

COURSE OBJECTIVE

Problem analysis and solution using Excel is an essential skill in business. In this course students learn how to use five tools in Excel (business problem modeling, linear programming, decision analysis, simulation, and waiting lines) to analyze and solve business problems in accounting, finance, human resources, marketing, and operations.

PREREQUISITES

Commerce 2QA3 and registration in any Commerce or Engineering and Management program; or one of Stats 2MB3, 3J04, 3N03 or 3Y03 and registration in any Engineering and Management program.

INSTRUCTOR AND COURSE INFORMATION

Section	C01 (16870), C02 (16871), C03 (16872)
Class times, classroom	Online weekly lectures (available continuously on YouTube) 3 hours of an (optional) online classroom (on Zoom) for ‘questions and answers’

All students in all sections complete the course entirely online. All sections use the same Avenue website. All lectures, practice problems, notes, software, instructions, podcasts, quizzes, and exams are identical for all sections. There are 3 hours of an (optional) online classroom (on Zoom) where the instructor is available for ‘questions and answers’.

Instructor	Teaching Assistants (TAs)
Dr. John Miltenburg email: miltenb@mcmaster.ca Office hours on Zoom: tba	Office hours: Mon., Tue., Wed., Thu., Fri. on Zoom: tba

Questions concerning course material must be posted on the Avenue to Learn Discussion board. These questions must NOT be e-mailed to the instructor or the TAs; these e-mails will not be answered. Questions posted on the Avenue Discussion board can be answered by the instructor or the TAs or other students.

Questions concerning special arrangements for quizzes or exams, or absences from exams must be discussed **in person** on Zoom with the instructor or TAs during office hours; **this cannot be done by e-mail.**

COURSE ELEMENTS

Credit value: 3	Leadership: Yes	IT skills: Yes	Global view: Yes
WebCT: Yes	Ethics: Yes	Numeracy: Yes	Written skills: No
Participation: Yes	Innovation: Yes	Group work: No	Oral skills: No
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 (business 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 online lecture podcasts, computer work with Excel, lecture notes and textbook readings, and practice problems.

LEARNING OUTCOMES

- Upon completion of this course, students will be able to complete the following:
- Create Excel models of business decision problems in accounting, finance, human resources, marketing, and operations.
 - Formulate linear and integer decision problems. Use Excel to solve these problems, perform sensitivity analyses, 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 simulation and waiting line/queuing models in Excel to model and analyze business processes.

REQUIRED COURSE MATERIALS

Textbook: Balakrishnan, N., Render, B., and R. Stair, Managerial Decision Modeling with Spreadsheets, 3rd edition, Pearson/Prentice Hall (2013).

A textbook is **highly recommended but is not required**. There are two options:

(i) e-book: An electronic book is available. This is the entire book (11 chapters). It is available from the bookstore for about \$75.

(ii) Traditional textbook: A used textbook may be available from students who took the course in previous years.

Textbook website: The textbook website is: http://wps.prenhall.com/bp_balakrishnan_mdms_3/

Other textbooks: Other editions (e.g. the 2nd edition) of the textbook are not as useful. There is an international version of the 3rd edition. Unfortunately this international version is missing ‘Chapter 4: Linear programming sensitivity analysis’, which is a very important chapter in the course.

Course Avenue to Learn Website: <http://avenue.mcmaster.ca>

Software: 1. Excel: For PC’s: Excel 2013, **2016** or **MS Office 365**. For Mac’s: Excel **2016**, or **MS Office 365**. McMaster students can install MS Office 365 for free at: <https://www.mcmaster.ca/uts/> This gives an up-to-date version of Excel. It is critically important that students have an up-to-date PC or Mac computer with an up-to-date version of Excel.

2. Excel Solver add-in: Available in all Excel versions on PC’s and Mac’s.

Excel Data Analysis add-in: Available on all PC’s and on Mac’s with Excel 2016 or MS Office 365.

3. TreePlan: Excel add-in for building and analyzing decision trees. Available on Avenue > Content

4. Queuing Model templates: 4 Excel templates for analyzing queuing problems. Available on Avenue > Content

PC users: All software runs on a PC. Your MS Office must be up-to-date. Microsoft does this automatically.

Mac users: If you use MS Office 365 updating should be done automatically. For other versions of Excel you must **manually update Excel. If Excel is not completely up-to-date then the add-ins and templates will not work.**

Lectures, Podcasts, Schedule: Lecture notes are on Avenue. All lectures are podcast on YouTube and are accessed through links on Avenue. Podcasts can be accessed at any time. The (unofficial) course schedule of lectures, podcasts, quizzes, and exams is shown at the end of this course outline. This schedule will be updated from time to time. The official, up-to-date course schedule will be in an Excel file at Avenue > Content.

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

EVALUATION AND COURSE DELIVERABLES

	Marks	Tentative Dates and Times
Quizzes	10	5 on-line on-Avenue quizzes; Sun. 12:00 noon to Mon. 12:00 noon; see schedule below
Exam 1	30	on-line, on-Avenue; tentatively 2.5 hours long; 7:00 pm to 9:30 pm, Fri. Feb. 14
Exam 2	30	on-line, on-Avenue; tentatively 2.5 hours long; 7:00 pm to 9:30 pm, Fri. Mar. 27
Final Exam (Cumulative)	30	on-line, on-Avenue; tentatively 2 hours*; day and time to be scheduled by the university; *there will be an additional 0.5 hours for students who miss Exam 1 or Exam 2 with an MSAF (more details follow below)
Total	100	

Quizzes: Five Quizzes help students keep up with their studies and prepare for the exams. At assigned times (see the course schedule on Avenue) when selected lectures, chapters in the textbook, and practice problems should be complete, students take a 25-minute**, 14-question (approximately), on-line on-Avenue Quiz. Students have 24-hour period (between Sunday 12:00 noon and Monday 12:00 noon) to start and finish a Quiz. Once a student starts a Quiz she has 25 minutes to finish. Quiz questions are randomly assigned and are based on the lecture notes, the lecture podcasts, the textbook and the practice problems. Questions are descriptive and short calculations. There are practice questions for some quizzes on Avenue and at the textbook website. Each Quiz question is worth one mark, so each Quiz has 14 marks (approximately). However the maximum mark is 10 (approximately). Students who correctly answer 10 or more questions get 10 out of 10. Students, for example, who correctly answer 8 questions get 8 out of 10. Marks are posted on Avenue. Quizzes are not returned. Students can review their Quiz with a TA during office hours within two weeks of the quiz marks being posted on Avenue. If a student misses a Quiz or receives a mark of zero on a Quiz, then the two marks for the Quiz are automatically added to the Final Exam (no MSAF is needed for a missed Quiz). In the Quizzes (and on the exams) students cannot ‘go back’. This means only one question appears on the computer screen at a time; students must answer the question that appears and then save their answer; when students move to the next question they cannot return to a previous question to answer the question later, or to check their work, or to change their answer. This is done to discourage students from sharing answers.

Exams: All exams are on-line, on-Avenue. Students must work individually, not in groups. Answers are checked carefully to make sure students work individually. Students can use their textbook, notes, computer, computer files, podcasts and calculator. Each exam has several parts: e.g. randomly assigned descriptive questions, randomly assigned calculation questions, randomly assigned Excel worksheet questions. All exams, like the Quizzes above, are set up so that students cannot 'go back' to previous questions. This means students must answer the question when it appears on the computer screen; when students move to the next question they cannot return to a previous question to check their work or answer the question later. This is done to discourage students from sharing their answers.

Students must install and learn the course software on their own computers well in advance of exams (and quizzes). A student's computer must have good internet access in order to quickly and easily access Avenue to download questions and data, and upload answers to Avenue Assignment assignment dropboxes.

There are three exams (see the course schedule). Exam 1 and Exam 2 cover material in the first-half and second-half of the course. The Final Exam covers all the material in the course.

Any student who misses Exam 1 or Exam 2 or both and has a valid MSAF (see p. 4 below) will (i) have the marks for the missed Exam(s) added to the Final Exam, and (ii) have additional questions covering the missed Exam(s) material and additional time added to their Final Exam.

Marks: Marks are posted on Avenue. Quizzes and Exams are not returned. Students who wish to review their Quiz or Exam questions, answers, marks, etc. must first review their Quiz or Exam with a TA during office hours. This must be done within two weeks of the marks being posted on Avenue. After this is done students can review their Quiz or Exam with the instructor during office hours.

Final Grades: At the end of the course, overall percentage grades are converted as follows to a letter grade.

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

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 Manish Verma (mverma@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 INTEGRITY

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.

ONLINE COURSE COMPONENTS

In this course we will be using Avenue to Learn. Students should be aware that when they access the electronic components of this course, private information such as first and last names, user names for the McMaster e-mail accounts, and program affiliation may become apparent to all other students in the same course. The available information is dependent on the technology used. Continuation in this course will be deemed consent to this disclosure. If you have any questions or concerns about such disclosure, please discuss this with the course instructor.

MISSED EXAMS/QUIZZES

If a student misses a Quiz or receives a mark of zero on a Quiz, then the two marks for the Quiz are automatically added to the Final Exam (no MSAF is needed for a missed Quiz).

Students wishing to request relief from a regularly scheduled exam (i.e. Exam 1, Exam 2, Final Exam) must follow the policy and procedure on the DeGroot website at: <http://ug.degroot.mcmaster.ca/forms-and-resources/missed-course-work-policy/> With respect to that policy:

1. There is no possibility of a “re-write” of Exam 1 and there is no possibility of a “re-write” of Exam 2.
 2. The “weight” of Exam 1 and the “weight” of Exam 2 will be “redistributed” as follows.
 - 2a. The marks for Exam 1 or Exam 2 or both are added to the marks for the Final Exam, and
 - 2b. If the student misses Exam 1 or Exam 2 or both and has a valid MSAF then additional questions covering the missed exam material (Exam 1 or Exam 2 or both) and additional time are added to the student’s Final Exam.
- An up-to-date list of valid MSAF’s for Exam 1 and for Exam 2 will be maintained at Avenue > News. Students who have requested relief should check this list in a timely manner. They should not e-mail the instructor.

There will be no exceptions to items 1, 2a, 2b.

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>

ACADEMIC ACCOMMODATION FOR RELIGIOUS, INDIGENOUS OR SPIRITUAL OBSERVANCES (RISO)

Students requiring academic accommodation based on religious, indigenous or spiritual observances should follow the procedures set out in the RISO policy <https://multifaith.mcmaster.ca/riso> . Students requiring a RISO accommodation should submit their request, including the dates/times needing to be accommodated and the courses which will be impacted, to their Faculty Office normally within 10 days of the beginning of term or to the Registrar's Office prior to their examinations. Students should also contact their instructors as soon as possible to make alternative arrangements for classes, assignments, and tests.

Potential Modifications to the Course

The instructor and university reserve the right to modify elements of the course during the term. The university may change the dates and deadlines for any or all courses in extreme circumstances. If either type of modification becomes necessary, reasonable notice and communication with 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.

Course Schedule

This is the preliminary, unofficial course schedule. It is shown here for illustration only. The final, official schedule is an Excel file (where all the details are easier to see) that is posted at Avenue > Contents > Course outline, schedule. That final, official schedule gives the official dates for all quizzes, exams, lecture podcasts, problems, etc.

	A	B	D	E	F	G	H	I	J	K	L	M
1	Commerce 3QA3 Course Schedule - Fall 2020											
2	updated June 30 2020											
3	Podcasts		Textbook Chapter and description of topic		Lecture/podcast number	Date	Lecture Notes pages	Pages in e-textbook	Practice problems			
4												
5	1a.Outline	33 min	Course outline, schedule		1a	Sept 8-13	Course outline, schedule					
6	1b.Workflow	12 min	Course workflow		1b							
7	Lecture 1c,2	49 min	Ch 1, App B - Business models, Excel tutorial		1c		Ch 1 Notes pp. 1-5		Ch 1, all pages; Excel tutorial; Appendix B	Ch. 1: Disc. quest. 2,12; Prob. 22,23,24; Solve all these problems using Excel; Bill Pritchett Practice Problem and Product Mix Problem on pp. 16-17 of Lecture Notes; Solve using Excel		
8	Lecture 3	38 min			2	Ch 1 Notes pp. 5-9						
9	Lecture 4	32 min			3	Ch 1 Notes pp. 9-end						
10	Lecture 5	48 min			4	Sept 14 - 20	Ch 2 Notes pp. 1-3		Ch 2, pp. 19-31		Quiz 1	
11	Quiz 1 (lectures 1-5): Sun. Sept. 20, 12 noon to Mon. Sept. 21, 12 noon											
12												
13	Lecture 6	45 min	Ch 2 - LP model, graphical, computer		6	Sept 14 - 20	Ch 2 Notes pp. 4-5		Ch 2, pp. 31-end		Quiz 2	
14	Lecture 7	40 min			7	Ch 2 Notes pp. 6-10				Ch. 2: Disc. quest. 3,4,10,11,12; Prob. 13, 17; Solve these problems using graphical method; Prob. 13,17,27,29,43; Solve these problems using Solver in Excel		
15	Lecture 8	35 min			8	Sept 21 - 27	Ch 2 Notes pp. 11-end					
16	Lecture 9	42 min			9	Ch 3,5 Notes pp. 1-5		Ch 3, pp. 65,66,77-81,73-74		Ch. 3: Prob. 3,12,13; Solve these problems using Solver in Excel		
17	Quiz 2 (lectures 6-9): Sun. Sept. 27, 12 noon to Mon. Sept. 28, 12 noon											
18	Lecture 10	37 min	Ch 3,5 - Standard LP problems		10	Sept 28 - Oct 4	Ch 3,5 Notes pp. 6-9		Ch 3, all except pp. 91-101; Ch 5, pp 165-168, 170-172		Quiz 3	
19	Lecture 11	46 min			11		Ch 3,5 Notes pp. 10-end				Ch. 3: Prob. 7,9,12,17,21; Ch. 5: Prob. 17; Solve these problems using Solver in Excel	
20	Lecture 12	37 min			12		Ch 4 Notes pp. 1-5					
21	Quiz 3 (lectures 10-12): Sun. Oct. 4, 12 noon to Mon. Oct. 5, 12 noon											
22	Lecture 13	39 min	Ch 4 - LP sensitivity		13	Oct 5 - 9	Ch 4 Notes pp. 6-9		Ch 4, pp. 119-133		Exam 1	
23	Lecture 14	44 min			14		Ch 4 Notes pp. 10-16				Ch. 4: Disc. quest. 8; Prob. 13,21(except i),22,23; Solve these problems using Solver in Excel	
24	Lecture 15+16	37+16 min			15+16		Ch 4 Notes pp. 17-22,26-28		Ch 4, pp. 134-138, 142-144			
25	Exam 1 (lectures 1-16): Fri. Oct. 9, 7:00 pm - 9:30 pm											
26	Oct 12 to Oct 18 - midterm break - no classes											
27	Lecture 17	34 min	Ch 6 - Integer LP		17	Oct 19 - 25	Ch 6 Notes pp. 1-5		Ch 6, pp. 211-223		Quiz 4	
28	Lecture 18	26 min			18		Ch 8 Notes pp. 1-7		Ch 8, pp. 319-325		Ch. 6: Disc. quest. 3; Prob. 13,19,37; Solve these problems using Solver in Excel	
29	Lecture 19	22 min			19		Ch 8 Notes pp. 8-10					
30	Lecture 21	22 min			20	Oct 26 - Nov 1	Ch 8 Notes pp. 11-13		Ch 8, pp. 325-332		Ch. 8: Disc. quest. 4,5,7,8; Prob. 14,15,19,20; Solve all these problems manually and in Excel Ch. 8: Prob. 26,37,38; Also solve using TreePlan in Excel	
31	Lecture 21	18 min			21		Ch 8 Notes pp. 14-18					
32	Lecture 22	39 min			22		Ch 8 Notes pp. 19-22, TreePlan					
33	Quiz 4 (lectures 17-22): Sun. Nov. 1, 12 noon to Mon. Nov. 2, 12 noon											
34	Lecture 23	36 min	Ch 8 - Decision analysis		23	Nov 2 - 8	Ch 8 Notes pp. 23-26		Ch 8, pp. 333-355		Quiz 5	
35	Lecture 24	39 min			24		Ch 8 Notes pp. 27-29				Ch. 8: Disc. quest. 11; Prob. 27,39; Solve these problems using TreePlan in Excel Prob 27 also solve in TreePlan using utility function: $U(X)=1.0-1.0 \times \exp(-X/25,000)$ Prob 39 also solve in TreePlan using utility function: $U(X)=1.0-1.0 \times \exp(-X/1,000)$	
36	Lecture 25a	49 min			25a		Ch 8 Notes pp. 30-34					
37	Lecture 25b	38 min			25b	Nov 9 - 15	Ch 8 Notes pp. 35-40				Exam 2	
38	Lecture 26	34 min			26		Ch 8 Notes pp. 41-49					
39	Lecture 27	34 min			27		Ch 10 Notes pp. 1-5					
40	Lecture 28	44 min			28	Nov 16 - 22	Ch 10 Notes pp. 6-11		Ch 10, pp. 407-427, 434-437		Ch 10: Prob. 18 (iv,v) as described on p. 11 of Lecture Notes Prob 23; Do N=200 replications	
41	Lecture 29	47 min			29		Ch 10 Notes pp. 12-14					
42	Lecture 30a	40 min			30a		Ch 10 Notes pp. 14-15					
43	Lecture 30b	25 min	Ch 10 - Simulation		30b	Nov 23 - 29	Ch 10 Notes pp. 16-19		Ch 10, all except pp. 443-452		Quiz 5	
44	Lecture 31	25 min			31		Ch 10 Notes pp. 20-24				Ch 10: Prob. 30; Do N=200 replications	
45	Lecture 32	27 min			32							
46	Exam 2 (lectures 17-32): Fri. Nov. 27, 7:00 pm - 9:30 pm											
47												
48	Lecture 33a	30 min	Ch 9 - Queuing		33a	Nov 30 - Dec 6	Ch 9 Notes pp. 1-4		Ch 9, pp. 367-398		Quiz 5	
49	Lecture 33b	30 min			33b		Ch 9 Notes pp. 4-6				Ch. 9: Disc. quest. 2,3,4; Prob. 13,22,23,27(use $\lambda=100$),28,29,30,33; Solve all these problems in Excel using the Queuing templates	
50	Lecture 34	30 min			34		Ch 9 Notes pp. 7-11					
51	Lecture 35	25 min			35	Dec 7 - 9	Ch 9 Notes pp. 12-17				Exam 2	
52	Final Exam (Lectures 1-35) 2 hours: Day and time will be set by the University											