

COMMERCE 3FN3 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: **Mondays at 11.30 AM or Wednesdays at 11.30 AM**

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

COMMERCE 2FB3 (or 3FA3) or IBH 3AC3; and registration in any Bachelor of Commerce or Engineering and Management program or relevant minor

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, office hours, group work, and online 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 person (individual)	50%
Big Data Project	Due at the end of the term (group)	30%
Total		100%

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. (Students can also use available MSAF submissions to obtain accommodations.) The weight of such additional missed quizzes (with approved accommodations) 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 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 'Student Experience – Academic Office' and obtain an official approval of relief to avoid getting a zero (0) grade for the additional missed test. If 'Student Experience – Academic Office' 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.

For MSAF purposes, the weight of each test is 25%.

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 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

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.

All students must receive feedback regarding their progress prior to the final date by which a student may cancel the course without failure by default.

- For Level 1 and Level 2 courses, this feedback must equal a minimum of 20% of the final grade.
- For Level 3 courses and above, this feedback must equal a minimum of 10% of the final grade.

Instructors may solicit feedback via an informal course review with students by Week #4 to allow time for modifications in curriculum delivery.

Students who have concerns about the course content, evaluation methods, or delivery should first reach out to the course instructor. If your concern remains unresolved after speaking with the instructor, you may then reach out to the relevant Area Chair for further consideration.

REQUESTING RELIEF FOR MISSED ACADEMIC WORK

In the event of an absence for medical or other reasons, students should review and follow the Academic Regulation in the Undergraduate Calendar, *Requests for Relief for Missed Academic Term Work*, and the link below:

<http://ug.degroote.mcmaster.ca/forms-and-resources/missed-course-work-policy/>

* Non-Commerce students must follow the Missed Course Work protocols outlined by their home faculty and Program Office.

COURSE MODIFICATION

From time to time, there may be a need to add and/or remove topics or to change the schedule or delivery format. If these are necessary, you will be given as much advance notice as possible.

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 two 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.

ACADEMIC INTEGRITY

You are expected to exhibit honesty and use ethical behaviour in all aspects of the learning process. Academic credentials you earn are rooted in principles of honesty and academic integrity. **It is your responsibility to understand what constitutes academic dishonesty.**

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. For information on the various types of academic dishonesty please refer to the Academic Integrity Policy at:

www.mcmaster.ca/academicintegrity

The following illustrates only three forms of academic dishonesty:

- plagiarism, e.g. the submission of work that is not one’s own or for which other credit has been obtained.
- improper collaboration in group work.
- copying or using unauthorized aids in tests and examinations.

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. Avenue to Learn, 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

Some courses may use on-line elements (e.g. email, Avenue to Learn, 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. The available information is dependent on the technology used. Continuation in a course that uses on-line 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. Please speak with the instructor if this is a concern for you.

ACADEMIC ACCOMMODATION OF STUDENTS WITH DISABILITIES

Students with disabilities who require academic accommodation must contact *Student Accessibility Services* (SAS) at 905-525-9140 ext. 28652 or sas@mcmaster.ca to make arrangements with a Program Coordinator.

For further information, consult McMaster University’s Policy for Academic Accommodation of Students with Disabilities:

<http://www.mcmaster.ca/policy/Students-AcademicStudies/AcademicAccommodation-StudentsWithDisabilities.pdf>

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.

EXTREME CIRCUMSTANCES

The University reserves the right to change the dates and deadlines for any or all courses in extreme circumstances (e.g., severe weather, labour disruptions, etc.). Changes will be communicated through regular McMaster communication channels, such as McMaster Daily News, Avenue to Learn and/or McMaster email.

ACKNOWLEDGEMENT OF COURSE POLICIES

Your enrolment in this course 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			
#	STARTS	CONTENT	DUE*
1	Sep 7	Introduction, AI Tools, and Big Data in Finance Course overview, programming floor	-
2	Sep 14	Machine Learning for Prediction Classification, regression, dimensionality, pipelines	• Quiz 1
3	Sep 21	Lab 1: Machine Learning Pipeline (Individual)	• Lab 1 • Quiz 2
4	Sep 28	Deep Learning and the Road to AI Neural networks, deep networks, transformers	• Quiz 3
5	Oct 3	Term Test 1 at 1.00 PM Eastern on Saturday, October 3	
-	Oct 12 to 18	Study Break (No class)	
6	Oct 19	Working with AI Tools Prompt engineering, MCP connectors, document AI	• Quiz 4
7	Oct 26	AI Agents and Workflows Agentic AI, context engineering, forward deployed skills	• Quiz 5
8	Nov 7	Term Test 2 at 1.00 PM Eastern on Saturday, November 7	
9	Nov 9	Lab 2: Document-AI Sprint (Group)	• Lab 2
10	Nov 16	Business and Finance of AI Big data infrastructure, tokens and economics, ethics and bias	• Quiz 6
11	Nov 28	Term Test 2 at 1.00 PM Eastern on Saturday, November 28	
12	Nov 30	Lab 3: Agentic Workflows (Group)	• Lab 3
13	Dec 7	Capstone and Integration Project presentations	-
-	Fri. Dec 11	Big Data Project – Due online by the 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.