# COURSE OUTLINE

## SCHOOL OF CONTINUING EDUCATION – TECHNOLOGY

| | |
|---|---|
| **COURSE NAME:** | Introduction to Machine Learning |
| **COURSE CODE:** | COMP 9721 |
| **CREDIT HOURS:** | 42 |
| **PREREQUISITES:** | none |
| **PLAR ELIGIBLE:** | YES   ( )     NO     ( X ) |
| **EFFECTIVE DATE:** | September 2020 |
| **TEACHER(S):** | **Moe Fadaee** |
| **OFFICE:** | C426 |
| **PHONE:** | 416-415-5000 x4861 |
| **EMAIL:** | cetechnology@georgebrown.ca |

**NOTE:** Academic departments at George Brown College do **not** store historical copies of course outlines. Retain this course outline for your future reference.

## EQUITY STATEMENT

George Brown College values the talents and contributions of its students, staff and community partners and seeks to create a welcoming environment where equity, diversity and safety of all groups are fundamental. Language or activities which are inconsistent with this philosophy violate the college's Human Rights Discrimination and Harassment policy and will not be tolerated. The commitment and co-operation of all students and staff are required to maintain this environment. George Brown College is dedicated to reducing barriers and providing equal access to education for students with disabilities. If you require academic accommodations, contact the Accessible Learning Services office on your campus.

## STUDENT RESPONSIBILITIES

Students should be familiar with information regarding the grading system, withdrawals, exemptions, class assignments, missed tests and exams, supplemental privileges and academic dishonesty. For a full outline of college policies, visit coned.georgebrown.ca/policies/. Students are required to apply themselves diligently to the course of study, and to prepare class and homework assignments as given. Past student performance shows a strong relationship between regular attendance and success.

## COURSE DESCRIPTION:

This course introduces Machine Learning (ML) and Artificial Intelligence (AI). Different types of Machine Learning approaches and techniques will be discussed.

In order to be successful in data analysis and machine learning a clear understanding of fundamental concepts of statistics is crucial. In this course, these essential concepts will be discussed and students have the chance to discover them using practical examples and real data. Data pre-possessing and preparation techniques will also be practiced. Furthermore in this course, linear and multiple regression will be introduced through several practical real life examples.

The main program languages in this course are Python and R. Basic command and programing techniques using Python and R will be practiced.

## COURSE OUTCOMES:

Upon successful completion of this course, the students will have an understanding of:

1. Different approaches of Machine Learning and types of learning algorithms
2. Fundamental concepts of statistics like, probabilities, mean and median, variation and standard deviation, probability density function, data distribution, covariance and correlation, normalization...
3. Data types, data-frames and arrays, random number generators, indexing and slicing, statements and conditionals, loops, function, classes and more in Python.
4. Python important libraries like Numpy, Pandas, Matplotlib, Scikit-Learn, Scipy and more.
5. Jupyter Notebook environment
6. Data management and pre-processing
7. Simple linear regression and multiple regression, polynomial regression
8. Classification and Logistic Regression

## DELIVERY METHODS / LEARNING ACTIVITIES:

**Temporarily delivered online through Blackboard Learn due to COVID-19**

Lectures, handouts, workshops, student presentations and short tests.

## LIST OF TEXTBOOKS AND OTHER TEACHING AIDS:

**Required:**

No, all material will be provided

**Recommended / Optional:**

Additional reference materials will be posted as the course progresses

## TESTING POLICY:

As per GBC policy, (see Student Code of Conduct & Discipline Section 3.2 & 4.1)

Tests and Examinations are to be written on the dates indicated. It is the student's responsibility to contact the instructor to arrange an extension within one week of the original test/exam date. Valid reasons for an extension are at the instructors' discretion.

## ASSIGNMENT POLICY:

As per GBC policy, (see Student Code of Conduct & Discipline Section 3.2 & 4.1)

Assignments are due on the dates indicated. It is the student's responsibility to contact the instructor to arrange an extension within one week of the original due date. Valid reasons for an extension are at the instructors' discretion.

## EVALUATION SYSTEM:

| Assessment Tool: | Description: | Outcome(s) assessed: | Date / Week: | % of Final Grade: |
|---|---|---|---|---|
| Participation and Team work | Attendance, Role Play & Peer Review | 1, 2, 8, 11 | | 20% |
| Assignment 1 | | 1 to 7, 10, 11 | Lesson 5 | 40% |
| Assignment 2 | | 1 to 7, 10, 11 | Lesson 10 | 40% |
| | | | **TOTAL:** | **100%** |

## GRADING SYSTEM

The passing grade for this course is **D (50%)**.

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| A+ | 90–100 | 4.0 | B+ | 77–79 | 3.3 | C+ | 67–69 | 2.3 | D+ | 57–59 | 1.3 | F | 0–49 | 0.0 |
| A | 86–89 | 4.0 | B | 73–76 | 3.0 | C | 63–66 | 2.0 | D | 50–56 | 1.0 | | | |
| A- | 80–85 | 3.7 | B- | 70–72 | 2.7 | C- | 60–62 | 1.7 | | | | | | |

**TOPICAL OUTLINE:**

| Lesson | Date | Topics | Content/Activities |
|:---:|---|---|:---:|
| **1** | | Introduction to AI and ML 1 | |
| **2** | | Python 1:<br>Jupyter Notebook environment<br>Reading Data<br>Data Types I<br>Indexing and Slicing | Group discussion |
| **3** | | Python 2:<br>Data Types II<br>Loops<br>Statements and Conditionals | |
| **4** | | Statistics 1: Data<br>distribution<br>Mode, mean, median<br>Standard deviation<br>Root mean square deviation | |
| **5** | | Statistics 2:<br>Covariance and Correlation | Assignment #1 out |
| **6** | | Python 3:<br>Data Management and Preparation | |
| **7** | | Assignment #1 solution | Assignment #1 due |
| **8** | | Linear Regression | Assignment #2 out |
| **9** | | Linear Regression<br>Polynomial regression<br>Confidence Intervals | |
| **10** | | Assignment #2 solution | |
| **11** | | Multiple regression | |
| **12** | | Multiple regression | |
| **13** | | Assignment #3 solution | Assignment #2 due |
| **14** | | More on AI and ML<br>Review of future course<br>Open discussion: "your problem" | |

**Note:** This schedule may change as resources and circumstances require. For information on withdrawing from this course without academic penalty, visit coned.georgebrown.ca/policies/withdrawals/.

# Information for Students

We hope you find your course at George Brown College to be a challenging and rewarding learning experience. Below you will find some important information to assist you while at the College.

**WITHDRAWAL**
To withdraw from a course without academic penalty (a failing grade), you must withdraw officially before 60% of the scheduled classes/meetings are held. If you stop attending your course without officially withdrawing, you will receive a failing grade that will be recorded on your grade report, and you will **not** receive a refund of fees.
To officially withdraw, you must e-mail your request to withdraw to cereg@georgebrown.ca. Include your name, your student ID number, the class section course registration number (CRN) and the reason for withdrawal. Alternately, you can withdraw in person at any Student Service Centre.

**REFUND POLICY**
If you withdraw from a course prior to the day of the first scheduled class, you will receive a full refund less a $20 administrative fee. If you withdraw up to ten business days (including the first scheduled day of class) after the course start date, you will receive the full refund **less 100% of the materials fee** and a $20 administrative fee. If you withdraw later than ten business days (including the first scheduled day of class) from the course start date, you will **not** receive a refund.
At this time, refunds can only be made by cheque, regardless of your method of payment. Ensure that your online student account contains your current address, and allow four weeks for processing and mail delivery of refund cheques. If you ask to have a duplicate cheque printed, you will be charged a $20 administrative fee.

**COURSE GRADES** can be printed from your student account located on the continuing education website: https://coned.georgebrown.ca/student-resources/student-account/. For assistance, please call: 416-415-2000.

**GBC EMAIL** is to be utilized for all Blackboard communication with Teachers. Please visit: https://www.georgebrown.ca/current-students/websites-apps-technical-support/technical-support-gbc-assist/email/

**CERTIFICATE REQUEST** form and instructions can be found on our website: https://coned.georgebrown.ca/policies/certificate-requests/

**Accessible Learning Services** (416-415-5000, ext. 2622)
**https://www.georgebrown.ca/accessible-learning-services/**

### Technology Department Contacts

| Administrative Assistant | Program Coordinator |
|---|---|
| (416) 415-5000 x6624 | (416) 415-5000 x4008 |
| kristine.bucais@georgebrown.ca | musarrat.saiyed@georgebrown.ca |

For information about more College services available to students,
visit: http://coned.georgebrown.ca/info/studentservices.html

*Enjoy the course!*