



**CARLETON UNIVERSITY
SPROTT SCHOOL OF BUSINESS
BUSI 4301
COURSE OUTLINE**

ARTIFICIAL INTELLIGENCE AND BUSINESS DECISION MODELS

Instructor: Dr. Ahmed Doha

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Schedule: Meeting days, dates, times, and locations are confirmed in Banner and Brightspace for each course offering.

Delivery mode:

- Weekly in-class lecture (students' remote attendance not permitted)
- Weekly lab

Lecture Room: Canal Building 2202

Lab Room: to be announced

Course calendar description:

This course lays the foundations of Artificial Intelligence (AI) for business decision models using two currently dominant frameworks: Machine Learning and Deep Learning. This course discusses how to profit from AI through business model innovation in business domains including accounting, finance, marketing and supply chain.

Includes: Experiential Learning Activity

Precludes additional credit for BUSI 2300, ECON 4005.

Prerequisite(s): third-year standing, BUSI 2401, and STAT 2601.

Lecture three hours and lab one hour per week.

Required Materials

- BUSI 4301 uses a coordinated methods stack rather than one required textbook. The titles below are available at no additional cost through Carleton University Library's institutional O'Reilly access; students are not required to purchase a textbook. Exact weekly chapters and any supplementary articles will be posted in Brightspace.

Cycles 1 and 3 · Representation, LLMs & Agents. Alammari, J., & Grootendorst, M. (2024). Hands-On Large Language Models. O'Reilly Media. Selected Chapters 1-8, assigned by topic. O'Reilly access: <https://www.oreilly.com/library/view/hands-on-large-language/9781098150952/>

Course foundations and Cycle 2 · Measurement. Chen, B., & Kling, G. (2025). Business Analytics with Python. Kogan Page. Selected Chapters 1, 4, 5, 7, 8, 10, and 11. O'Reilly access: <https://www.oreilly.com/library/view/business-analytics-with/9781398617278/>

Cycle 4 · Networks. Pinheiro, C. A. R. (2022). Network Science. Wiley. Selected Chapters 1-3 and 5. O'Reilly access: <https://www.oreilly.com/library/view/network-science/9781119898917/>

Optional advanced Cycle 4 extension · Graph Neural Networks. Stillman, N., & Broadwater, K. (2025). Graph Neural Networks in Action. Manning. Selected Chapters 1-2 for students who want to extend the course network work. O'Reilly access: <https://www.oreilly.com/library/view/graph-neural-networks/9781617299056/>

Access route. Sign in through the Carleton University Library, open the O'Reilly database, and search by title. Library authentication is required off campus. The official course outline and Brightspace reading schedule govern the assigned selections.

Course Evaluation

Grade Distribution

Attendance	10%
Assignment 1	15%
Assignment 2	15%
Term Paper	50%
Term Paper Presentation	10%

Attendance

Class attendance is important and is part of the overall grade. Attendance will be taken electronically using Poll Everywhere supported by Carleton's Educational Development Center. You need to register on Poll Everywhere using your cmail account (get in touch with EDC for any technical problems). A connected device such as a smartphone, tablet, or laptop is required in class to register attendance. Full attendance mark requires attending at least 9 of the 11 instructional classes (excluding the two presentation days, both of which must be attended) in the tentative schedule.

Assignments

There will be two assignments. Each assignment will involve the application of AI methods to answer business analytics questions on a dataset. An assignment (report, dataset, python code) will be submitted as a zipped file to Brightspace no later than 11:59pm on the day it is due.

Term Paper

Each student group will submit a term paper. The term paper is due one week after the final scheduled class, by 11:59 p.m., unless a different deadline is announced in Brightspace. Term paper rubrics will be made available on the course page. The submission will be accompanied by the secondary dataset(s) and the python code implementing the AI methods used. Students who do not obtain at least 50% average excluding the term paper will not be allowed to submit a term paper and will lose its marks. Term paper (paper, dataset, python code) will be submitted as a zipped file to Brightspace no later than 11:59pm on the day it is due.

Term Paper Presentation

Each student group will make a 15-20 min presentation of their term paper in class as per the tentative schedule. The presentation should introduce the problem/question, the dataset, the AI-based methods and code implementation, and results.

Tentative Schedule

Week	Topics
1	Class 1 · Introduction: The Yelp Philadelphia marketplace, business decisions, and the four-cycle evidence chain
2	Class 2 · Cycle 1 — Representation: How language becomes a mathematical object
3	Class 3 · Cycle 1 — Representation: From review vectors to candidate themes
4	Class 4 · Cycle 1 — Representation: Reliability, validity, and the wrong stable answer

5	Class 5 · Cycle 2 — Measurement: From business question to supervised learning design
6	Class 6 · Cycle 2 — Measurement: The excellent classifier that knew too much
7	Class 7 · Cycle 2 — Measurement: When a proxy predicts its own cousin
8	University break. Classes suspended.
9	Class 8 · Cycle 3 — LLMs & Agents: From language models to controlled decision agents
10	Class 9 · Cycle 3 — LLMs & Agents: Audit a grounded Yelp decision agent
11	Class 10 · Cycle 4 — Networks: When rows become relationships
12	Class 11 · Cycle 4 — Networks: Centrality, communities, and decisions under reconstruction

13	Class 12 · Term Paper Presentations — Session 1
14	Class 13 · Term Paper Presentations — Session 2

Academic-calendar note: Class dates, university breaks, registration and withdrawal deadlines, and other offering-specific dates are published in the official Carleton University academic calendar, Banner, and Brightspace.

ADDITIONAL INFORMATION

Course Sharing Websites

Materials created for this course (including presentations and posted notes, labs, case studies, assignments and exams) remain the intellectual property of the author(s). They are intended for personal use and may not be reproduced or redistributed without prior written consent of the author(s).

Required calculator in BUSI course examinations

If you are purchasing a calculator, we recommend any one of the following options: Texas Instruments BA II Plus (including Pro Model), Hewlett Packard HP 12C (including Platinum model), Staples Financial Calculator, Sharp EL-738C & Hewlett Packard HP 10bII

Group work

The Sprott School of Business encourages group assignments in the school for several reasons. They provide you with opportunities to develop and enhance interpersonal, communication, leadership, follower-ship and other group skills. Group assignments are also good for learning integrative skills for putting together a complex task. Your professor may assign one or more group tasks/assignments/projects in this course. Before embarking on a specific problem as a group, it is your responsibility to ensure that the problem is meant to be a group assignment and not an individual one.

In accordance with the Carleton University Undergraduate Calendar (p 34), the letter grades assigned in this course will have the following percentage equivalents:

A+ = 90-100	B+ = 77-79	C+ = 67-69	D+ = 57-59
A = 85-89	B = 73-76	C = 63-66	D = 53-56
A - = 80-84	B - = 70-72	C - = 60-62	D - = 50-52
F = Below 50			

Grades entered by Registrar:

WDN = Withdrawn from the course

DEF = Deferred

Academic Regulations

University rules regarding registration, withdrawal, appealing marks, and most anything else you might need to know can be found on the university's website, here: <http://calendar.carleton.ca/undergrad/regulations/academicregulationsoftheuniversity/>

Requests for Academic Accommodation

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

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, visit the Equity Services website: carleton.ca/equity/wp-content/uploads/Student-Guide-to-AcademicAccommodation.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, visit the Equity Services website: carleton.ca/equity/wp-content/uploads/Student-Guide-to-AcademicAccommodation.pdf

Academic Accommodations for Students with Disabilities

If you have a documented disability requiring academic accommodations in this course, please contact the Paul Menton Centre for Students with Disabilities (PMC) at 613-5206608 or pmc@carleton.ca for a formal evaluation or contact your PMC coordinator to send your instructor your Letter of Accommodation at the beginning of the term. You must also contact the PMC no later than two weeks before the first in-class scheduled test or exam requiring accommodation (if applicable). After requesting accommodation from PMC, meet with your instructor as soon as possible to ensure accommodation arrangements are made. carleton.ca/pmc

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 its 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: carleton.ca/sexualviolence-support

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.

<https://carleton.ca/senate/wp-content/uploads/Accommodation-for-StudentActivities-1.pdf>

For more information on academic accommodation, please contact the departmental administrator or visit: students.carleton.ca/course-outline

Academic Integrity

Violations of academic integrity are a serious academic offence. Violations of academic integrity – presenting another’s ideas, arguments, words or images as your own, using unauthorized material, misrepresentation, fabricating or misrepresenting research data, unauthorized co-operation or collaboration or completing work for another student – weaken the quality of the degree and will not be tolerated. Penalties may include; a grade of Failure on the submitted work and/or course; academic probation; a refusal of permission to continue or to register in a specific degree program; suspension from fulltime studies; suspension from all studies at Carleton; expulsion from Carleton, amongst others. Students are expected to familiarize themselves with and follow the Carleton University Student Academic Integrity Policy which is available, along with resources for compliance at: <https://carleton.ca/registrar/academic-integrity/>.

Sprott Student Services

The Sprott student services office, located in 710 Dunton Tower, offers academic advising, study skills advising, and overall academic success support. If you are having a difficult time with this course or others, or just need some guidance on how to successfully complete your Sprott degree, please drop in any weekday between 8:30am and 4:30pm. Our advisors are happy to discuss grades, course selection, tutoring, concentrations, and will ensure that you get connected with the resources you need to succeed! <http://sprott.carleton.ca/students/undergraduate/learning-support/>

Centre for Student Academic Support

The Centre for Student Academic Support (CSAS) is a centralized collection of learning support services designed to help students achieve their goals and improve their learning both inside and outside the classroom. CSAS offers academic assistance with course content, academic writing and skills development. Visit CSAS on the 4th floor of MacOdrum Library or online at: carleton.ca/csas.

Important Information:

- Students must always retain a hard copy of all work that is submitted.
 - All final grades are subject to the Dean’s approval.
 - For us to respond to your emails, we need to see your full name, CU ID, and the email must be written from your valid CARLETON address. Therefore, in order to respond to your inquiries, please send all email from your Carleton CMail account. If you do not have or have yet to activate this account, you may wish to do so by visiting <https://carleton.ca/its/get-started/new-students-2/>
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