

COURSE OUTLINES: BU5401 Management Decision Tools

Academic Year	2022/2023	Semester	2
Course Coordinator	Chin Chee Kai		
Course Code	BU5401		
Course Title	Management Decision Tools		
Pre-requisites	Basic concepts of probability distribution and Excel skills		
No of AUs	3		
Contact Hours	3 hrs per class X 13 classes, totaling 39 hrs		

Course Aims

This course aims to develop the use of a scientific approach using mathematical methods and computer software to make managerial decisions. Future managers, business owners, or professionals from various disciplines who have to work along with businesses would employ methods and tools from this course to formulate their business descriptions into mathematical models to facilitate solution finding.

Intended Learning Objectives

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

1. translate business problems into optimization, simulation or other mathematical models,
2. develop problem-solving skills related to business decision-making, including use of spreadsheet modeling software, to solve large-scale practical problems.

Course Content

Topics covered in the course include:

1. optimization models for business decisions,
2. simulation,
3. inventory control,
4. waiting line management,
5. forecasting and
6. decision making under uncertainty and risk,

Examples and cases are drawn from a variety of industries and business sectors, including accounting, finance, marketing, and operations management

Assessment					
Component	Course ILO Tested	Related Attributes	Weightage	Team/ Individual	Assessment Rubrics
Class Participation	1	Acquisition of Knowledge	15%	Ind	15%
Assessments	2	Acquisition of Knowledge, and Problem Solving	15%	Ind	15%
ACT #1	1, 2	Problem Solving	30%	Ind	30%
ACT #2	1, 2	Problem Solving	40%	Ind	40%
Total		100%	100%		100%
Formative Feedback:					
<p>You will receive verbal feedback during in-class discussions, as well as written feedback on solutions to most in-class exercises and assessments.</p> <p>In-Class Exercises (ICEs) are practices done individually during class with feedbacks and discussions of solutions. Assessments comprise online exercises and Excel file submissions where problems are to be worked out and submitted on individual's effort and timing. Questions may be taken from the textbook suitably spaced out within the semester to prompt students on revision of topics. Certain assessments could also prompt students to explore slightly more advanced related topics. You will receive formative feedback on assessments through performance indicators as well as sample standard solutions.</p> <p>You will further receive cohort-wide summative feedback through broad performance indicators on your performance in Achievement Test (ACT) #1. Your individual performance indicators for ACT #1 will signal your ability to track the topics discussed in this course. Achievement Tests, including both ACT #1 and ACT #2, do not come with solutions nor answers. Further, in accordance with prevailing mark-release policies, marks and performance indicators for ACT #2 will not be released.</p>					
Learning & Teaching Approach					
	Approach	How does this approach support students in achieving the learning outcomes?			
	Before Class Self-Learning Sessions (1.5 to 2 hrs per week)	You will prepare before lesson at your own time by reading up the required chapters and watching suggested video sessions to acquire the requisite foundation knowledge for the topics of the week. A set of Self-Assessment Exercises (SAEs) are also to be completed to supplement the understanding.			
	In-Class Sessions (1.5 hr per week)	You will participate in Q&A and problem-solving sessions during class. Impromptu in-class exercises (ICEs) based on topics of the week will be made available for you to attempt, discuss, and correct, and in so doing, discover your own mistakes or short-comings in mastery of the topics.			

Readings and References**Textbook**

David R. Anderson, Dennis J. Sweeney, Thomas A. Williams, R. Kipp Martin (2016). *An Introduction to Management Science, 14th Edition*. Cengage Learning. ISBN 13: 978-1-111-82361-0.

Other References

Chin Chee Kai (2016). *Essential Basics of Probability, Statistics and Analytics, 1st edition*. SoftML. ISBN 13: 978-981-11-0335-3. NTU Business Library Call Number: QA273.C539e. (Location: Library Outpost)

Bernard W. Taylor III (2012). *Introduction to Management Science: Global Edition, 11th Edition*. Pearson. ISBN 13: 9780273766407. ISBN 10: 0273766406.

Bernard W. Taylor III (2011). *Introduction to Management Science, 11th Edition*. Pearson. ISBN 13: 9780132751919.

Bernard W. Taylor III (2010). *Introduction to Management Science, 10th Edition*. Prentice Hall. ISBN 13: 9780136064367. ISBN 10: 0136064361. NTU Business Library Call Number: T56.T238 2010

Bernard W. Taylor III (2007). *Introduction to Management Science, 9th Edition*. Pearson/Prentice Hall. ISBN 10: 0131961330, 0131888099. NTU Lee Wee Nam Library Call Number: T56.T238 2007 + 1 CD.

Frederick S. Hillier, Mark S. Hillier (2008). *Introduction to Management Science – a Modeling and Case Studies Approach with Spreadsheets, 3rd Edition*. McGraw-Hill Irwin ISBN 13: 978-0-07-312903-7.

David R. Anderson, Dennis J. Sweeney, Thomas A. Williams, R. Kipp Martin (2011). *An Introduction to Management Science, 13th Edition*. Thomson/South-Western. ISBN 13: 9780538475655. ISBN 10: 053847565X. NTU Business Library Call Number: HD30.25.A546 2011 + 1 CD. Library Outpost Reserves.

Academic Integrity

Students should at all times uphold his or her academic integrity during the course. While discussions of chapter topics and principles are encouraged, only genuine individual work can be submitted for marking. Students are reminded of the seriousness of plagiarizing others' work, or attain course marks through direct or indirect cheating or short-cuts.

Good academic work depends on honesty and ethical behaviour. Students should adhere to the principles of academic integrity and to the NTU Honour Code, a set of values shared by the whole university community. Truth, Trust and Justice are at the core of NTU's shared values. Students must recognize their responsibilities in understanding and applying the principles of academic integrity in all the work you do at NTU. Not knowing what is involved in maintaining academic integrity does not excuse academic dishonesty. Students must actively equip themselves with strategies to avoid all forms of academic dishonesty, including plagiarism, academic fraud, collusion and cheating.

Course Instructors

Instructor	Office Location	Email Address
Chin Chee Kai (*)	S3-B1b-55	cheekai@ntu.edu.sg

(*) Course coordinator

Planned Weekly Schedule			
Week	Topics	Course ILO	Readings/ Activities
1 Jan 09	Introduction <ul style="list-style-type: none"> Quantitative Analysis and Decision Making Models of Cost, Revenue, and Profit Linear Programming and Problem Formulation A Simple Maximization Problem 	1, 2	Chap 1 and 2
2 Jan 16	Linear Programming: Sensitivity Analysis <ul style="list-style-type: none"> Sensitivity Analysis Range of Optimality Range of Feasibility Simultaneous Changes 	1, 2	Chap 2 and 3
3 Jan 23 (*CNY)	Linear Programming: Applications <ul style="list-style-type: none"> Marketing Applications Financial Applications Operations Management Applications 	1, 2	Chap 4
4 Jan 30	Integer Linear Programming <ul style="list-style-type: none"> Types of Integer Linear Programming Models Graphical and Computer Solutions for an All-Integer Linear Program Applications Involving 0-1 Variables 	1, 2	Chap 7
5 Feb 06	Distribution and Network Models <ul style="list-style-type: none"> Transportation Problem Assignment Problem Shortest-Route Problem 	2	Chap 6 [Chin] Chap 1, 2
6 Feb 13	Simulation <ul style="list-style-type: none"> Motivation and General Simulation Concept Cumulative Probability Production of Random Events Model and Discrete Time Simulation Result Interpretation 	1, 2	Chap 12 [Chin] Chap 3, 4
7 Feb 20	Forecasting <ul style="list-style-type: none"> Time Series Smoothing Methods Trend Forecasting Causal Regression Forecasting 	2	Chap 15 [Chin] Chap 9

	NTU Recess Week		
8 Mar 06	Waiting Line Models I <ul style="list-style-type: none"> • Structure of a Waiting Line System • Queuing Systems Parameters & Notations • M/M/1 Waiting Line Model • M/G/1 Waiting Line Model • M/D/1 Waiting Line Model 	1, 2	Chap 11 [Chin] Chap 3, 4 ACHIEVEMENT TEST #1
9 Mar 13	Waiting Line Models II <ul style="list-style-type: none"> • M/M/k Multi-server Waiting Line Model • Economic Analysis of Waiting Lines • Comparing M/M/k with k x M/M/1 	1, 2	Chap 11
10 Mar 20	Inventory Models: Deterministic Demand <ul style="list-style-type: none"> • Economic Order Quantity (EOQ) Model • Quantity Discounts for the EOQ Model • Economic Production Lot Size Model 	1, 2	Chap 10
11 Mar 27	Inventory Models: Probabilistic Demand <ul style="list-style-type: none"> • Continuous Review Model • Order-Quantity and Reorder-Point • Periodic-Review Model • Total Cost of Inventory 	1, 2	Chap 10 [Chin] Chap 3, 4
12 Apr 03	Decision Analysis <ul style="list-style-type: none"> • Decision Making without Probabilities • Decision Making with Probabilities • Concept of Perfect Information • Decision Analysis with Sample Information 	1, 2	Chap 13 [Chin] Chap 1, 2
13 Apr 10	Achievement Test #2		ACHIEVEMENT TEST #2

Appendix 1: Assessment Criteria for Class Participation

	Standards		
	Below Expectation	Meet Expectation	Above Expectation
Criteria for Verbal Participation	Usually not offering suggestions. When prompted, tend to take longer than usual time to respond. Response may or may not be correct. Discussion thoughts may sound a little lack of direction.	Usually offer correct solution formulation. Tend to answer when prompted. May occasionally suggest interesting perspectives, examples or questions.	Frequently respond with correct solution formulation, or voluntarily offer different or new ideas to solving problems, or raising meticulous observations that are often important, insightful or interesting.

Appendix 2: Assessment Criteria for Assessments

	Standards		
	Below Expectation	Meet Expectation	Above Expectation
Criteria for Assessments	Unable to solve most assigned problems most of the time. Solution correctness shows high inconsistencies. Usually unable to solve problems which are more indirect or extend a bit outside the scope of learning.	Usually able to solve problems, typically of easier, straight-forward questions. May exhibit mistakes or incorrect solutions when assigned problems contain more complexities. Tend to be able to solve problems designed from only within topics that have been discussed.	Able to solve assigned problems correctly with little to no mistakes. Shows ability to solve problems involving slight extension from topics being discussed.