Commerce 3QA3
Management Science for Business
Summer 2020 – Course Outline

COURSE OBJECTIVE

The analysis of decision problems is an essential part of the modern business world. This course will provide an understanding of the usefulness of linear programming, decision analysis, queuing models, and simulation as decision-making aids for business problems.

PREREQUISITES

COMMERCE 2QA3 and registration in any Commerce program; or one of ELECENG 3TQ4, STATS 2MB3, STATS 3J04, 3N03, STATS 3Y03 or both ENGPHYS 3W04 and MATH 3D03, and registration in any Engineering and Management program.

TEACHING STAFF AND CONTACT INFORMATION

Instructor:	**Teaching Assistant:**	**Teaching Assistant:**
Armagan Ozbilge, PhD Candidate	**Amin Shahmardan**, PhD Student	**Dewan F. Wahid**, PhD Candidate
ozbilgea@mcmaster.ca	shahmara@mcmaster.ca	wahidd@mcmaster.ca
Tel: 905-525-9140, x26357		
Office Hours: Wed. 10:00 am – 12:00 pm, Virtual – MS Teams	Office Hours: Monday 1:00 – 3:00 pm, Virtual – MS Teams	Office Hours: Friday, 11:30 am – 1:30 pm, Virtual – MS Teams

CLASS INFORMATION

Section	**Day**	**Time**	**Room**
C01	Monday & Wednesday	6:30 – 9:30 pm	Virtual – MS Teams

COURSE ELEMENTS

Credit value: 3	Leadership: Yes	IT skills: Yes	Global view: Yes
Avenue to Learn: Yes	Ethics: Yes	Numeracy: Yes	Written skills: Yes
Participation: Yes	Innovation: Yes	Group work: No	Oral skills: Yes
Evidence-based: Yes	Experiential: Yes	Final exam: Yes	Guest speaker(s): No

COURSE DESCRIPTION

The course will study five widely used quantitative management science tools (problem modeling, linear programming, decision analysis, simulation, and waiting lines) used in business decision problems when conditions are reasonably certain or somewhat uncertain. All five tools are implemented in Excel. The course is taught through lectures, textbook readings, practice problems, and computer works with Excel.

LEARNING OUTCOMES

Upon completion of this course, students will be able to complete the following key tasks:

- Create Excel models of decision problems which occur in different business functional areas such as operations, finance, and marketing;
- Formulate linear, integer, and nonlinear decision problems. Use Excel Solver to model and solve these problems, perform sensitivity analysis, and determine the marginal value of the resources used;
- Analyze business decision problems under uncertainty and risk using payoff tables and decision-tree models in Excel. Use utility functions to account for risk preferences.
- Use Excel to model and analyze business processes using simulation and waiting line/queuing models.

REQUIRED COURSE MATERIALS

Textbook: **Balakrishnan, N., Render, B., and Stair, R.M.** *Managerial Decision Modeling with Spreadsheets*. **Third edition, Pearson/Prentice Hall (2013)**

- ➤ The textbook is **highly recommended but is not required**. Any new book, used book, electronic book, etc. can be used. The electronic book is sold via Access Code in the Bookstore for $75. To purchase that Access Code click here to go to the Bookstore Buy Access Codes Online. Other editions (e.g. the 2nd edition) of the textbook are not as useful as the 3rd edition. The international version of the 3rd edition has a major shortcoming. It is missing 'Chapter 4: Linear Programming Sensitivity Analysis', which is one of the most difficult topics in the course.

- ➤ This course uses http://avenue.mcmaster.ca to post the outline, lecture notes, and feedback.

Software: This course is offered in a virtual classroom using MS Teams. Students are also encouraged to follow in-class applications with their computers. The following software are used in the course:

- MS Teams: Microsoft Office 365 is available for students.
- Excel: Excel 2010 or later is preferred.
- Excel Solver add-in: Available in Excel on Windows and Mac.
- TreePlan: Excel add-in for building and analyzing decision trees. Available on Avenue.
- Queuing Modules: Excel templates for analyzing queuing problems. Available on Avenue.

- ➤ First completely update Microsoft Office. Then completely update Excel. If Excel is not completely updated the add-ins and modules may not work.

- ➤ Students may need to set the security setting on Excel to 'medium' to 'enable' the 'macros' in these programs.

- ➤ All software runs on a Windows; students using a Mac must ensure that the software runs properly on their computer. **Students will be tested at the Midterm Exam and at the Final Exam on their proficiency with the software.**

Students are encouraged to attend class, and to bring their textbook, their computer, and the lecture notes (either electronic or paper form) to class. Students are expected to read the assigned materials in the textbook before coming to class.

Component	Best of below weighting schemes		
Midterm Exam	40%	60%	Virtual, problems & computer-approx. 2 hours and 30 mins,
Final Exam	60%	40%	Virtual, problems & computer-approx. 2 hours and 30 mins
Total	100%		

Practice Problems: There are no hand-in assignments. Practice Problems for self-study are assigned (see the course schedule below). Additional problems may be assigned during the course. All Practice Problems and solutions are to be posted on Avenue.

Exams: Both the Midterm Exam and the Final Exam are 2.5 hours long and will be virtually done on Avenue to Learn. The Final Exam is not comprehensive; rather it only tests material since the Midterm Exam. Both exams will include 'computer questions' which test students' proficiency with the software in the course. For such questions, the students will be asked to submit Excel files to Avenue.

Marks: Marks are posted on Avenue to Learn. Exams are not returned. Students must first review their Exam with the TA during office hours within two weeks of the marks being posted on Avenue. After this is done students can review their Exam with the instructor during office hours.

Final Grades: At the end of the course overall percentage grades are converted to a letter grade in accordance with the following conversion scheme:

Letter Grade	Percentage	Letter Grade	Percentage
A+	90 – 100	C+	67 – 69
A	85 – 89	C	63 – 66
A-	80 – 84	C-	60 – 62
B+	77 – 79	D+	57 – 59
B	73 – 76	D	53 – 56
B-	70 – 72	D-	50 – 52
		F	00 – 49

COMMUNICATION AND FEEDBACK

1. Students who are uncomfortable directly approaching an instructor regarding a course concern may send a confidential email to the Operations Management Area Chair, Professor Hassini (hassini@mcmaster.ca) or the Associate Dean (adbusac@mcmaster.ca).

2. Students' e-mails to instructors or TAs must originate from their official McMaster University e-mail account. This protects the confidentiality of information and confirms the identity of the student. E-mails regarding course issues should NOT be sent to the Area Administrative Assistant.

3. If after speaking with the instructor students wish to have a course component (i.e. midterm exam) re-evaluated, then they should complete the following process.
- Complete the form at http://www.mcmaster.ca/policy/Students-AcademicStudies/Form_A.pdf
- The component must be worth 10% or more of the final grade in the course
- Students pay a fee of $50 in Gilmour Hall #209. The receipt is then brought to Student Experience - Academic Office (formerly the APO) in DSB 112.
- The Area Chair will seek out an independent adjudicator to re-grade the component.

- An adjustment to the grade for the component will be made if a grade change of three points or greater on the 12 point scale (equivalent to 10 marks out of 100) has been suggested by the adjudicator as assigned by the Area Chair
- If a grade change is made, the student fee will be refunded.

ACADEMIC DISHONESTY

Students 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.

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.

It is the student's responsibility to understand what constitutes academic dishonesty. For information on the various types of academic dishonesty please refer to the *Academic Integrity Policy*, located at:
www.mcmaster.ca/academicintegrity

The following illustrates only three forms of academic dishonesty:
1. Plagiarism, e.g. the submission of work that is not one's own or for which other credit has been obtained.
2. Improper collaboration in group work.
3. Copying or using unauthorized aids in tests and examinations

REQUESTING RELIEF FOR MISSED ACADEMIC WORK

Students may request relief from a regularly scheduled midterm, test, assignment or other course components in the following ways:
a) For missed coursework worth less than 25% of the final grade (and/or absences from classes lasting up to three (3) days)
b) For missed coursework worth 25% or more of the final grade (and/or absences from classes lasting more than three (3) days)
c) For conflicts arising from Student Experience - Academic Office approved events.

a) For missed coursework worth less than 25% of the final grade (and/or absences from classes lasting up to three (3) days):

Students must use the MSAF (McMaster Student Absence Form). This is an on-line, self-reporting tool, for which submission of medical or other types of supporting documentation is normally not required. Students may use this tool to submit a maximum of one (1) request for relief of missed academic work per term as long as the weighting of the component is worth less than 25% of the course weight. Students must follow up with their course instructors regarding the nature of the relief within two days of submitting the form. Failure to do so may negate the opportunity for relief. It is the prerogative of the instructor of the course to determine the appropriate relief for missed term work in his/her course.

For more information, please refer to the policy and procedure on the DeGroote website at the link below;
http://ug.degroote.mcmaster.ca/forms-and-resources/missed-course-work-policy/

b) For missed coursework worth 25% or more of the final grade (and/or absences from classes lasting more than three (3) days):

Students cannot use the MSAF. They MUST report to their Faculty Office (the Student Experience –Academic Office for Commerce students) to discuss their situation and will be required to provide appropriate supporting documentation. Students who wish to submit more than one request for relief of missed academic work per term cannot use the MSAF. They must report to the Student Experience – Academic Office and discuss their situation with an academic advisor. They will be required to provide supporting documentation and possibly meet with the Manager.

The MSAF cannot be used during any final examination period. If a mid-term exam is missed without a valid reason, students will receive a grade of zero (0) for that component.

c) For conflicts arising from Student Experience – Academic Office approved events:

Students unable to write a mid-term at the posted exam time due to the following reasons: religious, work-related (for part-time students only), representing university at an academic or varsity athletic event, conflicts between two overlapping scheduled mid-term exams, or other extenuating circumstances, have the option of applying for special exam arrangements. Please see the DeGroote Missed Course Work Policy for a list of conflicts that qualify for academic accommodation:

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

Such requests must be made to the Student Experience – Academic Office at least ten (10) working days before the scheduled exam along with acceptable documentation. Non-Commerce students must submit their documentation to their own Faculty Office and then alert the Student Experience – Academic Office of their interest in an alternate sitting of the midterm.

Adjudication of all requests must be handled by the Student Experience – Academic Office. Instructors cannot themselves allow students to unofficially write make-up exams/tests.

STUDENT ACCESSIBILITY SERVICES

Students who require academic accommodation must contact Student Accessibility Services (SAS) to make arrangements with a Program Coordinator. Academic accommodations must be arranged for each term of study. Student Accessibility Services can be contacted by phone 905-525-9140 ext. 28652 or e-mail sas@mcmaster.ca. For further information, consult McMaster University's Policy for Academic Accommodation of Students with Disabilities:

http://www.mcmaster.ca/policy/Students-AcademicStudies/AcademicAccommodation-StudentsWithDisabilities.pdf

POTENTIAL MODIFICATIONS TO THE COURSE

The instructor reserves the right to modify elements of the course during the term. There may be changes to the dates and deadlines for any or all courses in extreme circumstances. If either type of modification becomes necessary, reasonable notice and communication with the students will be given with explanation and the opportunity to comment on changes. It is the responsibility of the student to check their McMaster email and course websites weekly during the term and to note any changes.

ACKNOWLEDGEMENT OF COURSE POLICIES

Your enrolment in Commerce 3QA3 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 Avenue to Learn. **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.

	Topics/Readings	**Practice Problems**
COURSE SCHEDULE (TENTATIVE)		
Date	*Readings are in the textbook.* *Lecture Notes are on Avenue.*	*Solutions are on Avenue.* *Solve all problems using Excel.*

1. Mon. June 22nd	Introduction to course
	Ch. 1: Introduction (pp. 1-16) and Excel Review
	Append. B: Excel commands/skills (pp. 561-571)
		Ch. 1:
		  Disc. quest. 2, 12;
		  Prob. 21, 22, 23, 24

2. Wed. June 24th	Ch. 2: Linear programming , graphical and
	    computer solution methods (pp. 19-56)
		Ch. 2:
		  Disc. quest. 3, 4, 7, 10, 11, 12
		  Prob. 13, 17, 27, 29, 43

3. Mon. June 29th	Ch. 3: Standard LP problems (pp. 65-88)
	Ch. 5: Transportation problem (pp. 165-168)
		Ch. 3:
		  Prob. 3, 7, 9, 12, 13, 17, 21
		Ch. 5:
		  Prob. 17

Wed. July 1st	Canada Day – No Class	

4. Mon. July 6th	Ch. 4: LP Sensitivity (pp. 119-148)	Ch. 4:
		  Disc. quest. 6, 8
		  Prob. 13, 15, 21, 22, 23

5. Wed. July 8th	Ch. 4: LP Sensitivity (continued)
	Ch. 6: Integer Programming (pp. 211-223)
	Ch. 6: Nonlinear Programming (pp. 242-247)
		Ch. 6:
		  Disc. quest. 3
		  Prob. 13, 19, 37

6. Mon. July 13th	Ch. 8: Decision Analysis (pp. 319-329)	Ch. 8:
		  Disc. quest. 4, 5
		  Prob. 14, 15, 19, 20

7. Wed. July 15th	Ch. 8: Decision Analysis (pp. 329-355)	Ch. 8:
		  Disc. quest. 7, 8, 11
		  Prob. 26, 27, 37, 38, 39
		Solve all these problems using TreePlan in Excel

Friday July 17th	**Midterm Exam** *(Including lectures 1-6)* **18:30 – 21:30**	
8. Mon. July 20th	Ch. 8 (Cont'd): Decision Analysis (pp. 329-355)	Ch. 8: Same as lecture 7!

9. Wed. July 22nd	Ch. 10: Simulation (pp.407-438)	Ch. 10:
		  Disc. quest. 10, 13
		  *Prob. 18, 23, 30
		Do each simulation in Excel; do N = 200 replications

10. Mon. July 27th	Ch. 9: Queuing or Waiting Line Models
	    (pp. 367-398)
		Ch. 9:
		  Disc. quest. 2, 3, 4
		  *Prob. 13, 22, 23, 27 (use λ=100), 28, 29, 30, 33
		Solve all these problems using Queuing Modules

11. Wed. July 29th	**Solving Practice Questions**	
Mon. August 3rd	Civic Holiday – No Class	
Wed. August 5th	**Final Exam** *(Including lectures 7-11)* **18:30 – 21:30**	