

**Commerce 3DA3 Predictive
Analytics Winter 2024 Course
Outline**

**Operations Management Area
DeGroot School of Business
McMaster University**

INSTRUCTOR AND CONTACT INFORMATION

**Section 1: Fr 02:30 - 05:30 (BSB 121)
Emanuele Blasioli**

Instructor
blasiole@mcmaster.ca
Office:
Office Hours:

**Student TA
Qi Yang**

Instructor
yangq107@mcmaster.ca

COURSE ELEMENTS

Credit Value: 3	Leadership: No	IT skills: Yes	Global view: No
A2L: Yes	Ethics: No	Numeracy: Yes	Written skills: No
Participation: Yes	Innovation: Yes	Group work: Yes	Oral skills: No
Evidence-based: Yes	Experiential: Yes	Final Exam: Yes	Guest speaker(s): Yes

COURSE INFORMATION

Lectures: 3hr x1/wk

Tutorials: N/A

Course Delivery Mode: in-person

Course Description: This course is designed to introduce the basics of predictive analytics to undergraduate students. The course takes a computational approach to address the concept of prediction and forecasting within business problems. Students will learn about the most commonly used predictive analytics tools and methodologies and get to apply them to a series of problems to gain hands-on experience. In this process, students learn the basics of predictive data analytics using state of the art analytics computational platforms and tools. Upon completion of the course, students are expected to have gained a broad understanding of predictive data analytics methods and algorithms (including some machine learning algorithms), and are able to use Python to perform a preliminary predictive analysis on a given data set. The course does not require any prior programming experience.

IMPORTANT LINKS

- [Mosaic](#)
- [Avenue to Learn](#)
- [Student Accessibility Services - Accommodations](#)
- [McMaster University Library](#)

COURSE LEARNING OUTCOMES

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

- Become familiar with key predictive analytics tools and techniques, develop and understanding on how and where each technique can be used to solve different business problems.
- Demonstrate a working level of data analysis and machine learning knowledge to approach a data set and build a predictive model based on it using software.
- Learn different data manipulation, data exploration and aggregation techniques.
- Learn different visualization techniques for both quantitative and categorical variables.
- Learn about different machine learning algorithms and gain hands-on experience in developing models and validating and interpreting results for the purpose of prediction. Learn and use several supervised machine learning algorithms for Regression and Classification purposes to create predictive models.
- Learn to evaluate predictive model results.
- Demonstrate ability to generate business insight based on results of predictive analytics models.

- Become familiar with unsupervised machine learning models.

COURSE LEARNING GOALS

The goals for this course include:

- Understanding the relationship between variables and how it can be leveraged to address business problems.
- Understand how to create predictive models using machine learning and generate results.
- Understand different aspects of a predictive analysis from data exploration to interpretation of results.
- Know how to translate technical results derived from machine learning models to actionable business solutions.
- Know how to use Python to explore and manipulate and visualize data, create machine learning models and generate results.

REQUIRED MATERIALS AND TEXTS

Optional Textbooks:

An Introduction to Statistical Learning (with Applications in Python), by James, Witten, Hastie, Tibshirani, Taylor. A free pdf version is available online.

Python Data Analytics, Fabio Nelli (2nd edition, 2018)

An electronic version is available for free at McMaster University Library website. You can obtain a free electronic copy at <http://library.mcmaster.ca> by logging in using your MAC ID and password.

CLASS FORMAT

This is an in-person 3-hour course. The three hours will consist of reviewing the material, problem-solving, programming in Python, discussion and applied exercises. There will be a short break part way through at a convenient time based on what we are working on. Please use this time to take care of personal needs of various kinds.

COURSE EVALUATION

Components and Weights

2 Take-home assignments	Individual	15%
Midterm Exam	Individual	30%
Group Project	Group	25%
Final Exam	Individual	30%
Total		100%

COURSE DELIVERABLES

2 Take-home assignments (15%)

These take-home assignments are individual evaluation components. They will be submitted on Avenue. The deadlines are "tentatively" scheduled as February 12 and March 25.

Midterm Exam (30%)

Midterm exam is mandatory and takes place during a session. You will be able to use your notes from the class. Midterm exam is individual. The exam date will be announced on Avenue. The midterm is tentatively scheduled for March 1st (time TBD).

Group Project (25%)

In this project, you will apply many of the topics learned in class to one or several datasets to conduct different tasks, build and evaluate models and produce insight. The project is a group work, and all group members will be receiving the same mark. The project may involve other aspects (research, etc.) as well. The details of the requirements for the group project will be announced in class.

Final Exam (30%)

Final exam is mandatory and will be schedule by the Office of Registrar. You will be able to use your notes from the class and the textbook. Final exam is individual.

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. Emails regarding course issues should NOT be sent to the Area Administrative Assistants. 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.

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

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.degroot.mcmaster.ca/forms-and-resources/missed-course-work-policy/>

COURSE MODIFICATION

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

GENERATIVE AI

USE PROHIBITED

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.

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](#).

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 ON-LINE ELEMENT

Some courses may use on-line elements (e.g. e-mail, 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.

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 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.

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 [Academic Accommodation of Students with Disabilities](#) policy.

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.

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.

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 Commerce 3DA3 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

**Commerce 3DA3
Predictive Analytics
Winter 2024 Course Schedule**

WEEK	TOPICS
1	Class outline, Introduction, What to expect! Jupyter Notebooks, Data manipulation, data types
2	Data exploration and manipulation, Data aggregation
3	Visualization (numerical variables, categorical variables)
4	Visualization (categorical variables)
5	Statistical Inference
6	Statistical Learning Methods, Supervised machine learning methods (classification models and performance evaluation) Statistical Inference
7	Statistical Learning Methods, Supervised machine learning methods (classification models and performance evaluation)
8	Statistical Learning Methods, Supervised machine learning methods (classification models and performance evaluation)
9	Statistical Learning Methods, Supervised machine learning methods (regression models and performance evaluation)
10	Statistical Learning Methods, Supervised machine learning methods (regression models and performance evaluation)
11	Data preparation, data transformation and feature engineering Other topics in data analytics (unsupervised learning, etc.)
12	Other topics in data analytics (unsupervised learning, etc.)