



**JINDAL GLOBAL
BUSINESS SCHOOL**
INDIA'S FIRST MULTI-DISCIPLINARY GLOBAL BUSINESS SCHOOL



O.P. Jindal Global University
A Private University Promoting Public Service
NAAC Accreditation - 'A' Grade

Jindal Global Business School
Course Outline

Course Title	Decision Analytics under Uncertainty
Core or Elective	Elective
Program and Batch	MBA-2025, IBM-2022, IBM-2023
Semester & Academic Year	Fall 2026
Credits	1.5
Discipline/Area	IS and Analytics
Name of the Faculty Member/Course Instructor	Mashkooor Ali
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Faculty Member's Open Office Day/s & Time	TBA

Introduction to the Course

Business decisions are often made under uncertainty due to fluctuating demand, incomplete information, and dynamic market conditions. ***Decision Analytics under Uncertainty*** introduces analytical and probabilistic tools to model and analyse such situations in a structured manner.

The course covers key concepts including decision-making under risk and uncertainty, utility-based analysis, decision trees, Poisson processes, Markov chains, and Markov decision processes. It focuses on developing intuition for uncertainty, evaluating trade-offs, and applying quantitative methods to support effective managerial decision-making in operational and strategic contexts.

Course Learning Objectives

At the end of the course, students should be able to

1. **CLO1-** Understand the concepts of risk, uncertainty, and variability and their role in business decision-making.
2. **CLO2-** Apply analytical tools such as decision trees, utility theory, Poisson processes, and Markov chains to model uncertain systems.
3. **CLO3-** Analyse decision problems under certainty, risk, and uncertainty, and select appropriate decision criteria

4. **CLO4-** Formulate and solve sequential and dynamic decision problems using Markov decision processes and interpret results for managerial decision-making.

Programme Competency Goals

MBA Programme Competency Goals (PCGs)		MBA Programme Learning Objectives (PLOs)
		Students will be able to
1	Technological Agility: Ability to adopt relevant technologies for better business decision making.	1. Understand relevant business technologies 2. Understand future technologies in business domain
2	Responsible Global Citizenship: Ability to understand the interplay between local and global issues and to act with sensitivity towards ethical and social issues	3. Understand the interplay between local and global business issues 4. Demonstrate sensitivity towards ethical issues 5. Demonstrate sensitivity towards social issues 6. Address societal issues
3	Effective communication: Ability to effectively exchange ideas and information	7. Present their ideas with clarity 8. Prepare an organized and logical business document 9. Use technology for effective communication
4	Critical Thinking: Ability to identify, analyze business problems and propose effective solutions	10. Identify main issues of business problems 11. Examine information from different sources 12. Draw inferences from analysis 13. Evaluate alternatives 14. Summarize and conclude
5	Leadership: Ability to take initiative, inspire and collaborate with others	15. Take initiative 16. Contribute effectively in groups

PLO-PCG Assessments Mapping Matrix

Program Learning Objectives (PLOs)	Program Competency Goals (PCGs)	Course Assessment Item
This course helps you to develop the following Program Learning Outcomes:	This course helps you to develop the following Program Competency Goals:	This learning outcome will be assessed in the following items
PLO1, PLO2, PLO10, PLO12, PLO13	PCG1, PCG4	A1, A2, A3
PLO7, PLO15	PCG3, PCG5	A1, A4
PLO8, PLO14	PCG3, PCG4	A1, A3, A4
PLO11	PCG1, PCG4, PCG2	A1, A2, A3, A4
PLO16	PCG2, PCG5	A1

Evaluation Schema

The course grade will be determined based on:

Assessment Task	Weightage (Percentage)	Nature (Individual/Group)	Week of Assessment	PLOs to be Assessed
A1: Group Project	30%	Group	8 th week	PLO1, PLO2, PLO10, PLO11, PLO12, PLO13, PLO14, PLO16
A2: Quiz	30%	Individual	3rd Week and 6th Week	PLO1, PLO2, PLO10, PLO11
A3: Assignments	30%	Individual	3rd Week, 5th Week and 7th Week	PLO8, PLO10, PLO11, PLO12, PLO13
A4: Class Participation	10%	Individual	Ongoing	PLO1, PLO7, PLO10, PLO11, PLO14

Description of Assessments:

A1: Group Project (30 Marks)- The project involves formulating and analysing a business decision problem under uncertainty. Students will identify a real or realistic scenario, model it using appropriate analytical tools such as decision trees, Poisson processes, Markov chains, or Markov decision processes, and derive solutions. The project will emphasize problem formulation, model selection, analysis, and managerial insights. It will include a written report and a presentation/viva.

A2: Quiz (30 marks)- There will be two in-class closed-book quizzes consisting of conceptual and numerical questions.

A3-Assignments (30 Marks)- Students will be given three assignments as part of continuous assessment. These may be completed in class or submitted within a specified time. Assignments will involve solving analytical problems related to decision models, including decision trees, inventory decisions under uncertainty, and Markov chain analysis. Submissions should include clear calculations, structured reasoning, and concise interpretation of results in a business context.

A4- Class Participation (10 marks)- Students are expected to actively participate in class discussions, engage in problem-solving activities, and contribute to the learning environment. Participation will be assessed based on preparedness, involvement, and quality of contributions.

A1: Project Presentation Rubrics

Rubrics for Assessments

Criteria (Weight)	Excellent	Very Good	Good	Satisfactory	Needs Improvement
Problem Formulation & Context (25%)	Problem is clearly defined with strong business relevance; decisions, uncertainties, and objectives are precisely identified.	Problem is well defined with good relevance; most elements clearly identified.	Problem is reasonably defined; some elements unclear or incomplete.	Problem definition is weak with limited clarity on uncertainty or decisions.	Problem is unclear or not properly formulated.
Model Selection & Justification (20%)	Appropriate model (decision tree/Poisson/Markov/MD P) selected with strong justification and clear assumptions.	Suitable model selected with good justification.	Model selection is acceptable, but justification is limited.	Model selection is weak or inappropriate.	No appropriate model selected or no justification provided.
Analytical Modelling & Solution (25%)	Model is correctly formulated and solved with accurate calculations and logical steps.	Minor errors but overall correct modelling and solution.	Basic model developed with some errors in formulation or calculation.	Incomplete or partially incorrect modelling.	No valid modelling or incorrect solution.
Interpretation & Managerial Insights (20%)	Results are interpreted clearly with strong, actionable business insights and decision recommendations.	Good interpretation with relevant insights.	Basic interpretation with limited insights.	Weak interpretation with minimal connection to decisions.	No meaningful interpretation provided.
Clarity,	Report is well-structured,	Good	Adequate	Poor	Disorganize

Structure & Presentation (10%)	clear, and professionally presented.	structure and clarity with minor issues.	presentation with some lack of clarity.	structure and unclear presentation.	d and difficult to understand.
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Teaching Method

The course will combine lectures with interactive discussions and hands-on exercises. Students will be encouraged to actively engage with concepts and apply analytical tools to practical decision-making situations. The instructor will facilitate learning by guiding discussions and problem-solving, helping students develop both intuitive and analytical understanding of decision-making under uncertainty.

Textbook / Other Readings

Textbook:

TB1: Wayne L. Winston: *Introduction to Probability Models: Operations Research. Volume 2*, Brooks/Cole-Thomson Learning, 2004

TB2: Sheldon M. Ross: *Introduction to probability models*. Academic press, 2014.

Other Readings:

TB3: Eric V. Denardo: *The science of decision making: A problem-based approach using Excel*. John Wiley & Sons, Inc., 2001.

Session Plan

Session Details	Topics	PLOs Covered
Session 1	Risk, Uncertainty, and Variability	PLO1, PLO2, PLO10
Objective of the session	Understand different types of uncertainty in decision-making contexts.	
Subtopics to be covered	Risk vs uncertainty, variability, types of decisions, optimization criteria	
Readings	TB1: Chapter 2	
Case Title & Number	N/A	
Pedagogy	Class discussion and Q&A Session with the help of PPT presentation	
Session 2	Poisson Processes and Random Arrivals	PLO1, PLO2, PLO10, PLO12
Objective of the session	Introduce stochastic modelling of random arrival processes.	
Subtopics to be covered	Poisson process, inter-arrival times, exponential distribution, business applications	
Readings	TB2: Chapter 5	
Case Title & Number	N/A	
Pedagogy	Class discussion and Q&A Session with the help of PPT presentation	

Session 3	Utility Theory	PLO10, PLO12, PLO13
Objective of the session	Analyse decision-making with risk preferences.	
Subtopics to be covered	Utility functions, risk aversion, expected utility	
Readings	TB1: Chapter 2	
Case Title & Number	N/A	
Pedagogy	Class discussion and Q&A Session with the help of PPT presentation	
Session 4	Decision Trees-Concepts and Structure	PLO10, PLO11, PLO13
Objective of the session	Introduce structured decision-making tools.	
Subtopics to be covered	Decision nodes, chance nodes, tree construction, evaluation	
Readings	TB1: Chapter 2	
Case Title & Number	N/A	
Pedagogy	Class discussion and Q&A Session with the help of PPT presentation	
Session 5	Applications of One-Time Decisions	PLO8, PLO10, PLO13, PLO14
Objective of the session	Apply decision tools to practical single-stage problems.	
Subtopics to be covered	Project selection, equipment replacement, product launch decisions, bidding decisions	
Readings	TB1: Chapter 2	
Case Title & Number	N/A	
Pedagogy	Class discussion and Q&A Session with the help of PPT presentation	
Session 6	Decision Trees-Advanced Analysis and Applications	PLO10, PLO11, PLO12, PLO13
Objective of the session	Introduce structured decision-making tools.	
Subtopics to be covered	Decision nodes, chance nodes, tree construction, evaluation	
Readings	TB1: Chapter 2	
Case Title & Number	N/A	
Pedagogy	Class discussion and Q&A Session with the help of PPT presentation	
Session 7	Repeated Decisions: Inventory Ordering under Uncertainty	PLO10, PLO11, PLO12
Objective of the session	Understand repeated decision problems in uncertain demand settings.	
Subtopics to be covered	Single-period inventory ordering, critical ratio, cost trade-offs, seasonal demand planning	
Readings	TB1: Chapter 3	
Case Title & Number	N/A	
Pedagogy	Class discussion and Q&A Session with the help of PPT presentation	

Session 8	Inventory and Buffering Strategies	PLO10, PLO11, PLO14
Objective of the session	Analyse operational strategies to manage uncertainty.	
Subtopics to be covered	Safety stock, buffering, demand variability, spare parts planning	
Readings	TB1: Chapter 3	
Case Title & Number	N/A	
Pedagogy	Class discussion and Q&A Session with the help of PPT presentation	
Session 9	Exploration vs Exploitation	PLO10, PLO11, PLO12, PLO13
Objective of the session	Understand trade-offs in learning and decision-making	
Subtopics to be covered	Exploration-exploitation dilemma, adaptive choice, A/B testing intuition, sequential learning.	
Readings	TB1: Chapter 3	
Case Title & Number	N/A	
Pedagogy	Class discussion and Q&A Session with the help of PPT presentation.	
Session 10	Guest Lecture	PLO1, PLO7, PLO11, PLO14
Objective of the session	Learn forecasting applications in industry.	
Subtopics to be covered	Real-world use cases in marketing, supply chains, or finance.	
Readings	N/A	
Case Title & Number	N/A	
Pedagogy	Guest speaker presentation, Q&A with PPT.	
Session 11	Introduction to Markov Chains	PLO10, PLO11, PLO12
Objective of the session	Model systems with probabilistic state transitions.	
Subtopics to be covered	States, transition probabilities, transition matrices	
Readings	TB1: Chapter 5, TB2: Chapter 4	
Case Title & Number	N/A	
Pedagogy	Class discussion and Q&A Session with the help of PPT presentation	
Session 12	Markov Chains -- Analysis	PLO10, PLO11, PLO12, PLO13
Objective of the session	Analyse long-run behaviour of stochastic systems.	
Subtopics to be covered	Chapman-Kolmogorov equations, steady-state distribution, long-run probabilities	
Readings	TB1: Chapter 5, TB2: Chapter 4	
Case Title & Number	N/A	
Pedagogy	Class discussion and Q&A Session with the help of PPT presentation	

Session 13	Sequential Decision-Making and MDP	PLO10, PLO11, PLO12, PLO13, PLO14
Objective of the session	Introduce dynamic decision models.	
Subtopics to be covered	Markov Decision Process, states, actions, rewards, dynamic policy choice	
Readings	TB1: Chapter 5, TB2: Chapter 4	
Case Title & Number	N/A	
Pedagogy	Class discussion and Q&A Session with the help of PPT presentation	
Session 14	Reading & Revision Week/ Examination Week*	PLO1, PLO2, PLO7, PLO8, PLO10, PLO11, PLO12, PLO13, PLO14
Objective of the session	NA	
Subtopics to be covered	NA	
Readings	NA	
Case Title & Number	NA	
Pedagogy	NA	
Session 15	Reading & Revision Week/ Examination Week*	PLO1, PLO2, PLO7, PLO8, PLO10, PLO11, PLO12, PLO13, PLO14
Objective of the session	NA	
Subtopics to be covered	NA	
Readings	NA	
Case Title & Number	NA	
Pedagogy	NA	

*Elective Endterm Examinations may take place in the last week of classes.

Disability Support

JGU endeavours to make all its courses accessible to students. The Disability Support Committee (DSC) has identified conditions that could hinder a student's overall wellbeing. These include physical and mobility-related difficulties, visual impairment, hearing impairment, mental health conditions, and intellectual/learning difficulties, e.g., dyslexia and dyscalculia. Students with any known disability needing academic and other support are required to register with the Disability Support Committee (DSC) by following the procedure specified at <https://jgu.edu.in/disability-support-committee/>

Students who need support may register any time during the semester up until a month before the end semester exam begins. Those students who wish to continue receiving support from the previous semester, must re-register within the first month of a semester. Last-minute registrations and support might not be possible as sufficient time is required to make the arrangements for support.

The DSC maintains strict confidentiality about the identity of the student and the nature of their disability and the same is requested from faculty members and staff as well. The DSC takes a strong stance against in-class and out-of-class references made about a student's disability without their consent and disrespectful comments referring to a student's disability.

All general queries are to be addressed to disabilitysupportcommittee@jgu.edu.in

Disclaimer: This course outline including assessments, mode, nature and weightage of assessments, sessions, sequence of sessions and/or readings may be revised during the semester if such need arises.