A. COURSE INFORMATION

COURSE NUMBER	MATH 102.1			NO. OF UNITS	3
COURSE TITLE	Topics in Operations Research				
PREREQUISITE/S	MATH 40.1, MATH 61.2				
DEPARTMENT/ PROGRAM	Mathematics			SCHOOL	SOSE
SCHOOL YEAR	2023 – 2024			SEMESTER	Second Semester
INSTRUCTOR/S	Jeric C. Briones				
VENUE/PLATFORM	SEC-A303A	SECTION	N O	SCHEDULE	TF 14:00 – 15:30 TF 15:30 – 17:00

B. COURSE DESCRIPTION

Operations Research (OR) consists of the application of mathematical methods to the optimization of decision-making in organizations. This course covers several areas of OR and the algorithms and solution procedures for problems in these areas, together with their mathematical justification and appropriate software.

WHERE IS THE COURSE SITUATED WITHIN THE FORMATION STAGES IN THE FRAMEWORK OF THE LOYOLA SCHOOLS CURRICULA	
	FOUNDATIONS: Exploring and Equipping the Self
×	ROOTEDNESS: Investigating and Knowing the World
	DEEPENING: Defining the Self in the World
	LEADERSHIP: Engaging and Transforming the World

C. COURSE LEARNING OUTCOMES

By the end of this course, students should be able to:

COURSE LEARNING OUTCOMES
CLO1: Demonstrate an understanding and appreciation of the operations research framework and the standard optimization models for mathematical programming.
CLO2: Formulate linear and integer programming problems.
CLO3: Solve aforementioned problems using appropriate algorithms and computer programs.

CLO4:	Formulate scenarios as Markov processes using given transition data or probabilities.
CLO5:	Compute numerical quantities, such as expectations and long-run probabilities, that provide significant insights on situations modeled by Markov chains.

D. COURSE OUTLINE AND LEARNING HOURS

COURSE OUTLINE	CLO	ESTIMATED LEARNING HOURS
Module 1: Linear Programming Formulation Algorithms: Graphical, Simplex Extensions to Simplex Method Spreadsheet Modelling **LONG TEST 1 – FEBRUARY 20*** **DUE: LT1 (TAKE HOME) – MARCH 2***	1, 2, 3	33

Module 2: Linear Programming Extensions
Duality and the Dual Simplex Method
Integer Programming
    Algorithms: Cutting Plane, Branch and Bound
    Formulation
    Spreadsheet Modelling
LONG TEST 2 – MARCH 15*
DUE: LT2 (TAKE HOME) – MARCH 23*
	1, 2, 3	27

Module 3: Basic Markov Processes Markov Chain Matrix of Transition Probabilities Steady-State Probabilities **DUE: LONG TEST 3 – APRIL 26***	1, 4, 5	18
GROUP REPORTS – APRIL 12 TO 19*	1, 2, 3	12

These dates are tentative. If there are changes, there will be an announcement.

E. ASSESSMENT AND RUBRICS

ASSESSMENT TASKS	ASSESSMENT WEIGHT	CLO
Long Test 1*	35%	1, 2, 3
Long Test 2*	35%	1, 2, 3
Long Test 3*	15%	1, 4, 5
Group Report	15%	1, 2, 3

Quizzes and problem sets may be given as an assessment of the student's understanding of the topic and as a supplement to class discussions. Grades for quizzes, problem sets, and take home components will be counted towards the corresponding LTs.

F. TEACHING AND LEARNING METHODS

TEACHING & LEARNING METHODS & ACTIVITIES	CLO
Lectures	1, 2, 3, 4, 5
Handouts, Discussion Boards	1, 2, 3, 4, 5
Problem Solving Sessions	2, 3, 4, 5
Computer Sessions	3, 5
Group Report	1, 2, 3

G. REQUIRED READINGS

[RR1] F. Hillier and G. Lieberman. *Introduction to Operations Research*. McGraw-Hill, 11th edition, 2021.

[RR2] J. Martin Jr., M. Ruiz, and J. Briones. Introduction to Operations Research (with some Financial Applications) Lecture Notes. unpublished, 2017.

[RR3] H. Taha. *Operations Research: An Introduction*. Prentice Hall PTR, 10th edition, 2017.

H. SUGGESTED READINGS

[SR1] A. Bari, M. F. Khan, and S. Khan. *Linear and Integer Programming*. Cambridge Scholars Publishing, 2019.

[SR2] V. Chvátal. *Linear Programming*. W. H. Freeman, 1983.

[SR3] J. P. Coelho, T. M. Pinho, and J. Boaventura-Cunha. *Hidden Markov Models: Theory and Implementation using Matlab*. CRC Press, 2019.

[SR4] H. Daellenbach, J. George, and D. McNickle. *Introduction to Operations Research Techniques*. Allyn and Bacon Boston, 1983.

[SR5] H. Eiselt and C.-L. Sandblom. *Operations Research: A Model-based Approach*. Springer Nature, 3rd edition, 2022.

[SR6] F. Hiller and M. Hiller. *Introduction to Management Science: A Modeling and Case Studies Approach with Spreadsheets*. McGraw-Hill, 2018.

[SR7] R. Larson and A. Odoni. *Urban Operations Research*. Dynamic Ideas, 2nd edition, 2007.

[SR8] P. Mohanty and S. Patel. *Operations Research*. Scientific Publishers, 2017.

[SR9] C. Ragsdale. *Spreadsheet Modeling and Decision Analysis: A Practical Introduction to Business Analytics*. Cengage Learning, 9th edition, 2021.

[SR10] M. Ruiz. *A First Course in Linear Programming*. Ateneo de Manila University, 1989.

[SR11] J. Slater and S. Wittry. *Practical Business Math Procedures*. McGraw-Hill, 13th edition, 2020.

[SR12] R. Vandbei. *Linear Programming: Foundations and Extensions*. Springer, 4th edition, 2013.

[SR13] R. Walker. *Introduction to Mathematical Programming*. Prentice Hall, 5th edition, 2016.

I. GRADING SYSTEM

PERCENTAGE OF TOTAL SCORE	EQUIVALENT LETTER GRADE
$92\% - 100\%$	A
$86\% - 91\%$	B+
$77\% - 85\%$	B
$69\% - 76\%$	C+
$60\% - 68\%$	C
$50\% - 59\%$	D
Below 50%	F

J. CLASS POLICIES

1. The official learning management system for this course will be Canvas. Only students who are officially enrolled will be included in the Canvas class and will be allowed to take and submit graded assessments. Students who join the course in Canvas but whose names do not appear in the official class list provided by the registrar will be removed as a student in the Canvas course. Students who require support for Canvas may seek help by sending an email to ls.one@ateneo.edu or chatting with LS-One through that account using their official student email.

2. The learning modules in the course site are based on the required textbook listed in this syllabus. Students are highly encouraged to read the discussions and answer exercises in the textbook as well.

3. The learning mode for this class is **onsite**, with classes to be held in **SEC-A303A** by default, or online when necessary. Recordings and other materials used in online synchronous sessions will be uploaded online, with the link to be posted in Canvas. *Should the need arise or should circumstances change, the learning mode for this class will shift to online.*

4. Materials posted on the course sites (Canvas, OneDrive, etc.) must not be shared online (on any other platform, website, and social media) or offline, and with other students not enrolled in the course. Infringements will result in disciplinary actions (e.g., reprimand, a zero in that graded assessment).

5. All exams will be taken onsite, unless otherwise stated. For all course assessments, use clean/recycled A4 bond papers, and **do not write or print at the back**. For written assessments, use only black or blue ball pens, and **only one item per page**. When applicable, submissions are expected to follow the specified LaTeX template. Relevant computation files, if any, must be sent to the instructor at the end of the exam following the instructions given during the exam. Late submissions will not be accepted.

6. Make-up assessments may be given in the case of grave medical and familial reasons (e.g., COVID-related, debilitating illness, death in the family) or official representation of the school (e.g., athletic events and other competitions, as endorsed by ADAA/ADSA/Athletics Office), after submission of a signed excuse letter at most **seven academic calendar days** after the assessment was given. The excuse letter should be handwritten on a clean sheet of paper, signed by the student, and certified true by a parent or guardian, with the scanned copy sent by email to the instructor. The contact information of the parent/guardian must be written down in the letter explicitly. *Commitments to attend events like weddings and birthdays or to travel are not considered valid reasons to secure a make-up exam.*

7. Students are highly encouraged to have a scientific calculator at their disposal during discussions, and have ready access to programs that will be used in this course.

8. Penalties (e.g., a zero in that graded assessment) will be imposed on submissions that are either not compliant to the guidelines set by the instructor or completed after the deadline.

9. Students are given at most three (3) school days after the return of the assessment to make the necessary appeals and requests for corrections. After the said period, grade changes will no longer be entertained.

The instructor reserves the right to review the entirety of the assessment, not just the item/part requested to be regraded. Note that this may result to an increase or decrease in the total score. All change-of-grade decisions are final.

10. All communications with the instructor should be coursed through email or Canvas. Outside of these channels, students should consult first with the instructor before using them. Students can contact the instructor at any time, but replies should only be expected during office hours.

11. When using AI tools (such as ChatGPT) for submissions, students are expected to (1) acknowledge and cite their use appropriately; (2) verify the accuracy of their content; and (3) take ownership of their submission. Submissions must also include an appendix detailing how and where these tools were used, including prompts used and output screenshots. Additional guidelines may be provided later.

12. Students are expected to exercise the highest level of academic integrity. Cheating or plagiarism will not be tolerated and will be treated as a grave offense (automatic F in the course). Disciplinary action will be pursued, following the process set by the university. Cheating during any graded activity includes, but is not limited to, posting of answers or hints related to any graded work in any online (e.g., social networking sites, chats) or offline (e.g., text messages) platform. Plagiarism also includes using AI tools without proper acknowledgement and citation.

13. The overall grade reflected in the Canvas course is not the official grade of the student. The official grade of the student in the course is the grade that is posted by the Registrar and reflected in the student's AISIS account.

14. The class adheres to the policies on attendance set forth in the LS Undergraduate Academic Regulations Section III, and the memo on *Undergraduate Academic Policies, Second Semester SY 2023-2024*.

15. The class also adheres to the LS Gender Policy, and the Code of Decorum and Administrative Rules on Sexual Harassment, Other Forms of Sexual Misconduct, and Inappropriate Behavior.

16. Other important guidelines and class policies not stated in this syllabus will be posted in Canvas.

K. CONSULTATION HOURS

NAME OF FACULTY	EMAIL	DAYS	TIME
Jeric C. Briones	jbriones@ateneo.edu	MTh *by appointment*	13:00 - 15:00 SEC-A321

L. ADDITIONAL NOTES

Important Dates (***Subject to changes***. *Updated dates will be posted in the course site*)

DATE	DAY	ACTIVITY
Jan 15	Mon	Start of Second Semester
Jan 15 – Feb 19	Mon – Mon	Module 1 Topics
Jan 25	*Thu*	*University Employees' Gathering*
Feb 5	*Mon*	*President's Day*
Feb 10	*Sat*	*Lunar New Year*
Feb 20*	Tue	Long Test 1
Feb 21 – Mar 14	Wed – Thu	Module 2 Topics
Feb 25	*Sun*	*People Power Anniversary*
Feb 28	*Wed*	*University Service Awards*
Mar 2*	Sat	DUE: Long Test 1 (Take Home)

Mar 15*	Fri	Long Test 2
Mar 18 – Apr 11	Mon – Thu	Module 3 Topics
*Mar 22**	*Fri*	*Faculty Day*
Mar 23*	Sat	DUE: Long Test 2 (Take Home)
Mar 25 – 30	*Mon – Sat*	*Midterm Academic Break*
Apr 9	*Tue*	*Araw ng Kagitingan*
Apr 12 – 19*	Fri –Fri	Group Reports
Apr 22 – 23	*Mon – Tue*	*Study Day*
Apr 24 – 27	Wed – Sat	Finals Week
Apr 26*	Fri	DUE: Long Test 3

Onsite classes will be held on the **first session (January 16)** of the term, and every session thereafter. Changes in synchronous and asynchronous sessions will be announced in advance.

Useful Links

1. For general information about our virtual campus: `https://ateneobluecloud.ateneo.edu/`
2. The One Stop Student Services for LS: `https://sites.google.com/ateneo.edu/ls-one` or alternatively, you may use `bit.ly/LS-One`.
3. The LS Primer, CHARTING A RE-IMAGINED PATH: ADAPTIVE TEACHING AND LEARNING IN THE LOYOLA SCHOOL, SY 2020-2021, `https://ateneobluecloud.ateneo.edu/LS`.