DeGroote
SCHOOL OF BUSINESS
EDUCATION WITH PURPOSE

McMaster University

Commerce 3DA3
Predictive Analytics
Fall 2022 Course Outline

Operations Management Area
DeGroote School of Business
McMaster University

COURSE OBJECTIVE

This course is designed to introduce students to the principles of predictive analytics. Students will learn about concepts involved in predictive analytics work while gaining hands-on experience through applying these techniques on data and using the R language. Upon completion of the course, students are expected to have developed a thorough understanding of different tools involved in predictive analytics (including some statistical/machine learning algorithms in classification and regression) and be able to conduct preliminary predictive analysis using data to generate insight and evaluate results. No prior experience in programming is required for the course. The course is aimed to help students interested in a career in analytics with hands-on experience in using predictive analytics models to generate managerial insight.

INSTRUCTOR AND CONTACT INFORMATION

Section 1: Tue 08:30 – 11:30
Dr. Behrouz Bakhtiari
Instructor
bakhtib@mcmaster.ca
Office: DSB 232
Drop-in Hours: Tue. 11:30-12:30
(your drop-in hours are both online
on MS Teams and in-person)
Tel: (905) 525-9140 23998

Student TA
TBA
TA
TBA@mcmaster.ca
Drop-in Hours: TBA
Drop-in Hours Location: TBA

COURSE ELEMENTS

Credit Value:	3	Leadership:	No	IT skills:	Yes	Global view:	Yes
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 DESCRIPTION

Predictive Analytics is an important step in most business analytics projects. Any analytics professional is expected to have some understanding of different aspects involved in predictive analytics. Producing "predictions" is an important part in the analytics project life cycle.

This course aims to equip students with the essential knowledge required to understand and conduct basic predictive modeling and evaluation. The material used in the course will use data from different sources, and will address business problems in various different industries and sectors.

The course takes an experiential-learning approach and will help students develop hands-on experience and gain a thorough understanding of the material through applying the concepts using the R programming language. We will review data manipulation and aggregation, data visualization, statistical and machine learning algorithms along with statistical inference techniques and how their results can be used in predictive models.

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 statistical data analysis knowledge to approach a data set and build a 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

➢ Understand statistical inference and how its results can be used to contribute to prediction

➢ Learn about different statistical and machine learning algorithms and gain hands-on experience in developing models and validating and interpreting results for the purpose of prediction.

➢ Learn to evaluate predictive model results

➢ Demonstrate ability to generate business insight based on results of predictive analytics models

COURSE MATERIALS AND READINGS

Required:

Course Materials Are Available on Avenue To Learn. This includes any material shared by the instructor (slides, handouts, etc.)
http://avenue.mcmaster.ca

Textbook: Business Analytics. By Sanjiv Jaggia and Alison Kelly and Kevin Lertwachara and Leida Chen. 2nd Edition. McGraw Hill. ISBN10: 9781265087685

COURSE OVERVIEW AND ASSESSMENT

In-class quizzes	Individual	12%
Midterm Exam	Individual	30%
Group Project	Group	20%
Final Exam	Individual	38%
Total		**100%**

COURSE DELIVERABLES

In-class quizzes (12%)
These in-class quizzes are worth 12% of your overall mark. An in-class quiz will include questions on the material discussed up to that session in the course. The quiz takes place during the lecture. In-class quizzes are individual. There will be three in-class quizzes during lectures in weeks 5, 9 and 12 (see last page of outline for dates).

Midterm Exam (30%)
Midterm exam is mandatory and takes place during a session. Midterm exam is individual.

Final Exam (38%)
Final exam is cumulative and will be schedule by the Office of Registrar. Final exam is individual.

Group Project (20%)
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 later in the term.

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

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,* located at https://secretariat.mcmaster.ca/university-policies-procedures- guidelines/

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. 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 ON-LINE ELEMENT

Some courses may use on-line 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.

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, A2L 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.

Commerce 3DA3
Winter 2022 Course Schedule

WEEK	DATE	CONTENT
1	September 06	• Introduction to the course structure • Introduction to Predictive Analytics
2	September 13	• Data exploration, manipulation, and wrangling
3	September 20	• Data exploration, manipulation, and wrangling • Data aggregation • visualization (numerical variables)
4	September 27	• Visualization (numerical variables, categorical variables)
5	October 04	• Visualization (numerical variables, categorical variables) • Statistical inference and analysis • **In-Quiz 1**
6	October 11	• Statistical inference and analysis
7	October 25	**MIDTERM EXAM (in-class)**
8	November 01	• Statistical/Machine Learning Methods and prediction (Classification and Regression algorithms and performance evaluations)
9	November 08	• Statistical/Machine Learning Methods and prediction (Classification and Regression algorithms and performance evaluations) • **in-class quiz 2**
10	November 15	• Statistical/Machine Learning Methods and prediction (Classification and Regression algorithms and performance evaluations)
11	November 22	• Statistical/Machine Learning Methods and prediction (Classification and Regression algorithms and performance evaluations)
12	November 29	• Statistical/Machine Methods and prediction (Classification and Regression algorithms and performance evaluations) • Data preparation, data transformation and feature engineering • **In-Quiz number 3**
13	December 06	• Data preparation, data transformation and feature engineering • Other discussions in analytics (statistical learning methods, etc.)

Note: Based on class progress the above schedule may change slightly.