



**Shri Vaishnav Vidyapeeth Vishwavidyalaya, Indore**  
**Shri Vaishnav School of Management**

**Choice Based Credit System (CBCS) in Light of NEP-2020**  
**BBA (Hons.) - III SEMESTER (2021-2024)**

**ML307 ENVIRONMENTAL MANAGEMENT AND SUSTAINABILITY**

COURSE CODE	CATEGORY	COURSE NAME	TEACHING & EVALUATION SCHEME									
			THEORY			PRACTICAL			L	T	P	CREDITS
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*					
ML307	AECC	Environmental Management and Sustainability	60	20	20	0	0	3	0	0	3	

**Legends:** L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical: C - Credit; AECC- Ability Enhancement Compulsory Course

\***Teacher Assessment** shall be based on following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

**Course Objective**

1. To create awareness towards various environmental problems.
2. To create awareness among students towards issues of sustainable development.
3. To expose students towards environment friendly practices of organizations.
4. To sensitize students to act responsibly towards environment.

**Examination Scheme**

The internal assessment of the students' performance will be done out of 40 Marks. The semester Examination will be worth 60 Marks. The question paper and semester exam will consist of two sections A and B. Section A will carry 36 Marks and consist of five questions, out of which student will be required to attempt any three questions. Section B will comprise of one or more cases / problems worth 24 marks.

**Course Outcomes**

1. The course will give students an overview of various environmental concerns and practical challenges in environmental management and sustainability.
2. Emphasis is given to make students practice environment friendly behavior in day-to-day activities.

**COURSE CONTENT**

**UNIT I: Introduction to Environment Pollution and Control**

1. Pollution and its types (Air, Water, and Soil): Causes, Effects and Control measures
2. Municipal Solid Waste: Definition, Composition, Effects
3. Electronic Waste: Definition, Composition, Effects
4. Plastic Pollution: Causes, Effects and Control Measures

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**UNIT II: Climate Change and Environmental Challenges**

1. Global Warming and Green House Effect
2. Depletion of the Ozone Layer
3. Acid Rain
4. Nuclear Hazards

**UNIT III: Environmental Management and Sustainable Development**

1. Environmental Management and Sustainable Development: An overview
2. Sustainable Development Goals (17 SDGs)
3. Significance of Sustainable Development
4. Environment Friendly Practices At Workplace and Home (Three Rs' of Waste Management, Water Conservation, Energy Conservation)

**UNIT IV: Environmental Acts**

1. The Water (Prevention and Control of Pollution) Act, 1974: Objectives, Definition of Pollution under this act, Powers and Functions of Boards
2. The Air (Prevention and Control of Pollution) Act, 1981: Objectives, Definition of Pollution under this act, Powers and Functions of Boards
3. The Environment (Protection) Act, 1986: Objectives, Definition of important terms used in this Act, Details about the act.
4. Environmental Impact Assessment: Concept and Benefits

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**UNIT V: Role of Individuals, Corporate and Society**

1. Environmental Values
2. Positive and Adverse Impact of Technological Developments on Society and Environment
3. Role of an individual/ Corporate/ Society in environmental conservation
4. Case Studies: The Bhopal Gas Tragedy, New Delhi's Air Pollution, Arsenic Pollution in Ground Water (West Bengal), Narmada Valley Project, Cauvery Water Dispute, Fukushima Daiichi Disaster (Japan), Ozone Hole over Antarctica, Ganga Pollution, Deterioration of Taj Mahal, Uttarakhand flash floods

**Suggested Readings:**

1. Rogers, P.P., Jalal, K.F. , Boyd, J.A.(Latest Edition) . **An Introduction to Sustainable Development.** Earthscan
2. Kalam, A.P.J. (Latest Edition) . **Target 3 Billon: Innovative Solutions Towards Sustainable Development.** Penguin Books
3. Kaushik , A. and Kaushik (Latest Edition). **Perspectives in Environmental Studies.** New Delhi: New Age International Publishers.
4. Dhameja, S.K. (Latest Edition). **Environmental Studies.** S.K. Kataria and Sons.New Delhi
5. Bharucha, E. (Latest Edition). **Environmental Studies for Undergraduate Courses.** New Delhi: University Grants Commission.
6. Wright, R. T. (Latest Edition). **Environmental Science: towards a sustainable future .**New Delhi: PHL Learning Private Ltd.
7. Rajagopalan, R. (Latest Edition). **Environmental Studies.** New York: Oxford University Press.

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# Shri Vaishnav Vidyapeeth Vishwavidyalaya, Indore

## Name of the Program: B. Sc. (Statistics)

SUBJECT CODE	Category	SUBJECT NAME	TEACHING & EVALUATION SCHEME								
			THEORY			PRACTICAL		Th	T	P	CREDITS
			END SEM	MST	Q/A	END SEM	Q/A				
BSST303	DC	Statistical Inference	60	20	20	30	20	3	0	4	5

**Legends:** L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C – Credit.

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### Course Objective

*To introduce the students with the Fundamentals of the Statistical Inference*

### Course Outcomes

*After the successful completion of this course students will be able to:*

- Know the contribution of a good estimator.
- Apply the Cramer Rao inequality.
- Differentiate between Type-I and Type-II error.
- Conduct and Interpret student's t, Snedecor's F and chi-square Distribution.
- Differentiate between parametric and non-parametric test.
- Identify, apply and interpret the different small sample and large sample tests.

### Course Content:

#### UNIT – I

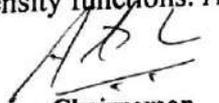
Theory of Estimation: Definition of a random sample, Parameter and Statistic. Concepts of point and interval estimation, criterion of a good estimator; Unbiasedness, Consistency, efficiency and sufficiency; Mean square error of an estimate, Method of maximum likelihood estimation. Cramer - Rao inequality and its applications confidence interval.

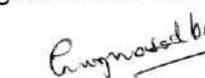
#### UNIT – II

Concept of Test of Significance, Null and alternative hypothesis, Simple and composite hypothesis. Type I and II errors, Critical region and level of significance. One and two tailed tests, Neymann Pearson lemma for construction of most powerful tests for simple null versus simple alternative for the parameters of Binomial, Poisson and Normal distributions. Likelihood ratio test, Likelihood ratio test for single mean.

#### UNIT – III

Non parametric Tests: Order statistics: Definition, distributions of single, joint and marginal density functions. Advantages and disadvantages of non-parametric methods. Run test for

  
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randomness, sign tests for univariate and bivariate distribution, Wilcoxon's signed ranked test for univariate and bivariate distribution, Mann-Whitney U test, Wald-Wolfowitz run test, Median test (Applications only).

#### UNIT – IV

Sampling Distribution Sampling distribution of a statistic, definition of standard error and some examples. Sampling distribution of Sum of binomial and poisson variates. Sampling distribution of mean of normal distribution. Derivation of Chi-Square, Student's t, Fisher's t and F distributions with their properties, relation between Chi-Square, t and F.

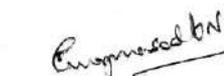
#### UNIT – V

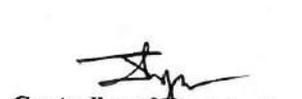
Large Sample Tests: Test of significance of single proportion, z-test of significance for single mean and for difference of means. **Small Sample Test:** t-Test for single mean, and difference of means, paired t-test, F-test for equality of population variances. Conditions for the validity of Chi-square test for goodness of fit, test for independence of attributes: (Contingency table). Fisher's Z-transformations and their applications.

#### SUGGESTED READINGS:

1. Goon A.M., Gupta M.K.: Das Gupta.B. (2005), Fundamentals of Statistics, Vol. I, World Press, Calcutta.
2. Rohatgi V. K. and Saleh, A.K. Md. E. (2009): An Introduction to Probability and Statistics. 2<sup>nd</sup> Edn. (Reprint) John Wiley and Sons.
3. Miller, I. and Miller, M. (2002) : John E. Freund's Mathematical Statistics (6th addition, low price edition), Prentice Hall of India.
4. Dudewicz, E. J., and Mishra, S. N. (1988): Modern Mathematical Statistics. John Wiley & Sons.
5. Mood A.M, Graybill F.A. and Boes D.C.: Introduction to the Theory of Statistics, McGraw Hill.
6. Bhat B.R, Srivenkatramana T and Rao Madhava K.S. (1997) Statistics: A Beginner's Text, Vol. I, New Age International (P) Ltd.
7. Snedecor G.W and Cochran W.G.(1967) Statistical Methods. IOWA State University Press.
8. Jim Frost, Introduction to Statistics: An Intuitive Guide for Analyzing Data and Unlocking Discoveries, Jim Frost MS.

  
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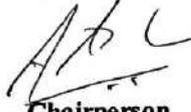
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BSST303	DC	Statistical Inference	60	20	20	30	20	3	0	4	5

### List of Practical

1. Unbiased estimators (including unbiased but absurd estimators)
2. Consistent estimators, efficient estimators and relative efficiency of estimators.
3. Cramer-Rao inequality and MVB estimators
4. Sufficient Estimators – Factorization Theorem, Rao-Blackwell theorem, Complete Sufficient estimators
5. Lehman-Scheffe theorem and UMVUE
6. Maximum Likelihood Estimation
7. Asymptotic distribution of maximum likelihood estimators
8. Estimation by the method of moments, minimum Chi-square
9. Type I and Type II errors
10. Most powerful critical region (NP Lemma)
11. Uniformly most powerful critical region
12. Unbiased critical region
13. Power curves
14. Likelihood ratio tests for simple null hypothesis against simple alternative hypothesis
15. Likelihood ratio tests for simple null hypothesis against composite alternative hypothesis
16. Asymptotic properties of LR tests

  
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			THEORY			PRACTICAL		Th	T	P	CREDITS
			END SEM	MST	Q/A	END SEM	Q/A				
BSMA304	DC	Integral Calculus	60	20	20	-	-	4	0	-	4

### Course Objective

*To introduce the students with the Fundamentals of the Integral Calculus.*

### Course Outcomes

*This course will enable the students to:*

- 1. Develop the Reduction Formulae.*
- 2. Know and apply various properties of the Definite Integral.*
- 3. Justify the concept of double and triple integral and their application.*
- 4. Learn about length, surface area and the volume by single and the multiple integrals.*

### Course Content

#### UNIT – I

**Integration:** Integration of the form :  $\int \frac{dx}{a \cos x + b \sin x + c}$ ,  $\int \frac{a \cos x + b \sin x + c}{p \cos x + q \sin x + r} dx$  and

Integration of Rational functions, six important integral, Reduction formulae of  $\int \sin^m x \cos^n x dx$ ,  $\int \sin^m x \cos^n x dx$ ,  $\int \tan^n x dx$  and associated problems (m and n are non-negative integers).

#### UNIT – II

**Definite Integral:** Evaluation of definite integrals, Properties of integral Calculus, Integration as the limit of a sum (with equally spaced as well as unequal intervals), summation of series.

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BSMA304	DC	Integral Calculus	60	20	20	-	-	4	0	-	4

### UNIT – III

**Definition of Improper Integrals:** Statements of (i)  $\mu$  -test, (ii) Comparison test (Limit form excluded) – Simple problems only. Use of Beta and Gamma functions (convergence and important relations being assumed).

### UNIT – IV

**Rectification:** Length of Plane Curve, Intrinsic Equation of a Curve, Quadrature, Working knowledge of Double integral, Application of Double integral, Change Order of integration.

### UNIT – V

**Volume and Surfaces of Revolution:** Volume and Surface areas of solids formed by revolution of plane curve and areas Problems only.

### Texts:

- 1 Integral Calculus – Shanti Narayan & P. K. Mittal (S. Chand & Co. Ltd.)
- 2 Integral Calculus – H. S. Dhama (New Age International)
- 3 Integral Calculus – B. C. Das & B. N. Mukherjee (U. N. Dhur)
- 4 Differential & Integral Calculus (Vols. I & II) – Courant & John.
- 5 Differential & Integral Calculus (Vol. I) – N. Piskunov (CBS Publishers & Distributors)
6. Integral Calculus – Shantin Narayan.

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BSMA305	DC	Differential Equations	60	20	20	-	-	4	0	-	4

### Course Objective

*To introduce the students with the Fundamentals of the Differential Equation.*

### Course Outcomes

*This course will enable the students to:*

- 1. Learn various techniques of getting solution of first order and first-degree differential equation.*
- 2. Apply the techniques of the orthogonal trajectories.*
- 3. Demonstrate the solution of the second order linear differential equation.*
- 4. Solve Euler's Homogeneous equations.*

### Course Content

#### UNIT – I

**Differential equation of first degree and first order:** Order, degree and solution of an ordinary differential equation (ODE) in presence of arbitrary constants, Formation of ODE, First order equations, Variables separable, Homogeneous equations and equations reducible to homogeneous forms, Exact equations and those reducible to such equation, Euler's and Bernoulli's equations (Linear).

#### UNIT – II

**Equation of the first order but not of the first degree:** Equation solvable for P, Equation solvable for X, Equation solvable for y, Clairaut's Equations (General and Singular solutions).

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BSMA305	DC	Differential Equations	60	20	20	-	-	4	0	-	4

### UNIT – III

**Orthogonal Trajectories:** Definition, Cartesian coordinates, polar coordinates, Self Orthogonal families.

### UNIT – IV

**Second order linear equations:** Second order linear differential equations, with constant coefficients, operator, Rule of finding particular integral.

### UNIT – V

**Homogeneous equations:** Euler's Homogeneous equations, Equation reducible to homogeneous form.

### Texts:

1. Differential Equations – Lester R. Ford (McGraw Hill).
2. Differential Equations – S. L. Ross (John Wiley).
3. Differential Equations – H. T. H. Piaggio.
4. A Text Book of Ordinary Differential Equations – Kiseleyev, Makarenko & Krasnov (Mir).
5. Differential Equations – H. B. Phillips (John Wiley & Sons).
6. Differential Equations with Application & Programs – S. Balachanda Rao, H. R. Anuradha (University Press).
7. Text Book of Ordinary Differential Equations (2nd Ed.) – S. G. Deo, V. Lakshminantham & V. Raghavendra (Tata McGraw Hill).
8. An Elementary Course in Partial Differential Equation – T. Amarnath (Narosa).
9. An Introductory Course on Ordinary Differential Equation – D. A. Murray

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BAHNECO301	CC	Macro Economics I	60	20	20	0	0	3	0	0	3	

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**Course Educational Objectives:**

- CEO1: To provide the knowledge about the basic terms of macroeconomics.
- CEO2: To enable students to calculate the national income through various methods.
- CEO3: To help students in identifying various multipliers and accelerators.
- CEO4: To relate money supply with its determinants.
- CEO5: To summarise various theories of demand for money.

**Course Outcomes:**

Students will be able to:

- CO1: Define basic concepts related to economics.
- CO2: Solve the problems of national income accounting.
- CO3: Demonstrate the use of multipliers and accelerators in an economy.
- CO4: Link money supply with its determinants.
- CO5: Discuss various theories of demand for money.

**Syllabus**

**UNIT I: Introduction**

Nature and Scope of Macroeconomics, Stock and Flow Variables; Equilibrium and Disequilibrium, Statics, Comparative Statics and Dynamics

**UNIT II: National Income Accounting**

Concepts of National Income: GDP, GNP, NNP, NDP, Personal Income and Personal Disposable Income, Measurement of National Income – Expenditure Method, Concept of Green GDP; Concepts of Quick Estimates, Revised Estimates, Budget Estimates

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**UNIT III: Theory of Multiplier and Accelerator**

The Concept of Investment Multiplier, Working of Multiplier, Leakages in Multiplier Process, Theory of Accelerator

**UNIT IV: Supply of Money and its Determinants**

Money Supply and High-Powered Money, Four Concepts of Money Supply, Factors Determining Money Supply.

**UNIT V: Demand for Money**

Motives for Liquidity Preference, Transactions Demand for Money, Precautionary Motive, Speculative Demand for Money, Keynesian Liquidity Preference Theory

**Suggested Readings:**

1. Ahuja, H. L. (2021). *Principles of Macroeconomics*. New Delhi: S Chand Publication
2. Dwivedi, D.N. (2020). *Macroeconomics: Theory and Policy*. New Delhi: McGraw Hill Education (India) Pvt Limited
3. Sikdar, Shoumyen (2021). *Principles of Macroeconomics*. India: Oxford University Press
4. Agrawal, Vanita (2020). *Macroeconomics Theory and Policy*. New Delhi: Pearson Education Inc

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Vishwavidyalaya, Indore

**Chairperson**

Faculty of Studies

Shri Vaishnav Vidyapeeth  
Vishwavidyalaya, Indore

**Controller of Examination**

Shri Vaishnav Vidyapeeth  
Vishwavidyalaya, Indore

**Joint Registrar**

Shri Vaishnav Vidyapeeth  
Vishwavidyalaya, Indore