TED ROGERS SCHOOL
Information Technology Management

Ryerson University
The Chang School of Continuing Education

RYERSON UNIVERSITY

Ted Rogers School of Information Technology Management
And G. Raymond Chang School of Continuing Education

(C)ITM 501 – Prescriptive Analytics and Simulation

COURSE OUTLINE FOR 2020-2021

1.0 PREREQUISITE

The prerequisite for this course is QMS 210 or QMS 202 or QMS 204 or in the 2-year BTM Public Ontario College Diploma Graduate Program. Students who do not have the prerequisite will be dropped from the course.

2.0 INSTRUCTOR INFORMATION

- Name:
- Office Phone Number:
- E-mail address:
- Faculty/course web site(s): https://my.ryerson.ca
- Office Location & Consultation hours:
  - Your instructor is available for personal consultation during scheduled consultation hours which are posted on their office door or on the course shell in D2L Brightspace. However, you are advised to make an appointment by e-mail or by telephone before coming to ensure that the professor is not unavoidably absent.
- E-mail Usage & Limits:

In accordance with the policy on Ryerson Student E-mail accounts (Policy 157), ***Ryerson requires that any official or formal electronic communications from students be sent from their official Ryerson E-mail account.*** As such emails from other addresses may not be responded to. Students are expected to monitor and retrieve messages and information issued to them by the University via Ryerson online systems on a frequent and consistent basis.

3.0 CALENDAR COURSE DESCRIPTION

This course provides an overview of prescriptive analytics and simulation techniques important to developing solutions to business problems. This course will take a problem-driven approach to developing students' skills in applying decision trees, decision tables, linear programming, and Monte Carlo and discrete event simulation techniques applied to real-world problems. Students will

be required to do problem formulation, develop applications and implement problem solutions using industry-standard software tools.

4.0 COURSE OBJECTIVES AND LEARNING OUTCOMES

This course provides an overview of decision analysis topics important to developing solutions to business problems. This course will take a problem-driven approach to developing students' skills in applying decision trees, expected value analysis, single- and multiple-attribute decisions, sensitivity analysis, and linear programming applied to real-world problems. Students will be required to do problem formulation, develop applications and implement problem solutions using industry-standard software tools.

We focus on a number of powerful quantitative methods that support managerial decision-making. Students will learn about decision theory and different decision-making environments, optimization, and business simulation. These concepts will be applied to an extensive set of business problems in an MS-Excel-based analysis environment. As such, the course aims to equip students with analytical skills that are critical for many managerial scenarios. The course applies conceptual and hands-on learning to accomplish its learning objectives.

5.0 TEXTS & OTHER READING MATERIALS

Title: Quantitative Analysis for Management, 13th Edition (e-book)
Author: B. Render, R. Stair, M. Hanna, T. Hale
Publisher: Pearson
ISBN: 978-0134543161

Suggested/Recommended Textbook

- Introduction to Business Analytics Using Simulation (Individual Chapters)
- Introduction to Business Analytics Using Simulation (Whole Book)

6.0 TEACHING METHODS

You are expected to already know basic statistical concepts from QMS 102 or QMS 204, and the use of MS Excel from ITM100. This course will help you understand how these concepts apply to real managerial decision-making scenarios. The pedagogical approach for this course is Outcomes Based Action Learning. The reason for this is that it is impossible to develop design competence without structured experiential design learning activities. In this regard, you will receive formal lectures on methods and techniques for managerial decision-making, a set of In-Class Design Exercises, a set of 6 homework assignments, and a project. These will give you hands-on experience to complement conceptual understanding of powerful management techniques and tools.

7.0 EVALUATION, ASSESSMENT AND FEEDBACK

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

Evaluation Component	Percentage of the Final Grade
Midterm Exam 1	35%
Midterm Exam 2	35%
Assignments	15%
Simulation Project	15%
Total	**100%**

NOTE: Students must achieve a course grade of at least 50% to pass this course.

- At least **20%** of student's grade based on individual work will be returned to students prior to the last date to drop a course in good academic standing .

Citation Format for Essays and Term Papers
All essay assignments, term paper and other written works must adhere with APA citation format. Technical errors (spelling, punctuation, proofing, grammar, format, and citations) and/or inappropriate levels of language or composition will result in marks being deducted. You are encouraged to obtain assistance from the Writing Centre (www.ryerson.ca/writingcentre) for help with your written communications as needed.

You can find APA guidelines and academic referencing from the following online resources:

Student Learning Support > Online Resources > Writing Support Resources
- APA Basic Style Guide

Ryerson Library Citations and Style Guides
- APA Style

8.0 TOPICS – SEQUENCE & SCHEDULE

Session	Lecture, Learning Objectives	In-Class Exercise	Readings	Assignments Due
1	**Lecture:** Introduction to Managerial Decision-Making and Quantitative Analysis **Learning Objective:** The student should be able to recognize the variety of managerial decision scenarios	Building spreadsheet models for break-even analyses	Chapter 1	
2	**Lecture:** Decision Analysis – Different Decision-making Environments	Creating and analyzing decision-trees	Chapter 3	

	Learning Objective: The student should be able to identify the differences between decision environments and conduct what-if analysis			
3	**Lecture:** Advanced Decision Concepts **Learning Objective:** The student should be able to incorporate interdependence of decisions and individuals' utility models into the analysis of decision scenarios	Analysis of utility functions	Chapter 3	**Homework Assignment 1:** Decision-Making Under Risk and Value of Perfect Information
4	**Lecture:** More on Decision Theory **Learning Objective:** The student should be able to model and analyze decisions in various risk and pay-off scenarios	Modeling and solving a variety of problems from different domains	Chapter 3	
5	**Midterm 1**			
6	**Lecture:** Linear Programming Models **Learning Objective:** The student should be able to define decision variables, goal(s), and constraints of an optimization problem	Generating an LP model for a given manufacturing problem	Chapters 7,8	
7	**Lecture:** Solving LP Models **Learning Objective:** The student should be able to use MS Excel Solver to solve LP problems	Using Solver for the manufacturing problem	Chapters 7,8	
8	**Lecture:** LP Sensitivity Analysis **Learning Objective:** The student should be able to use MS Excel Solver to conduct LP sensitivity analysis	Using Solver to conduct sensitivity analysis for the manufacturing problem	Chapters 7,8	
9	**Lecture:** Integer and Nonlinear Programming **Learning Objectives:** The student should be able to model and solve integer programming and nonlinear programming models	Formulating integer programming and nonlinear programming models and solving them using Excel's Solver	Chapter 10	**Homework Assignment 2:** Generating an LP model, model solution and sensitivity analysis with MS Excel
10	**Midterm 2**			
11	**Lecture:** Introduction to Simulation with MS Excel **Learning Objectives:** The student should understand what business	Monte Carlo Simulations of an Inventory Problem with MS Excel	Chapter 13	

	problems call for simulation, the basics of Monte Carlo simulations, and the use of MS Excel for random variable, data table, and scenario generation,			
12	**Lecture:** Using MS Excel for Building Simulation Models **Learning Objective:** The student should understand the use of MS Excel for building simulations	Monte Carlo Simulations of an Inventory Problem with MS Excel Monte Carlo Simulations of an Queuing Problem with MS Excel	Chapter 10	**Project Introduction:** Simulation with MS Excel **Homework Assignment 3:** Generation of Demand Forecasts

9.0 VARIATIONS WITHIN A COURSE

All sections of a course (Day and CE sections) will follow the same course outline and will use the same course delivery methods, methods of evaluation, and grading schemes. Any deviations will be posted on D2L Brightspace once approved by the course coordinator.

10.0 OTHER COURSE, DEPARTMENTAL, AND UNIVERSITY POLICIES

For more information regarding course management and departmental policies, please consult the **'Appendix of the Course of Study'** which is posted on the Ted Rogers School of Information Technology Management website.

NOTE: Students must adhere to all relevant university policies found in their online course shell in D2L and /or on the flowing URL: senate-course-outline-policies.