# SISTER NIVEDITA UNIVERSITY

# SYLLABUS FOR THREE YEARS B.Sc. (DEGREE) COURSE IN ECONOMICS UNDER UGC-CBCS SYSTEM

**2020**

***CREDIT DISTRIBUTION***

Name of Department: **Economics**
Name of the UG program: **B.Sc. (Hons.)**
Duration of Program: **6 Semester (3 years)**
Head/ In-Charge of the Department: **Navin Kumar Jha**

| Credit | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Semester** | **CC** | **DSE** | **GE** | **AECC** | **SEC** | **USC** | Total/ Sem |
| **1st** | 12 | | 4 | 2 | | 2 | 20 |
| **2nd** | 12 | 6 | 4 | 2 | 1 | 2 | 27 |
| **3rd** | 12 | 6 | 4 | 2 | 1 | 2 | 27 |
| **4th** | 12 | 6 | 4 | 2 | 1 | 2 | 27 |
| **5th** | 18 | 6 | | | 1 | | 25 |
| **6th** | 18 | | | | 6 | | 24 |
| Total Credit / Course | **84** | **24** | **16** | **8** | **10** | **8** | **150** |

**CC:** Core Courses; **GE**: General Elective; **AECC:** Ability Enhancement Compulsory Course; **SEC**: Skill Enhancement Courses; **DSE**: Discipline Specific Elective; **USC:** University specified course

| Category | Course name | Code | Credit | Teaching Scheme | | |
|---|---|---|---|---|---|---|
| | | | | L | T | P |
| **Semester-I** | | | | | | |
| CC-1 | Introductory Microeconomics | 1251111 | 6 | 5 | 1 | 0 |
| CC-2 | Introductory Macroeconomics | 1251112 | 6 | 5 | 1 | 0 |
| GE-1 | Generic Elective | 1253113 | 4 | 4 | 0 | 0 |
| AECC-1 | Communicative English | 1254114 | 2 | 2 | | 0 |
| USC-1 | Foreign Language I | 1256115 | 2 | 2 | 0 | 0 |
| Total Credit = 20 | | | | Teaching Hour = 20 | | |
| **Semester-II** | | | | | | |
| CC-3 | Intermediate Microeconomics | 1251121 | 6 | 5 | 1 | 0 |
| CC-4 | Intermediate Macroeconomics | 1251122 | 6 | 5 | 1 | 0 |
| DSE-1 | Basic Statistics | 1252123 | 6 | 4 | 0 | 2 |
| GE-2 | Generic Elective | 1253124 | 4 | 3 | 1 | 0 |
| AECC-2 | Communicative English | 1254125 | 2 | 2 | 0 | 0 |
| SEC-1 | Mentored Seminar – I | 1255326 | 1 | 1 | 0 | 0 |
| USC-2 | Foreign Language II | 1256127 | 2 | 2 | 0 | 0 |
| Total Credit = 27 | | | | Teaching Hour = 27 | | |
| **Semester-III** | | | | | | |
| CC-5 | Economics of Growth and Development | 1251131 | 6 | 5 | 1 | 0 |
| CC-6 | Mathematical Economics | 1251132 | 6 | 5 | 1 | 0 |
| DSE-2 | History of Economic Thought | 1252133 | 6 | 5 | 1 | 0 |
| GE-3 | Generic Elective | 1253134 | 4 | 3 | 1 | 0 |
| AECC-3 | Environmental Science | 1254335 | 2 | 2 | 0 | 0 |
| SEC-2 | Mentored Seminar – II | 1255336 | 1 | 1 | 0 | 0 |
| USC-3 | Foreign Language III | 1256137 | 2 | 2 | 0 | 0 |
| Total Credit = 27 | | | | Teaching Hour = 27 | | |
| **Semester-IV** | | | | | | |
| CC-7 | Public Finance | 1251141 | 6 | 5 | 1 | 0 |
| CC-8 | Basic Game Theory | 1251142 | 6 | 5 | 1 | 0 |
| DSE-3 | Probability and Probability Distributions | 1252143 | 6 | 5 | 1 | 0 |
| GE-4 | Generic Elective | 1253144 | 4 | 3 | 1 | 0 |
| AECC-4 | Environmental Science | 1254145 | 2 | 2 | 0 | 0 |
| SEC-3 | Mentored Seminar – III | 1255345 | 1 | 1 | 0 | 0 |
| USC-4 | Foreign Language IV | 1256346 | 2 | 2 | 0 | 0 |
| Total Credit = 27 | | | | Teaching Hour = 27 | | |
| **Semester-V** | | | | | | |
| CC-9 | Indian Economics | 1251151 | 6 | 5 | 1 | 0 |
| CC-10 | Basic Econometrics and Applications | 1251152 | 6 | 5 | 1 | 4 |
| CC-11 | Environmental Economics | 1251153 | 6 | 5 | 1 | 0 |
| DSE-4 | Statistical Computing with Statistical Packages | 1252154 | 6 | 1 | 5 | 0 |
| SEC-4 | Mentored Seminar – IV | 1255355 | 1 | 1 | 0 | 0 |
| Total Credit = 25 | | | | Teaching Hour = 25 | | |
| **Semester-VI** | | | | | | |
| CC-12 | Political Economy | 1251161 | 6 | 5 | 1 | 0 |
| CC-13 | Financial Economics | 1251162 | 6 | 5 | 1 | 0 |
| CC-14 | International Economics | 1251163 | 6 | 4 | 2 | 0 |
| SEC-5 | Dissertation/Project | 1255464 | 6 | 0 | 0 | 0 |
| Total Credit = 24 | | | | Teaching Hour = 24 | | |

## Course Outline Semester-1

## CC-1 Introductory Microeconomics

**Objectives:**

The basic objective of this course is to introduce students to the principles of microeconomics. There are two broad economic decisions that an Economist has to make: the behaviour of individuals and firms in making decisions regarding the allocation of scarce resources and the interactions among these individuals and firms. Based on the outcome of these two decisions, students can analyse the market mechanisms that establish relative prices among goods and services and allocate limited resources among alternative uses.

This course introduces various factors behind these decisions. The aim is to provide a grounding in the theory and practice of Microeconomics at an introductory level, and a synthesis of the most important current research in Microeconomics, with an emphasis on the applications of the principles.

**Session Plan**

| Sl no | Main Agenda | Components |
|---|---|---|
| 1 | **Basic Concepts** | Scarcity and Choice; Production possibility frontier, Positive and normative economics; constructing a model, scientific method; concepts of opportunity cost, rate of growth, and total, average and marginal functions. Demand and Supply: Market demand, elasticity, shifts and movements, Applications of Demand, Supply and elasticity. Revenue and Expenditure, elasticity and marginal revenue; income elasticity of demand; consumer surplus **(15 L+3T)** |
| 2 | **Consumer Behaviour** | Cardinal theory, derivation of demand in case of one or more goods; Ordinal theory: Budget sets and Preferences under different situations. Indifference curves: the marginal rate of substitution. Consumer equilibrium; effects of change in prices and income; Engels curve. Derivation of the demand curve. Income and substitution effects: Hicks and Slutsky. Applications of indifference curves to other economic problems Revealed preference theory and the derivation of the demand curve. **(15L+3T)** |
| 3. | **Production** | Production functions: single variable - average and marginal product, variable proportions, stages of production. Two variables - isoquants, returns to scale and to a factor; factor prices; cost minimization and output maximization; Elasticity of substitution. Expansion path and the cost function. **(15L+3T)** |
| 4. | **Cost** | Concept of economic cost; Short-run and long-run cost curves; increasing and decreasing cost industries; envelope curve; L-shaped cost curves; economies of scale. Prices as parameters: Firm equilibrium and profit; short and long-run supply function; taxes and subsidies. **(15L+3T)** |
| 5 | **Market Morphology** | **A.** Perfect competition, Monopoly, Monopolistic Competition, Oligopoly and Duopoly (concepts only).<br>**B.** Features of Perfect Competition, Short-run and Long-run equilibrium of firm and industry under Perfect competition, Effects of Taxation, Deadweight loss<br>**C.** Price and Output Determination under Monopoly, features, effects of taxation.<br>**(15L+3T)** |

***References:***

**Basic Text**

S R. Chakravarty: Microeconomics, Allied, New Delhi, 2016(sixth print)

**Supplementary Readings**


1. Samuelson, P.A, and William. D. Nordhaus: Economics, McGraw Hill Book Co. Singapore
2. Lipsey, R.G: An Introduction to Positive Economics, Weidenfeld and Nicholson, London.
3. Robert S. Pindyck, Daniel L. Rubinfeld, Prem L.Mehta: Microeconomics, 7th Edn. Pearson.
4. H. Varian: Intermediate Microeconomics, W. W. Norton & Company; Seventh edition
5. A.Koutsoyiannis: Modern Microeconomics, Macmillan Education


## CC-2 Introductory Macroeconomics

**Objectives**

The basic objective of this course is to introduce students to the principles of macroeconomics. Macroeconomics deals with the performance, structure, behaviour, and decision-making of an economy as a whole. By studying macroeconomics students can understand aggregated indicators such as GDP, unemployment rates, national income, price indices, and the interrelations among the different sectors of the economy.

**Session Plan**

| Sl no | Main Agenda | Components |
|---|---|---|
| 1 | **The National Income and products accounts** | **A.** Definition, concepts, and measurement of GNP, NNP, GDP, NDP, NI, DI, GNP deflator, GDP deflator and price indices.<br>**B.** Different methods of measuring national income – product method, income method, and expenditure method.<br>**C.** Problems of using national income as a measure of economic welfare.<br>**D.** Circular flow of income – equilibrium condition – concepts of injection, withdrawal, etc.<br>**(15 L+3T)** |
| 2 | **The classical system: Theory of Income and Employment** | **A.** The Classical view of macroeconomics in respect of the determination of employment, output, and prices – Say's law of the market.<br>**B.** The Classical quantity theory of money and its criticisms – Fischer's transaction version - Cambridge cash balance version<br>**(15 L+3T)** |
| 3. | **Keynesian Theory of Income and Employment** | **A.** Simple Keynesian theory of income and employment: Concept of effective demand<br>**B.** Keynesian consumption function, the relation between average propensity to consume and marginal propensity to consume – Simple Keynesian model, Employment and output Determination, the multipliers.<br>**(15 L+3T)** |
| 4. | **Extension of Keynesian Theory of Income and Employment** | **A.** IS-LM model – construction of IS and LM curves – shapes –Motives of holding money – Transactions, Precautionary and Speculative motives. |

| | | |
|---|---|---|
| | | **B.** Keynesian liquidity preference theory indeterminacy of the rate of interest in the liquidity preference theory – the liquidity trap.<br>**C.** Fiscal and Monetary Policy<br>**D.** Determination of equilibrium values of rate of interest and level of income.<br>**E.** Supply of money – Different sources of the money supply – M1, M2, M3, and M4<br>**(15 L+3T)** |
| 5. | **Theory of Inflation** | A. Concept of inflation - Demand-pull inflation and cost-push inflation – comparison between them.<br>B. Inflationary gap – Limitations of it.<br>C. Consequences of inflation – measures to control inflation.<br>**(15 L+3T)** |
| 6. | **Basics of Banking** | A. Functions of Commercial Banks<br>B. Functions of Central Bank<br>C. Credit creation by Commercial Banks – credit creation multiplier.<br>D. Credit control by Central Bank – Different methods of credit control.<br>**(15 L+3T)** |

***References***

***Basic Text***

Sikdar, S – Principles of Macroeconomics, 2nd Edition, Oxford University Press

***Supplementary Books***

1. Mankiw – Macroeconomics, Worth Publishers; Tenth edition
2. Branson – Macroeconomic Theory and Policy, Affiliated East-west Press Pvt Ltd.; 3rd edition
3. Dornbusch, Fisher, and Startz: Macroeconomics, McGraw Hill Education; Twelfth edition
4. Froyen – Macroeconomics – Theories and Policies, 10th Edition, Pearson.

## CC-4 Intermediate Macroeconomics

**Objectives**

The objective of the course is to provide knowledge of the chronological development of Macroeconomics. This will help students to understand current macroeconomic situations.

**Session Plan**

| Sl no | Main Agenda | Components |
|---|---|---|
| 1 | **Unemployment** | The Natural Rate – Types of Unemployment – Full Employment – Costs of Unemployment. Wage rigidity- Generic Efficiency wage Model -Stiglitz Shapiro model.<br>**(15L+3T)** |
| 2 | **Wage-Unemployment-Inflation Trade-off** | The Phillips Curve, Short run and long run, Theories of Inflation – A Brief Review; Demand-pull, Cost-push, Monetary, and Structural Inflation; Stagflation; Costs of Inflation; Anti-Inflationary Policy. |

| | | |
|---|---|---|
| | | **(15L+3T)** |
| 3 | **The Demand for Money** | Keynesian liquidity preference, Baumol-Tobin model, Tobin's Portfolio Balance Approach<br>Portfolio Balance Approach**.**<br>**(15L+3T)** |
| 4 | **The Supply of Money** | The balance sheet of RBI- sources & components of High-powered money. A balance sheet of Commercial Banks- sources & components of the money supply. Concept of Money Multiplier.<br>**(15L+3T)** |
| 5 | **Open-Economy- Macroeconomics** | Balance of Payments accounting; national product accounting; monetary accounting.<br>Different Exchange rate regimes and concepts of the exchange rate.<br>IS-LM model with goods trade: comparative statics results- Monetary policy, Fiscal policy, Exchange rate policy (Devaluation).<br>The Mundell-Fleming Model.<br>**(15L+3T)** |

***References***

***Basic Text***

Sikdar, S – Principles of Macroeconomics, 2nd Edition, Oxford University Press.

**Supplementary Readings**


1. Mankiw – Macroeconomics, Worth Publishers; Tenth edition
2. Branson, W. (1989) – Macroeconomic Theory and Policy; (3rd Ed, Harper & Row)
3. Dornbush, R. S. Fischer and Startz (2004) – Macroeconomics (9th Ed, Tata-McGraw Hill)


## Semester-III
## CC-5 Economics of Growth and Development

**Objectives**

Development economics is a branch of economics that deals with the economic aspects of the development process in low-income countries. The course begins with a discussion of alternative conceptions of development and their justification. It then proceeds to aggregate models of growth and cross-national comparisons of the growth experience that can help evaluate these models. The axiomatic basis for inequality measurement is used to develop measures of inequality and connections between growth and inequality are explored. The course ends by linking political institutions to growth and inequality by discussing the role of the state in economic development and the informational and incentive problems that affect state governance.

After studying this course, it is expected that students will understand the methods of promoting economic development, economic growth, and structural change. Besides that, they will have ideas on improving the potential for the mass of the population, for example, through health, education and workplace conditions, whether through public or private channels.

**Session Plan**

| Sl no | Main Agenda | Components |
|---|---|---|
| 1 | **Conceptions of Development** | Alternative measures of development, documenting the international variation in these measures, comparing development trajectories across nations and within them. **(15L+3T)** |
| 2 | **Growth Models and Empirics** | The Harrod-Domar model, the Solow model and its variants, endogenous growth models and evidence on the determinants of growth. Planning, Strategies of Planning **(15L+3T)** |
| 3. | **Poverty and Inequality: Definitions, Measures and Mechanisms** | Inequality axioms; a comparison of commonly used inequality measures; connections between inequality and development; poverty measurement; characteristics of the poor; mechanisms that generate poverty traps and path dependence of growth processes. **(15L+3T)** |
| 4. | **Political Institutions and the Functioning of the State** | Definition of institutions, Evolution of Political and Economic Institutions; The determinants of democracy; alternative institutional trajectories and their relationship with economic performance; within-country differences in the functioning of state institutions; state ownership and regulation; government failures and corruption. **(20L+4T)** |
| 5. | **Foreign Direct Investment** | Different forms, Their Roles in Economic Development **(10L+2T)** |

***References***

***Basic Text***

Debraj Ray, *Development Economics,* Oxford University Press, 2009.

**Supplementary Readings**

1. Partha Dasgupta, *Economics, A Very Short Introduction,* Oxford University Press, 2007.
2. Abhijit Banerjee, Roland Benabou and Dilip Mookerjee, *Understanding Poverty,* Oxford University Press, 2006.
3. Kaushik Basu, *The Oxford Companion to Economics in India,* OUP, 2007.
4. Amartya Sen, *Development as Freedom,* OUP, 2000.
5. Daron Acemoglu and James Robinson, *Economic Origins of Dictatorship and Democracy*, Cambridge University Press, 2006.

## CC-6 Mathematical Economics

**Objectives**

The objective of basic mathematics that enables the study of economic theory at the undergraduate level, specifically the courses on microeconomic theory, macroeconomic theory, statistics and econometrics set out in this syllabus. In this course, particular economic models

are not the ends, but the means for illustrating the method of applying mathematical techniques to economic theory in general. The level of sophistication at which the material is to be taught is indicated by the contents of the prescribed textbook

**Session Plan**

| Sl no | Main Agenda | Components |
|---|---|---|
| 1 | **Preliminaries** | Basic set operations; relations; functions, number systems. **(10L+2T)** |
| 2 | **Functions of one variable** | Graphs; elementary types of functions: quadratic, polynomial, power, exponential, logarithmic; sequences and series: convergence, algebraic properties, and applications; continuous functions: Intermediate Value Theorem; differentiable functions: properties concerning various operations and applications; second and higher-order derivatives: Convex, concave functions **(10L+2T)** |
| 3 | **Functions of Two or More Variables** | Partial derivatives, total differentiation, convex, concave, quasi-concave functions, homogenous, homothetic functions, Euler's Theorem Applications in Economics **(10L+2T)** |
| 4 | **Single-variable optimization** | Local and global optima: geometric characterizations, characterizations using calculus and applications. **(5L+1T)** |
| 5 | **Integration of functions and Difference Equations** | Areas under curves; indefinite integrals; the definite integral. First-order difference equations **(5L+1T)** |
| 6 | **Linear Programming Problem** | Linear Programming Technique as a Tool of optimization – General Formulation of the LP Problem – Applications in Economics – Graphical solution of some standard problems, Concepts of Slack Variable, Basic Feasible Solution – Solution of some simple problems by Simplex Method (Maximization case only)- The Dual problem – Economic Interpretation of Duality**.** **(15L+3T)** |
| 7 | **Input-Outputt Analysis** | Basic Concept of Input-Output Analysis – Assumptions and structure of the Leontief Static Open Model (2 ×2 Case) – Solution in such a Model – Hawkins – Simon condition and it's Economic Interpretation. **(15L+3T)** |
| 8 | **Decision Under Uncertainty** | Expected Utility Maximisation. **(5L+1T)** |

***References***

**Readings:**


1. K. Sydsaeter and P. Hammond, Mathematics for Economic Analysis, Pearson Educational Asia: Delhi, 2002.
2. S Chakravarty, Quantitative Economics: Theory and Practices, Allied Publishers, New Delhi
3. Dorfman, Samuelson, and Solow: Linear Programming and Economic Analysis
4. N. D. Vora: Quantitative Techniques in Management, Tata McGraw Hill.
5. Sharma: Operation Research, Theory and Applications, Macmillan India Ltd.
6. Taro Yamane: Mathematics for Economists- An Elementary Survey

7. Alpha. C. Chiang and Kevin Wainwright, Fundamental Methods of Mathematical Economics, McGraw Hill Education; Fourth edition (1 July 2017)
8. Henderson (2003) Microeconomic Theory- A Mathematical Approach (3e), McGraw Hill.
9. Simon C and L. Blume, Mathematics for Economists, Viva books, 2009.

## Semester-IV

### CC-7- Public Finance

It is the branch of economics which assesses the government revenue and government expenditure of the public authorities and the adjustment of one or the other to achieve desirable effects and avoid undesirable ones. The purview of public finance is considered to be threefold: governmental effects on (1) efficient allocation of resources, (2) distribution of income, and (3) macroeconomic stabilization. This course will help students to understand the basic ideas of Public Finance. The course will be useful for students aiming towards careers in the government sector, policy analysis, business, and journalism.

**Session Plan**

| Sl No | Main Agenda | Components |
|---|---|---|
| 1 | **Introduction to Public Economics** | The nature, scope, and significance of public economics<br>**(5L+1T)** |
| 2 | **Forms and Functions of Government** | Different forms of government – unitary and federal. Tiers of government in the federal form- Central, State, Local (Introductory discussion with examples). Functions of Government - Economic functions allocation, distribution, and stabilization.<br>Regulatory functions of the Government and its economic significance<br>**(10L+2T)** |
| 3 | **Federal Finance** | Federal Finance: Different layers of the government, Intergovernmental transfer—horizontal vs. vertical equity.<br>Grants—merits and demerits of various types of grants—unconditional vs. conditional grants, tied grants, matching grants.<br>**(10L+2T)** |
| 4 | **Public Goods and Public Sector** | Market failures Concept of public goods—characteristics of public goods, national vs. local public goods, efficient supply of public goods, alternative schemes for the provision of the public good, Lindahl equilibrium, median voter principle, demand revealing tax scheme, merit goods, club goods.<br>Concept of externality; production externalities: the resolution of production externalities: merger and internalization, Pigouvian Taxes, Coase Theorem; consumption externalities, resolution of consumption externalities, Pigouvian taxes. |

| | | |
|---|---|---|
| | | **(15L+3T)** |
| 5 | **Government Budget and Policy** | Government budget and its structure – Receipts and expenditure - concepts of current and capital account, balanced, surplus, and deficit budgets, the concept of budget deficit vs. fiscal deficit, functional classification of budget.<br>Concept of Revenue Deficit. Budget, government policy, and its impact. Budget multipliers<br>**(15L+3T)** |
| 6 | **Tax Structure** | Concept of tax, types of tax – direct tax and indirect tax, canons of taxation, subsidy, transfer policy.<br>Principles of taxation -Ability to Pay principle (brief discussion), Benefit Approach (Actual Examples)<br>Tax Design - introduction – truth-seeking mechanism**.**<br>**(15L+3T)** |

***References***


1. Musgrave and Musgrave: Public Finance in Theory and Practice (Fifth Edition).
2. S. R.Chakravarty: Microeconomics Allied, New Delhi, 2016(sixth print)
3. Hall R Varian: Intermediate Microeconomics
4. Amaresh Bagchi (Ed.). Readings in Public Finance. Oxford University Press. 4.Misra and Puri. Indian Economy. (Latest Edison)


## CC-8 Basic Game Theory

Game theory is an integral part of modern economic analysis. Topics in Microeconomics-I introduce the students to the elementary game theory under complete information. This course introduces the basic concepts of game theory in a way that allows students to use them in solving simple problems. The course will deal with the solution concepts for normal form and extensive form games along with a variety of economic applications**.**

### Session Plan

| Sl no | Main Agenda | Components |
|---|---|---|
| 1 | **Introduction** | Basic Concepts and Assumptions of Game Theory – Two Person – Zero – Sum Game with Saddle Point – Concept of Dominance – Elements of Non – Zero – Sum Game – Prisoner's Dilemma – Concept of Dominant Strategy equilibrium<br>**(15L+3T)** |
| 2 | **Normal form games** | The normal form; dominant and dominated strategies; dominance solvability; mixed strategies; Nash equilibrium; symmetric single population games; applications.<br>**(15L+3T)** |
| 3. | **Extensive form games with perfect information** | The game tree; strategies; subgame perfection; backward induction infinite games; commitment; bargaining; other applications. |

| | | |
|---|---|---|
| | | **(15L+3T)** |
| 4. | **Simultaneous move games with incomplete information** | Strategies; Bayesian Nash equilibrium; applications **(10L+2T)** |
| 5. | **Extensive form games with imperfect information** | Strategies; beliefs and sequential equilibrium; applications **(15L+3T)** |
| 6. | **Information economics** | Adverse selection; moral hazard; signalling games. **(5L+1T)** |

***Reference:***

1. Martin J. Osborne, An Introduction to Game Theory, Oxford University Press, New Delhi, 200
2. Gibbons, R. A Primer in Game Theory, Pearson Education, 1992.
3. Bierman and Fernandez, Game Theory with Economic Applications, Second Edition, Addison Wesley (1998).
4. Fudenberg and Tirole, Game Theory, MIT Press (1991)

## CC-10 Basic Econometrics and Applications

**Objectives**

This course provides a comprehensive introduction to basic econometric concepts and techniques. It covers statistical concepts of hypothesis testing, estimation and diagnostic testing of simple and multiple regression models. The course also covers the consequences of and tests for the misspecification of regression models. The central objective of this course is to understand the use of econometric methods to analyze data for efficient decision making in the field of Business and Economics. We will examine the mathematical and statistical foundations of the methods, applying them using the statistical software SPSS/R and learn to verbally communicate the results of the analysis.

**Session Plan**

| Sl no | Main Agenda | Components |
|---|---|---|
| 1 | **Introduction** | Classical Linear Regression Models, Best Linear Unbiased estimator, Properties **(10L+2T)** |
| 2. | **Elementary Econometrics** | Gauss Markov Theorem, Goodness of fit: R square – Coefficient of Determination **(10L+2T)** |
| 3. | **Inference in the Linear Regression Model** | Inference in the Linear Regression Model-Confidence interval for the parameters and the Testing of Hypotheses -Prediction with the Simple |

| | | |
|---|---|---|
| | | Regression Model. **(10L+2T)** |
| 4. | **Heteroscedasticity** | Consequences, Causes, and Remedies **(10L+2T)** |
| | **Autocorrelation** | Consequences, Causes, and Remedies **(10L+2T)** |
| | **Multicollinearity** | Consequences, Causes, and Remedies **(10L+2T)** |
| 5. | **Introduction to Practical** | Warm-up with SPSS/R **(3P)** |
| | **Basic Statistics** | Correlation, Rank Correlation, R square, Adjusted R square **(3P)** |
| | **Regression Analysis: Practical** | F test, t-test, Regression Analysis using SPSS/R analysis **(3P)** |
| | **Heteroscedasticity: Practical** | Detection, consequences, and remedy Using SPSS/R Analysis **(3P)** |
| | **Autocorrelation: Practical** | Detection, consequences, and remedy using SPSS/R analysis **(3P)** |
| | **Multicollinearity: Practical** | Detection, consequences, and remedy using SPSS/R Analysis **(3P)** |

***References***


1. G.S. Maddala and K. Lahiri – Introduction to Econometrics
2. Damodar N. Gujarati, Basic Econometrics, 4th Edition, TATA McGraw Hill Publishing.
3. Dinardo. Johnston, Econometric Methods (4th Edition) SPSS and R Software
4. Wooldridge, Introductory Econometrics, A Modern Approach, third edition, South-Western Cengage Learning.
5. A. Koutsoyiannis, The Theory of Econometrics, 2nd Edition, ESLB.
6. Ramu. Ramanathan, Introductory Econometrics with Applications, Harcourt Academic Press, 2002
7. W.H. Greene, Econometric Analysis, 4th edition, Prentice-Hall, 2000
8. Gujarati, Damodar N., Basic Econometrics, 4th Edition, TATA McGraw Hill Publishing, 2004


## CC-11 Environmental Economics

**Objectives**

This course introduces students to concepts, methods and policy options in managing the environment using tools of economic analysis. This course should be accessible to anyone with an analytical mind and familiarity with the basic concepts of economics. Since several

environmental problems are caused by economic activity (for instance, carbon emissions, overharvesting of renewable resources and air and water pollution as a by-product of industrial activity), this course examines different approaches to adjusting behaviour through economic institutions such as markets and incentives as well as through regulation, etc. It also addresses the economic implications of environmental policies through practical applications of methods for the valuation of environmental goods and services and quantification of environmental damages. Conversely, the impact of economic growth on the environment is also addressed under the rubric of sustainable development. Environmental problems and issues from the Indian and international context (especially global warming) are used to illustrate the concepts and methods presented in the course. The course will be useful for students aiming towards careers in the government sector, policy analysis, business, journalism, and international organizations.

**Session Plan**

| Sl no | Main Agenda | Components |
|---|---|---|
| 1 | **Introduction** | Key environmental issues and problems, economic way of thinking about these problems, basic concepts from economics; Pareto optimality and market failure in the presence of externalities; property rights and other approaches. **(20L+4T)** |
| 2 | **The Design and Implementation of Environmental Policy** | Overview, Pigouvian taxes, and effluent fees, tradable permits, implementation of environmental policies in India and international experience; transboundary environmental problems; economics of climate change. **(20L+4T)** |
| 3. | **Environmental Valuation Methods and Applications** | Valuation of non-market goods and services--theory and practice; measurement methods; cost-benefit analysis of environmental policies and regulations. **(20L+4T)** |
| 4. | **Sustainable Development** | Concepts; measurement; perspectives from Indian experience **(15L+3T)** |

***References***

Basic Text

1. Charles Kolstad, Intermediate Environmental Economics, Oxford University Press, 2ndedition, 2010.

Supplementary reading

1. Roger Perman, Yue Ma, Michael Common, David Maddison, and James McGilvray, Natural Resource and Environmental Economics, Pearson Education/Addison
2. Wesley, 4th edition, 2011.
3. Robert N. Stavins (ed.), Economics of the Environment: Selected Readings, W.W. Norton, 6th edition, 2012.
4. Robert Solow, An Almost Practical Step Toward Sustainability, Resources for the Future 40th anniversary lecture,1992.
5. Kenneth Arrow et al., Are We Consuming Too Much? Journal of Economic Perspectives, 18(3): 147- 172, 2004.

6. IPCC (Intergovernmental Panel on Climate Change), Fifth Assessment Report (forthcoming 2014).
7. Rabindranath Bhattacharya, Environmental Economics: An Indian Perspective, Oxford University Press; Edition (12 June 2002)

## Semester-VI
## CC-12 Political Economy

This course explores changes in the organisation of production, labour market institutions and corporate structure. It goes on to study the consequences of globalization, especially of financial flows, for the role of the state, economic performance, gender issues, environment, human welfare, and development.

### Session Plan

| Sl no | Main Agenda | Components |
|---|---|---|
| 1. | **Introduction and Historical Overview** | Perspective on political economy with a historical overview: capitalist development in the pre-second world war period, the golden age and later **(15L+3T)** |
| 2. | **Changing Dynamics of Capitalist Production, Organisational Form and Labour Process** | Fordist and post-Fordist production; changing dynamics of organisation of production, markets and labour process; the changing nature of job security and labour rights. **(15L+3T)** |
| 3. | **The State in the Era of Globalisation: Welfare, Development, and Autonomy** | Globalisation and the limits of the welfare state, development and state autonomy **(10L+2T)** |
| 4. | **The Changing Role of Finance** | The changing role of finance in capital accumulation and corporate structure; finance and globalisation - financialisation, financial liberalisation, and financial crisis. **(15L+3T)** |
| 5. | **The Social Dimension** | Globalisation and uneven development – growth, inequality, and exclusion. **(10L+2T)** |
| 6. | **New Perspectives** | Gender in work, accumulation, and globalisation; issues in environment and sustainability; alternatives ahead. **(10L+2T)** |

*References*

1. Michel Beaud, A History of Capitalism, 1500-2000, trans. by Tom Dickman and Anny Lefebvre, New York: Monthly Review Press, 2001.
2. Ash Amin (ed.), Post-Fordism: A Reader, Blackwell, 1994.
3. Fran Tonkiss, Contemporary Economic Sociology: Globalisation, Production, Inequality, Chapter 4 (Fordism and After), Routledge India 2008 reprint, 2006. 30
4. S. Hymer, "The Multinational Corporation and the Law of Uneven Development", in H. Radice (ed.) International Firms and Modern Imperialism, Penguin Books, 1975.
5. G. Gereffi, J. Humphrey and T. Sturgeon, 2005, ―The Governance of Global Value Chains‖, Review of International Political Economy, Volume 12: 78–104.

6. Narasimha Reddy, ―Economic Globalisation, Past, and Present – The Challenges to Labour‖ in Jomo
7. K.S. & Khoo Khay Jin (ed.) Globalization and Its Discontents, Revisited, Sepsis -Tulika Books, 2003

## CC-13- Financial Economics

### Objectives

Financial economics is the branch of economics characterized by a "concentration on monetary activities", in which "money of one type or another is likely to appear on *both sides* of a trade". Its concern is thus the interrelation of financial variables, such as prices, interest rates, and shares, as opposed to those concerning the real economy. The subject is concerned with "the allocation and deployment of economic resources, both spatially and across time, in an uncertain environment". After the course, it is expected that students will understand the basic ideas of Financial Economics.

### Session Plan

| Sl no | Main Agenda | Components |
|---|---|---|
| 1. | **Introduction** | Evolution of limited companies, Time Value of Money, Basic concepts of financial decision areas, Concepts of Money and Capital markets, Concepts of risk and returns. **(15L+3T)** |
| 2. | **Corporate Finance** | Concepts of Capital structure and Cost of capital; Concept of optimal capital structure, and Theories of capital structure (NI approach, NOI approach, and M- M approach). **(20L+4T)** |
| 3. | **Investment Theory and Portfolio Analysis** | Deterministic cash-flow streams Basic theory of interest; discounting and present value; internal rate of return; evaluation criteria; fixed-income securities; bond prices and yields; interest-rate sensitivity and duration; immunization; the term structure of interest rates; yield curves; spot rates and forward rates.<br>Single-period random cash flows Random asset returns; portfolios of assets; portfolio mean and variance; feasible combinations of mean and variance; mean-variance portfolio analysis: the Markowitz model and the two-fund theorem; risk-free assets and the one-fund theorem.<br>CAPM Sharpe Ratio, the capital market line; the capital asset pricing model; the beta of an asset and a portfolio; security market line; use of the CAPM model in investment analysis and as pricing**. (20L+4T)** |

| | | |
|---|---|---|
| 4. | **Options, Futures, and Derivatives** | Introduction to derivatives, forward and futures contracts; options; other derivatives; Options Terminology; Option pay off; Option market players and options Trading; Derivative market regulatory framework in India.<br><br>Non-arbitrage, binomial pricing, short selling, swap, foreign currency swap, Hedging, strike price Pay off, premium, etc. **(20L+4T)** |

**Basic Text**


1. Hull, John C., Options, Futures, and Other Derivatives, Pearson Education, 6th edition, 2005.
2. Brealey, R.A., Myers, S.C. and Marcus, A.J. (2012) Fundamentals of Corporate Finance. International Edition. 7th Edition. New York: McGraw-Hill


**Supplementary Text**


1. David G. Luenberger, Investment Science, Oxford University Press, USA, 1997.
2. Stephen A. Ross, Randolph W. Westerfield, and Bradford D. Jordan, Fundamentals of Corporate Finance. McGraw-Hill, 7th edition, 2005.
3. Berk, J. and DeMarzo, P. (2011) Corporate Finance. Global Edition. Second Edition. Boston: Prentice Hall
4. Pandey, I.M., Financial Management, Vikas Publishing
5. Bodie, Z., Kane, A., Marcus, A. J., Mahanty, P., Investments, Tata McGraw-Hill
6. S R.Chakravarty, An Outline of Financial Economics, Anthem Press, New York, 2014(second print)


## CC-14 International Economics

**Objectives**

International economics is concerned with the effects upon economic activity from international differences in productive resources, consumer preferences and the international institutions that affect them. The course is divided into two-tier. In the first tier, we consider the traditional theories of international economics. The Second-tier focuses on different kinds of trade policies and exchange rates. It is expected that students will learn the basic concepts of international economics.

| Sl no | Main Agenda | Components |
|---|---|---|
| 1 | **Introduction** | Ricardian Model: Comparative advantage. One factor economy: production possibility frontier, relative demand, and relative supply and autarkic terms of trade. Trade-in Ricardian world: determination of international terms of trade, complete specialisation, gains from trade **(20L+4T)** |

| | | |
|---|---|---|
| 2 | **Resources, Comparative Advantage, and Income Distribution** | Model of the two-factor economy: Assumptions, Factor prices and commodity prices -correspondence, Resources& output, Rybczynski effect. Heckscher Ohlin model of trade, Relative prices and the pattern of Trade, Trade and distribution of Income, Stolper-Samuelson Theorem, Factor Price Equalization. - Leontief Paradox. **(20L+4T)** |
| 3. | **Trade Policy** | Partial equilibrium analysis: Tariff- cost and benefit, the effective rate of protection and intermediate goods, quota, tariff- quota equivalence and non-equivalence, export subsidy, voluntary export restraint. General Equilibrium Analysis: Distinction between small and large open economy, welfare effects of tariff in a small country, the optimum tariff for a large open economy, Metzler's paradox. Tariff & Import Quotas in presence of monopoly**.** **(20L+4T)** |
| 4 | **Accounting, Income Determination and Exchange Rates** | Balance of payment accounts; national income accounting in an open economy; monetary account; Determination of National Income, multiplier analysis, the transfer problem, introduction of foreign country and repercussion effect. Fixed and Flexible Exchange rates: Adjustments, Demand & Supply of foreign exchange, Effects of exchange rate changes on domestic prices and terms of Trade, Marshall-Lerner Condition, J Curve Effect **(15L+3T)** |

***References***


1. Salvatore.D, International Economics, Wiley; 9 edition (January 2, 2007)
2. Paul R. Krugman, Maurice Obstfeld, and Melitz (8th Ed.), International Economics, Pearson Education Caves,
3. Frankel, Jones (9th Ed.), World Trade and Payments, Pearson Education


## DSE-II History of Economic Thought

**Objectives:**

This course aims to provide a perspective on the development of economic ideas and thought that helps to generate the current thinking. It introduces the students to the philosophers and economists who developed economic reasoning and modeling of economic activities

**Session Plan**

| Sl no | Main Agenda | Components |
|---|---|---|
| 1 | **Introduction and Early Economic Thought** | Mercantilism-main characteristics, Thomas Mur's views; Physiocracy- main features, Tableau Economique, taxation; Early Classicism: Adam Smith- Theory of Value, Division of labour, capital accumulation, distribution, views on trade and economic progress; David Ricardo-theory of value, the theory of rent, distribution, ideas on international trade and development. |

| | | |
|---|---|---|
| | | **(20L+4T)** |
| 2 | **Classicism Vs Marxism** | Thomas Malthus- population theory, glut theory; Karl Marx-dynamic of social change, the theory of value, surplus value, the theory of profit, crisis of capitalism, Johns Stuart Mill- ideas on value, distribution, views as a synthesizer.<br>**(20L+4T)** |
| 3. | **The Marginalists' Revolution** | Economic ideas of Jevons, Walras, and Menger, Bohm-Bowerk, Wicksell; Marshall – Role of time element in price determination, ideas on consumer surplus, Marshal as a synthesizer<br>**(20L+4T)** |
| 4. | **Indian Economic Thought** | Main themes of Kautilya's Arthasashtra; Modern Economic Ideas: Dada Bhai Naoroji, M.K. Gandhi, village swaraj, non-violence, machines and labour, cottage industries; Comparison of Indian Economic thought with western Economic thought.<br>**(15L+3T)** |

**Text Book**


1. Gide, Charles and Rist, Charles (1973): A History of Economic Doctrines, Oxford University Press.
2. Dasgupta, A K (1986): Epochs of Economic Theory, Oxford University Press, New Delhi


**Reference Book:**


1. O'Brien, D P (1975): Classical Economists, Oxford, Clarendon Press.
2. Ekelund, Robert B. and Robert F. Hebert (1990): A History of Economic Theory and Method, third edition, New York: McGraw Hill
3. Henry W. Spiegel (1991): The Growth of Economic Thought, 3rd ed. Durham: Duke University Press
4. Tom Bottomore (1980): Dictionary of Marxist Thought, Basic Blackwell Publishers.
5. Eric, Roll, History of Economic Thought, Faber and Faber Ltd.
6. L N Rangarajan (1992): Kautilya: The Arthasastra, edited, rearranged, translated and introduced; Penguine books, New Delhi


**DSE-V Statistical Computing with Statistical Packages**

Module 1: Introduction to SPSS/ R and RStudio. Using the help facility. (5L+10P)

Module 2 Data structures: vectors, matrices, lists and data frames. (5L+10P)

Module 3 Reading data into SPSS/ R from various data sources. (5L+10P)

Module 4 Statistical modeling functions: lm and glm. (5L+10P)

Module 5 Iterating: logic and flow control. (5L+10P)

Module 6 Extending with add-on packages and the R ecosystem. (5L+10P)

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# GENERIC ELECTIVES (GE)

# COURSES OFFERED BY DIFFERENT DEPARTMENTS AS GENERAL ELECTIVE SUBJECT FOR UNDER GRADUATE STUDENTS

| DEPARTMENT | COURSE |
|---|---|
| ENGLISH | THE STUDY OF SCRIPTS (FOR ODD SEMSTER) |
| | TRANSLATION STUDIES (FOR EVEN SEMESTER) |
| COMPUTER SCIENCE | BASICS OF COMPUTER SCIENCE (FOR FIRST SEMESTER) |
| | DATA STRUCTURE (FOR 4TH SEMESTER) |
| | OBJECT ORIENTED PROGRAMMING (FOR 5TH SEMESTER) |
| | DATABASE MANAGEMENT SYSTEMS (DBMS) (FOR 6TH SEMESTER) |
| BIOTECHNOLOGY | BIOTECHNOLOGY IN HUMAN WELFARE (FOR ODD SEMESTER) |
| | FUNDAMENTALS OF DEVELOPMENTAL BIOLOGY (FOR EVEN SEMESTER) |
| MASS COMUNICATION AND JOURNALISM | BASICS OF JOURNALISM (FOR ODD SEMESTER) |
| | SCIENTIFIC REPORT WRITING AND EDITING (FOR EVEN SEMESTER) |
| HOSPITALITY AND TOURISM ADMINISTRATION | HOSPITALITY & TOURISM ENTREPRENEURSHIP (FOR ODD SEMESTER) |
| | PERSONALITY DEVELOPMENT (FOR EVEN SEMESTER) |
| MICROBIOLOGY | MOLECULAR SECRETS OF LIFE (FOR ODD SEMESTER) |
| | INTRODUCTION TO FORENSIC SCIENCE (FOR EVEN SEMESTER) |
| ECONOMICS | ECONOMIC HISTORY OF INDIA (FOR ODD SEMESTER) |
| | ECONOMIC DEVELOPMENT (FOR EVEN SEMESTER) |
| CHEMISTRY | FUNDAMENTALS OF CHEMISTRY (FOR ODD SEMESTER) |
| | STEREOCHEMISTRY AND CONFORMATION (FOR EVEN SEMESTER) |
| PHYSICS | WHERE DO YOU LIVE? A JOURNEY THOUGH OUR GORGEOUS UNIVERSE (FOR ODD SEMESTER) |
| | HISTORY AND PHILOSOPHY OF SCIENCE |
| MANAGEMENT | ORGANIZATIONAL BEHAVIOR (FOR ODD SEMESTER) |
| | BUSINESS STRATEGY (FOR EVEN SEMESTER) |

**DEPARTMENT: ENGLISH**
**COURSE: GE – THE STUDY OF SCRIPTS (FOR ODD SEMSTER)**

**1.Course Objectives:**
This course intends to acquaint the students with the ancient scripts of the bronze as well as the iron age civilizations that are awaiting decipherment, especially the Linear A and B scripts, the enigmatic Indus Valley Civilization Script (IVCS), the Rongorongo script and the Egyptian script that however, has been deciphered. It will trace the history of the study of these scripts and shall look into the modern computational methods and the latest discoveries in the field of computational and cognitive linguistics that have been used to study them.

**2.Course Outcomes:**
After taking this course, students are expected to gain an understanding of the basic orthography as well as the real problems that lie in the path of decipherment of the same and also understand the various research methods employed to study them.

**Unit I: The History of Language Decipherment:**
Decipherment and the underlying theory, first and second order language, the concept of underlying language, famous linguists, structuralism and structural linguistics, Chomsky and the cognitive revolution, ethnography, archaeology and the study of scripts.

**Unit II: Scripts: An Introduction**
Linear A and B, Rongorongo, IVC, Egyptian.

**Unit III: The Indus Valley Script—Detailed Study**
Problems posed by short inscriptions and orthography, the proto-Dravidian Hypothesis, Iravathan Mahadevan's concordance of the IVC signs, Asko Parpola and his hypothesis, Nisha Yadav's and Rajesh Rao's observations, the study of select seals from Dholavira and Harappa, the Dholavira sign board, the possible reasons for the decline of the script, IVC painted pottery, the 'Pashupatinath' seal, the dancing girl and female iconography, trade practices and the IVC script, the anti-literate hypothesis: S. Farmer et al. , animal figurines in the seals, seals found in Mesopotamia: issues.

**Unit IV: Modern techniques to study the IVC script:**
The idea of conditional entropy, recent advances in computational linguistics, the use of sound silencing, AI and decipherment, the Chennai team and deep neural networks, efforts in IIT Kharagpur to understand the disappearance of the civilization and the script through climate modelling simulation, other relevant techniques.
Select Readings:
1)Robinson, Andrew, Lost Languages: The Enigma of World's Undeciphered Scripts. New York: Mac-Graw-Hill, 2005.
2)Shendge, Malati J, Unsealing the Indus Script: Anatomy of its Decipherment. New Delhi: Atlantic, 2010.
3)Yule, George, The Study of Language. New Delhi: CUP, [2007?].

## COURSE: GE – TRANSLATION STUDIES (FOR EVEN SEMESTER)

**1.Course Objectives:**

After taking this course, the students are expected to understand the nuances of translation and the act of transcreation itself that often takes into account the fact that the translator has to possess a sound understanding of both the language and the general vocabulary of the target text and the source text.

**2.Course Outcomes:**

After going through the course, the students are expected to understand the theory and the praxis of the very enterprise of transcreation.

**Unit I: Transcreation: Theory and History**

The history of translation and the emergence of translation studies, translation as a discipline in ancient Greece and Rome, translation in India, the theory of translation, translation or transcreation?

**Unit II: Translation: Issues at Work**

Translation and the issue of vocabulary, the 'loss' of meaning during the act of translation, 'good' and 'bad' translation, the issue of copyright © in translation, translation as a profession.

**Unit III: Transcreation: Practice 1**

Translating from select texts into English (from Bengali to English and Hindi to English and vice versa).

**Unit IV: Transcreation: Practice 2**

The concept of computer/ machine translation and the use of software and translation blogs and services.

**Select Readings:**

Munday, Jeremy. Introducing Translation Studies: Theories and Applications. New York; London: Routledge, 2012.

**DEPARTMENT: COMPUTER SCIENCE**

**COURSE: GE – BASICS OF COMPUTER SCIENCE (FOR FIRST SEMESTER)**

**Unit 1: Data representation (4 Lectures):**
Data vs Information: Bit, byte number system: binary, octal, hexadecimal, 1's, 2's complement arithmetic, digital logic: AND, OR etc.

**Unit 2: General Problem-Solving concepts (6 Lectures):**
Algorithm and Flowchart for problem solving with Sequential Logic Structure, Decisions and Loops, time & space complexity; Imperative languages: Introduction to imperative language; syntax and constructs of a specific language (ANSI C).

**Unit 3: Human Computer Interface: (7 Lectures):**
Types of software, operating system as user interface, utility programs; Computing systems: hardware & software, Architecture & organization history: von Neumann Architecture: memory, processor, I/O; BIOS, Booting, Application software, system software, introduction of programming languages: brief overview of Pascal, FORTRAN, and BASIC.

**Unit 4: Devices:(6 Lectures):**
Input and output devices (with connections and practical demo), keyboard, mouse, joystick, scanner, OCR, OMR, bar code reader, web camera, monitor, printer, plotter Memory: Primary, secondary, auxiliary memory, RAM, ROM, cache memory, hard disks, optical disks.

**Unit 5: Computer Organisation and Architecture: (5 Lectures):**
C.P.U., registers, system bus, main memory unit, cache memory, Inside a computer, SMPS, Motherboard, Ports and Interfaces, expansion cards, ribbon cables, memory chips, processors.

**Unit 6: Overview of Emerging Technologies: (4 Lectures)**
Bluetooth, cloud computing, big data, data mining, mobile computing and embedded systems.

**Unit 7: Use of Computers in Education and Research: (4 Lectures)**
Data analysis, Heterogeneous storage, e-Library, Google Scholar, Domain specific packages such as SPSS, Mathematica etc.

**Reference Books:**
1.A. Goel, Computer Fundamentals, Pearson Education, 2010.
2.P. Aksoy, L. DeNardis, Introduction to Information Technology, Cengage Learning, 2006
3.P. K.Sinha, P. Sinha, Fundamentals of Computers, BPB Publishers, 2007.

**COURSE: GE – DATA STRUCTURE (FOR 4TH SEMESTER)**

**(36 LECTURES); L-T-P: 3-0-2**

**Module 1: (8 Lectures)**
Introduction: Basic Terminologies: Elementary Data Organizations, Data Structure Operations: insertion, deletion, traversal Searching: Linear Search and Binary Search Techniques and their complexity analysis.

**Module 2: (10 Lectures)**
Stacks and Queues: ADT Stack and its operations: Algorithms and their complexity analysis, Applications of Stacks: Expression Conversion and evaluation – corresponding algorithms and complexity analysis. ADT queue, Types of Queue: Simple Queue, Circular Queue, Priority Queue; Operations on each types of Queues

**Module 3: (10 Lectures)**
Linked Lists: Singly linked lists: Representation in memory, Algorithms of several operations: Traversing, Searching, Insertion into, Deletion from linked list; Linked representation of Stack and Queue, Header nodes, Doubly linked list

Trees: Basic Tree Terminologies, Different types of Trees: Binary Tree, Threaded Binary Tree, Binary Search Tree, AVL Tree; Tree operations on each of the trees

**Module 4: (10 Lectures)**
Sorting and Hashing: Objective and properties of different sorting algorithms: Selection Sort, Bubble Sort, Insertion Sort, Quick Sort, Merge Sort, Heap Sort;

**Suggested books:**
1.“Fundamentals of Data Structures”, Illustrated Edition by Ellis Horowitz, Sartaj Sahni, Computer Science Press.

Suggested reference books:
1.Algorithms, Data Structures, and Problem Solving with C++”, Illustrated Edition by Mark Allen Weiss, Addison-Wesley Publishing Company

2.“How to Solve it by Computer”, 2nd Impression by R. G. Dromey, Pearson Education.

**COURSE: GE – OBJECT ORIENTED PROGRAMMING (FOR 5TH SEMESTER) (30 Lectures); L-T-P: 3-0-2**

**Module 1:** Abstract data types and their specification. How to implement an ADT. Concrete state space, concrete invariant, abstraction function. Implementing operations, illustrated by the Text example. Features of object-oriented programming. Encapsulation, object identity, polymorphism
– but not inheritance. Inheritance in OO design. [10L]
**Module 2:** Design patterns. Introduction and classification. The iterator patterns. Model-view-controller pattern. Commands as methods and as objects. Implementing OO language features. Memory management. Generic types and collections [12L]
**Module 3:** The software development process. The concepts should be practised using Java. [8L]
**Suggested books**
1. Barbara Liskov, Program Development in Java, Addison-Wesley, 2001
Suggested reference books
1. Any book on Core Java 2. Any book on C++

**COURSE: GE – DATABASE MANAGEMENT SYSTEMS (DBMS) (FOR 6TH SEMESTER)**

**(36 Lectures); L-T-P: 3-0-2**

**Module 1: (10L)**

Database system architecture: Data Abstraction, Data Independence, Data Definition Language (DDL), Data Manipulation Language (DML). Data models: Entity-relationship model, network model, relational and object-oriented data models, integrity constraints, data manipulation operations.

**Module 2: (10L)**

Relational query languages: Relational algebra, Tuple and domain relational calculus, SQL3, DDL and DML constructs, Open source and Commercial DBMS - MYSQL, ORACLE, DB2, SQL server. Relational database design: Domain and data dependency, Armstrong's axioms, Normal forms, Dependency preservation, Lossless design. Query processing and optimization: Evaluation of relational algebra expressions, Query equivalence, Join strategies, Query optimization algorithms.

**Module 3: (6L)**

Storage strategies: Indices, hashing.

**Module 4: (10L)** Transaction processing: Concurrency control, ACID property, Serializability of scheduling, Locking and timestamp-based schedulers, Multi-version and optimistic Concurrency Control schemes, Database recovery.

**Suggested books:**

1. “Database System Concepts”, 6th Edition by Abraham Silberschatz, Henry F. Korth, S. Sudarshan, McGraw-Hill.

Suggested reference books:

2.“Principles of Database and Knowledge – Base Systems”, Vol 1 by J. D. Ullman, Computer Science Press.

3.“Fundamentals of Database Systems”, 5th Edition by R. Elmasri and S. Navathe, Pearson Education

4. “Foundations of Databases”, Reprint by Serge Abiteboul, Richard Hull, Victor Vianu, Addison-Wesley

**DEPARTMENT: BIOTECHNOLOGY**

**COURSE: GE – BIOTECHNOLOGY IN HUMAN WELFARE (FOR ODD SEMESTER)**

**PURPOSE**

The course will provide a basic knowledge of applications of Biotechnology in industrial and medical fields

**Unit 1: Environmental Biotechnology**

Water and waste water treatment process: Current community drinking water treatment process disinfection of water (chlorination and ozonation), primary, secondary and advanced treatment of sewage (domestic waste water), Definition and concept of: biodegradation, bio deterioration and biotransformation. Biodegradation of plastic, pesticides and hydrocarbons Bioremediation, Bioleaching, Biosorption, Biopesticides, Biofertilizers, Biofuels, Biosensors, Bioindicators, Biodegradable plastics

**Unit II: Xenobiotic and recalcitrant compounds**

Bioaccumulation and biomagnification. Assessment of water and wastewater quality: Concept of COD, DO and BOD. Indicators of faecal pollution and MPN and MFtechnique for coliforms. Significance and principal of IMViC.

**UNIT III: Industrial Biotechnology**

Basic Principles of Industrial Biotechnology: Important commercial products produced by microorganisms and GMOs and their applications. Microbes in industry – foods from microorganism (vinegar and cheese). production of citric acid, amylases, proteases, vitamin B12, beer, wine, biogas, methane, hydrogen.

**Unit IV: Food Biotechnology**

Production and types of cheese, microorganisms as food –production of mushroom and spirulina, assessment of microbiological quality of various foods. Industrial awareness: Quality control and quality assurance in food and pharamaceutical industry, concept of current good manufacturing practices in pharmaceutical industry

**Unit V: Agricultural Biotechnology**

crop improvement, herbicide resistance, insect resistance, virus resistance, plants as bioreactors. Genetic modification in Agriculture –transgenic plants, genetically modified foods, application, future applications, ecological impact of transgenic plants

**COURSE: GE – FUNDAMENTALS OF DEVELOPMENTAL BIOLOGY (FOR EVEN SEMESTER)**

PURPOSE- This course presents the genetic, cellular and molecular mechanisms involved in the development of animal embryology

**Unit I: Gametogenesis and Fertilization**

Definition, scope & historical perspective of development Biology, Gametogenesis – Spermatogenesis, Oogenesis Fertilization - Definition, mechanism, types of fertilization. Different types of eggs on the basis of yolk.

**Unit II: Early embryonic development**

Cleavage: Definition, types, patterns & mechanism Blastulation: Process, types & mechanism Gastrulation: Morphogenetic movements– epiboly, emboly, extension, invagination, convergence, de-lamination. Formation & differentiation of primary germ layers, Fate Maps in early embryos.

**Unit III: Embryonic Differentiation**

Differentiation: Cell commitment and determination- the epigenetic landscape: a model of determination and differentiation, control of differentiation at the level of genome, transcription and post-translation level Concept of embryonic induction: Primary, secondary & tertiary embryonic induction, Neural induction and induction of vertebrate lens.

**Unit IV: Organogenesis**

Neurulation, notogenesis, development of vertebrate eye. Fate of different primary germlayers Development of behaviour: constancy & plasticity, Extra embryonic membranes, placenta in Mammals

**DEPARTMENT: MASS COMUNICATION AND JOURNALISM**

**COURSE: GE – BASICS OF JOURNALISM (FOR ODD SEMESTER)**

Pre requisites: Basic Knowledge of 12th grade communicative English.

**Course Objective:**

1.Gain an overview of news journalism's public service role in a democratic society
2. Become familiar with fundamental principles of journalism, such as truth-telling, watchdog reporting,
accuracy, courage, tolerance, justice, minimizing harm
3. Learn basics of journalism law, history and ethics

**Course Outcome:**

Demonstrate critical thinking skills necessary to collect, evaluate, organize and disseminate news 1.Analyze relative newsworthiness of various fact sets, using elements of newsworthiness (proximity, interest, importance, impact, timeliness)
2.Write a simple news using set of facts
3.Distinguish news from infotainment, public relations, advertising and non-journalistic blogging, as well as the difference between news and opinion

**Unit 1:** Understanding News Ingredients of news meaning, definition, nature The news process: from the event to the reader (how news is carried from event to reader) Hard news vs. Soft news, basic components of a news story Attribution, embargo, verification, balance and fairness, brevity, dateline, credit line, byline.

**Unit 2:** Tabloid press Language of news- Robert Gunning: Principles of clear writing, Rudolf Flesch formula- skills to write news.

**Unit 3:** Understanding the structure and construction of news Organizing a news story, 5W's and 1H, Inverted pyramid Criteria for news worthiness, principles of news selection, importance of research in news, sources of news, use of internet

**Unit 4:** Different mediums-a comparison Language and principles of writing: Basic differences between the print, electronic and online journalism Citizen journalism

**Unit 5:** Role of Media in a Democracy Responsibility to Society press and Democracy Contemporary debates and issues relating to media Ethics in journalism, debates discussion and practical writing /Viva.

Books/References

1.Bruce D. Itule and Douglas A. Anderson. News writing and reporting for today's media; McGraw Hill Publication, 2000. –
2.M.L. Stein, Susan Paterno& R. Christopher Burnett. News writer's Handbook: An Introduction to Journalism; Blackwell Publishing,2006.
3.George Rodmann. Mass Media in a Changing World; Mcgraw Hill Publication,2007.
4.Carole Flemming and Emma Hemmingway. An Introduction to Journalism; Vistaar Publications,2006. Richard Keeble. The Newspaper's Handbook; Routledge Publication,2006.
5.JohnHohenberg: Professional Journalists; Thomson Learning.

6.M.V. Kamath: Professional Journalism; Vikas Publishing, New Delhi.

## COURSE: GE – SCIENTIFIC REPORT WRITING AND EDITING (FOR EVEN SEMESTER)

**Course Overview**

Science and technology profoundly shape our lives, changing the way we communicate with others, the kinds of careers we will have, and the quality of our natural environment. When science and technology move from laboratory to corporate boardroom to Media houses writing is involved in every step in this process. This course will focus on the writing that constitute science and technology. We will explore the writing done by scientists, technologists, will examine how writing circulates through society journalism, press releases, policy makers, citizens.

**Course Outcome**

•Use writing for the purposes of reflection, action, and participation in academic inquiry
•Work within a repertoire of genres and modes—including digital media—to meet appropriate rhetorical purposes
•Exercise a flexible repertoire of invention, arrangement, and revision strategies
•Engage in reading for the purposes of reflection, critical analysis, decision-making, and inquiry
•Demonstrate the ability to locate, critically evaluate, and employ a variety of sources for a range of purposes
•Synthesize external data and documentary sources into your own writing with greater awareness of proper citation

**Unit 1: (4 Lectures)**

Introduction to Science Writer Profile; Stories about Scientists; Introduction to New Discovery Story; Science communication models - problems, its solutions; writing science as news; engaging writing style; Article analysis – structure, style, voice, narrative.

**Unit 2: (8 Lectures)**

Writing from science journals; Language goals in scientific writing; reporting on new research; explanatory writing; Avoiding jargon; New discovery story analysis, Introduction to Feature Article, Explanatory features; Ethics in writing.

**Unit 3: (6 Lectures)**

Select a recent healthcare research study and find both the original study published in a biomedical journal and another (non-academic) article written about the study findings; Target Audience-Who is the audience? Purpose of the article; Bibliographic Database Searching and Citation Management Software; Fact-checking

**Unit 4: (8 Lectures)**

Interviewing a scientist; Questionnaire Design; Prepare Press releases; Workshopping ideas; Presentations and Posters; Presentation Slides; Presenting Research; Grant Proposals; Writing Abstracts; Writing Thesis and Capstone Documents; Survey: Schedule, Sample; Tools of Data Collection

**Unit 5: (6 Lectures)**

Planning for print-size, anatomy, grid, design; Format, typography, copy, pictures, advertisements; Plotting text: headlines, editing pictures, captions; Page-making; Technology and Print; layout, use of graphics and photographs; Printing Processes: Traditional vs modern; Desk Top Publishing: Quark Express, Coral Draw, Photoshop

**Unit 6: (6 Lectures)**

Online Story Package – Use of text, photos, video, audio, graphics; working together to tell a story; Types of Multimedia Content; Supporting Text; Story Pitch; Search Operators; Database; Hyperlink; Rule of Thirds; Rendering; Authenticity; In-Depth Story

**REQUIRED TEXTBOOK(S):**

1.Alley, Michael. The Craft of Scientific Writing, third edition. New York: Springer, 2009. ISBN: 0387947663 ISBN-13: 9780387947662

2.Alley, Michael. The Craft of Scientific Presentations, second edition. New York: Springer, 2013. ISBN: 1441982787 ISBN-13: 9781441982780

## DEPARTMENT: HOSPITALITY AND TOURISM ADMINISTRATION

## COURSE: GE – HOSPITALITY & TOURISM ENTREPRENEURSHIP (FOR ODD SEMESTER)

**UNIT 1: 08 LECTURES**

Introduction to Entrepreneurship Development: Definition of entrepreneurship-emergence of entrepreneurial classes-theories of entrepreneurship-role of socio-economic environment-characteristics of entrepreneur-leadership, risk taking, decision-making & business planning. Scope in tourism. Introduction to entrepreneur and entrepreneurship.

**UNIT 2: 08 LECTURES**

Opportunity analysis: External environmental analysis (economic, social & technological)-competitive factors-legal requirements for establishment of a new unit related to tourism & raising of funds-venture capital sources & documentation required.

**UNIT 3: 08 LECTURES**

Entrepreneurial Behaviour: Innovation and entrepreneur, entrepreneurial behaviour & psychological theories.

**UNIT 4: 08 LECTURES**

Entrepreneurial Development Program (EDP): EDPs & their role, relevance and achievements-role of Government in organizing EDPs-evolution of EDPs. Social responsibility in business.

**UNIT 5: 10 LECTURES**

Role of Entrepreneur: Role of an entrepreneur in economic growth as an innovator, generation of employment opportunities, complementing economic growth, bringing about social stability & balanced regional development of industries with emphasis on tourism, foreign earnings etc.

## COURSE: GE – PERSONALITY DEVELOPMENT (FOR EVEN SEMESTER)

**Unit I- 4 lectures**
Introduction to bio data, features of a bio data, types of bio data, importance of bio data, specifications, preparation of bio data.

**Unit II- 4 lectures**
Group discussion: importance, participation, rules to be followed, listening skills, do's and don'ts Personal interview: Self introduction, expressing yourself, understanding the interviewers' need, do's and don'ts

**Unit III- 4 lectures**
Grooming and hygiene: basic grooming ideas, self-check of grooming, healthy practices.

**Unit IV- 6 lectures**
Speech on a given topic (extempore speech); presentation Skills; public speaking.
Time Management; Organizational Skills; Stress management; Team Building Skills; Change management.

**Unit V- 4 lectures**
Table manners, telephone etiquettes, body language

DEPARTMENT: MICROBIOLOGY

## COURSE: GE – MOLECULAR SECRETS OF LIFE (FOR ODD SEMESTER)

**Unit 1: Origin of Life:**
Formation of life, Concept of Biogenesis and abiogenesis, Miller-Urey experiment, properties of water, contribution of scientists to the journey of biology, Discovery of microscope and its types. Theories of evolution, Contribution of Lamarck and Darwin.

**Unit 2: Cell structure and function:**
Prokaryotic and eukaryotic cell structure. Difference between prokaryotic and eukaryotic cell, Plant and animal cell, Cell envelop, Cell organelles and their functions. Eukaryotic cycle definition and its regulation, phases of cell cycle, Cell division and its significance, types of cell division, Mitosis and meiosis, different stages of cell division.

**Unit 3: Biodiversity and classification:**
Classification living organisms, nomenclature system, Characteristics of different classes of organisms, Three domains of life,

**Unit 4: Macromolecules of life:**
Carbohydrates and sugars, amino acids and proteins, enzymes, Lipids, Nucleic acid (both DNA and RNA)

**Unit 5: Information flow in life:**
Concept of gene and chromosome, Replication, Transcription, Translation, Methods of gene transfer in prokaryotes like Transformation, Transduction and Conjugation, Operon concept, Mutation.

**Unit 6: Metabolic pathways in life:**
Carbohydrate metabolism – glycolysis, TCA cycle, oxidative phosphorylation. Amino acid metabolism and urea cycle, Fatty acid metabolism – β oxidation of saturated and unsaturated fatty acids, photosynthesis.

**COURSE: GE – INTRODUCTION TO FORENSIC SCIENCE (FOR EVEN SEMESTER)**

**Unit 1: History of Development of Forensic Science in India:**
Functions of forensic science. Historical aspects of forensic science. Definitions and concepts in forensic science. Scope of forensic science. Need of forensic science. Basic principles of forensic science. Frye case and Daubert standard.

**Unit 2: Tools and Techniques in Forensic Science:**
Branches of forensic science. Forensic science in international perspectives, including set up of INTERPOL and FBI. Duties of forensic scientists. Data depiction. Report writing.

**Unit 3: Organizational set up of Forensic Science Laboratories in India**
Hierarchical set up of Central Forensic Science Laboratories, State Forensic Science Laboratories, Government Examiners of Questioned Documents, Fingerprint Bureaus, National Crime Records Bureau, Police & Detective Training Schools, Bureau of Police Research & Development, Directorate of Forensic Science and Mobile Crime Laboratories. Police Academies. Police dogs. Services of crime laboratories. Basic services and optional services.

**Unit 4: Instrumentation:**
Sample preparation for chromatographic and spectroscopic evidence. Chromatographic methods. Fundamental principles and forensic applications of thin layer chromatography, gas chromatography and liquid chromatography. Spectroscopic methods. Fundamental principles and forensic applications of Ultravioletvisible spectroscopy, infrared spectroscopy, atomic absorption spectroscopy, atomic emission spectroscopy and mass spectroscopy. X-ray spectrometry. Colorimetric analysis and Lambert-Beer law. Electrophoresis – fundamental principles and forensic applications. Neutron activation analysis – fundamental principles and forensic applications.

**Unit 5: Basics of Criminology:**
Definition, aims and scope. Theories of criminal behavior – classical, positivist, sociological. Criminal anthropology. Criminal profiling. Understanding modus operandi. Investigative strategy. Role of media.

**Unit 6: Basics of Fingerprinting:**
Introduction and history, with special reference to India. Biological basis of fingerprints. Formation of ridges. Fundamental principles of fingerprinting. Types of fingerprints. Fingerprint patterns. Fingerprint characters/minutiae. Plain and rolled fingerprints. Classification and cataloguing of fingerprint record. Automated Fingerprint Identification System. Significance of poroscopy and edgeoscopy.

**Unit 7: Biological Evidence:**
Nature and importance of biological evidence. Significance of hair evidence. Transfer, persistence and recovery of hair evidence. Structure of human hair. Comparison of hair samples. Morphology and biochemistry of human hair. Comparison of human and animal hair. Types and identification of microbial organisms of forensic significance. Identification of wood, leaves, pollens and juices as botanical evidence. Diatoms and their forensic significance.

**DEPARTMENT: ECONOMICS**

**COURSE: GE – ECONOMIC HISTORY OF INDIA (FOR ODD SEMESTER)**

**Course Description**

Using appropriate analytical frameworks, this course reviews major trends in economic indicators and policy debates in India in the post-Independence period, with particular emphasis on paradigm shifts and turning points. Given the rapid changes taking place in India, the reading list will have to be updated annually.

**Course Outline**

**Unit 1: Economic Development since Independence**

Major features of the economy at independence; growth and development under different policy regimes-goals, constraints, institutions and policy framework; an assessment of performance-sustainability and regional contrasts; structural change, savings and investment.

**Unit 2: Population and Human Development**

Demographic trends and issues; education; health and malnutrition.

**Unit 3; Growth and Distribution**

Trends and policies in poverty; inequality and unemployment

**Unit 4: Policies and Performance in Agriculture**

Growth; productivity; agrarian structure and technology; capital formation; trade; pricing and procurement.

**Unit 4: Policies and Performance in Industry**

Growth; productivity; diversification; small scale industries; public sector; competition policy; foreign investment.

**Unit 6: Trends and Performance in Services**

**Readings:**

1.Kaushik Basu, 2009, ―China and India: Idiosyncratic Paths to High Growth, Economic and Political Weekly, September.

2.Himanshu. 2011, ―Employment Trends in India: A Re-examination, Economic and Political Weekly, September.

3.Rama Baru et al, 2010, ―Inequities in Access to Health Services in India: Caste, Class and Region, Economic and Political Weekly, September.

4.Geeta G. Kingdon, 2007, ―The Progress of School Education in India, Oxford Review of Economic Policy

## COURSE: GE – ECONOMIC DEVELOPMENT (FOR EVEN SEMESTER)

**Unit 1:** Meanings and nature of development – economic growth, redistribution from growth and capabilities approach to development, Objectives of development, Measures of development – Purchasing power parity and Per capita income as an index of development, difference between growth and development, human development index, developing economy – features, Introduction to concept of sustainable development,

**Unit 2:** Factors in economic development - Land: Ownership and tenancy system – fixed rent contract and share cropping, role of agriculture in development, barriers to agricultural development and land reforms, Labour – Population and Labor force growth, casual and long term labor, permanent labor market, Capital: Role of capital accumulation in economic development. Significance of capital-output ratio, role of technology and technological progress, learning, human capital, Natural Capital & concept of investment.

**Unit 3:** Population and Development - Concepts of Population: definitions of fertility, mortality, birthrates, death rates, fertility rate, life expectancy, infant mortality rate, youth dependency ratio. Theory of demographic transition

**Unit 4:** Development strategies - Complementarity and Coordination, Poverty Trap of Nurkse and Big Push theory of Rosenstein-Rodan , Linkages – backward and forward; linkages, policy and big push,,
Choice of technology and choice of scale (large vs small) and criteria for investment, Gains from trade, sustainable development strategies.

**Unit 5:** Development in a Labour surplus economy - The concept of economic dualism, Disguised Unemployment, The Informal Sector, Rural-urban migration of labour – Harris-Todaro model, development in natural resource rich contest

**Unit 6:** Development, Inequality and poverty - Meaning of inequality, inequality measures, Lorenz Curve, Range, Coefficient of variation, Gini-coefficient, Kuznet's Inverted U hypothesis. Poverty, relative and absolute deprivation with respect to income, Poverty line, Poverty measures – Head count ratio, Poverty gap ratio, Income gap ratio, Human Poverty Index. Social dimensions of poverty – rural poverty, women and ethnic minorities and indigenous populations

**References:**

Development Economics Debraj Ray Development Economics Hayami

**DEPARTMENT: CHEMISTRY**

**COURSE: GE – FUNDAMENTALS OF CHEMISTRY (FOR ODD SEMESTER)**

## Unit 1: Basic concepts of Organic Chemistry

Fundamentals and Applications:
Basic Organic Chemistry Concepts: introduction to organic molecules and functional groups understanding organic reactions, atomic orbitals, hybridization, orbital representation of methane, ethane, ethyne and benzene.
Polarity of bonds: Inductive, resonance and steric effects hyper conjugation, and their influence on acidity and basicity of organic compounds.
Green Chemistry introduction and principles.

## Unit 2: Basic concepts of Physical Chemistry

Zeroth Law of Thermodynamics: Equilibrium, State Functions, Temperature, Equations of State. First Law of Thermodynamics: Work, Heat, Internal Energy, Heat Capacity, Concept of Enthalpy. Open thermodynamics.
Solutions: Molarity, Normality, Partial Molar Quantities, Ideal Solutions, Non Ideal Solutions, Electrolytes, Ionic activity and the Debye Huckel Theory, Colligative properties.

Reaction Kinetics: Reaction Rates, Rate Laws, Application.

## Unit 3: Basic concepts of Inorganic Chemistry Atomic Structure & Study of matter:

Study of matter – its properties and behavior; Atomic Structure: Discovery of Electron by J J Thomson, Bohr's Theory, De Broglie Hypothesis, Heisenberg's Uncertainty Principle.

**COURSE: GE – STEREOCHEMISTRY AND CONFORMATION (FOR EVEN SEMESTER)**

**Unit 1: Stereochemistry**

Introduction, Chirality, Concepts of Isomerism, Types of Isomerism: Structural and Stereoisomerism.
(R) and (S) Nomenclature of asymmetric carbon atoms. Optical Isomerism or Enantiomerism, Optical Activity. Biological discrimination of enantiomers.
Racemic mixtures, Enantiomeric excess, Optical purity. Fischer Projections and their use.
Diastereomers, stereochemistry of molecules with two or more asymmetric carbons. Geometrical isomerism: cis–trans and, syn-anti isomerism and E/Z notations.

**Unit 2 - Conformation**
Cycloalkanes and Conformational Isomerism, Conformational analysis of ethane and n-butane, Conformation analysis of alkanes: Relative stability, Axial and Equatorial bonds.
Energy diagrams of cyclohexane: Chair, Boat and Twist boat forms; Relative stability with energy diagrams.

**DEPARTMENT: PHYSICS**

**COURSE: GE – WHERE DO YOU LIVE? A JOURNEY THOUGH OUR GORGEOUS UNIVERSE (FOR ODD SEMESTER)**

**Unit 1:** Radiation from stars: spectral lines and their formation; stellar atmosphere.
**Unit 2:** Telescopes and other detectors.
**Unit 3:** Special relativity - Basic ideas.
**Unit 4:** Stellar parameters; Binary stars.
**Unit 5:** Main sequence stars and their structure; Nuclear processes in stars; End points of stellar evolution; White dwarfs, Neutron stars and Black holes.
**Unit 6:** Interstellar medium and star formation.
**Unit 7:** Cluster of stars.
**Unit 8:** Galaxies.
**Unit 9:** Universe on large scale: an overview.
**Unit 10:** Cosmological moles for a homogeneous and isotropic universe. Unit 11: Early Universe.

References:
1.The Physical Universe: an introduction to Astronomy - Frank H. Shu
2.Cosmos - Carl Sagan
3.Fundamental Astronomy - H. Karttunen et. al

## COURSE: GE – HISTORY AND PHILOSOPHY OF SCIENCE (FOR EVEN SEMESTER)

**Unit 1:** What is Science?
**Unit 2:** Scientific Reasoning.
**Unit 3:** Explanation in Science.
**Unit 4:** Realism and Anti-realism.
**Unit 5:** Scientific change and Scientific evolution.
**Unit 6:** Philosophical problems in physics, biology and psychology.
**Unit 7:** Science and its critics.
**Unit 8:** Conclusions.

**References:**

1.Science order and creativity -D. Bohm and D. Peat
2.Understanding Philosophy of Science - J. Ladyman
3.Philosophy of Science: A Contemporary introduction - A. Rosenberg

## DEPPARTMENT: MANAGEMENT
## COURSE: GE - ORGANIZATIONAL BEHAVIOR (FOR ODD SEMESTER)

1) Organization- the concept.
2) Human behavior- concepts and practice.
3) Leadership and leadership styles.
4) Motivation- theory and practice.
5) Communication.
6) Individual and Group dynamics.
7) OB and decision making.
8) Presentation and case studies.

## COURSE: GE - BUSINESS STRATEGY (FOR EVEN SEMESTER)

1) Concept of business strategy- reactive, preactive and proactive strategies.
2) McKinsey 7S framework.
3) Impact of environment in strategy formulation.
4) Mega, Micro and relevant environment.
5) The strategic management pyramids.
6) Swot analysis.
7) BCG growth share matrix.

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# SKILL ENHANCEMENT COURSE (SEC)

**Course: SEC1 – Mentored Seminar I Credit: 1 (1L-0T-0P)**

In this course, every student has to prepare presentations during the first semester under the guidance of any faculty of the department who will mentor the student's work. The students are taught how to prepare a presentation, how to deliver seminar and to make them comfortable in answering the questions asked to them during the interactive session. At the end of the semester, the student has to deliver a lecture on a specific topic.

**Course: SEC2 – Mentored Seminar II Credit: 1 (1L-0T-0P)**

In this course, every student has to prepare presentations during the second semester under the guidance of any faculty of the department who will mentor the student's work. The students are taught how to prepare a presentation, how to deliver seminar and to make them comfortable in answering the questions asked to them during the interactive session. At the end of the semester, the student has to deliver a lecture on a specific topic

**Course: SEC3 – Mentored Seminar III Credit: 1 (1L-0T-0P)**

In this course, every student has to prepare presentations during the third semester under the guidance of any faculty of the department who will mentor the student's work. The students are taught how to prepare a presentation, how to deliver seminar and to make them comfortable in answering the questions asked to them during the interactive session. At the end of the semester, the student has to deliver a lecture on a specific topic

**Course: SEC4 – Mentored Seminar IV Credit: 1 (1L-0T-0P)**

In this course, every student has to prepare presentations during the fourth semester under the guidance of any faculty of the department who will mentor the student's work. The students are taught how to prepare a presentation, how to deliver seminar and to make them comfortable in answering the questions asked to them during the interactive session. At the end of the semester, the student has to deliver a lecture on a specific topic

## Course: SECV – Dissertation/Project
## Credit: 6

A dissertation may be written on any issues pertaining to Indian economy and/or Global Economy in the present context or in the historical context. The students should be guided in how to analyse data relating to economic issues for this purpose. The evaluation of the said dissertation will be done on the basis of power-point presentation before the external examiner. 60 marks should be allotted for the report writing and 20 marks should be allotted for presentation and 20 marks for viva-voce.

| Sl no | Main Agenda | Components |
|---|---|---|
| 1. | Introduction | Basic of Survey |
| 2. | Literature Review | Summary of Literature |
| 3. | Collection of data | Sampling, Data collection |
| 4. | Analysis of Data | Using tools of statistics and Econometrics model fitting and Estimation |
| 5. | Interpretation | Interpret the estimated results |
| 6. | Summary and conclusion | Presenting entire analysis in a condensed manner. |
| 7. | Report Writing | How to write report |
| 8. | Presentation of Report | PPT Presentation |

# ABILITY ENHANCEMENT COMPULSORY COURSES (AECC)

**Course: AECC1 – Communicative English Credit: 2 (2L-0T-0P)**
**Component: Theory**

**Unit 1 - Functional grammar**
Tenses: basic forms and use; sentence formation; common errors; parts of speech, direct and reported speech structures and voices

**Unit 2 - Letter Writing**
Job application; business letter; editorial letter; email

**Unit 3 - Essay Writing**
Overall argument; consistent logic; main points; paragraphs; introduction & conclusion

**Unit 4 - Report Writing**
Manuscript; memo

**Unit 5 - Precis Writing**
Understanding main points; inculcating precision; reducing to basics

**Unit 6 - Note Making**

**Unit 7 - Other Kinds of Texts**
Notice; Circular; Agenda; Minutes

**Unit 8 - Presentation Skills**
Soft skills; relevance of content; knowledge and confidence

**Unit 9 - Group Discussion**
The basic structure of GD's; workshops to develop participation and team-work skills

**Unit 10 - Role play**
What is 'role play'? identifying and understanding one's role; workshops

**Unit 11 - Developing Interview Skills**
The "Do's & Don'ts" of Interviews; verbal proficiency; personality development; mock-interviews

**References:**

Nilanjana Gupta - *Communicate with Confidence* (Anthem Press, 2011)

Barun Mitra - *Effective Technical Communication: Guide for Scientists and Engineers* (OUP, 2006)

**Course: AECC1 – Environmental Science Credit: 2 (2L-0T-0P)**
**Component: Theory**

**Unit 1: Environment and its components:**
Definition, Geographical distribution of environment, Environmental chemistry, Atmosphere and its composition.

**Unit 2: Forest resources:**
Use and over exploitation, deforestation, timber extraction, mining, dams and their effects on forests, tribal people.

**Unit 3: Water resources:**
Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams- benefits and problems.

**Unit 4: Food resources:**
World food problems, changes caused by agriculture and over-grazing, effects of modern agriculture, fertilizer and pesticides, water logging, salinity.

**Unit 5: Energy resources:**
Growing energy needs, renewable and non-renewable energy resources, use of alternative energy sources.

**Unit 6: Land resources:**
Land as a resource, land degradation, man induced landslides, soil erosion and desertification.

**Unit 7: Ecosystem, Biodiversity and its Conservation:**
Concept of ecosystem, structure and function of ecosystem, Energy flow, Bio-geological cycles, Introduction to biodiversity, genetic diversity, species diversity, ecological diversity, Biogeographical classification of India, Biodiversity Hot-spots, conservation of biodiversity.

**Unit 8: Environmental Pollution:**
Definition, cause and effect of pollution, Control measures of pollution, Air pollution, Water pollution, Soil pollution, Noise pollution, Solid waste management, Disaster management, role of the society to control pollution.

**Unit 9: Environmental issues, Laws and ethics:**
Water conservation, climate change: cause and effect, global warming, acid rain, ozone layer depletion, hazardous material industries, Wasteland reclamation, Environment protection act, Air (prevention and control of pollution) act, Water (prevention and control of pollution) act, Wildlife protection act, Forest conservation act, issues involved in enforcement of environment legislation, Public awareness.

# UNIVERSITY SPECIFIED COURSE (USC)

**Course: USC1 – Foreign Language –I (German) Credit: 2 (2L-0T-0P)**
**Component: Theory**

Lesson 1 Speech acts:
Greetings and farewells
1st, 2nd and 3rd person introduction. Speaking about other persons Numbers till 20
Exchanging telephone numbers and E-mail addresses. How to spell a word?
Speaking about countries and languages.
Grammar: W-Questions and declarative sentences, personal pronouns- I. Vocabulary: Numbers, countries and languages.

Lesson 2:
Speech acts:
Speaking about hobbies.
Weekdays and weekends.
Speaking about work, profession and working hours. Numbers above 20
Seasons
Making profiles on the internet
Grammar: Definitive articles, verbs and personal pronouns-II, yes/no questions, plurals, verbs 'haben' and 'sein'.
Vocabulary: Hobbies, Days of the week, numbers from 20, months of the year, seasons

Lesson 3 Speech acts:
To name places and buildings
To ask questions about places Picture stories
To enquire about things Transportation
Concept of international words
Grammar: Articles for nouns, definite articles, indefinite articles, negative articles, imperative sentences.
Vocabulary: Places and buildings, transportation, directions.

**Course: USC1 – Foreign Language –I (Spanish) Credit: 2 (2L-0T-0P)**
**Component: Theory**

1. Introduction, Alphabets

2. Vocabulary (Relatives, Fruits, Flowers, Colours, Food, Dress, Days of Week, Month, year etc.)
3. Numbers
4. Noun
5. Subject Pronoun
6. Indicative Mood
7. Verbs: - Regular
8. Verbs Irregular: - Ser, Estar, Tener, Haber, poder, poner etc.
9. Verbs Irregular: - Stem Changing (e to ie), (e to i), (o to ue)
10. Adjective: -Regular Comparative and Superlative
11. Reflexive Verb
12. Object Pronoun
13. Preposition
14. Demonstrative Adjective
15. Possesive Adjective
16. Possesive Pronoun
17. Por and Para
18. Past Tense: - Preterite
19. Audio
20. Conversation

**Course: USC1 – Foreign Language I (Japanese) Credit: 2 (2L-0T-0P)**
**Component: Theory:**

a. Course Title: Japanese Language Course
b. Learning Objectives:

- Can understand and use familiar everyday expressions and very basic phrases aimed at the satisfaction of needs of a concrete type.
- Can introduce him/herself and others and can ask and answer questions about personal details such as where he/she lives, people he/she knows and things he/she has.
- Can interact in a simple way provided the other person talks slowly and clearly and is prepared to help.

Text Books:
① Marugoto: Japanese language and culture Starter A1 Coursebook for communicative language competences (Goyal Publisher & Distributer Pvt Ltd. New Delhi)
② Marugoto: Japanese language and culture Starter A1 Coursebook for communicative language activities (Goyal Publisher & Distributer Pvt Ltd. New Delhi)

1. Japanese Script & Greetings
    - Hiragana (Japanese Native Script)
    - Katakana (Foreign Script)
    - Kanji
    - Exchange greetings in Japanese
2. Japanese Vocabulary
    - Country Names, Languages, Occupations, Family, People, Numbers
    - Food, Drinks, Food for Lunch, Eating Places
    - Home, Furniture, Places to visit Near buy, Rooms, Things in the room
    - Daily routines, Time, Free-time activities, Places, Calendar

3. Basic Conversation & Grammar
4. Listening, Reading and Writing activities in Japanese Self-introduction
    - My Family Favorite Food
    - My family's breakfast
    - My breakfast
    - My lunch
    - My home
    - My room
    - My daily life
    - My week's schedule

**Course: USC2 – Foreign Language II (German) Credit: 2 (2L-0T-0P)**
**Component: Theory**

**Lesson 4:**

**Speech acts:** Talk about food, planning shopping, conversations during shipping, conversations in a Restaurant, understanding texts with W-Questions.

**Grammar:** Positions in a sentence, sentence structure, ‘Akkusativ’ and 'Akkusativ'-verbs.

**Vocabulary:** meals, groceries, beverages, shops, and businesses.

**Lesson 5:**

**Speech acts:** Understanding of time and to call, information with date and time, talking about family, planning an appointment, to apologise for delay, cancellation of an appointment over the telephone.

**Grammar**: Informations with date and time with prepositions 'um’, 'am’, 'von’……. ‘bis’, possessive articles, Modal verbs,

**Vocabulary:** Daily routine, time, family.

**Lesson 6:**

**Speech acts:** Planning something together, to speak about birthdays, to receive and send invitations, talk about events, finding of particular informations in a text.

**Grammar:** separable verbs, preposition 'für’ for ‘Akkusativ’, personal pronouns, past tense of 'haben’ and 'sein’.

**Vocabularies:** Hobbies, food, beverages, passion and events

**Course: USC2 – Foreign Language II (Spanish) Credit: 2 (2L-0T-0P)**
**Component: Theory**

1. Gustar, Encantar, Doler Verb
2. Some More irregular Verbs- Saber, Conocer, querer, hacer, etc
3. Past Tense: - Preterite indefinido
4. Audio
5. Conversation
6. Comprehension
7. Picture description
8. Letter Writing
9. Paragraph Writing
10. Form Filling

**Course: USC2 – Foreign Language II (Japanese) Credit: 2 (2L-0T-0P)**
**Component: Theory**

a. Course Title: Japanese Language Course
b. Learning Objectives:
- Can understand and use familiar everyday expressions and very basic phrases aimed at the satisfaction of needs of a concrete type.
- Can introduce him/herself and others and can ask and answer questions about personal details such as where he/she lives, people he/she knows and things he/she has.
- Can interact in a simple way provided the other person talks slowly and clearly and is prepared

d. Text Books:
① Marugoto: Japanese language and Culture Starter A1 Coursebook for communicative language competences (Goyal Publisher & Distributer Pvt Ltd. New Delhi)
② Marugoto: Japanese language and Culture Starter A1 Coursebook for communicative language activities (Goyal Publisher & Distributer Pvt Ltd. New Delhi)

1. Japanese Script
   - Kanji
2. Japanese Vocabulary
   - Hobbies (sports, films, music, etc.), Places, Events, Calendar
   - Transport, Places in Town, Locations
   - Souvenirs, Counting Numbers, Clothes, Prices
   - Holiday activities
3. Conversation & Grammar
4. Listening, Reading and Writing activities in Japanese
   - My hobby
   - My town
   - My shopping last week
   - Clothes that I like
   - My Holiday trip Experiences in Japan