

St. Joseph's College of Commerce

(Autonomous)

163, Brigade Road, Bengaluru - 560 025

Accredited with 'A++' Grade (4th Cycle) by the National
Assessment and Accreditation Council (NAAC)

Recognized by the UGC as
"COLLEGE WITH POTENTIAL FOR EXCELLENCE"



B.Sc. (Economics, Mathematics, and Data Analytics)

Semester I

*Syllabus as per State Education Policy 2024
Curriculum Framework w.e.f., 2024-2025*

**Academic Year 2024 - 2025
Batch 2024**

SEP CREDIT MATRIX - Academic Year 2024-25

Structure	Semester 1 (Cr)	Semester 2 (Cr)	Semester 3 (Cr)	Semester 4 (Cr)	Semester 5 (Cr)	Semester 6 (Cr)	Total
<i>Language 1</i>	3	3	3	3	-	-	24
<i>Language 2</i>	3	3	3	3	-	-	
<i>Paper 1</i>	5	5	5	5	5	5	90
<i>Paper 2</i>	5	5	5	5	5	5	
<i>Paper 3</i>	5	5	5	5	5	5	
<i>Elective</i>	-	-	-	-	3	3	6
<i>Compulsory Courses</i>	2 (<i>Psychological Wellbeing</i>)	2 (<i>Indian Constitution</i>)	2 (<i>Environmental Studies</i>)	-	2 (<i>Skill Based Course</i>)	2 (<i>Research Methodology</i>)	10
<i>Extension and Extra Curricular Activities</i>	1 <i>College Association Activities</i>		1 <i>Department Association Activities</i>				4
	1 <i>Outreach Activities</i>		1 <i>Outreach Activities</i>				
<i>Allied Required* (SWAYAM/N PTEL/Certificate Courses)</i>	3	3		2	2	2	12
<i>Internship</i>			2 (<i>Social, Startup, Hospitality/Tourism</i>)		2 (<i>Corporate</i>)		4
<i>Total Credits</i>	26	28	25	25	24	22	150

B. Sc. - Economics, Mathematics and Data Analytics Programme

**PROGRAMM STRUCTURE
CORE SUBJECTS
SEMESTER - I**

Course Code	Title of the Course	Category	Lecture Hours per week	Credits
S1 24 MC 101	Microeconomics	Major Core	5	5
S1 24 MC 102	Fundamentals of Applied Mathematics	Major Core	5	5
S1 24 MC 103	Descriptive Statistics and Excel	Major Core	5	5
S1 24 AR 101	Contemporary Indian Economy	Allied Required	3	3
S1 24 GE 101	Language 1	Language	3	3
	Language 2	Language	3	3
S1 24 KN 101	Kannada			
S1 24 HN 101	Hindi			
S1 24 AE 101	Additional English			
UG 24 FC 101	Psychological wellbeing	Compulsory course	2	2
Total credits				26

SEMESTER - I

S1 24 MC 101: MICROECONOMICS

COURSE OBJECTIVES

The course is designed to acquaint the students with the basic concepts of microeconomics which form the base of modern economics. The course help the student understand the functioning of the economy at the individual level.

Module 1 - Introduction to Economics 10 hrs

Introduction to Economics: Nature and scope of economics, Basic Concepts in economics, Importance of study of Economics, Understanding the economy, Mankiw's ten principles of economics.

Module 2 - Approaches to Consumer Behaviour 15 hrs

Cardinal Analysis: Utility: Law of diminishing marginal utility, equi marginal utility, consumer's equilibrium, Consumer surplus and its - application. Ordinal analysis: Meaning of Indifference curves - Indifference Schedule, Indifference Map, properties of Indifference curves Budget line - Equilibrium position, Income, Price, and substitution effects through **Hicks and Slutsky's Method**-inferior goods v/s Giffen goods, Samuelson's revealed preference theory, **Choice under risk and uncertainty.**

Module 3 - Demand Analysis 10 hrs

Meaning and Determinants of Demand, the Demand Schedule, The Law of Demand, Exceptions to the Law of Demand, Elasticity of Demand: Meaning- Types: Price, Income and Cross Elasticity, Measurement of Elasticity of Demand. Supply: Concept of Supply, the Law of Supply, and Determinants of Supply.

Module 4 - Production Analysis 15 hrs

Production Function Production Function - The Law of Variable Proportion - the Law of Returns to Scale -**Isocost- Isoquant Approach**- Least cost combination of Inputs

Module 5 - Cost Analysis 5 hrs

Cost Concepts, Cost output relationship in the short - run and long - run - Relationship between Short run and long run curves, Relationship between Average Cost and Marginal Cost

Module 6 - Market Competition 20 hrs

Concepts of Revenue: Total, Average and Marginal Revenue Curve
- Price and Output determination under different markets: Meaning and features of perfect competitive market, Monopoly, Monopolistic competition and oligopoly, Price, and Output determination under these markets. **(in depth)**

SKILL DEVELOPMENT

(These activities are only indicative, and the faculty member can innovate)

1. Understand how economic concepts are applicable to everyday life by taking live examples.
2. Conduct a small survey to understand how consumer behaviour has evolved during the pandemic.
3. Choose a particular firm or industry and study the demand forecasting techniques.
4. Analyse different companies and identify which market competition they fall into.
5. Study the price fluctuations in the market due to changes in demand and supply.

COURSE OUTCOMES:

After the completion of the course, students will be able to:

1. Analyse the economic behaviour of the consumer and the firm
2. Explain the relationship between various variables such as Input and output, cost and output, price of the product and quantity demand and so on
3. Product and Factor pricing under different market structure

Books for Reference

1. Ahuja H.L, Advanced Economic Theory, S. Chand and Company, New Delhi
2. Koutsoyiannis A, Modern Microeconomics, Macmillan, London
3. Dominick Salvatore, Theory and Problems of Microeconomic Theory, Schaum's Outline Series, McGraw-Hill Book Company, Singapore
4. Ferguson C.E and Maurice S. Charles, Economic Analysis-Theory and Applications, Richard D. Irwin Inc. USA
5. Hubbard R. Glenn and Anthony Patrick O'Brien, Microeconomics, Pearson Prentice Hall, New Jersey
6. Pindyck Robert S., and Daniel L. Rubinfeld, Microeconomics, Pearson Prentice Hall, New Jersey
7. Varian, H. R., "Intermediate Microeconomics: A Modern Approach", W. W. Norton and Company

S1 24 MC 102: FUNDAMENTALS OF APPLIED MATHEMATICS

COURSE OBJECTIVES:

This aims to provide students with a firm grasp of key matrix algebra, differential and integral calculus, and mathematical modelling. Through theoretical learning and practical applications, students will develop essential problem-solving skills relevant to mathematical analysis in addressing real-world problems.

Module - 1: Sets and functions 12 hrs

Definition of sets, set notation, types of sets, set operations (union, intersection, and difference), laws of set operations, Venn diagram and applications. Relations and Functions: ordered pairs, definition of a relation and examples, definition of a function, domain, codomain and range of a function, and types of functions (one to one, onto, many to one, and bijective) with examples. Algebraic functions -constant function, polynomial functions, rational functions and non - algebraic functions.

Module 2: Matrices, Determinants and Applications 15 Hrs.

Definition of matrix, order, Types of matrices, Determinant: Value of determinant of order 2×2 and 3×3 , adjoint, row operations, inverse using formula method and row operations (2×2 and 3×3 matrices only). System of linear equations, augmented matrix, row operations, row echelon form, reduced row echelon form, existence and uniqueness of the solution, Gauss -Elimination method, Cramer's and matrix methods (2×2 and 3×3 matrices only).

Applications - Linear systems: Investment Problems, Traffic Flow, and Balancing the Chemical equations, and data encryption and decryption using a matrix and its inverse.

Module - 3: Differential Calculus 15 hrs

Functions, Limits and Continuity, Derivative of a function (concepts only), derivatives of the standard functions (excluding trigonometric functions), Rules of Differentiation: addition/subtraction, scalar multiplication, product, quotient, chain, Partial Derivatives, Maxima and Minima, and Lagrangian Multiplier-Constrained Optimization.

Applications: Cost minimization and Revenue and Profit maximization, Break Even Point, Marginal Cost, Marginal Revenue, and price elasticity of demand.

Module - 4: Integral Calculus 15 hrs

Introduction, Indefinite Integration, Standard Integrals (excluding trigonometric functions), Rules of Integration: addition/subtraction and scalar multiplication, Integration by Substitution, Integration by Parts, Integration by resolving into Partial Fractions.

Applications of Integration in business (finding cost, revenue functions from marginal cost and marginal revenue functions)

Module - 5: Differential Equations 8 Hrs

Definition of differential equation, first and second order linear homogenous ordinary differential equation with constant coefficients and its solution.

Module -6: Mathematical modelling using differential equations 10 hrs

Definition of Mathematical modelling, Applications: Radioactive Decay, Logistic growth (fishery, rabbits' population, piggery etc.), and Exponential Growth (continuous compounding of an invested amount)

SKILL DEVELOPMENT

1. Visualization of solution or roots of algebraic functions and discussion of nature of the roots
2. To solve and visual system of linear equations with 3 variables on GeoGebra website (Math visualizer platform)
3. Visualization of maxima and minima of single and multivariable functions(optimization) through function plotting software.
4. Visualization of the solution of the differential equations.

COURSE OUTCOMES:

After the completion of the course, students will be able to:

1. Understand the basic concepts of sets, relations, and functions.
2. Perform operations in matrix algebra and solve system of equations of real-world problems.
3. Differentiate and optimize the function of single and multiple independent variables.
4. Integrate functions with single independent variable.
5. Solve first and second order linear ordinary homogenous differential equations.
6. Model and solve differential equations governing real world problems.

Books for Reference

1. P. N. Arora & S. Arora: Mathematics
2. Lay, D. C., Lay, S. R., & McDonald, J. J, Linear algebra, and its applications
3. Pugh, C. C, Real mathematical analysis
4. Fitzpatrick, P. M., Advanced calculus
5. D.R. Agarwal: Comprehensive Mathematics
6. Anand Sharma: Business Mathematics & Analytics
7. Ajay Goel &Alka Goel: Mathematics & Statistics
8. Robert R. Stall: Linear Algebra & Matrix Theory

S1 24 MC 103: DESCRIPTIVE STATISTICS AND EXCEL

COURSE OBJECTIVES

This aims to provide students with a firm grasp of basic statistical concepts. Through theoretical learning and practical applications, students will develop an essential problem-solving skill relevant to statistics and real-world data analysis and interpretation, with a focus on applications in various fields and master excel functions for precise data manipulation. Develop proficiency in data visualization through charts and graphs for clear communication of insights. Gain expertise in dashboard development for representation of dynamic systems.

Module 1: Introduction to Statistics 15 Hrs.

Definition of Statistics, Scope and Limitations, Ethics to be followed by a statistician and role of statistics in sustainable development. Data- Meaning, Collection methods, and sampling techniques, Variables and Attributes - Discrete and Continuous Variables, Classification of data based on the nature of the variable and the source of collection, Formation of Statistical Series, Frequency Distribution (univariate and bivariate) and Tabulation. Diagrams and Graphs: Line, Bar diagrams and Pie chart, Ogives, Histogram, Frequency Curve and Polygon.

Module 2: Measures of Central Tendency and Dispersion 15 Hrs.

Meaning of Central Tendency, Arithmetic Mean (Simple, Weighted and Combined), Median, Mode, Empirical relationship, Quartiles, Deciles, Percentiles (applications, importance, merits, and demerits). Definition of Dispersion, Importance of Dispersion, Range, Quartile Deviation, Mean Deviation, Standard Deviation, and their coefficients, (applications, importance, merits, and demerits).

Module 3: Skewness and Kurtosis 10 Hrs.

Definition of Skewness, Measures of Skewness: Karl Pearson's and Bowley's Coefficient of Skewness, Moments (about mean and arbitrary point), Coefficient of Skewness based on Moments. Definition of Kurtosis, Measure of Kurtosis, and Coefficient of Kurtosis based on Moments.

Module 4: Correlation & Simple Linear Regression Analysis 15 Hrs

Correlation: definition, scatter diagram, levels of correlation, Karl Pearson's Coefficient of Correlation (Direct method only), probable error and confidence interval, and Spearman's Correlation Coefficient (unique and repeated ranks) and applications. Meaning of Linear regression, general expression ($y = \beta_0 + \beta_1x + \epsilon$), types of simple linear regression equations, regression equation using method of least squares (direct method only), relationship between regression and correlation coefficients, and applications.

Module 5: Introduction to Excel 10 Hrs

Origin and Importance of Excel in Data Analysis, workbook, sheets: cells, columns, rows,

ribbon and its components, table border and style, cell colour, text colour, range, formula bar and status bar, referencing: Relative, Absolute and Mixed, Mathematical operators and relations. Excel Functions - Mathematical Functions: SUM, AVERAGE, COUNT, COUNTA, MIN/MAX, SQRT, POWER, LCM, COMBIN and PERMUT. String functions: LEN, LEFT, MID, RIGHT, CONCAT, TRIM, UPPER, LOWER, PROPER, Date Functions, Random number generators: RAND and RANDBETWEEN, Conditional functions: IF, NESTED IF, SUMIFS, COUNTIFS, and AVERAGEIFS, Data Handling Functions: VLOOKUP, HLOOKUP. Financial functions: PMT, PV, RATE, NPER.

Module 6 : Statistical Analysis using Excel 10 Hrs

Data Visualization: Bar charts, Column charts, Histogram, pie-chart, Line graphs, Sparklines, Scattered plot: linearity check and curve fitting, Chart elements and Chart designs. Interactive Dashboard Development: Pivot Table, Pivot Chart and Slicers. Measures of Central tendency: mean, median, mode, Dispersion: standard deviation, skewness and kurtosis, coefficient of correlation, simple linear regression, and estimation. What if Analysis: Goal Seek, Scenario manager, and Data table (one way and two way).

Skill Component:

Group Project: Utilizing Excel Tools for Analysis and Presentation of Insights.

The objective of this project is to employ the necessary Excel tools to analyse a given case study and extract valuable insights and presentation the same.

Course Outcomes:

After completion of the course, the students will be able to

1. Illustrate the significance of statistics in analysing business problems.
2. Use the concept of measures of central tendency and dispersion for decision making.
3. Apply the concept of Correlation and Regression to analyse the data.
4. Proficiently utilize Excel functions for precise data manipulation, enhancing analytical capabilities.
5. Demonstrate proficiency in data visualization through charts and graphs, and in statistical analysis, enabling clear communication of findings.

Books for Reference:

1. Gupta S.P., Statistical Methods, New Delhi, Sultan Chand & Sons.
2. J K Sharma - Business Statistics.
3. Akhilesh K. B. and Balasubrahmanyam S, Mathematics and statistics for Management, 1st Edition, Delhi, Vikas Publishing.
4. Winston, W. L., Microsoft Excel: Data Analysis & Business Model.
5. Lalwani, L., Excel All-In-One.
6. McFedries, P. Excel Formulas and Functions.
7. Alexander, M., & Walkenbach, J. Excel Dashboards and Reports.

UG 24 FC 101: PSYCHOLOGICAL WELL-BEING

COURSE OBJECTIVE

This course aims to nurture self-awareness and meaningful relationship skills and to help in the development of emotional quotient and inter-personal skills.

Module 1 - Introduction 3 Hrs.

Meaning of counselling - Myths and Facts related to counselling - Breaking stigmas related to seeking counselling - Normalizing seeking help - Self-reflection through concentric circles.

Module 2 - Intra-personal and Inter-personal Awareness 10 Hrs.

Meaning of self-esteem - Factors that influence self-esteem - Importance of self-esteem - Effects of low self-esteem - Qualities seen in people with high vs. low self-esteem - How to improve self-esteem - Self-awareness activity. Meaning of peer pressure - Different kinds of peer pressure - Resisting peer pressure - Confronting peer pressure - Group sharing activity. Meaning of relationships - Types of relationships - Healthy relationship dynamics - Personal Rights in a relationship - Components of a healthy relationship - Types of abuse in a relationship - Intimacy and understanding our needs - Boundaries

Module 3 - Understanding Emotions 4 Hrs.

Meaning of emotions - Role of emotions in our lives - Beliefs regarding emotions - Harmful effects of suppressing emotions - Signs of emotional suppression - Handling emotions in a healthy manner - Self-assessment activity

Module 4 - Anger management 5 Hrs.

Meaning of anger - Physical and Emotional symptoms of anger - Different ways that people express anger - Expression and experience of anger - What makes us angry and what it means when we're angry - Dealing with anger - Guided visualization and art activity.

Module 5 - Managing Anxiety/Fear 4 Hrs.

Meaning of fear - Types of fear - Physical and Emotional symptoms of fear - Different reactions to fear - Overcoming fear - Artwork followed by group sharing activity.

Module 6 - Dealing with Loss and Grief 4 Hrs.

Understanding loss and grief - Form of loss - Stages of grief - Dangers of not grieving - Dealing with grief - Ways to help others in grief.

COURSE OUTCOMES

After completion of the course, the students should be able to:

1. Develop a better emotional quotient.
2. Formulate a healthier sense of self through self-awareness.
3. Build more meaningful relationships.
4. Display an improvement in inter-personal skills.
5. Modify thought and belief patterns.

S1 24 AR 101: CONTEMPORARY INDIAN ECONOMY

Course objectives

- To familiarise students on the current problems of Indian Economy
- Identify solutions through specific policies.

Module 1: LPG Policies and Economic Reforms 5 hrs

of LPG-Economic reforms under the New economic policy – globalisation, privatisation, and liberalisation -Niti Aayog – functions and its role in India's economic development

Module 2 NITI AAYOG and Economic Development 10 hrs

NITI Aayog and goals of SDG, programs of the govt- priorities of economic growth and employment, education, health and gender, environmental concerns, clean water, energy security, poverty alleviation and income inequality (overview of different programs). Population and demographic dividend. Human development Index, Hunger Index, Gross Happiness Index,

Module 3 Economic Reforms in Agriculture and Food management 10 hrs

Green revolution- Agricultural Finance-Agriculture price policy, minimum support price-procurement prices and issue price- zero hunger, public distribution system. MGNREGA-Agriculture and WTO (overview)

Module 4. Industry, innovation, infrastructure 10 Hours

New Industrial Policy 1991- public sector reforms, privatisation and disinvestment, entrepreneurship- competition policy. Role of MNCs in industrial development- economic and social infrastructure-roads, railways, airports tele density (overview).

Module 5. Monetary, Fiscal Policy and External Trade 10 Hours

Monetary Policy – RBI- Monetary policy -banking privatisation, role of SEBI. Fiscal Policy - Finance Commission and its role- Fiscal federalism. India's foreign trade- volume, direction, and composition (latest trends)- FDI -Meaning, trends and patterns- India's balance of payment since 1991.

Skill Development:

1. Using case study analyse the U N sustainable development goals.
2. Draft a diagrammatic representation of inflation rates for specific products using secondary data from websites
3. Using a chart to show impact of MNREGA works.
4. Using secondary data analyse India's direction of trade in the last 5 years.
5. Using secondary data analyse India's volume of trade in the last 5 years.

Course Outcomes

After completion of the course the students will be able to:

1. Understand the current problems of Indian Economy
2. Analyse the sector specific policies adopted for achieving the aspirational goals.
3. Review various economic policies adopted.
4. understand the history of Economic planning in India.
5. understand the sectoral reforms through LPG policy.

BOOKS FOR REFERENCE

1. Ramesh Singh. 2022 The Indian Economy, Tata McGraw Hill
2. Byres Terence J. (ed.), (1998), The State, Development Planning and Liberalisation 'in India, Delhi,
3. Dutt Ruddar and K.P.M Sundaram (2011): Indian Economy, S Chand& Co. Ltd. New Delhi
4. Frankel Francine R., (2004), India's Political Economy, Delhi.Jenkins Rob, 2000, Economic Reform in India, Cambridge,
5. Jalan, B. (1996), India's Economic Policy- Preparing for the Twenty First Century, Viking, New Delhi.
6. Joshi Vijaya and L.M.D. Little, (1998), India's Economic Reform 1991-2001, Delhi,
7. Kapila Uma: Indian Economy: Policies and Performances, Academic Foundation
8. Mishra S.K & V.K Puri (2001) "Indian Economy and -Its development experience", Himalaya Publishing House.
9. Mukharji Rahul (ed.) (2007), India's Economic Transition: The Politics of Reforms, edited by Rahul Mukherji, Oxford University