

University of Toronto
Department of Mechanical and Industrial Engineering
MIE368: Analytics in Action
(Fall 2020)

Instructor	Timothy Chan, MC315, tcychan@mie.utoronto.ca Office hours: By appointment	
TAs	Anonymized TA #1 Anonymized TA #2 Anonymized TA #3	
Lectures	Mon 10am-12pm	Online (via BB Collaborate)
Lab	Wed 3-6pm	Online (via BB Collaborate)
Tutorial	Thurs 9-10am	Online (via BB Collaborate)
Course Site	on q.utoronto.ca	
Description	This course showcases the impact of analytics focusing on real world examples and case studies. Particular focus on decision analytics, where data and models are combined to ultimately improve decision-making. Methods include: linear and logistic regression, classification and regression trees, clustering, linear and integer optimization. Application areas include: healthcare, business, sports, manufacturing, finance, transportation, public sector.	
Prerequisite	MIE262, MIE263, MIE237 (or permission of the instructor)	
Policies	<p><u>Academic integrity</u>: Students are reminded of the seriousness of academic dishonesty in any form, including plagiarism. Students are expected to adhere to the “Code of Behaviour on Academic Matters” as well as the “Code of Student Conduct” available at http://www.governingcouncil.utoronto.ca/policies/behaveac.htm and at http://www.governingcouncil.utoronto.ca/policies/studentc.htm, respectively. General academic integrity information is available at http://www.utoronto.ca/academicintegrity/.</p> <p><u>Communication</u>: I access my email during regular business hours. Email should not be seen as an alternative to office hours, nor should it be used as a mechanism to receive private tutorials prior to an exam/assignment or on lecture material. Class-wide announcements will generally be made via the class website. Please post all questions regarding homework on the discussion board.</p>	
Safety	As professional engineers in training, you have a responsibility to ensure that safety is duly considered at all times. You are expected to behave with your personal safety and the safety of others in mind. In order to be allowed access to any undergraduate labs, including computer labs, it is mandatory that you	

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complete the MIE online health and safety training course. Instructions for the completion of safety training requirements have been sent in an e-mail to all students (also available here: <https://safetytraining.engineering.utoronto.ca/>).

Grading	Project	66.6666666667%
	Lab quizzes	33.3333333333%

The **Project** (4 students) will involve applying concepts and methods learned in the course to a problem identified by the student team. Students are responsible for clearly defining the problem, obtaining the data, developing the model(s), analyzing the results, and presenting the findings. The teaching team (instructor and TAs) will provide guidance and support throughout. Overall project grade will be based on:

- 1) One-page project proposal outlining the problem, data sources, and methods to be used
- 2) Three-page report summarizing data, initial findings, and changes to proposal
- 3) Half-page abstract
- 4) Five-minute final presentation
- 5) Eight-page final report

Project deliverables (dates tentative)

Proposal (10%):	October 9
Preliminary report (15%):	November 6
Abstract (5%):	November 27
Presentation (25%):	December 1
Final report (45%):	December 9

The teaching team will select teams to present their project during one of the final lectures. Based on the abstracts, which will be posted online, students will also be able to vote for the projects they wish to see presented. The teams that present will not receive any extra credit, only the admiration of their classmates.

Lab quizzes focus on developing proficiency in Python with the various methods presented in the course. The method will be introduced, students will have a chance to practice on their own, and then they will be evaluated on a problem in a quiz-like environment. Some lab sessions will be used for students to work on their projects with help from the TAs.

Learning objectives: By the end of this course, you should be able to:

- Recognize problems that are amenable to analytics methods and identify whether a predictive or prescriptive analytics approach is appropriate
- Apply an appropriate analytics approach to solve a problem using computer software
- Effectively communicate analytics content through written and oral formats

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Tentative Course Outline

Wk	Date	Lecture (Monday)	Lab (Wednesday)	Tutorial (Thursday)	Proj. deliverable
1	Sep 7–11	<i>No lecture</i>	<i>No lab</i>	Course/project overview	
2	Sep 14–18	Wine quality, Moneyball	Python and Colab intro, data engineering, EDA	Quiz 0 (not marked)	
3	Sep 21–25	Framingham heart study	Linear, logistic regression	Quiz 1	
4	Sep 28–Oct 2	Supreme Court	CART, RF	Quiz 2	
5	Oct 5–9	Radiation therapy optimization	Optimization	Quiz 3	Proposal (F)
6	Oct 12–16	<i>Thanksgiving – no lecture</i>	Project	Project	
7	Oct 19–23	eHarmony; Refugee resettlement	Predict then optimize	Quiz 4	
8	Oct 26–30	Hockey analytics; Netflix	Clustering and model engineering	Quiz 5	
9	Nov 2–6	Sim. blackjack and tennis	Simulation	Quiz 6	Prelim report (F)
10	Nov 9–13	<i>Fall study break</i>			
11	Nov 16–20	Identifying crime patterns; Travel time prediction in Dhaka, Bangladesh	Project	Project	
12	Nov 23–27	Women's College Hospital; NHL expansion draft	Project	Project	Abstract (F)
13	Nov 30–Dec 4	AED location optimization	Presentations	Project	Presentation (T)
14	Dec 7–11	Student presentations, wrap-up	<i>No lab</i>	<i>No tutorial</i>	Final report (W)