BUSADMIN 2025
O711 – Predictive Modelling & Analytics
Winter 2026 Course Outline

Operations Area
DeGroote School of Business
McMaster University

COURSE OBJECTIVE

This course will introduce students to the foundational concepts of predictive analytics using a combination of everyday software (Microsoft Excel) and industrial analytics platform such as Power BI and R. The course will focus on the applied aspects of predictive modeling and discuss common challenges faced by businesses while building optimized predictive analytics solutions. The course will use Microsoft Excel to build intuition, Power BI to build visuals, and R to build predictive models from the perspective of a business analyst / manager. This course will use a hands-on approach to solve mini-cases from diverse industries and functional areas and help learn predictive analytics for mining data and making evidence-informed decisions.

INSTRUCTOR AND CONTACT INFORMATION

Instructor:	Srikanth Balasubramanian, balass13@mcmaster.ca
Office hours:	By appointment
Teaching Assistant:	TBD

Course Website: http://avenue.mcmaster.ca
Course pre-requisites: **Q600 or I602 and I603**
Course Venue & Timings: **RJC 214 – Tuesdays 7:00 pm to 9:50 pm**

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COURSE ELEMENTS

Credit Value:	3	Leadership:	Yes	IT skills:	No	Global view:	Yes
Avenue:	Yes	Ethics:	Yes	Numeracy:	Yes	Written skills:	No
Participation:	Yes	Innovation:	Yes	Group work:	Yes	Oral skills:	Yes
Evidence-based:	Yes	Experiential:	Yes	Final Exam:	Yes	Guest speaker(s):	No

COURSE DESCRIPTION

The course will start with a focus on Just enough R including topics like data ingestion in R using excel or csv files, data cleaning, data transformation and visualization using commonly used R packages for data wrangling and data exploration. The course will also discuss how to use Power BI to build some commonly used visuals in business reporting. The course will focus on when a specific predictive model is used, the pros and cons of the model and how to make reliable and insightful business decisions using them.

The course will discuss a range of predictive models including Linear Regression, Logistic Regression, KNN, Naïve Bayes, Decision Trees, Ensemble methods, Clustering and introductory Time Series Forecasting. The students are expected to have a good understanding of model evaluation and model performance optimization at the end of the course.

LEARNING OUTCOMES

Upon completion of this course, students will be able to complete the following key tasks:

- Define essential requirements for building a predictive model based on data.
- Become familiar with key predictive analytics tools and techniques.
- Demonstrate the ability to apply statistics and analytical techniques to the given data set.
- Work in R software environment to build predictive models.
- Work in Power BI to build commonly used visuals for business reporting
- Understand why and how models work by using excel based intuitions and formulae.
- Demonstrate the knowledge and ability to apply different predictive analytics techniques to analyze the given managerial problem.

- Demonstrate competence in summarizing to tell the story of the data at hand and provide well-rounded recommendations and conclusion.
- Understand how to assess model performance and tune model parameters to maximize the accuracy and relevance of the predictive models
- Understand some commonly known use cases of analytics in the industry and analyze critically why they succeeded or failed.

REQUIRED COURSE MATERIALS AND READINGS

Avenue registration for course content, readings and case materials

- http://avenue.mcmaster.ca $ FREE

- Jaggia, S., Kelly, A., Lertwachara, K., & Chen, L. (2025). Business analytics: 2025 release (ISE). McGraw-Hill. $ 95.95 CAD

- The course text will be delivered through the Immediate Access Program in partnership with the Campus Store. You'll receive digital access to the required textbook on Avenue to Learn starting the first day of class.
- The discounted price for this resource is **$95.95.** This cost will be shown on your student account at the beginning of the term.
- The deadline to make changes to your IA options (opt out or back in) is January 16th, any changes that you make will be reflected on your student account after that deadline.
- You can manage your access at any time before the January 16th deadline through your personalized booklist on the Campus Store website. A reminder email will be sent to your McMaster account before the deadline. If you choose not to participate, you will no longer have access to these materials after the deadline.

EVALUATION

Components and Weights

Quizzes (five)	Totally five quizzes (5 * 8%)	40%
Assignments (three)	Totally three assignments (3 * 10%)	30%
Final Exam	Final Exam – during exam week	30%
Total		**100%**

NOTE: The use of a McMaster standard calculator is allowed during examinations in this course. See McMaster calculator policy at the following URL:

www.mcmaster.ca/policy/Students-AcademicStudies/UndergraduateExaminationsPolicy.pdf

Grade Conversion

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+	75-79	9
B	70-74	8
B-	60-69	7
F	00-59	0

Course Deliverables

Quizzes (8% x 5 = 40%) Due on Jan 13, Jan 20, Feb 03, Feb 24, Mar 17

There will be five quizzes, each worth 8 points based on mini cases that can be completed using Excel, R or Power as described in the case. Final responses will be marked using a multiple-choice question format. These online quizzes will be for a maximum duration of 30 minutes. All quizzes must be completed by each participant independently.

Assignments (10% x 3 = 30%) Due on Feb 10, Mar 03 and Mar 24 by 23:59 hrs.

There will be three assignments to be completed as a group of 3-5 members. All members of each group must contribute to the project. The team must use the assigned Teams channel to collaborate, e-meet and document their work. All meetings must be recorded to assess the work. The score assigned will be based on the solution approach (2 points), team communication and collaboration (2 points), quality of discussions (2 points), the final presentation deck (2 points) and the delivery of the presentation (2 points)

Final Exam (30%) TBA

Final Exam will be cumulative and conducted during the exam week. The actual date will be announced later. You will complete this exam using Excel and R. Final answers must be marked using a multiple-choice question format. Working files must be submitted for auditing purposes.

Communication and Feedback

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.

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.

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, located 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.

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 Avenue 2 Learn, WebEx, Teams, 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.

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 examination period at the end of the following semester. In select cases, the deferred examination may be written at a time facilitated by the DSSAO (DSB Student Services Academic Office) (DSB Student Services Academic Office) and agreed to by the course instructor.

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 are required to inform SAS of accommodation needs for course work at the outset of term. Students must forward a copy of such SAS accommodation to the instructor normally, within the first three (3) weeks of classes by setting up an appointment with the instructor. 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

- SAS will now be using our online system, MySAS Portal, for graduate students to share accommodation letters with their Instructors and their Faculty/Program. Students will be responsible to activate their accommodations on a term-by-term basis and the approved accommodation letter will be directly sent to the Instructor.

- Students must engage the DSSAO (DSB Student Services Academic Office) to implement their accommodation(s) (e.g., extra-time, memory aid, 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. 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, memory aid, 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.

All policies and procedures, including restroom access, how extra-time is allocated for assessments under Universal Design, and the submission of memory aids in advance, are consistent with those of

SAS on Main Campus. The only variance in procedure is communication around, and physical location of, assessment. There is not a dedicated testing space at RJC. Existing classrooms and lecture halls will be used for most testing. All SAS-approved accommodations will be honoured by our staff; however, core testing elements are not eliminated in alternative testing formats. Students should expect and plan for invigilation, incidental noise, and other potential distractions.

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 the DSSAO (DSB Student Services Academic Office) ***normally within 10 working days*** of the beginning of term in which they anticipate a need for accommodation. Students should also contact their instructors as soon as possible to make alternative arrangements for classes, assignments, and tests.

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.

Potential Modification 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:

http://reo.mcmaster.ca/

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.

ARTIFICIAL INTELLIGENCE

Students are not permitted to use generative AI in this course. In alignment with McMaster academic integrity policy, it "shall be an offence knowingly to … submit academic work for assessment that was purchased or acquired from another source". This includes work created by generative AI tools. Also state in the policy is the following, "Contract Cheating is the act of "outsourcing of student work to third parties" (Lancaster & Clarke, 2016, p. 639) with or without payment." Using Generative AI tools is a form of contract cheating. Charges of academic dishonesty will be brought forward to the Office of Academic Integrity.

Professionally, you cannot ask AI to read and summarize someone else's case solution for you….

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COURSE SCHEDULE

MBA 2025
Predictive Modelling & Analytics
Winter 2026 Course Schedule

RJC 214 – Tuesdays 7:00 pm to 9:50 pm

SESSION	DATE	TOPICS
1	Tue. Jan. 06	Getting Started with Data Analysis using R ✓ Installation of R and RStudio ✓ Introduction to the tidyverse package
2	Tue. Jan. 13	Data Wrangling using R ✓ Data cleaning ✓ Data transformation ✓ Data exploration Quiz 1
3	Tue. Jan. 20	Data Visualization using Power BI ✓ Building basic visuals ✓ Common errors ✓ Communicating data stories Quiz 2
4	Tue. Jan. 27	Building a simple report / dashboard using Power BI ✓ Build the right visuals ✓ Leverage formats, labels ✓ Feature / Variable Selection
5	Tue. Feb. 03	Clustering using Excel / R ✓ Concepts ✓ Approaches ✓ Implementation Quiz 3

6	Tue. Feb. 10	KNN using Excel / R ✓ Intuition ✓ Implementation ✓ Pros and Cons **Assignment 1**
	Tue. Feb. 17	No session on Feb 17, 2026
7	Tue. Feb. 24	Naïve Bayes using Excel / R ✓ Intuition ✓ Implementation ✓ Pros and Cons Quiz 4
8	Tue. Mar. 03	Classification Trees using Excel / R ✓ Intuition ✓ Implementation ✓ Pros and Cons **Assignment 2**
9	Tue. Mar. 10	Logistic Regression using Excel / R ✓ Intuition ✓ Implementation ✓ Pros and Cons
10	Tue. Mar. 17	Multiple Regression using Excel / R ✓ Concepts ✓ Formulae ✓ Implementation Quiz 5
11	Tue. Mar. 24	Regression Trees using Excel / R ✓ Concepts ✓ Approaches ✓ Implementation **Assignment 3**

12	Tue. Mar. 31	Ensemble Methods using Excel / R ✓ Classification Models ✓ Regression Models ✓ Scoring the Models on new data points
13	Tue. Apr. 07	Basic Time Series Analysis using Excel / R ✓ Moving Average ✓ Exponential Smoothing ✓ Holt-Winters
FINAL EXAM		Final exam will be conducted during the exam week. The date will be announced later.