Toronto Metropolitan University

The Chang School of Continuing Education

TED ROGERS SCHOOL Information Technology Management

(C) ITM 760 - Big Data Analytics

COURSE OUTLINE FOR 2025-2026

Prerequisite(s): (C)ITM 618

Faculty/Contract Lecturer Information

- **Faculty/Contract Lecturer Name:**
- **Office Location:**
- **Office Hours:**
- **Phone:** (416) 979 – 5000, ext.
- **Course Website:** my.torontomu.ca (for courses using D2L)
- **Email Address:** youremail@torontomu.ca

Email Policy

Students are expected to monitor and retrieve messages and information sent through D2L and TMU email on a frequent and consistent basis. In accordance with the Policy on TMU Student E-mail Accounts (Policy 157), Toronto Metropolitan University (TMU) requires that any electronic communication by students to TMU faculty or staff be sent from their official university email account. Communications sent from other accounts may be disregarded.

Course Description

The objective of this course is to introduce topics in business analytics and data mining with special emphasis on Big Data. Topics may include, but are not limited to, Big Data processing systems, Big Data visualization, data stream mining and large-scale machine learning. Applications will be drawn from various areas such as social network analysis, recommendation systems, and web analytics. Students will gain knowledge on the practical design principles of big data-driven solutions for purposes of business analytics.

Course Details

Teaching Methods

If you are registered in an in-person or a virtual classroom, instruction will take place at scheduled hours, following the approach outlined in D2L Brightspace. If you are registered in a Chang School Distance Education course, please follow the schedule, course outline and learning modules as outlined in D2L Brightspace.

Note: All assessments in this course, regardless of its delivery format, will be held in-person on campus. This applies to in-person, virtual, and online courses, including sections/courses delivered through the Chang School.

Course Materials

Textbook:

Title: Mining of Massive Datasets, 3rd Edition
Author: Jure Leskovec, Anand Rajaraman, Jeffrey David Ullman
Publisher: Cambridge University Press
ISBN: 978-1108476348 (Hardcopy), 978-1108684163 (e-book)
Price: $87.17

Suggested/Recommended Textbook
Title: Data Science for Business: What You Need to Know about Data Mining and Data-Analytic Thinking
Author: Foster Provost, Tom Fawcett
Publisher: O'Reilly Media
ISBN-13: 978-1449361327
Price: $74.95

Course Learning Outcomes

With rapid advances in computing power and dramatic expansion of data collection and storage capability, nowadays, businesses and organizations have collected vast amounts of data about their business processes. These data are modern-day treasure stores that can be mined to glean insights into a business' products, services and customers. Despite great efforts that have been made in the field of data analytics, there are still many challenges while transcending towards Big Data. How can we discover actionable knowledge from dynamically changing data? How can we effectively combine human and machine intelligence to gain more effective insights from Big Data? This course is a business centric approach to Big Data Analytics where the focus is to train, design and development of techniques and technologies that can be used to answer these

challenges. This course will discuss key business analytics techniques, frameworks, and strategies as they are employed to analyze large volumes of data and its application to intelligence discovery in different business area.

- Identify a business problem and translate it to an analytics problem and design data-driven solutions.
- Understand the unique challenges of processing and analyzing Big Data at the theoretical and practical level.
- Understand state of the art methods, practices and technologies behind the Big Data processing systems.
- Utilize data mining and machine learning methods to effectively and efficiently process Big Data to support a wide range of queries including business intelligence and data mining.
- Understand the issues involved in building and designing efficient big data systems, and the strategies, data-structures, and technologies used in the implementation of these systems

Academic Integrity

Academic integrity is integral to your learning, the credibility of your degree or certification, and the integrity of the university as a whole. Senate Policy 60: Academic Integrity defines academic misconduct, provides a non-exhaustive list of examples of behaviours that may be considered as academic misconduct, and explains how academic misconduct concerns are evaluated and decided. The entirety of the policy applies in this course. As well, please note that submitting work created in whole or in part by artificial intelligence tools unless expressly permitted by the faculty/contract lecturer, is considered a violation of Policy 60.

Generative AI Course Policy, Plagiarism Detection, and Virtual Proctoring

Generative AI Course Policy

Use of Generative AI (e.g. ChatGPT, Grammarly, Perplexity, DeepL Translator) to develop or assist with any ideas or material submitted for coursework is expressly prohibited in this course. Use of Generative AI in this manner will be considered a breach of Policy 60.

Turnitin or another originality detection software

Turnitin is a plagiarism prevention and detection service to which TMU subscribes. It is a tool to assist faculty/contract lecturers in determining the similarity between students' work and the work of other students who have submitted papers to the site (at any university), internet sources, and a wide range of books, journals and other publications. While it does not contain all possible sources, it gives faculty/contract lecturers some assurance that students' work is their own. No decisions are made by the service; it

generates an “originality report,” which faculty/contract lecturers must evaluate to judge if something is plagiarized.

Students agree by taking this course that their written work will be subject to submission for textual similarity review to Turnitin. Instructors can opt to have student’s papers included in the Turnitin database or not. Use of the Turnitin service is subject to the terms-of-use agreement posted on the Turnitin website. Students who do not want their work submitted to this plagiarism detection service must, by the end of the second week of class, consult with their faculty/contract lecturer to make alternate arrangements. Students who choose not to have their papers screened for textual similarity review by turnitin may be required to submit additional work with their research essay. For example:

- an annotated bibliography of each source used in your paper; and/or
- the first few pages of each cited source used in your paper

Even when an faculty/contract lecturer has not indicated that a plagiarism detection service will be used, or when a student has opted out of the plagiarism detection service, if the faculty/contract lecturer has reason to suspect that an individual piece of work has been plagiarized, the faculty/contract lecturer is permitted to submit that work in a non-identifying way to any plagiarism detection service.

Virtual Proctoring Information

Online exam(s) within this course use a virtual proctoring system. Please note that your completion of the exam will be recorded via the virtual platform and subsequently reviewed by your faculty/contract lecturer. The virtual proctoring system provides recording of flags where possible indications of suspicious behaviour are identified only. Recordings will be held for a limited period of time in order to ensure academic integrity is maintained.

TMU supports Respondus Lockdown Browser with Monitor. Access to a computer that can support remote recording is your responsibility as a student. The computer should have the latest operating system, at a minimum Windows (11 and 10 or Mac (OS X 10.15 to 14.0+) and web browser Google Chrome or Mozilla Firefox. You will need to ensure that you can complete the online exam using a reliable computer with a webcam and microphone available, as well as a high-speed internet connection. Please note that you will be required to show your TMU OneCard prior to beginning to write the exam. Should a student not have a OneCard, government issued ID can be displayed to the camera, showing only the picture and name (all other information can be covered by the student). A virtual proctoring web page that addresses privacy concerns and includes a FAQ is available for students.

Information will be provided prior to the exam date by your faculty/contract lecturer who may provide an opportunity to test your set-up or provide additional information about online proctoring. Since videos of you and your environment will be recorded while writing the exam, please consider preparing the background (room/walls) so that personal details are not visible, or move to a room that you are comfortable showing on camera.

Copyright

The course materials provided to you are copyrighted, and may not be shared without my express written permission. Do not share these materials (e.g. course outline, lecture slides, assignment instructions) with others and do not post them on the internet during the course, or at any time after. If you do so, Policy 60 will apply.

Academic Integrity Resources

To learn more about Policy 60 and how to avoid academic misconduct, please review and take advantage of these resources:

- Policy 60: Academic Integrity: www.torontomu.ca/senate/policies/academic-integrity-policy-60/
- Academic Integrity Office website: www.torontomu.ca/academicintegrity
- "Academic Integrity in Space" game: https://games.de.torontomu.ca/aio/#/
- "Academic Integrity in Cyberspace!" game: https://www.torontomu.ca/aic/#/
- Student Life and Learning Support: www.torontomu.ca/student-life-and-learning/learning-support

Topics and Course Schedule

Week	Topic	Readings
1	**Introduction to Big Data Analytics** ● Get familiarized yourself with data analytics process, Big Data analytics terminology, concepts and challenges	Chapter 1 Lecture notes
2	**MapReduce and the New Software Stack** ● Understand how distributed file systems and MapReduce work ● Explain major big data environments such as Apache Hadoop and Apache spark ● Describe main challenges in Big Data environments	Chapter 2 Lecture notes
3	**Mining Data Streams** ● Understand concepts of data streams, data stream mining and main challenges ● Explain how to do sampling over data streams	Chapter 4 Lecture notes
4	**Mining Data Streams** ● Get familiarized with data stream processing models such as sliding window and decaying model ● Understand how to filter data streams	Chapter 4 Lecture notes
5	**Link Analysis** ● Understand how first generation of Web search engines were working ● Describe popular link analysis methods such as PageRank	Chapter 5 Lecture notes
6	**Advertising on the web** ● Describe online advertising terminology, concepts and challenges ● Understand matching and ad-words problems	Chapter 8 Lecture notes
8	**Large Scale Machine Learning (Nearest neighbors analysis and Perceptrons)** ● Understand supervised vs unsupervised learning techniques ● Explain techniques such Nearest neighbors analysis and Perceptrons	Chapter 12 Lecture notes

Week	Topic	Readings
9	**Large Scale Machine Learning (Discriminant-based classification)** ● Get familiarized with support vector machine for classification ● Understand kernel methods	Chapter 12 Lecture notes
10	**Recommendation Systems** ● Describe recommendation system models ● Explain content-based and collaborative filtering approaches ● Identify big data challenges in applying recommendation systems ● Explain dimensionality reduction to recommendation systems	Chapter 9 Lecture notes
11	**Mining Social Network-Graphs** ● Get familiarized with concepts of social networks as graphs ● Describe clustering and community detection in social networks ● Explain neighborhood properties to analyze social networks	Chapter 10 Lecture notes
12	**Location-based Analysis** ● Get familiarized with location-based analysis process, concepts and techniques ● Explain state-of-the-arts for location-based analysis.	Lecture notes

Evaluation

The grade for this course is composed of the mark received for each of the following components:

Evaluation Component	Due Date	Percentage of Final Grade	Anticipated Return Date
Assignment #1	Week 6	5%	Week 8
Assignment #2	Week 10	5%	Week 12
Course Project	Week 11	15%	Week 12
Midterm Exam	Week 7	30%	Week 8
Final Exam	TBA	45%	TBD
Final Grade		100%	
Note: Students must achieve a course grade of at least 50% to pass this course. At least 20% of the grade based on individual work will be returned to students prior to the last date to drop a course in good academic standing. For Fall 2025, this is Friday November 14, 2025. For Winter 2026, this is Friday March 27, 2026.			

University Policies

You are reminded that you are required to adhere to all relevant university policies found in their online course shell in D2L and/or on the Senate website. Please refer to the Course Outline Appendix for more detail.

Important Resources Available at Toronto Metropolitan University

- The University Libraries provide research workshops and individual consultation appointments. There is a drop-in Research Help desk on the second floor of the library, and students can use the Library's virtual research help service to speak with a librarian, or book an appointment to meet in person or online.
- Student Life and Learning Support offers group-based and individual help with writing, math, study skills, and transition support, as well as resources and checklists to support students as online learners.
- You can submit an Academic Consideration Request when an extenuating circumstance has occurred that has significantly impacted your ability to fulfill an academic requirement. You may always visit the Senate website and select the blue radio button on the top right hand side entitled: Academic Consideration Request (ACR) to submit this request.
  For Extenuating Circumstances, Policy 167: Academic Consideration allows for a once per semester ACR request without supporting documentation if the absence is less than 3 days in duration and is not for a final exam/final assessment. Absences more than 3 days in duration and those that involve a final exam/final assessment, always require documentation. Students must notify their faculty/contract lecturer once a request for academic consideration is submitted. See Senate Policy 167: Academic Consideration.
  Longer absences are not addressed through Policy 167 and should be discussed with your Chair/Director/Program to be advised on next steps.
- If taking a remote course, familiarize yourself with the tools you will need to use for remote learning. The Remote Learning Guide for students includes guides to completing quizzes or exams in D2L Brightspace, with or without Respondus LockDown Browser and Monitor, using D2L Brightspace, joining online meetings or lectures, and collaborating with the Google Suite.
- FAQs Academic Considerations and Appeals
- Information on Copyright for Faculty and students.
- Information on Academic Integrity for Faculty and students.

Accessibility

- At Toronto Metropolitan University, we are committed to ensuring that all courses are accessible to everyone and to removing barriers that may prevent some individuals from enrolling in courses.
- All technologies and tools used in this course are accessible.
- Students who discover an accessibility barrier with any of the course materials or technologies should contact their faculty/contract lecturer.
- As outlined in Policy 159: Academic Accommodation of Students with Disabilities, students are required to proactively consult with AAS, the faculty/contract lecturer, Department or Faculty, as soon as feasible, including prior to enrolling in a course or program, on any concerns they may have about their ability to meet the essential academic requirements of a course/program.

Academic Accommodation Support

Academic Accommodation Support (AAS) is the university's disability services office. AAS works directly with incoming and returning students looking for help with their academic accommodations. AAS works with any student who requires academic accommodation regardless of program or course load.

- Learn more about Academic Accommodation Support.
- Learn how to register with AAS.
- Learn about Policy 159: Academic Accommodation of Students with Disabilities

Academic Accommodations (for students with disabilities) and Academic Consideration (for students faced with extenuating circumstances that can include short-term health issues) are governed by two different university policies. Learn more about Academic Accommodations versus Academic Consideration and how to access each.

Wellbeing Support

At Toronto Metropolitan University, we recognize that things can come up throughout the term that may interfere with a student's ability to succeed in their coursework. These circumstances are outside of one's control and can have a serious impact on physical and mental well-being. Seeking help can be a challenge, especially in those times of crisis.

If you are experiencing a mental health crisis, please call 911 and go to the nearest hospital emergency room. You can also access these outside resources at anytime:

- Distress Line: 24/7 line for if you are in crisis, feeling suicidal or in need of emotional support (phone: 416–408–4357)
- Good2Talk: 24/7-hour line for postsecondary students (phone: 1-866-925-5454)
- Keep.meSAFE: 24/7 access to confidential support through counsellors via My SSP app or 1-844-451-9700

If non-crisis support is needed, you can access these campus resources:

- Centre for Student Development and Counselling: 416-979-5195 or email csdc@torontomu.ca
- Consent Comes First – Office of Sexual Violence Support and Education: 416-919-5000 ext 3596 or email osvse@torontomu.ca
- Medical Centre: call (416) 979-5070 to book an appointment

We encourage all Toronto Metropolitan University community members to access available resources to ensure support is reachable. You can find more resources available through the Toronto Metropolitan University's Wellbeing Central website.