COURSE MANUAL

Business Mathematics and Statistics

Spring 2020

Course Instructor

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Course Coordinator

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Part I

Course Title: Business Mathematics and Statistics

Course Duration: One Semester

No. of Credit Units: 4

Level: BBA. LLB Programme

Medium of Instruction: English

Pre-requisites: None

Pre-cursor: None

Equivalent Courses: None

Part II

Course Description

This course introduces students to the basic concepts of mathematics and statistics which has applications in economics and finance. Students are expected to master the basic concepts of mathematics and introductory statistics, and go over applications of the core topics covered, mainly from business, economics and finance.

Course Aims

- To provide students with grounding in the basic concepts of business mathematics and statistics.

- To familiarize students with applications in economics and finance using mathematics and statistics.

- To encourage students to appreciate the role of mathematics as a language in social sciences and the importance of empirical analysis using data.

Course Intended Learning Outcomes

Course Intending Learning Outcomes		Teaching and Learning Activities	Assessment Tasks/Activities
By the end of the course students should be able to:			
➢ Master the basic concepts of business mathematics and statistics	50%	*Lecture, class participation, class presentations and involvement.* • Students will get introduced to the basic business mathematics and statistics. Through class participation, students will get familiar to and understand the subject matter.	One time, closed book end semester written exam Class room discussion

➤ Apply basic principles of business mathematics and statistics in problems of economics and finance.	50%	*Lecture, class participation and involvementin the class room discussion based on readings and general understanding.* Through participation tutorials and in-class problem solving, students will master applications of mathematics and statistics in economics and finance.	➤ In class participation in problem solving and tutorial.

Grading of Students Achievement

Exam:

- One time end semester written exam carrying 50% weightage.

- Two In-Class Quizzes: 25% each.

Percentage of Marks	Grade	Grade Value	GRADE DEFINITION
80 and above	O	8	Sound knowledge of the subject matter, excellent organizational capacity, ability to synthesize ideas, rules and principles, critically analyse existing materials and originality in thinking and presentation.
75 – 79	A+	7.5	Sound knowledge of the subject matter, thorough understanding of issues; ability to synthesize ideas, rules and principles and critical and analytical ability.
70 – 74	A	7	Good understanding of the subject matter, ability to identify issues and provide balanced solutions to problems and good critical and analytical skills.
65 – 69	A-	6	Adequate knowledge of the subject matter to go to the next level of study and reasonable critical and analytical skills.
60 – 64	B+	5	Descent Knowledge of the subject matter but average critical and analytical skills.
55 – 59	B	4	Limited knowledge of the subject matter and irrelevant use of materials and, poor critical and analytical skills.
50 – 54	B-	3	Poor comprehension of the subject matter; poor critical and analytical skills and marginal use of the relevant materials. Will require repeating the course.
Below 50	F	0	None of the Above

Plagiarism

Any idea, sentence or paragraph you cull from a web source **must be credited** with the original source. If you paraphrase or directly quote from a web source in the exam, presentation or essays, the source must be explicitly mentioned. You *SHOULD NOT* plagiarise content, be it from scholarly sources (i.e. books and journal articles) or from the Internet. The university has strict rules with consequences for students involved in plagiarism. **This is an issue of academic integrity on which no compromise will be made**, especially as students have already been trained in the perils of lifting sentences or paragraphs from others and claiming authorship of them.

Disability Support

JGU endeavours to make all its courses accessible to students. All students with a known disability needing academic accommodations are required to register with the Disability Support Committee.   Our email address for appointments is "Disability Support Committee" <dsc@jgu.edu.in>.

The Committee provides a range of accommodations to the conditions identified by the The Rights of Persons with Disabilities Act, 2016 and the Mental Health Care Act 2017 and beyond. We provide support to students with a wide-range of health and learning related conditions. These conditions include physical and mobility-related difficulties; visual impairment; hearing impairment; medical conditions; specific learning difficulties, e.g. dyslexia; dyscalculia, mental health conditions such as anxiety and panic attacks. The Disability Support Committee maintains strict confidentiality in its discussions. We respect the privacy of the students.

The registrations for the DSC are open throughout the year. However, the students with long-standing conditions should register with the Committee at the beginning of the academic year. The DSC will take at least 14 business days to make arrangements with the respective departments'.

Part III

Keyword Syllabus

Business Mathematics, Statistics, Calculus, Differentiation, Optimization, Probability, Estimation

Basic reading:

K. Sydsaeter and P. Hammond: Mathematics for Economic Analysis, Pearson Educational Asia: Delhi (2002))

Fundamentals of Mathematical Statistics by *S. C. Gupta and V. K. Kapoor*

Additional Reading:

Mathematics for Economic and Business by *R. S. Bhardwaj*

Part IV

Lecture Programme and Schedule

Teaching Week	Lecture Title
1	Introduction to Mathematics: Why do we need mathematics? Logic and proof techniques; Number systems.
2	Set Theory: sets and set operations; Relations;
3	Functions: Graphs, types of functions and their properties
4	Differentiation
5, 6	Optimization in Single Variable: Maxima and Minima
7	Revision and Practice
8	Introduction to Statistics: What is Statistics? Data and Representation
9	Central Tendency
10	Dispersion
11	Correlation and Regressiom
12	Probability Theory and Estimation
13	Statistics Using Excel
14	Revision and Practice

Details on Week-Wise Lecture Outline and Readings

Week 1

Introduction

- Introduction; mathematics for social sciences; models

- Variables; constants; parameters; endogenous and exogenous variables.

- Equations and identities; behavioural equations; equilibrium.

- **Reading:**

  - ➤ *Chapters 1 Sydsaeter and Hammond*

Week 2

Set Theory

- Statement form method, roster form, rule or set builder; null/empty, singleton, finite, infinite sets.

- Cardinal number; relations; subset, equal, identical, power, and universal sets.

- Operations: union, intersection, complement, and difference.

- Venn diagram; commutative, associative, and distributive laws.

- **Readings:**

  - ➤ *Chapter 1 Sydsaeter and Hammond*

Week 3

Functions

- Notation (one variable); domain and range; independent and dependent variable.

- Graphs: constant, linear, quadriatic, polynomial; power, exponential.

- Examples: slope, demand and supply (graphs and equations), cost, revenue, and profit functions

- Functions of two variables; Utility function and budget set.

- Linear inequalities with example of budget set.

- **<u>Readings:</u>**

  ➢ *Chapters 2 and 3   Sydsaeter and Hammond*

<u>Week 4</u>

<u>Differentiation</u>

- Single variable differentiation; slope of a curve;

- Economic significance as rate of change.

- Examples: marginal cost, marginal revenue, marginal utility, marginal product of labour (draw graphs).

- Simple rules of differentiation: constants, constant plus variable, constant*variable, power rule; sum, product and quotient rules;

- Second order and higher order derivative.

- Elasticities.

- **<u>Readings:</u>**

  ➢ *Chapters 4 and 5 Sydsaeter and Hammond*

<u>Week 5 and 6</u>

<u>Optimization</u>

- First order and second order condition (necessary and sufficient condition).

- Examples: profit maximization, cost minimization, utility maximization with budget constraint (simplified without Lagrange multiplier).

- **<u>Readings:</u>**

➢ *Chapter 9 — Sydsaeter and Hammond*

<u>Week 7: Revision</u>

Week 8

Introduction to Statistics

- What is statistics? Functions and limitations.

- Data and representation: frequency and non-frequency data; tabulation; diagrammatic representation.

- Frequency distribution: attribute and variable; discrete and continuous variable; graphical representation.

- **Readings:**

  - *Chapters 1 and 2 S. C. Gupta and V. K. Kapoor*

Week 9

Central Tendency

- Meaning; common measures; requirements of an ideal average.

- Mean; median; mode; geometric mean; harmonic mean.

- Weighted mean.

- **Readings:**

  - *Chapter 2 S. C. Gupta and V. K. Kapoor*

Week 10

Dispersion

- Range; mean deviation; standard deviation; quantile and percentile; quartile deviation.

- Comparisons of measure of dispersion.

- Skewness and kurtosis

- **Readings:**

  - *Chapter 3 S. C. Gupta and V. K. Kapoor*

Week 11

Probability Theory and Estimation

- Probabilty: examples and calculation

- Classical definition and limitation; frequency definition; conditional probability; Bayes' rule; statistical independence.

- **Readings:**

  ➤ *Chapter 4 S. C. Gupta and V. K. Kapoor*

Week 12

Correlation and Regression

- Bivariate analysis: simple correlation and regression, scatter diagram; correlation; correlation coefficient; regression; limitations of correlation coefficient.

- Least squares.

- **Readings:**

  ➤ *Chapter 10 S. C. Gupta and V. K. Kapoor*

Week 13

Statistics using Excel

- Use Microsoft Excel for statistical analysis such as mean and median, standard deviation, and regressions, and how to interpret data (such as a grading curve).

Week 14: Revision