

Fall Term - 2024
Airport Planning
Civil & Environmental Engineering
CIVE5403 (CVG7158)

Teaching Team

Instructor:

Andrew Schmidt, M.Eng., P.Eng.

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office hours: by appointment

Course Description and requirements

1) Course schedule

Day of Week: Tuesdays

Time Slot: 18:05 – 20:55

Location:

*Please refer to the [Public Class Schedule](#) for the most recent information.

2) Course description

This course covers a full range of airport planning topics from general planning principles to runway layout. It introduces the student to concepts of demand forecasting, which aircraft characteristics impact on airport design, and how the airport impacts upon, and is influenced by, its surrounding environment. We will investigate the various components of the airport, grouped by airside, terminal, and groundside facilities. We will also touch on various specialty type airports, and finish with student presentations on specialized topics in airport planning.

3) Prerequisites and recommended knowledge

Various lectures and assignments will be using Microsoft Excel[®] and students are expected to have a basic familiarity with this software. This includes being able to:

- create and copy basic formulae,
- add, edit, and delete data in specific cells, rows, and columns,
- format tables and data using colour, borders, shading, emphasis, etc.,
- import data from external sources, and
- create a PDF of your work to submit online through Brightspace.

4) Learning Outcomes

Overall, the course aims to equip students with a holistic understanding of airport planning, covering various aspects from demand forecasting and site selection to terminal design, air traffic control, and sustainability considerations.

By successfully completing this course, students will have the knowledge and skills necessary to engage effectively in the multifaceted field of airport planning. They will be equipped to tackle real-world challenges, contribute to informed decision-making, and participate in the sustainable growth of the aviation industry by integrating various components of airport planning, addressing complex planning issues, accommodating diverse aircraft needs, and understanding the role of air traffic control in shaping airport operations.

5) Text book(s)/References

Text (Optional)

Ashford, Norman J., Mumayiz, Saleh, and Wright, Paul H., *Airport Engineering: Planning, Design and Development of 21st Century Airports (4th Edition)*, John Wiley & Sons, New York, April 2011.

Note: This textbook is not mandatory for this course. We will be drawing on a wide variety of reference material which will be discussed throughout the course. Any mandatory readings will be provided through Brightspace.

Likewise, the references provided below were used in the preparation of material for this course and provide additional context for students interested in pursuing more information related to this field.

References

A. Books

1. DeNeufville, Richard L. and Odoni, Amedeo R., *Airport Systems Planning Design and Management*, 2nd Edition, McGraw Hill Companies, 2013.
2. Horonjeff, Robert D. and McKelvey, Francis X., Sproule, William, *Planning and Design of Airports, 5th Edition*, McGraw Hill Companies, May, 2011.
3. Wells, Alexander T., and Young, Seth, *Airport Planning and Management*, 6th Edition, McGraw-Hill Companies, October 2011.

B. Government of Canada Reference Documents

1. Aeronautics Act (R.S., 1985, C. A-2)
2. Canadian Aviation Regulations (CAR), SOR/96-433, Part III, Subpart 2 – *Airports*, 2020
3. Transport Canada, TP 312 (5th Edition), *Aerodrome Standards & Recommended Practices*, 2015
4. Transport Canada, TP1247/E, *Land Use in the Vicinity of Aerodromes*, 9th Edition, 2014

C. ICAO documents

1. *Aerodrome Design Manual: Part 1 - Runways, (Doc 9157 AN/901 Part 1)*, Third Edition, 2006
2. *Aerodrome Design Manual: Part 2 – Taxiways, Aprons and Holding Bays, (Doc 9157 AN/901 Part 2)*, Fourth Edition, 2005
3. *Airport Planning Manual, Part 1 (Master Planning Manual), (Doc 9184-AN/902 part1), Second Edition, 1987*
4. *Airport Planning Manual, Part 2 (Land Use and Environmental Control), (Doc 9184 AN/902 part 2)*, Third Edition, 2002
5. *Manual on Air Traffic Forecasting (Doc 8991 AT/722/3), Third Edition, 2006*

D. IATA documents

1. *Airport Development Reference Manual (Ref No. 9044-09), Ninth Edition, 2004*

E. ACRP documents

1. *Report 25 – Airport Passenger Terminal Planning and Design (3 volumes)*, TRB, Washington, 2010
2. *Report 16 – Guidebook for Managing Small Airports*, TRB, Washington, 2009

6) Topics and tentative plan

Lectures:

Week	Topic
1.	Introduction to Airport Planning: course housekeeping, brief history of air transportation, organizations, terminology/acronyms, airport planning procedures, Canadian airport policy, airport planning as a career
2.	Demand Forecasting: methods of forecasting, annual and peak hour forecasts, data sources, long range forecasts, operational forecasts, Transport Canada forecasting models
3.	Airport Site Selection and Land Use Impacts: site selection criteria, fine tuning site selection, environmental impact studies, land use planning impacts, noise contours, pollution
4.	Aircraft Characteristics: aircraft trends, factors affecting aircraft development, design aircraft for facility planning and design, Aircraft Group Number
5.	Airside Layout (Runways): runway orientation, wind rose analysis, runway configurations, Obstacle Limitation Surfaces, runway components, Declared Distances, runway separation
6.	Airside Layout (Taxiways & Aprons): taxiway layout and design, holding bays, apron layout and design, ATC Tower considerations, ground-based navaids, airside capacity
7.	Air Traffic Control (ATC) and NavAids: air navigation services, flight rules (VFR/IFR), airspace, ATC, flight services, aviation weather, navigation aids, Performance-Based Navigation (PBN), impacts on airport planning
8.	Air Passenger Terminal Building (PTB): historic context, planning considerations, siting the terminal, PTB layouts, PTB sub-systems, pedestrian flows, and modeling

9.	Air Cargo Terminal Building: terminology, planning process, functions of the terminal, air cargo characteristics and shipping models, terminal concepts, and planning considerations
10.	Ground Transportation System: fundamentals and planning approach, groundside components, (users, transport modes, infrastructure), capacity and level of service, problem areas
11.	General Aviation and Special Airports: GA Master Planning, types of operations and aircraft, facility planning, heliports, water aerodromes, ice aerodromes
12.	Special Topics in Airport Planning: Presentation of Group Projects

7) Evaluation and marking scheme

a) Mark allocation

Problem Sets (Assignments)	25%
Group Project	20%
Critical Readings Assessment	5%
Final Exam	50%
<hr/> Total	<hr/> 100%

b) Problem Sets

Two problem sets will be assigned, one in the first half of the course, and the second after the mid-term break. Two weeks will be allotted to complete each assignment. The assignments will focus on concepts covered during the lectures and practical application of those concepts.

c) Group Project

The group project is an opportunity for students to delve deeper into a specific topic that we could only skim the surface of in the lectures. And, to share their findings with the rest of the class.

Students will be assigned to groups of up to five (5) team members. Over the course of the semester, each team will prepare a technical paper and presentation on a specific topic within a given theme. This year's theme is:

Ancillary Facilities in Airport Planning

Each team will present their findings in the final lecture.

d) Readings

Up to five (5) marks will be assigned for providing thoughtful/critical feedback on a variety of assigned readings in asynchronous discussion forums. We will go over the objectives and expectations for this feedback in Lecture 1.

e) Learning Modality

As of the time of preparation of this Outline, this course is scheduled to be delivered in-person in Room 4236 of the Mackenzie Building on the Carleton University campus from 6:05pm to 8:55pm on Tuesday evenings (starting Sept 10, 2024). However, all lecture notes / slide decks, readings, assignments, group project material, and gradings will be communicated via Brightspace. Students are encouraged to familiarize themselves with the course Brightspace website and to check it regularly for updates and announcements.

Should circumstances dictate, the course may be moved online where the Instructor and students will meet via web conferencing tools (Zoom), at the same scheduled lecture dates/times. Participation in synchronous courses requires students to have reliable, high-speed internet access, a computer (ideally with a webcam), and a headset with a microphone.

f) Final Examination

- i) **Final exams are for evaluation purpose and will not be returned to students.**
- ii) Exam Conditions - Closed book exam
- iii) Exam format – in-person, proctored exam, on campus
- iv) Final Exam Weight = **50%**
- v) Deferred Final Examinations: Students who are unable to write the final examination because of extenuating circumstances, as defined in the [Academic Consideration Policy](#), may apply for accommodation by contacting the Registrar's office. Consult [Section 4.3 of the University Calendar](#).

g) Term work late submission policy

- Up to 12 hours late (-10%)
- 12-24 hours late (-25%)
- 24+ hours late (submission not accepted)

Late submissions may be accommodated if the Instructor is approached at least 48 hours in advance of the due date and legitimate reason(s) for anticipated late submission is provided (poor distribution of your workload is not an excuse).

h) Self-Declaration form and deferred term work

Students who claim extenuating circumstances defined in the [Academic Consideration Policy](#), as a reason for missed term work are held responsible for immediately informing the instructor concerned and for making alternate arrangements with the instructor and in all cases. This must occur no later than three (3) days after the term work was due. The alternate arrangement must be made before the last day of classes in the term as published in the academic schedule. Consult [Section 4.4 of the University Calendar](#).

8) Academic dates

Students should be aware of the academic dates (e.g. last day for academic withdrawal) posted on the Registrar's office web site <https://carleton.ca/registrar/registration/dates/academic-dates/>

Academic Integrity and Plagiarism

- a) Please consult the Faculty of Engineering and Design information page about the Academic Integrity policy and our procedures: <https://carleton.ca/engineering-design/current-students/fed-academic-integrity> Violations of the Academic Integrity Policy will result in the assignment of a penalty such as reduced grades, the assignment of an F in a course, a suspension or, expulsion.
- b) One of the main objectives of the Academic Integrity Policy is to ensure that **the work you submit is your own**. As a result, it is important to write your own solutions when studying and preparing with other students and to avoid plagiarism in your submissions. The University Academic Integrity Policy defines plagiarism as “presenting, whether intentionally or not, the ideas, expression of ideas or work of others as one’s own.” This includes reproducing or paraphrasing portions of someone else’s published or unpublished material, regardless of the source, and presenting these as one’s own without proper citation or reference to the original source.

Examples of violations of the policy include, but are not limited to:

- any submission prepared in whole or in part, by someone else;
- using another’s data or research findings without appropriate acknowledgement;
- submitting a computer program developed in whole or in part by someone else, with or without modifications, as one’s own; and
- failing to acknowledge sources of information through the use of proper citations when using another’s work and/or failing to use quotations marks.

Copyright

The materials (including the course outline and any slides, posted notes, videos, labs, project, assignments, quizzes, exams and solutions) created for this course and posted on this web site are

intended for personal use and may not be reproduced or redistributed or posted on any web site without prior written permission from the author(s).

Learning and Working Environment

The University and all members of the University community share responsibility for ensuring that the University's educational, work and living environments are free from discrimination and harassment. Should you have concerns about harassment or discrimination relating to your age, ancestry, citizenship, colour, creed (religion), disability, ethnic origin, family status, gender expression, gender identity, marital status, place of origin, race, sex (including pregnancy), or sexual orientation, please contact the [Department of Equity and Inclusive Communities](mailto:equity@carleton.ca) at equity@carleton.ca. We will strive to create an environment of mutual respect for all through equity, diversity, and inclusion within this course. The space which we work in will be safe for everyone. Please be considerate of everyone's personal beliefs, choices, and opinions.

Academic Accommodations

You may need special arrangements to meet your academic obligations during the term. For an accommodation request the processes are as follows:

Academic Accommodations for Students with Disabilities: The Paul Menton Centre for Students with Disabilities (PMC) provides services to students with Learning Disabilities (LD), psychiatric/mental health disabilities, Attention Deficit Hyperactivity Disorder (ADHD), Autism Spectrum Disorders (ASD), chronic medical conditions, and impairments in mobility, hearing, and vision. If you have a disability requiring academic accommodations in this course, please contact PMC at **613-520-6608** or pmc@carleton.ca.

You should request your academic accommodations in the [Ventus Student Portal](#), for each course at the beginning of every term. For in-term tests or midterms, please request accommodations at least two (2) weeks before the first test or midterm. Please consult the [PMC website](#) for the deadline to request accommodations for the formally-scheduled exam (if applicable).

Accommodation for Student Activities: Carleton University recognizes the substantial benefits, both to the individual student and for the university, that result from a student participating in activities beyond the classroom experience. Reasonable accommodation must be provided to students who compete or perform at the national or international level. Please contact your instructor with any requests for academic accommodation during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist. For more details, see the [Senate Policy on Accommodation for Student Activities \(PDF\)](#).

Pregnancy Obligation: Please contact your instructor with any requests for academic accommodation during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist. For more details, please review the [Student Guide to Academic Accommodation \(PDF\)](#).

Religious Obligation: Please contact your instructor with any requests for academic accommodation during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist. For more details, please review the [Student Guide to Academic Accommodation \(PDF\)](#).

Survivors of Sexual Violence: As a community, Carleton University is committed to maintaining a positive learning, working and living environment where sexual violence will not be tolerated, and where survivors are supported through academic accommodations as per Carleton's Sexual Violence Policy. For more information about the services available at the university and to obtain information about sexual violence and/or support, visit the [Sexual Violence Prevention & Survivor Support](#).

Engineering Academic Advising

The [Engineering Academic Support Service](#) assists undergraduate engineering students with course selection, registration, and learning support from first-year through to graduation.

Academic Advisors Contact can be found here: <https://carleton.ca/engineering-design/current-students/undergrad-academic-support/undergraduate-advisors/>.

Student Mental Health and Wellness

As a university student you may experience a range of mental health challenges that can significantly impact your academic success and overall well-being. Carleton's [Wellness Services Navigator](#) is designed to help students connect with mental health and wellness resources.

If you need to talk to someone from the department for more information and support with connecting to resources, you can contact the following faculty members, depending on your program. Or contact the department at CEEUGChair@cunet.carleton.ca.

ACSE: Prof. [Elie Azar](#)

Email: Elie.Azar@carleton.ca, Office: 3432 Mackenzie

CIVE: Prof. [Heng Khoo](#)

Email: heng.khoo@carleton.ca, Office: 3364 Mackenzie

ENVE: Prof. [Shoeleh Shams](#)

Email: shoelehshams@cunet.Carleton.ca, Office: 4242 Mackenzie

Here is a list of on-campus and off-campus recourses:

1. **Carleton's Wellness Desk:** Located at 204A MacOdrum Library, is a space for students to learn about resources, connect with our Wellness Coordinator, and decompress during stressful times of the year. You can pop into the Wellness Desk any time during its hours of operation – no appointments necessary! <https://wellness.carleton.ca/mental-health/wellness-desk/>
2. **Carleton's Health and Counselling Services:** To book an appointment contact the main clinic by calling (613) 520-6674. If urgent, let the Patient Care Coordinator know or go in person to the main clinic (2500 Carleton Technology and Training Centre Building) and indicate that they are in crisis and need to speak to someone right away. <https://carleton.ca/health/>
3. **Residence Counselling and Wellness Service:** Counselling services specifically for students in residence. <https://carleton.ca/health/residence-counselling/>
4. **Therapy Dogs:** Carleton's therapy dogs are around campus with their owners (who are Carleton University staff and faculty) to comfort and provide support to help you thrive as a university student. <https://carleton.ca/wellness/dogs/>
5. [Emergencies and Crisis](#) and [Emergency Numbers](#)
6. **Good2Talk (1-866-925-5454):** Good2Talk is a free, confidential helpline providing professional counselling and information and referrals for mental health, addictions and well-being to post-secondary students in Ontario, 24/7/36 <https://good2talk.ca/>
7. **Empower Me:** Undergraduate students have access to free counselling services in the community through Empower Me, either in person, by telephone, video-counselling or e-counselling. **This free service is accessible 24/7, 365 days per year.** Call **1-844-741-6389 (toll free)** to make an appointment with a counsellor in the community. More information is available <https://students.carleton.ca/services/empower-me-counselling-services/>
8. **The Walk-In Counselling Clinic (off-campus community resource):** The walk-in Counselling Clinic have offices in various locations across Ottawa and the greater Champlain region that are open 7 days a week. Individuals will be assisted, with no appointment, on a first-come, first-serve basis during the Walk-in Counselling Clinic hours. The Walk-in Counselling Clinic **offers services in many languages** and is free and confidential. More information can be found at: <https://walkincounselling.com/>
9. **Distress Centre of Ottawa and Region:** Available 10am-11pm, 7 days/week, 365 days/year. **Distress Line:** 613-238-3311, **Crisis Line:** 613-722-6914 or 1-866-996-0991, **Text:** 343-306-5550. <https://www.dcottawa.on.ca/>
10. **Distress and Crisis Ontario**, Available for chat 2 pm – 2 am EST. <https://www.dontario.org/>
11. **BounceBack Ontario (Toll-Free: 1-866-345-0224)** is a free skill-building program managed by the Canadian Mental Health Association (CMHA). It is designed to help adults and youth 15+ manage low mood, mild to moderate depression and anxiety, stress or worry. Delivered over the phone with a coach and through online videos, you will get access to tools that will support you on your path to mental wellness. <https://bouncebackontario.ca/>.