Course Title:	Data Modeling and Decision
Course Code:	OM556
Prerequisites	*Production Operations Management or equivalent*

HSM Vision

HSM envisions its success in the sustainable contribution that it will make to the industry, academia and research in public and private sector. HSM will lead by providing professionally competent and ethically conscious human resources engaged in the global and local context to foster socio-economic growth and sustainability for the society. HSM envisages having faculty with high research potential and a deep desire for cutting edge research including collaboration with national and international partners.

HSM Mission

Being a research-oriented and student-centric business school, we emphasize research publications in impact journals as well as state-of -the-art learning methodologies. We will prepare our students to become the future ethical business leaders and the guiding post for the society, while equipping them with the knowledge and skills required by world-class professionals. We will be the leading choice for organizations seeking highly talented human resource. HSM will foster internationalization with key stakeholders and actively work to exchange best practices with business schools across Pakistan through collaborations, workshops, conferences and other means.

CAPSULE STATEMENT

A major function of a business manager or an entrepreneur is to make decisions. Success of the organization or business depends heavily on soundness of these decisions. Quantitative methods have always played an important role in enhancing the soundness. However, with recent development in information technology, the role of quantitative techniques in decision making has increased manifold. More and more managers are using such techniques to complement their experience and expertise in business world.

This course is aimed to provide the necessary tools to managers and entrepreneurs for decision making in variety of business situations. Participants will learn to formulate the real life business problems into quantitative models. Teaching of conceptual framework of these tools will be supplemented by hands on application of various software packages that will aide in solving these models. Expertise will be developed in interpretation of these solutions and their use in decision making.

LEARNING OBJECTIVES

Upon successful completion of this course, the participants will be able to:

1. Appreciate the important role that quantitative methods play in decision making in today's business world

2. Describe real life business situations by quantitative models

3. Solve and interpret these models using variety of techniques

4. Utilize these solutions in making better decisions

LEARNING METHODOLOGY

Lectures	In-class Skill Development Exercises	Simulations
Computer Software Tools	Case Studies & Presentations	Textbook

COURSE ASSESSMENT

Quizzes	15%
Assignments	20%
Class Participation	10%
Presentations	5%
Midterm	20%
End-term Exam (Comprehensive)	30%

TEXT BOOK   (Mandatory)

Spreadsheet Modelling & Decision Analysis (5th Edition)   by   *Cliff. T. Ragsdale*

ADDITIONAL REFERENCES

1. Data Analysis & Decision Making   3rd Edition   by   *Albright, Winston, Zappe*

2. *Quantitative Analysis for Management*   9th Edition   by   *Render, Stair, Hanna*

DATA MODELLING & DECISIONS
CLASS POLICY

PARTICIPATION

Each course participant shall be expected to participate fully in class activities. You will be expected to contribute significantly to in-class analysis and discussion of readings and case studies.

Ways to effectively contribute include:

- Responding to questions
- Asking questions that lead to revealing discussions
- Doing the practice problems assigned in the class.

Coming late, leaving class during discussion or lecture and using mobile phones in class will counts as negative participation.

TEAM WORK

Teamwork is a very important part of your learning experience and you are expected to learn to do tough assignments in teams *(not chosen by you)* and meet the deadlines and quality standards. The assignments during the course will be based on the group work unless otherwise specified. It is recommended that all students should equally participate in the group assignments in order to avoid undue burden on some group members. If due to any (genuine) reason any member of the group is unable to participate in the assignment, it is suggested that this member should contact me BEFORE the class personally or through email

ASSIGNMENTS

Group and/or individual assignments may be assigned related to each session. These assignments are to be uploaded on **Moodle** before the deadline. No submissions would be allowed after the class on submission day. In case of any emergency you need to inform me **before** the deadline for time extension.

PRESENTATIONS

Presentations in this course will be related to the assignments. Each group would asked to present their assignment solution in front of the class at least once during the course. This presentation may include the demonstration of the solution procedure through excel if required.

QUIZZES

1. Quizzes are usually taken unannounced

2. From a total of (n) quizzes, best (n -1) quizzes may be considered for the final grade

3. No make-up quizzes will be allowed

USE OF MOBILE PHONES AND OTHER ELECTRONIC DEVICES

1. Use of mobile phones and any other electronic device (except calculators) is prohibited during the class time.

2. All mobile phones should be turned-off and secured in pockets or bags during the class time, and may not be used for ANY purpose, including calculations, time-keeping, etc

EMAIL

In order to contact me through email give me at least 24 hours to respond. You will receive my emails on the address you use to log in to Moodle. It will be your responsibility to check this email at least once a week for any possible announcements.

COUNSELING HOURS

Counseling hours will be displayed on the office door after the first week. Please follow the displayed timings for your visits. In case you need time other than the counseling hours, you may take the appointment through email.

If you find the course difficult I suggest that you should contact me in the first quarter of the course. Because the concepts usually build upon each other, understanding the basics is absolutely necessary.

REQUIRED MATERIAL

You are required to bring the following to every class:

1. **Textbook**
2. **Calculator**
3. **USB Flash drive**
4. **Ring file (for notes)**
5. **Lead pencil (and accessories)**

Course Content

Week	Topics	Chapters	Learning Outcomes	Activities	Assessment Tools
1	Introduction to Quantitative Models for Decision Making, Comparison of Quantitative and Qualitative Approaches of Decision Making, Good Decisions vs Good Outcomes Types of Decision Models (Prescriptive, Predictive, Descriptive)	1	Understand the importance of Decision Making in businesses Appreciate the role of formal decision making models Able to differentiate between different types of models and select the one suitable for a given situation	Introduction, Lecture	Assignment
2	Introduction to Forecasting , Time Series Forecasting Models, Exponential Smoothing	11	Application of Exponential Smoothing model for developing better forecasts	Lecture, Presentation, Discussion, Skill development Exercise,	Assignment
3	Measuring Forecasting Errors Forecast Bias, MAD, RMSE	11	Determination of forecasting errors , and using it as criterion for selection of most appropriate forecasting method	Lecture, Presentation, Discussion, Skill development Exercise	Presentations, Assignment, Quiz
4	Causal Methods of Forecasting, Simple Linear Regression, Model Validation	9	Develop regression model, validate model, use model for forecasting	Lecture, Presentation, Discussion, Skill development Exercise,	Presentations, Assignment, Case Submission & Discussion

5	Multiple Regression Models, Model Validation, Step-wise Regression	10	Forecasting through Multiple Regression models	Lecture, Presentation , Discussion, Skill developmen t Exercise,	Presentations, Assignment, Quiz
6	Introduction to Optimization Modeling , Constrained Optimization Models Fundamentals of Linear Programming (LP) Components of a Linear Program (Decision Variables, Objective Function, Constraints)	2	Formulate a basic LP Represent Constraints in form of mathematical expressions	Lecture, Presentation Exercise	Presentations, Assignment
7	LP Formulations (Product-Mix, Blending, Scheduling, Financial Planning)	3	Formulate various types of LP	Lecture, Presentation Skill Development Exercise	Presentations, Assignment, Case Study
8	**MIDTERM**				
9	Computer Modeling and Solutions of LP	3	Determining Optimal solutions using computer tools (Excel SOLVER) Interpreting SOLVER output	Lecture, Discussion, Presentation, Skill Development Exercise	Presentations, Assignment, Case Submission & Discussion Quiz
10	Sensitivity Analysis , Post Optimality Analysis Shadow Prices, Reduced Costs	4	Evaluation What-if scenario using SOLVER Sensitivity Report,	Lecture, Presentation , Discussion, Skill developmen t Exercise,	Presentations, Assignment, Quiz

11	LP Applications (Transportation, Assignment, Network Problems, Aggregate Planning)	5	Application of LP in various areas of business management	Lecture, Presentation, Discussion, Skill development Exercise,	Presentations, Assignment, Case Discussion, Quiz
12	Integer Programming (IP) Models, Use of Binary Variables in IP Models	6	Use of binary variables in formulating YES /NO type of decision scenarios for optimization	Lecture, Presentation, Discussion, Skill development Exercise,	Presentations, Assignment, Case Submission & Discussion
13	Decision Making under Uncertainty, Pessimistic and Optimistic Approaches to decision analysis, Rational decision models based on Expected Monetary Value (EMV), Decision Trees (Construction & Solution)	15	Ability to represent a complex decision making situation in form of a decision tree, Solution of decision trees to determine the Optimal decision	Lecture, Presentation, Discussion, Skill development Exercise,	Presentations, Assignment, Case Discussion
14	Value of Information, Value of Perfect Information, Value of Experimentation, Multistage Decision Making Models	15	Evaluate the value of information in decision analysis	Lecture, Presentation, Discussion, Skill development Exercise,	Presentations, Assignment, Case Submission & Discussion
15	Simulation Models, Monte Carlo Simulation Method, Using Excel for Simulation	12	Develop basic business simulation models using Excel	Lecture, Presentation, Discussion, Skill development Exercise,	