

BUSINESS F743
Big Data in Finance
Fall 2026 Course Outline

Finance and Business Economics Area
DeGroote School of Business
McMaster University

COURSE DESCRIPTION

This course introduces business students to the applications of data science, its key statistical tools, and the underlying technology in the finance area. Students gain a deeper understanding of how finance, technology, and statistics intersect in an applied setting to solve tough problems in innovative ways. The course is intended to equip students with skills in solving problems requiring acquisition, management, and analysis of very large datasets.

INSTRUCTOR AND CONTACT INFORMATION

Class Timing: **Wednesdays at 7.00 PM**
All times referenced in this document are Eastern.

Adeel Mahmood
Instructor
Office Hours: Before or after class, or by appointment

COURSE ELEMENTS

Credit Value: 3	Leadership: Yes	IT skills: Yes	Global view: Yes
Avenue: Yes	Ethics: No	Numeracy: Yes	Written skills: Yes
Participation: Yes	Innovation: Yes	Group Work: Yes	Oral skills: Yes

COURSE PREREQUISITES AND COMPLEMENTS

Students should have the academic credit of Bus F600 or F650 – or equivalent preparation – prior to the start of this course.

COURSE OVERVIEW

This course examines how **large datasets** and **artificial intelligence** are used to solve problems in finance. It is built for business students rather than for programmers. Writing analysis code from scratch is no longer the scarce skill; AI tools now produce working code from a plain-language request in seconds. What is scarce, and what this course develops, is the ability to state a problem precisely, direct the tools that solve it, read and repair what they return, verify that the result is sound, and translate it into a decision a manager can act on.

Students work through the technical material once, hands-on, so that they understand what they are supervising. The course then moves to the material that employers and regulators are asking about: working with AI beyond the chat window, extracting reliable information from business documents, designing multi-step AI workflows with controls and human oversight, and assessing what AI costs and earns. The course closes with the business implications of the AI build-out and the governance and regulatory expectations now forming around model risk and AI use in financial institutions.

The technical floor of this course is four verbs: **generate** code with an AI tool, **read** what was generated, **debug** it when it misbehaves, and **validate** that its output is correct. AI tools are permitted helpers at every step. Assessment targets the evidence that all four verbs were exercised, not the polish of the final artifact.

LEARNING OUTCOMES

Upon completion of the course, a student will be able to:

- Frame a business problem in finance as a data or automation problem, and state what a good answer would look like before any work begins.
- Build and evaluate a machine-learning pipeline end to end with AI assistance, including the data preparation, the split, the model, and the evaluation on held-out data.
- Recognize the common failure modes of predictive work — leakage, an unrepresentative split, a metric that flatters a weak model — and test for them.
- Explain in plain language how modern AI systems work, what they are reliably good at, and where and why they fail.
- Direct AI tools professionally: write a specification a tool cannot reasonably misread, improve it from evidence, and choose the right tool and approach for a task.
- Extract information from business documents with AI tools and verify it against the source well enough to know what can be relied upon.
- Design a multi-step AI workflow for a finance task, including a guardrail, a human approval checkpoint, and a record of what the workflow did.
- Assess the cost and business value of an AI solution, including usage-based costs and the assumptions behind them.

- Discuss the governance, ethical, bias, and regulatory expectations that apply to AI and model use in financial institutions.
- Present and defend a technical solution to a management audience.

REQUIRED COURSE MATERIALS AND READINGS

Course content and class communication available on Avenue:

- <http://avenue.mcmaster.ca>

EVALUATION

This course will be delivered using a variety of tools, including pre-recorded and live lectures, group work, and experiential activities. The final student grade will be calculated as follows:

Components and Weights

Quizzes	Completed online (individual)	5%
Lab Assignments	Completed out of class (individual, group)	15%
Term Tests	Written in class (individual)	50%
Big Data Project	Due at the end of the term (group)	30%
Total		100%

At the end of the course your overall percentage grade will be converted to your letter grade in accordance with the following conversion scheme:

LETTER GRADE	PERCENT	POINTS
A+	90-100	12
A	85-89	11
A-	80-84	10
B+	77-79	9
B	73-76	8
B-	70-72	7
F	00-69	0

Quizzes

There are six (6) **quizzes** in total, of which each student's **best five (5) marks** are used to compute their grade for this component. The quizzes are written online and can be completed from anywhere using a computer and an Internet connection. The quizzes are due by the end of the Sunday of the week for which they are assigned.

Each quiz has a limited duration but can be written anytime during a longer window of time. The quiz questions are multiple-choice in format. The content covered is the lecture topic in the week immediately preceding the quiz deadline. Students can use books, notes, and computing devices but must write each quiz on own without assistance from any other person.

The first missed quiz is dropped from the grade - such that the student's marks on the remaining quizzes are used to calculate the overall grade for this component. Any additional missed quizzes can only be accommodated for documented, valid reasons. The weight of such accommodated missed quizzes is reallocated to that of the remaining quizzes.

Lab Assignments

The purpose of the **Lab Assignments** is to give students the opportunity to understand machine learning and AI tools in depth on real-world finance problems. There are three lab assignments in total. The first is completed individually and carries the smallest weight; the other two are group assignments and are equally weighted. All three are worked on out of class and submitted online. Full instructions for each are posted on the course website.

The two group labs require the use of AI tools rather than merely permitting it. What is marked is the documented craft: the specification given to the tools, the record of what was run and what changed, the verification of what came back, and own account of what worked and what did not.

Late submissions are subject to a 25% mark deduction for every 24 hours past the deadline. If there is a valid reason as supported with documentation for a late submission, the deadline will be extended to the time allowed in the documentation.

Term Tests

Three (3) term tests – **open-book, open-notes** tests – will be written during the term. For each student, the two highest percentage scores of the three tests (i.e. **best two out of three**) will be considered in the determination of the final grade. More details of the format, structure, and content coverage will be provided on the course website.

If a student **misses one term test** out of the three, the missed test's weight will become zero, and the student's overall **Term Tests** grade will be calculated using the two tests that are written.



A student *missing any additional term test beyond the first missed test* is required to contact the DSSAO (DSB Student Services Academic Office) and obtain an official approval of relief to avoid getting a zero (0) grade for the additional missed test. If the DSSAO adjudicates that relief be provided, the student will be able to write an alternate test, in lieu of the additional missed test, during the final exam period at the end of the term.

Big Data Project

The **big data project** allows students to work in groups on a data analytics problem faced by an institution and to apply the key skills of the course: the analysis of large datasets, the application of modern machine learning, the use of the necessary technology infrastructure, and the supervision of delegated AI work. It culminates in presenting and defending a management-level solution to the proposed problem.

Projects fall into one of two categories. The **data science** category builds a deep-learning prediction pipeline on a large dataset. The **business workflow automation** category maps, redesigns, and automates a real manual company-scale workflow. The project concludes with an in-person presentation and defence, in which questions are directed at individual group members. Full requirements are posted on the course website.

The group members will be assigned individual grades relative to the group grade based on the peer assessments completed towards the end of the course. More details of the format, structure, and length of the project will be provided during the term.

Late submissions are subject to a 25% mark deduction for every 24 hours past the deadline. If there is a valid reason as supported with documentation for a late submission, the deadline will be extended to the time allowed in the documentation.

COMMUNICATION AND FEEDBACK
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Students that are uncomfortable in directly approaching an instructor regarding a course concern may send a confidential and anonymous email to the respective Area Chair or Associate Dean:

<http://mbastudent.degroote.mcmaster.ca/contact/anonymous/>

Students who wish to correspond with instructors or TAs directly via email must send messages that originate from their official McMaster University email account. This protects the confidentiality and sensitivity of information as well as confirms the identity of the student. Emails regarding course issues should NOT be sent to the Administrative Assistant.

Instructors are encouraged to conduct an informal course review with students by Week #4 to allow time for modifications in curriculum delivery. Instructors should provide evaluation feedback for at least 10% of the final grade to students prior to Week #8 in the term.

AUTHENTICITY/ PLAGIARISM DETECTION

Some courses may use a web-based service (Turnitin.com) to reveal authenticity and ownership of student submitted work. For courses using such software, students will be expected to submit their work electronically either directly to Turnitin.com or via an online learning platform (e.g. A2L, etc.) using plagiarism detection (a service supported by Turnitin.com) so it can be checked for academic dishonesty.

Students who do not wish their work to be submitted through the plagiarism detection software must inform the Instructor before the assignment is due. No penalty will be assigned to a student who does not submit work to the plagiarism detection software.

All submitted work is subject to normal verification that standards of academic integrity have been upheld (e.g., on-line search, other software, etc.). For more details about McMaster's use of Turnitin.com please go to www.mcmaster.ca/academicintegrity.

COURSES WITH AN ONLINE ELEMENT

All courses use some online elements (e.g. e-mail, Avenue to Learn (A2L), LearnLink, web pages, capa, Moodle, ThinkingCap, etc.). Students should be aware that, when they access the electronic components of a course using these elements, private information such as first and last names, user names for the McMaster e-mail accounts, and program affiliation may become apparent to all other students in the same course.

Students may be required to use the Respondus LockDown Browser and Respondus Monitor. The Respondus LockDown Browser is a downloadable program that allows a student to take an Avenue to Learn quiz in a secure environment. Quizzes can be set to use LockDown Browser or LockDown Browser.

For more details about McMaster's use of Respondus Lockdown Browser please go to <https://avenuehelp.mcmaster.ca/exec/respondus-lockdown-browser-and-respondus-monitor/>

The available information is dependent on the technology used. Continuation in a course that uses online elements will be deemed consent to this disclosure. If you have any questions or concerns about such disclosure, please discuss this with the course instructor.

ONLINE PROCTORING

Some courses may use online proctoring software for tests and exams. This software may require students to turn on their video camera, present identification, monitor and record their computer activities, and/or lock/restrict their browser or other applications/software during tests or exams. This software may be required to be installed before the test/exam begins.

CONDUCT EXPECTATIONS

As a McMaster student, you have the right to experience, and the responsibility to demonstrate, respectful and dignified interactions within all of our living, learning and working communities. These expectations are described in the ***Code of Student Rights & Responsibilities*** (the “Code”). All students share the responsibility of maintaining a positive environment for the academic and personal growth of all McMaster community members, **whether in person or online**.

It is essential that students be mindful of their interactions online, as the Code remains in effect in virtual learning environments. The Code applies to any interactions that adversely affect, disrupt, or interfere with reasonable participation in University activities. Student disruptions or behaviours that interfere with university functions on online platforms (e.g. use of A2L, WebEx or Zoom for delivery), will be taken very seriously and will be investigated. Outcomes may include restriction or removal of the involved students’ access to these platforms.

COPYRIGHT AND RECORDING

Students are advised that lectures, demonstrations, performances, and any other course material provided by an instructor include copyright protected works. The Copyright Act and copyright law protect every original literary, dramatic, musical and artistic work, **including lectures** by University instructors.

The recording of lectures, tutorials, or other methods of instruction may occur during a course. Recording may be done by either the instructor for the purpose of authorized distribution, or by a student for the purpose of personal study. Students should be aware that their voice and/or image may be recorded by others during the class. Speak with the instructor if this is a concern for you.

ACADEMIC INTEGRITY

You are expected to exhibit honesty and use ethical behaviour in all aspects of learning. Academic credentials you earn are rooted in principles of honesty and academic integrity.

Academic dishonesty is to knowingly act or fail to act in a way that results or could result in unearned academic credit or advantage. This behaviour can result in serious consequences, e.g. the grade of zero on an assignment, loss of credit with a notation on the transcript (notation reads: “Grade of F assigned for academic dishonesty”), and/or suspension or expulsion from the university.

It is your responsibility to understand what constitutes academic dishonesty. For information on the various types of academic dishonesty please refer to the Academic Integrity Policy, at:
www.mcmaster.ca/academicintegrity

Students are responsible for being aware of and demonstrating behaviour that is honest and ethical in their academic work. Such behaviour includes:



- following the expectations articulated by instructors for referencing sources of information and for group work;
- asking for clarification of expectations as necessary;
- identifying testing situations that may allow copying;
- preventing their work from being used by others (e.g., protecting access to computer files); and
- adhering to the principles of academic integrity when conducting and reporting research.

GENERATIVE AI

This is a course about working with artificial intelligence, and the use of AI tools is expected in most of its assessed work. The specific expectation varies by component and is stated in each assignment's instructions.

- **Quizzes:** books, notes, and computing devices may be used, but each quiz must be written without assistance from another person.
- **Lab Assignments:** AI use is permitted throughout and is required in the group labs. Students must document what they asked the tools, what came back, and what they did about it.
- **Term Tests:** open book and open notes but no electronic devices or AI use permitted. Specific restrictions on test conduct are stated on the course website.
- **Big Data Project:** AI use is expected and required, and evidence of how it was directed and verified forms part of the grade.

Two principles apply everywhere. First, students remain fully responsible for everything they submit, including anything an AI tool produced on their behalf: an error generated by a tool is the student's error. Second, students must be able to explain their own submitted work: how it was produced, why the choices in it were made, and how its outputs were checked. Work that cannot be explained by its authors is treated as work they did not do.

ATTENDANCE

Arriving late or missing class disrupts the learning experience for both you and your peers. Punctuality and attendance are crucial to maintaining a respectful, professional and productive environment for everyone, including our faculty.

Instructors may use Top Hat in their course in a variety of ways, including to capture attendance in their classes. Attendance is recorded by submitting a unique 4-digit code displayed in your physical classroom using your personal device.

MISSED ACADEMIC WORK

Missed Mid-Term Examinations / Tests / Class Participation

Please do not use the online [McMaster Student Absence Form \(MSAF\)](#) as this is for Undergraduate students only. The MBA program will not accept an MSAF.

When students miss regularly scheduled term work which contributes 10% or more to the final grade, for legitimate reasons as determined by the [DSB Student Services – Academic Office](#) (DSSAO (DSB Student Services Academic Office)), the activity necessary to compensate for the missed work will be determined by the course instructor. The compensatory activities assigned will vary with the nature of the course and the missed requirement. They include, but are not restricted to, an alternative assignment, a rescheduled midterm exam, or re-weighting the marks for the missed component to other mark components. Documentation explaining such missed work must be provided to the DSSAO (DSB Student Services Academic Office) **within five (5) working days** of the scheduled date for completion of the work.

Acceptable reasons for missed work, along with the [Petition for Missed Term Work](#) and the [MBA Student McMaster University Student Health Certificate](#), can be found on the DeGroote MBA Student website (mbastudent.degroote.mcmaster.ca). Please direct any questions about acceptable documentation to the MBA Academic Advisors (askmba@mcmaster.ca).

University policy states that a student may submit a **maximum of three (3)** [Petition for Missed Term Work](#) per academic year, after which the student must meet with the Director of the program.

If term work is missed without an approved reason, students will receive a grade of zero (0) for that component.

Missed Final Examinations

Students must be available for the duration of the posted exam period regardless of their personal exam schedule. This is to ensure student availability throughout the entire exam period in the event that an exam must be rescheduled due to unforeseen circumstances (university closure, power outage, storm policy, etc.). A student who misses a final examination without valid reason will receive a mark of 0 on the examination.

Students who have missed a final exam for a valid reason can apply to the DSSAO ([DSB Student Services Academic Office](#)) to write a deferred examination by submitting an [Application for Deferring a Final Exam](#) with supporting documentation. The application must be made **within five days** of the scheduled exam.

The [Application for Deferring a Final Exam](#) and the [MBA Student McMaster University Student Health Certificate](#) can be found on the DeGroote MBA Current Student website (mbastudent.degroote.mcmaster.ca)

Deferred examination privileges, if granted, are normally satisfied during the deferred examination period as set by the [Office of the Registrar](#).

Requests for a second deferral or rescheduling of a deferred examination will not be considered.



ACADEMIC ACCOMMODATION FOR STUDENTS WITH DISABILITIES

Student Accessibility Services (SAS) offers various support services for students with disabilities. Students must activate their accommodation(s) (e.g., extra-time, alone room, etc.) via [mySAS](#) portal at the beginning of each term, normally, within the first three (3) weeks of classes. If a student with a disability chooses NOT to take advantage of an SAS accommodation and chooses to sit for a regular exam, a petition for relief may not be filed after the examination is complete. The SAS website is:

<http://sas.mcmaster.ca>

Use of Test Accommodations at McMaster University Burlington Campus Ron Joyce Centre

Whereas Student Accessibility Services (SAS), on Main Campus, determines all MBA student accommodations, the MBA Faculty Office manages the coordination of accommodations for tests, midterms, and exams at the Ron Joyce Centre in Burlington.

Process for Students

- Student Accessibility Services (SAS) now uses the online [mySAS](#) Portal for graduate students to share accommodation letters with their instructors and Faculty/Program. Students are responsible for activating their accommodations each term through the [mySAS](#) Portal. Once activated, an approved accommodation letter will be automatically sent to the instructors associated with the student's enrolled courses for that term.
- Students must engage the DSSAO (DSB Student Services Academic Office) to implement their accommodation(s) (e.g., extra-time, alone room, etc.) for each upcoming test, midterm, or exam, at **least two weeks in advance**. Students can do this by emailing DeGroote MBA SAS scheduling office at DSBSAS@mcmaster.ca or completing the [Accommodation Implementation form](#). If a student cannot meet this deadline, they should contact DSBSAS@mcmaster.ca to discuss alternative arrangements. The program is committed to exploring flexibilities where possible to support students.
- All tests, midterms, and exams are booked synchronously with the class's start time. Any deviations from the start time (e.g. start earlier than the class to enable completion at the same end time) requires a discussion with their instructor on protocol at the time of accommodation activation.
- Students will leverage the accommodation (e.g., extra-time, alone room, etc.), in a designated testing room. Rooms will be booked according to the student's SAS accommodation. Unless the accommodation states otherwise, students should expect that they will be writing in a room with other students. One or more invigilators will always be in the room.
- Following the request to implement the accommodation(s), dsbsas@mcmaster.ca will reach out to the student with their test, midterm, or exam details, including the date, time,

and room number. As there may be other students writing tests in the room, we ask that students enter the room quietly and leave all personal items at the front of the room.

ACADEMIC ACCOMMODATION FOR RELIGIOUS, INDIGENOUS OR SPIRITUAL OBSERVANCES (RISO)

Students requiring academic accommodation based on religious, indigenous or spiritual observances should follow the procedures set out in the RISO policy. Students should submit their request to their Faculty Office **normally within 10 working days** of the beginning of term in which they anticipate a need for accommodation or to the Registrar's Office prior to their examinations. Students should also contact their instructors as soon as possible to make alternative arrangements for classes, assignments, and tests.

POTENTIAL MODIFICATIONS TO THE COURSE

The instructor and university reserve the right to modify elements of the course during the term. The university may change the dates and deadlines for any or all courses in extreme circumstances. If either type of modification becomes necessary, reasonable notice and communication with the students will be given with explanation and the opportunity to comment on changes. It is the responsibility of the student to check their McMaster email and course websites weekly during the term and to note any changes.

RESEARCH USING HUMAN SUBJECTS (ONLY IF APPLICABLE)

Research involving human participants is premised on a fundamental moral commitment to advancing human welfare, knowledge, and understanding. As a research intensive institution, McMaster University shares this commitment in its promotion of responsible research. The fundamental imperative of research involving human participation is respect for human dignity and well-being. To this end, the University endorses the ethical principles cited in the Tri-Council Policy Statement: Ethical Conduct for Research Involving Humans:

<http://www.pre.ethics.gc.ca>

McMaster University has mandated its Research Ethics Boards to ensure that all research investigations involving human participants are in compliance with the Tri-Council Policy Statement. The University is committed, through its Research Ethics Boards, to assisting the research community in identifying and addressing ethical issues inherent in research, recognizing that all members of the University share a commitment to maintaining the highest possible standards in research involving humans.

If you are conducting original research, it is vital that you behave in an ethical manner. For example, everyone you speak to must be made aware of your reasons for eliciting their responses and consent to providing information. Furthermore, you must ensure everyone understands that participation is entirely voluntary. Please refer to the following website for more information about McMaster University's research ethics guidelines:



Organizations that you are working with are likely to prefer that some information be treated as confidential. Ensure that you clarify the status of all information that you receive from your client. You **MUST** respect this request and cannot present this information in class or communicate it in any form, nor can you discuss it outside your group. Furthermore, you must continue to respect this confidentiality even after the course is over.

ACKNOWLEDGEMENT OF COURSE POLICIES

Your registration and continuous participation (e.g. on A2L, in the classroom, etc.) to the various learning activities of MBA XXXX will be considered to be an implicit acknowledgement of the course policies outlined above, or of any other that may be announced during lecture and/or on A2L. It is your responsibility to read this course outline, to familiarize yourself with the course policies and to act accordingly.

Lack of awareness of the course policies cannot be invoked at any point during this course for failure to meet them. It is your responsibility to ask for clarification on any policies that you do not understand.



COURSE SCHEDULE

CL.	DATE	CONTENT	DUE*
1	Wed. Sep 9	Introduction, AI Tools, and Big Data in Finance Course overview, programming floor	-
2	Wed. Sep 16	Machine Learning for Prediction Classification, regression, dimensionality, pipelines	• Quiz 1
3	Wed. Sep 23	Lab 1: Machine Learning Pipeline (Individual)	• Lab 1 • Quiz 2
4	Wed. Sep 30	Term Test 1 (Written in Class)	
5	Wed. Oct 7	Deep Learning and the Road to AI Neural networks, deep networks, transformers	• Quiz 3
6	Wed. Oct 14	Working with AI Tools Prompt engineering, MCP connectors, document AI	• Quiz 4
7	Wed. Oct 21	Lab 2: Document-AI Sprint (Group)	• Lab 2
8	Wed. Oct 28	Term Test 2 (Written in Class)	
9	Wed. Nov 4	AI Agents and Workflows Agentic AI, context engineering, forward deployed skills	• Quiz 5
10	Wed. Nov 11	Business and Finance of AI Big data infrastructure, tokens and economics	• Quiz 6
11	Wed. Nov 18	Lab 3: Agentic Workflows (Group)	• Lab 3
12	Wed. Nov 25	Term Test 3 (Written in Class)	
13	Wed. Dec 2	Presentations and Integration Ethics and bias, governance	-
-	Sun. Dec 7	Big Data Project – Due online by end of day	

* Each quiz and lab assignment is due online by the end of the day on the Sunday following the listed date of the respective week.