dishonesty is any act that breaches one or more of the principles of academic integrity. Acts of academic dishonesty may include but are not limited to the following types:

Cheating: Using or providing unauthorized aids, assistance or materials while preparing or completing assessments, or when completing practical work (in clinical, practicum, or lab settings), including but not limited to the following:

- Copying or attempting to copy the work of another during an assessment;
- Communicating work to another student during an examination;
- Using unauthorized aids, notes, or electronic devices or means during an examination;
- Unauthorized possession of an assessment or answer key; and/or,
- Submitting of a substantially similar assessment by two or more students, except in the case where such submission is specifically authorized by the instructor.

Fraud: Creation or use of falsified documents.

Misuse or misrepresentation of sources: Presenting source material in such a way as to distort its original purpose or implication(s); misattributing words, ideas, etc. to someone other than the original source; misrepresenting or manipulating research findings or data; and/or suppressing aspects of findings or data in order to present conclusions in a light other than the research, taken as a whole, would support.

Plagiarism: Presenting or submitting, as one's own work, the research, words, ideas, artistic imagery, arguments, calculations, illustrations, or diagrams of another person or persons without explicit or accurate citation or credit.

Self-Plagiarism: Submitting one's own work for credit in more than one course without the permission of the instructors, or re-submitting work, in whole or in part, for which credit has already been granted without permission of the instructors.

Prohibited Conduct: The following are examples of other conduct specifically prohibited:

- Taking unauthorized possession of the work of another student (for example, intercepting and removing such work from a photocopier or printer, or collecting the graded work of another student from a stack of papers);
- Falsifying one's own and/or other students' attendance in a course;
- Impersonating or allowing the impersonation of an individual;
- Modifying a graded assessment then submitting it for re-grading; or,
- Assisting or attempting to assist another person to commit any breach of academic integrity.

Sexual Violence and Misconduct

All Members of the University Community have the right to work, teach and study in an environment that is free from all forms of sexual violence and misconduct. Policy B401 defines sexual assault as follows:

Sexual assault is any form of sexual contact that occurs without ongoing and freely given consent, including the threat of sexual contact without consent. Sexual assault can be committed by a stranger, someone known to the survivor or an intimate partner.

Safety and security at the University are a priority and any form of sexual violence and misconduct will not be tolerated or condoned. The University expects all Students and Members of the University Community to abide by all laws and University policies, including B.401 Sexual Violence and Misconduct Policy and B.401.1 Sexual Violence and Misconduct Procedure (found on Policy page <https://www.capilanou.ca/about-capu/governance/policies/>)

Emergencies: Students are expected to familiarise themselves with the emergency policies where appropriate and the emergency procedures posted on the wall of the classroom.