

ఆంధ్రప్రదేశ్ కేంద్రీయ విశ్వవిద్యాలయం ఆంధ్రప్రదేశ్ కేంద్రీయ విశ్వవిద్యాలయ
CENTRAL UNIVERSITY OF ANDHRA PRADESH

Jnana Seema, Ananthapuramu, India - 515701

DEPARTMENT OF ECONOMICS
SCHOOL OF ARTS, HUMANITIES AND SOCIAL SCIENCES

Masters Programme
(as per the National Credit Framework 2023)



Vidya Dadati Vinayam
(Education Gives Humility)

M.Sc. Economics and Data Analytics



Programme Structure
(Effect from Academic Year 2026 - 27)

M.Sc. Economics and Data Analytics
Department of Economics
School of Arts, Humanities and Social Sciences

CONTENTS

Sl. No.	Particulars	Page No.
1	Introduction to the Programme	2-5
2	Semester and Course wise Credits	6
3	Programme Structure	7-8
4	Credits Distribution	8-9
5	Important Information to Students	10
6	Semester-wise Detailed Syllabus	11-64

M.Sc. Economics and Data Analytics

Department of Economics

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1. Introduction to the Programme

The Master of Science in Economics and Data Analytics (MED) programme at the Central University of Andhra Pradesh is designed to equip students with the in-demand skills required to succeed in today's competitive job market. The programme aims to produce competent postgraduates who can make meaningful contributions to academia, industry, and policy, armed with both theoretical knowledge and practical expertise. Emphasizing critical thinking and problem-solving, the curriculum develops advanced analytical skills essential for navigating the evolving global business and economic landscape. It integrates insights from economics - human behaviour, decision-making, and policy analysis - with modern data analytics techniques. A strong foundation in both economics and data analytics is provided through core courses, while electives in econometrics and applied analytics allow students to specialise further.

Technical competencies form the heart of the programme. Students gain hands-on experience with leading software packages such as Power BI, STATA, SQL, R, Python, and SPSS, ensuring they are proficient in handling complex datasets. Beyond classroom learning, the programme offers opportunities to apply knowledge through industry talks, internships, dissertations, and field surveys. This multidisciplinary approach ensures that students not only refine their technical and analytical skills but also develop professional competencies. By combining theory with practice, the programme prepares postgraduates to meet real-world challenges and thrive in diverse professional settings.

2. Programme Vision

The vision of the Master of Science in Economics and Data Analytics (MED) programme is to become a globally recognised leader in advanced education that integrates economic theory with econometrics and statistical applications using the latest analytical tools. It seeks to empower students with the knowledge, skills, and ethical framework necessary to excel in a dynamic and interconnected world. Through innovative research, interdisciplinary collaboration, and a commitment to excellence, the programme aims to prepare postgraduates to address complex economic challenges and make meaningful contributions to society. The vision is to foster a vibrant learning community that nurtures intellectual curiosity, critical thinking, and lifelong learning, equipping students to become leaders in academia, industry, government, and beyond.

3. Programme Educational Objectives (PEOs)

PEO1 Foundational Knowledge: Graduates will acquire advanced knowledge in economics, econometrics, and data analytics, enabling them to understand and address complex socio-economic challenges.

PEO2 Analytical and Technical Skills: Graduates will develop proficiency in modern analytical tools, statistical software, and programming languages (R, Python, SQL, SPSS, STATA, Power BI) to solve applied economic and policy problems.

PEO3 Research and Innovation: Graduates will design and conduct independent research projects, dissertations, and field surveys, contributing innovative solutions to academia, industry, and policy-making.

PEO4 Professional and Ethical Competence: Graduates will demonstrate ethical responsibility, critical thinking, and professional readiness to work effectively in diverse teams and multidisciplinary environments.

PEO5 Lifelong Learning and Leadership: Graduates will recognize the need for lifelong learning, adapt to evolving global economic and technological landscapes, and assume leadership roles in academia, industry, and government.

4. Programme Outcomes (POs)

The purpose of this programme is to equip students with advanced knowledge and practical skills in economics and data analytics. After successful completion of the programme, students will be able to:

PO1 Economics and Analytics Knowledge: Apply advanced knowledge of microeconomics, macroeconomics, econometrics, statistics, and data analytics to solve complex socio-economic and policy problems.

PO2 Problem Analysis: Identify, formulate, and analyse economic and business problems using econometric models, statistical methods, and data-driven approaches.

PO3 Design and Development of Solutions: Design solutions for economic and policy challenges by integrating theoretical models with applied data analytics, ensuring relevance to social, cultural, and environmental contexts.

PO4 Research and Investigation: Conduct independent research using econometric techniques, field surveys, and computational tools to interpret data and derive valid conclusions.

PO5 Modern Tool Usage: Select and apply modern software tools (Power BI, STATA, SQL, R, Python, SPSS) for modeling, simulation, and solving applied economic problems.

PO6 Economics and Society: Apply contextual knowledge to assess societal, legal, health, and cultural issues, and evaluate the impact of economic decisions on communities.

PO7 Sustainability and Policy: Understand the implications of economic and data-driven solutions in environmental and societal contexts, demonstrating commitment to sustainable development.

PO8 Ethics: Apply ethical principles and professional standards in economic analysis, data handling, and research practice.

PO9 Individual and Team Work: Function effectively as an individual and as a member or leader in diverse teams, demonstrating collaboration in multidisciplinary settings.

PO10 Communication: Communicate effectively on economic and analytical issues with peers, academia, industry, and society through reports, documentation, and presentations.

PO11 Project Management and Finance: Demonstrate knowledge of economics, analytics, and management principles, and apply them to project work, internships, and dissertations.

PO12 Lifelong Learning: Recognize the need for, and develop the ability to engage in independent and lifelong learning in economics, data analytics, and interdisciplinary domains.

5. Programme-Specific Outcomes (PSOs):

The learning outcomes are designed to equip students with the knowledge, skills, and abilities necessary to succeed in careers related to economics, data analysis, and decision-making:

PSO1: Economic Knowledge: Students will demonstrate advanced understanding of microeconomics, macroeconomics, econometrics, and applied economics, enabling them to interpret socio-economic behaviour and policy frameworks.

PSO2: Data Analytics Proficiency: Students will acquire hands-on expertise in modern analytical tools and programming languages (R, Python, SQL, SPSS, STATA, Power BI) to analyse and visualize complex datasets.

PSO3: Technical and Computational Competence: Students will integrate computational skills with econometric modeling, database management, and machine learning techniques to solve applied economic and business problems.

PSO4: Research and Critical Evaluation: Students will critically analyse market structures, production and cost functions, and pricing strategies, while designing independent research projects and dissertations that contribute to academia, industry, and government.

PSO5: Professional Readiness and Ethics: Students will develop professional competencies, teamwork, communication, and leadership skills, while adhering to ethical and professional standards in economic analysis and data-driven decision-making.

5. Pedagogy of the Programme

The pedagogy for the M.Sc. in Economics and Data Analytics is carefully designed to progress through the six levels of Bloom's Taxonomy, ensuring a structured and engaging learning environment that blends theory with practice. Students begin by recalling and defining fundamental concepts in microeconomics, macroeconomics, econometrics, statistics, and applied economics through interactive lectures and foundational readings. They then move to understanding and interpreting theories of utility, cost analysis, and market structures, strengthening conceptual clarity through group discussions, debates, and problem-solving activities. At the application stage, learners engage in household surveys, field visits, and hands-on projects, using statistical methods, econometric techniques, and programming tools such as Power BI, STATA, SQL, R, Python, and SPSS to connect theory with real-world practice. This systematic approach ensures that students develop both analytical depth and technical proficiency early in the programme.

As students advance, they are trained to analyze and evaluate socio-economic issues and complex datasets through dissertation work, case studies, and interdisciplinary assignments that integrate economics with computer science, business, and public policy. They critique empirical research, assess policy implications, and apply ethical and professional standards in collaborative projects and peer learning. Finally, at the creation stage, the programme culminates in a capstone project or thesis, where students design and conduct independent research, innovate solutions to pressing societal challenges, and present findings to academic and industry audiences. Complementary activities such as networking events, career fairs, and mentorship programmes further enhance professional readiness, leadership development, and smooth transition into diverse career pathways. This pedagogy not only equips graduates with advanced knowledge and technical expertise but also nurtures critical thinking, ethical responsibility, and lifelong learning.

6. Programme Structure

- The Master of Science in Economics and Data Analytics is a two-year postgraduate programme divided into four semesters, comprising a total of 95 credits.
- The curriculum integrates Core Courses, Discipline-Specific Electives, Multidisciplinary Courses, MOOCs, Skill/Internship Components, and Dissertation Work, ensuring a balanced and comprehensive learning journey.
- **Semester-wise Structure:**
 - **Semester I:** Foundational courses in microeconomics, macroeconomics, statistics, and data analytics, supported by one discipline-specific elective and one MOOC. Includes two lab components for practical exposure.
 - **Semester II:** Advanced courses in econometrics, development economics, database management, and machine learning, with one elective, one MOOC, and a compulsory core course. Lab work strengthens applied skills.
 - **Semester III:** Courses in advanced econometrics, applied data analytics, and research methodology, alongside electives, a MOOC, and a skill/internship project. Multiple lab components ensure hands-on training.
 - **Semester IV:** Dedicated to Dissertation Work (8 credits) and two advanced core course enabling students to apply knowledge to significant research questions or practical problems.

M.Sc. Economics and Data Analytic
Department of Economics
School of Arts, Humanities and Social Sciences

Semester and Course wise Credits Distribution

Semester	Core Course Credits				DSE Credits		IDE Credits		CCC Credits				SIP Credits		Dissertation Credits		Total Credits
	Code	L/T	P	Total	Code	Total	Code	Total	Code	T	L/P	Total	Code	Total	Code	Total	
I	MED101	4	0	4	MED111	4	MED112 MOOC	3	-		-	-	-	-	-	-	25
	MED102	4	0	4													
	MED103	2	2	4													
	MED104	4	0	4													
	MED105	1	1	2													
	Total	15	3	18	-	4	-	3	-	-	-	-	-	-	-	-	
II	MED201	2	2	4	MED211	4	MED212 MOOC	3	MED213	2	2	4	-	-	-	-	27
	MED202	3	1	4													
	MED203	4	0	4													
	MED204	3	1	4													
	Total	13	4	16	-	4	-	3	-	2	2	4	-	-	-	-	
III	MED301	2	2	4	MED311	4	MED312 MOOC	3	MED313	2	0	2	MED314	2	-	-	27
	MED302	3	1	4													
	MED303	3	1	4													
	MED304	4	0	4													
	Total	12	4	16	-	4	-	3	-	2	0	2	-	2	-	-	
IV	MED401	4	0	4	-	-	-	-	-	-	-	-	-	-	MED411	8	16
	MED402	4	0	4													
	Total	8	0	8	-	-	-	-	-	-	-	-	-	-	-	8	
Total Courses	15	-	-	-	3	-	3	-	2	-	-	-	1	-	1	-	25
Total Credits	-	47	11	58	-	12	-	9	-	4	2	6	-	2	-	8	95
Percentage	-	49.47	11.57	61.05	-	12.62	-	9.47	-	4.21	2.11	6.32	-	2.11	-	8.42	100

Note: L/T: Lectures/Tutorial

IDE: Inter-disciplinary Electives

P: Practicals.

CCC: Common Compulsory Course

DSE: Discipline Specific Elective

SIP: Summer Internship Project

M.Sc. Economics and Data Analytics
Department of Economics
School of Arts, Humanities and Social Sciences

Programme Structure

Semester I						
Sl. No.	Course Code	Title of the Course	Credit Points	Credit Distribution		
				L*	T*	P*
1	MED101	Microeconomic Theory	4	3	1	0
2	MED102	Macroeconomic Theory	4	3	1	0
3	MED103	Computational Statistics and Data Visualization	2	2	0	0
		Lab: MS Excel and Power BI	2	0	0	2
4	MED104	Introduction to Econometric Theory	4	3	1	0
5	MED105	Computer Applications in Economics	1	1	0	0
		Lab: Basic Computer Operations, Documentation, Data Handling & Visualization with MS Office	1	0	0	1
6	DES Elective-I: Any one of the following		4	3	1	0
	MED111	A. Public Finance and Fiscal Policy				
		B. Money and Banking				
		C. Sustainability and Climate Economics				
7	MED112	*IDE-I: MOOCs	3	3	0	0
Total			25	18	4	3

Semester II						
Sl. No.	Course Code	Title of the Course	Credit Points	Credit Distribution		
				L*	T*	P*
1	MED201	Data Analytics with R	2	2	0	0
		Lab: R Programming and RStudio	2	0	0	2
2	MED202	Time Series Econometrics	3	3	0	0
		Lab: STATA/EViews	1	0	0	1
3	MED203	Indian Economy - Structure and Performance	4	3	1	0
4	MED204	Economics Institutions and Databases Systems	4	3	0	1
5	DSE Elective-II: Any one of the following		4	3	1	0
	MED211	A. Financial Economics				
		B. Energy Economics				
		C. Insurance Economics				
6	MED212	*IDE-II: MOOCs	3	3	0	0
7	MED213	CCC-I: Introduction to AI and ML	2	2	0	0
		Lab: Introduction to AI and ML	2	0	0	2
Total			27	19	2	6

Semester III						
Sl. No.	Course Code	Title of the Course	Credit Points	Credit Distribution		
				L*	T*	P*
1	MED301	Data Analytics with Python	2	2	0	0
		Lab: Python	2	0	0	2
2	MED302	Research Methodology	3	3	0	0
		Lab: SPSS and LaTeX	1	0	0	1
3	MED303	Applied Econometrics	3	3	0	0
		Lab: STATA/EViews	1	0	0	1
4	MED304	International Economics	4	3	1	0
5	DSE Elective-II: Any one of the following		4	3	1	0
	MED311	A. Financial Econometrics				
		B. Digital Economy				
		C. Entrepreneurship Development				
6	MED312	IDE-III: MOOCs #	3	3	0	0
7	MED313	CCC-II: Building Mathematical Ability and Financial Literacy	2	1	1	0
8	MED314	SIP: Summer Internship Programme	2	0	0	2
Total			27	18	3	6

Semester IV						
Sl. No.	Course Code	Title of the Course	Credit Points	Credit Distribution		
				L*	T*	P*
1	MED401	Economic Growth and Development	4	3	1	0
2	MED402	Game Theory for Economics and Strategy	4	3	1	0
3	MED411	Dissertation	8	0	0	8
Total			16	6	2	8
Grand Total			95	61	11	23

Note: *L: Lectures; T: Tutorials P: Practicals. # As suggested by the department and the university.

Semester-wise Credit Distribution

Semester	Total Credits	Cumulative credit at the end of the semester
1	25	25
II	27	52
III	27	79
IV	16	95

I. Credit Requirement

- The minimum number of credits required to be earned by a student for the award of the degree is **95**.
- Students may earn credits in excess of 95 by opting for additional courses; however, the upper limit shall not exceed **96 credits**.

II. Assessment Pattern

- **Theory Courses:**
 - **Internal (40%)** – Formative evaluation comprising two best out of three tests (each test carrying a maximum of 15 marks, totalling 30 marks), along with seminar/assignments/attendance (10 marks).
 - **External (60%)** – Summative evaluation through the semester-end examination.

III. Laboratory Components:

- **Internal (60%)** – Continuous assessment through lab work and internal examination.
- **External (40%)** – Summative evaluation through the semester-end practical examination.

IV. End-Semester Examination:

- Maximum Marks: **60**
- Duration: **3 Hours**

M.Sc. Economics and Data Analytics
Department of Economics
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Important Information to Students

- i. Eligibility: A Bachelor's degree in Economics with at least 50% marks in aggregate and at least 50% marks in Economics with Mathematics/Statistics; Or Bachelor's degree with at least 60% marks in aggregate any of the allied subjects viz. Commerce, Statistics, Mathematics, Engineering or any of the Social Sciences subjects with Mathematics/Statistics.
- ii. The minimum duration for completion of the programme is four semesters (two academic years) and the maximum duration is eight semesters (four academic years) or as per amendments made by the regulatory bodies from time to time.
- iii. A student should attend at least 75% of the classes, seminars, practicals in each course of study.
- iv. All theory courses in the programme carry a Continuous Internal Assessment (CIA) component to a maximum of 40 marks and Semester End Examination (SEE) for a maximum of 60 marks. The minimum pass marks for a course is 50%.
- v. All lab components carry a Continuous Internal Assessment (CIA) component to a maximum of 60 marks and Semester End Examination (SEE) for maximum of 40 marks. The minimum pass marks for a course in 50%.
- vi. A student should pass separately in both CIA and the SEE/, i.e., a student should secure 20 (50%) out of 40 marks in CIA and 30 (50%) out of 60 marks in SEE. Contrary a student should secure 30 (50%) out of 60 marks in CIA and 20 (50%) out of 40 marks in the SEE.
- vii. There are 3 CIA tests for each course per semester from which the best 2 performances are considered for the purpose of calculating the marks in CIA. A record of the continuous assessment is maintained by the academic unit.
- viii. Each CIA contains 15 marks, out of the best 2 tests scores are considered for 30 marks. Remaining 10 marks awarded for assignments, class presentations and class participation and punctuality of the student.
- ix. A student failing to secure the minimum pass marks in the CIA is not allowed to take the semester end examination of that course. S/he has to redo the course by attending special classes for that course and get the pass percentage in the internal tests to become eligible to take the end semester examination.
- x. Semester-end examination shall consist of objective type questions, descriptive type questions, short answer questions and case studies or any other recommended by the Board of Studies (BoS).
- xi. Students failing a course due to lack of attendance should redo the course.
- xii. Re-evaluation is applicable only for SEE papers and shall not be entertained for other components such as lab/practical /thesis/ dissertation/ internship etc.
- xiii. An on-campus elective course is offered only if 10 or 50% of the students registered, whichever is higher.

**SEMESTER WISE
DETAILED SYLLABUS**

SEMESTER-I

Course Code : MED101 Course Type : Core No. of Credits : 4.00 No. of Hours : 60 (L 45 + T 15)	Course Title Microeconomic Theory
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Course Objectives:

- Provide a strong grounding in microeconomic concepts including consumer behaviour, production, market equilibrium, pricing, and structures, enabling recall, definition, and interpretation of core theories.
- Train students to apply microeconomic models for decision-making, production optimization, and pricing, while critically analyzing market structures, policy interventions, and welfare implications.
- Encourage students to design and conduct case-based projects or research applications that integrate theory with practice, fostering innovation, ethical responsibility, and professional readiness.

Course Outcomes (COs):

By the end of the course, students can be able to;

- **CO1:** Recall and define key concepts of consumer behaviour, production functions, market equilibrium, pricing principles, and advanced applications.
- **CO2:** Explain and interpret theories of utility, cost analysis, and market structures in microeconomics.
- **CO3:** Apply microeconomic models to analyze consumer decisions, production optimization, and pricing strategies.
- **CO4:** Critically analyze perfect competition, monopoly, monopolistic competition, and oligopoly models, and evaluate policy interventions, pricing models, and welfare implications.
- **CO5:** Design and conduct case-based projects or research applications integrating consumer behaviour, production, and market analysis for practical problem-solving.

COs /POs Mapping:

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	–	–	–	–	–	–	–	–	–	–	✓
CO2	✓	✓	–	–	–	✓	–	–	–	–	–	–
CO3	–	✓	✓	–	✓	–	–	–	–	–	–	–
CO4	–	✓	–	✓	–	✓	✓	✓	–	–	–	–
CO5	–	–	✓	✓	–	–	–	–	✓	✓	✓	–

Course Outline:

Unit-I: [12 Hours]

Theory of Consumer Behaviour: Cardinal Utility Theory; Indifference Curves Theory; Revealed Preferences Hypothesis; Derivation of Demand; Determinants of Demand and Elasticities of Demand; Consumers Surplus; Expected Utility and Risk Analysis.

Unit-II: [12 Hours]

Theory of Production and Costs: Production Function; Law of Variable Proportions; Cobb-Douglas Production Function; Optimal Combination of Factors Inputs; Cost Analysis – Short run and Long-run Cost Analysis; Modern Theories of Costs.

Unit-III: [14 Hours]

Market Equilibrium and Perfect Competition: Short Run and Long Run Equilibrium of Firm and Industry; Monopoly – Short Run and Long Run Equilibrium; Monopoly Power and Price Discrimination; Monopolistic Competition – Equilibrium of Monopolistic Firm with Selling Costs; Chamberlin Model of Group Equilibrium; Oligopoly - Non-collusive Oligopoly Models and Collusive Oligopoly Models.

Unit-IV:**[12 Hours]**

Pricing Principles: Break-even Analysis and Marginal Cost Pricing Principle; Average Cost or Full Cost Pricing Principle; Mark-up Pricing Principle; Limit Pricing Principles – Bain's Limit Pricing Theory; Sylos-Labini Model; Franco Modigliani Model; Bhagawati Model and Pashigian Model of Limit Pricing.

Unit-V:**[10 Hours]**

Theories of Distribution: Marginal Productivity Theory of Distribution; Theories of Rent; Theories of Wages; Theories of Interest; and Theories of Profits.

Suggested Readings:

Koutsoyiannis A (1979): *Modern Microeconomics*, Second Edition, The Macmillan Press Ltd.

Varian, H. R. (2010). *Intermediate microeconomics: A modern approach* (3rd ed.). W. W. Norton & Company.

Nicholson, W., & Snyder, C. (2012). *Microeconomic theory: Basic principles and extensions* (12th ed.). Cengage India Private Limited.

References:

Sen, A. (2010). *Microeconomics: Theory and applications* (2nd ed.). Oxford University Press India.

Bernheim, B. D., & Whinston, M. D. (2008). *Microeconomics* (8th ed.). McGraw-Hill Companies.

Kreps, D. M. (1990). *A course in microeconomic theory*. Princeton University Press.

Kreps, D. M. (2013). *Microeconomic foundations: Choice and competitive markets*. Princeton University Press.

Varian, H. R. (2010). *Intermediate microeconomics with calculus* (1st ed.). W. W. Norton & Company.

Varian, H. R. (1992). *Microeconomic analysis* (3rd ed.). W. W. Norton & Company.

Mas-Colell, A., Whinston, M. D., & Green, J. R. (1995). *Microeconomic theory*. Oxford University Press.

Nicholson, W. (2002). *Microeconomic theory: Basic principles and extensions* (8th ed.). South-Western Thomson Learning.

Course Code : MED102 Course Type : Core No. of Credits : 4.00 No. of Hours : 60 (L 45 + T 15)	Course Title Macroeconomic Theory
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Course Objectives:

The main aim of this course is to:

- To understand how national income is measured using different methods and basic concepts like circular flow of income and input-output tables.
- To learn major theories of consumption, investment, and money and understand how people spend, save, invest, and how money works in the economy.
- To understand basic macroeconomic issues and policies like inflation, unemployment, business cycles, and how fiscal and monetary policies help manage the economy.

Course Learning Outcomes:

By the end of the course, students are expected;

- **CO1:** Understand the structure of national income accounting and apply expenditure, income, and value-added methods for measuring national income, including analysis of circular flow and input-output tables.
- **CO2:** Analyze major theories of consumption such as Absolute Income, Permanent Income, Life Cycle, and Inter-temporal Choice models to explain consumer behavior.
- **CO3:** Evaluate theories of investment and demand for money, including neoclassical investment theory, accelerator theory, Tobin's Q theory, and monetary concepts like money multiplier and high-powered money.
- **CO4:** Examine Keynesian and neoclassical macroeconomic models, and assess the role and effectiveness of fiscal and monetary policy using IS-LM, AD-AS, and open economy frameworks.
- **CO5:** Interpret business cycle phases, inflation, unemployment, and Phillips Curve relationships, and assess macroeconomic policy coordination challenges in developing economies.

COs /POs Mapping:

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	–	✓	✓	–	–	–	–	–	–	✓
CO2	✓	✓	–	✓	–	✓	–	–	–	–	–	✓
CO3	✓	✓	✓	✓	✓			✓	–	–	–	✓
CO4	✓	✓	✓	✓	✓	✓	✓	✓	–	✓	–	✓
CO5	✓	✓	✓	✓	–	✓	✓	✓	✓	✓	✓	✓

Course Outline:

Unit-I: [12 Hours]

National Income Accounting: Accounting structure, key concepts in accounting, circular flow of income, computational problems - Expenditure approach, income approach and value added approach for measurement, input-output tables.

Unit-II: [10 Hours]

Theories of Consumption: The Psychological Law of Consumption - Kuznets 's Consumption Puzzle - Fisher 's Inter-temporal Choice Model - Permanent Income Hypothesis - Life Cycle Hypothesis.

Unit-III: [14 Hours]

Theories of Investment, Demand and Supply of Money: The Neoclassical Theory of Investment - Capital Theory and Theory of the Firm - Finance and the Cost of Capital - The Accelerator Theory of Investment - The Stock Market and Tobin's Q Theory; Baumol Inventory Theory of Money, Quantity Theory of Money, High Powered Money, Money Multiplier.

Unit-IV:**[12 Hours]**

Macroeconomic Models: Fiscal and Monetary Policy in IS-LM Model, Relative Efficacy, Aggregate Supply and Aggregate Demand, Open Economy Models.

Unit-V:**[12 Hours]**

Business Cycles, Inflation, and Macroeconomic Policy Coordination: Phases and theories of business cycles; Inflation – types, causes, and effects Phillips Curve – Expectations-Augmented Phillips Curve; Unemployment – types and measurement; Role of Fiscal and Monetary Policy in stabilization; Policy coordination and challenges in developing economies.

Suggested Readings:

D'Souza, E. (2008). *Macroeconomics*. Pearson Publication.

Romer, D. (2012). *Advanced macroeconomics* (4th ed.). McGraw-Hill Irwin.

References:

Blanchard, O., & Fischer, S. (1989). *Lectures on macroeconomics*. MIT Press.

Snowdon, B., & Vane, H. R. (2005). *Modern macroeconomics: Its origins, development and current state*. Edward Elgar.

Dornbusch, R., Fischer, S., & Startz, R. (2008). *Macroeconomics* (10th ed.). Tata McGraw-Hill.

Mankiw, N. G. (2014). *Principles of macroeconomics* (7th ed.). Cengage Learning.

Obstfeld, M., & Rogoff, K. (1996). *Foundations of international macroeconomics*. MIT Press.

Samuelson, P. A., & Nordhaus, W. D. (2012). *Macroeconomics*. McGraw-Hill.

Scarh, W. (2010). *Macroeconomics: An introduction to advanced methods*. Titles on Demand.

Course Code : **MED103**
 Course Type : **Core**
 No. of Credits : **4.00**
 No. of Hours : **90 (L 30 + P 60)**

Course Title
Computational Statistics and Data Visualization

Course Objectives:

- Provide a strong foundation in statistical and econometric concepts including descriptive measures, probability theory, correlation, regression, hypothesis testing, time series analysis, and index numbers.
- Train students to apply computational tools such as Excel and Power BI for data handling, transformation, visualization, statistical analysis, and dashboard creation, integrating theory with practice.
- Develop analytical and problem-solving skills through case-based projects and research applications, enabling students to critically interpret statistical results and design practical solutions for economic and business contexts.

Course Outcomes (COs):

By the end of the course, students can be able to;

- **CO1:** Recall and define fundamental concepts of statistics, probability, correlation, regression, hypothesis testing, and time series, including measures of central tendency, dispersion, distributions, and index numbers.
- **CO2:** Apply Excel and Power BI tools to organize, visualize, and analyze datasets using descriptive statistics, probability functions, correlation, regression, and hypothesis testing techniques.
- **CO3:** Interpret statistical results through dashboards, charts, and DAX measures, critically evaluating independence, variance, regression outcomes, and forecasting models.
- **CO4:** Analyze real-world datasets using sampling methods, probability distributions, regression models, hypothesis testing, and time series techniques to derive meaningful insights.
- **CO5:** Design and present case-based projects integrating statistical theory with Excel/Power BI execution, demonstrating problem-solving, analytical reasoning, and professional readiness.

COs /POs Mapping:

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓	✓	✓	✓		✓		✓
CO2	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓
CO4	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓
CO5	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Course Outline:

Unit-I: **[18 Hours]**

Data Presentation and Descriptive Statistics: Introduction to statistics and data types; Tabular and graphical presentation of data; Measures of central tendency, dispersion, skewness, kurtosis; Census, population and sample; Parameters and estimators; sampling methods and distributions; Sampling errors; point and interval estimates. **Excel Execution:** Sample datasets - Format cells - Data Validation - Conditional Formatting - Form – Table/PivotTables - Insert Charts - Sparklines - Insert Functions- Data Analysis ToolPak.

Unit-II: **[18 Hours]**

Probability Theory: Introduction to Probability; Approaches to Assigning Probabilities; Rules for Computing Probabilities; Contingency Tables, Venn and Tree Diagrams; Principles of Counting; Bayes' Theorem; Random Variable; Probability Distribution; Mathematical Expectation; Discrete Distributions. **Excel Execution:** Random number generation - Simulation and Probability Functions - Monte Carlo simulation with Argo.

Unit-III: **[16 Hours]**

Correlation and Regression: Introduction to correlation - Correlation coefficient, Karl Pearson's Correlation Coefficient, Spearman's Rank Correlation; Introduction to regression - Simple linear regression, Method of ordinary least square, Multiple regression. **Excel Execution:** Built-in functions - Scatter Plot - Trendline - display equation and R² value - Data Analysis ToolPak.

Unit-IV:**[14 Hours]**

Tests of Hypothesis: Introduction to Hypothesis - Simple versus composite hypothesis, Level of significance in hypothesis testing and critical region; Type-I and type-II error and Power of a test; Hypothesis test - z, t, F and χ^2 statistic; Goodness-of-fit test- Analysis of variance; Chi-Square Test for Independence -Contingency Tables.
Excel Execution: Built-in Functions for Hypothesis Testing - Data Analysis ToolPak.

Unit-V:**[14 Hours]**

Time Series Analysis and Index Numbers: Introduction to time series data and components - trend, seasonality, cyclicity, irregularity; Moving averages and exponential smoothing methods; Basics of ARIMA models; Construction and interpretation of index numbers-Laspeyres, Paasche, Fisher. **Excel Execution:** Built-in Functions for Time Series Analysis and Index Numbers - Data Analysis ToolPak.

Separate Lab Component with Power BI:**[10 Hours]**

Data Interface - Power Query - Visualization – Statistics - Dashboard.

Suggested Readings:

Anderson, D. R. et. al. (2011). *Statistics for Business and Economics* (11th ed.). Cengage India.
Bluman, A. G. (2022). *Elementary Statistics: A Step-by-Step Approach* (11th ed.). McGraw-Hill.
Gupta, S. C. (2020). *Fundamentals of Statistics*. Sultan Chand & Sons, New Delhi.

References:

Black, K. (2004). *Business Statistics*. John Wiley, Student Edition.
Ross, S. M. (2014). *Introduction to Probability Models*. Academic Press.
Webster, A. (1998). *Applied Statistics for Business and Economics*. McGraw-Hill International Edition.
Clark, M. J., & Randal, J. A. (2011). *A First Course in Applied Statistics*. Pearson Education, New Zealand.
Hogg, R. V., & Craig, A. T. (1965). *Introduction to Mathematical Statistics*. McGraw-Hill.
Levin, R. I. (2008). *Statistics for Management*. Prentice Hall Inc.
Mood, A. M., Graybill, F. A., & Boes, D. C. (1974). *Introduction to the Theory of Statistics*. McGraw-Hill.
Nagar, A. L., & Das, R. K. (1983). *Basic Statistics*. Oxford University Press.

Course Code : **MED104**
 Course Type : **Core**
 No. of Credits : **4.00**
 No. of Hours : **60 (L 45 + T 15)**

Course Title

Introduction to Econometric Theory

Course Objectives:

- Introduce the basic tools of econometric analysis.
- Understand the methods of econometric analysis and their application in empirical research.
- To develop students' ability to apply econometric methods and diagnostic techniques in empirical research, including handling problems such as multicollinearity, heteroskedasticity, autocorrelation, and specification errors.

Course Outcomes (COs):

By the end of the course, students can be able to;

- CO1:** Understand and apply the Classical Linear Regression Model (CLRM) and estimate econometric relationships using the Ordinary Least Squares (OLS) method.
- CO2:** Interpret and evaluate regression results using statistical inference techniques such as hypothesis testing, confidence intervals, goodness of fit, and ANOVA.
- CO3:** Identify and address violations of CLRM assumptions including multicollinearity, heteroskedasticity, and autocorrelation using appropriate diagnostic and remedial measures.
- CO4:** Analyze regression models with qualitative (dummy) variables and apply models involving interaction effects, structural stability tests, and piecewise regression analysis
- CO5:** Apply Maximum Likelihood Estimation (MLE) techniques and estimate binary and limited dependent variable models such as Logit, Probit, and Multinomial models for empirical economic analysis

COs /POs Mapping:

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	✓	✓	✓	–	–	✓	–	–	–	✓
CO2	✓	✓	–	✓	✓	✓	–	✓	–	✓	–	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	–	✓	–	✓
CO4	✓	✓	✓	✓	✓	✓	✓	✓	–	✓	✓	✓
CO5	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Course Outline:

Unit-I:

[15 Hours]

The Linear Regression Analysis: Bi-variate and multivariate linear regression models, CLRM assumptions, Ordinary Least Squares estimation, Properties of OLS and the Gauss- Markov theorem. General and confidence approach to hypothesis testing, goodness of fit, ANOVA and testing of overall significance of sample regression, matrix approach to linear regression models.

Unit-II:

[08 Hours]

Functional Forms of Regression Models: Choice of functional forms-Log-linear, Double log and Lin-Log models, Reciprocal and polynomial models, Choice of functional form, Interpreting coefficients in different functional forms and applications, Specification error and tests for specification error.

Unit-III:

[13 Hours]

Relaxation of CLRM Assumptions and Problems in Regression: Violation of CLRM assumptions and its consequences, detection and remedial measures of multicollinearity, heteroskedasticity and autocorrelation.

Unit-IV:**[12 Hours]**

Regression with Dummy Variables: The nature of dummy variables, Regression on dummy variables with two categories, with more than two categories- intercept shifters, dummy variable trap, interaction of two categorical variables, interaction of categorical and continuous (quantitative) variables- slope shifters, piecewise linear regression model, Chow test for cross-section data and for time-series data (test structural stability of regression models).

Unit-V:**[12 Hours]**

Maximum Likelihood Estimation: Introduction to binary and limited dependent variable, Limitation of the linear probability model (LPM), Method of maximum likelihood estimation and its properties (including consistency), Probit and Logit models, Multinomial models

Suggested Readings:

Gujarati, D and Porter, (2009) *Basic Econometrics*. Fifth Edition, McGraw Hill/Irwin.

Greene, William H, (2008) *Econometric Analysis*. 6th Edition, Prentice Hall.

References:

Johnston J. and DiNardo, J, (1997) *Econometric Methods*. 4th Ed. McGraw-Hill.

Ramanathan, Ramu, (2002) *Introductory Econometrics with Applications*. (5th edit), Thomson Asia Pvt Ltd., Singapore.

Stock, James H., and Mark W. Watson, (2006) *Introduction to Econometrics*, Second Edition, (Addison-Wesley Series in Economics).

Wooldridge, J., (2015) *Introductory Econometrics: A Modern Approach*. Nelson Education.

G. S. Maddala, (2009) *Introduction to Econometrics*. Wiley Publishers, 4th Edition, Indian edition.

Christopher Dougherty, (2007) *Introduction to Econometrics*. Oxford University Press (3rd edit), Indian edition.

Course Code : MED105 Course Type : Core No. of Credits : 2.00 No. of Hours : 45 (L 15 + P 30)	Course Title Computer Applications in Economics
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Course Objectives:

- Provide foundational knowledge of computer operations and MS Office applications for academic and economic data tasks.
- Train students to handle, document, and visualize data using Word, Excel, and PowerPoint.
- Develop analytical and presentation skills by integrating documentation, data handling, and visualization tools.

Course Outcomes (COs):

By the end of the course, students can be able to;

- **CO1:** Recall and define basic computer operations and MS Office functionalities.
- **CO2:** Apply MS Word for documentation, formatting, and academic/professional reporting
- **CO3:** Use MS Excel for data handling, validation, and statistical summaries.
- **CO4:** Create effective visualizations (charts, sparklines, dashboards) to interpret economic data.
- **CO5:** Design integrated reports and presentations combining documentation, data analysis, and visualization.

COs /POs Mapping:

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	–	–	–	✓	–	–	–	–	–	–	✓
CO2	✓	–	✓	–	✓	–	–	✓	–	✓	–	✓
CO3	✓	✓	✓	✓	✓	–	–	✓	–	✓	–	✓
CO4	✓	✓	✓	✓	✓	✓	✓	✓	–	✓	–	✓
CO5	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Course Outline:

Unit-I: [8 Hours]

Basic Computer Operations: Introduction to operating systems and file management; Folder creation, file handling, shortcuts, and system utilities. **Lab:** Practice on Windows OS, file organization, and basic troubleshooting.

Unit-II: [12 Hours]

Documentation with MS Word: Formatting academic and professional documents; Tables, charts, references, and citations. **Lab:** Creating reports, inserting equations, and preparing official notices.

Unit-III: [12 Hours]

Data Handling with MS Excel: Data entry, formatting, and validation; Sorting, filtering, and conditional formatting. **Lab:** PivotTables, PivotCharts, and dashboards.

Unit-IV: [8 Hours]

Data Visualization with MS Excel: Graphical representation of data (bar, line, pie, scatter); Sparklines and dynamic charts. **Lab:** Comparative charts, trend analysis, and dashboards.

Unit-V: [5 Hours]

Data Visualization with MS Excel: Combining Word and Excel outputs for reports.; Using MS PowerPoint for presentations. **Lab:** Preparing integrated project reports with tables, charts, and visualizations with MS PowerPoint.

Suggested Readings:

Norton, P. (2010). *Introduction to Computers* (7th ed.). McGraw Hill Education.
Shelly, G. B., & Vermaat, M. E. (2014). *Discovering Computers: Fundamentals* (8th ed.). Cengage Learning.
Walkenbach, J. (2015). *Excel Bible* (3rd ed.). Wiley.

References:

Reding, E. E., & Krause, J. S. (2019). *Microsoft Office 365: In Practice*. McGraw Hill Education.
Frye, C. (2019). *Microsoft Excel 2019 Step by Step*. Microsoft Press.
Lambert, J., & Cox, J. (2015). *Microsoft Word Step by Step*. Microsoft Press.
Chappell, D. (2018). *Introducing Power BI*. Microsoft Press.
Alexander, M., & Kusleika, D. (2018). *Excel Power Query and Power Pivot*. Wiley.
Collie, R., & Singh, A. (2016). *Power BI Cookbook*. Packt Publishing.

Course Code : MED111 Course Type : Elective-I No. of Credits : 4.00 No. of Hours : 60 (L 45 + T 15)	Course Title Public Finance and Fiscal Policy
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Course Objectives:

- Provide a comprehensive understanding of government intervention in economic activities, allocation of resources, and provision of public goods.
- Develop analytical and critical understanding of public policies related to taxation, public expenditure, public debt, and welfare Programmes.
- Familiarize students with principles of public finance and fiscal policy in the Indian context.

Course Outcomes (COs):

By the end of the course, students can be able to;

- **CO1:** Explain the role of government and principles of public economics in a mixed economy.
- **CO2:** Analyze taxation systems, public expenditure, and welfare policies in India.
- **CO3:** Evaluate the implications of public debt and fiscal deficits on economic development.
- **CO4:** Examine budgetary policy and fiscal federalism in the Indian economy.
- **CO5:** Formulate policy suggestions relating to public finance, taxation, and fiscal reforms.

COs /POs Mapping:

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	–	✓	–	✓	✓	✓	–	✓	–	✓
CO2	✓	✓	✓	✓	✓	✓	✓	✓	–	✓	–	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	–	✓	✓	✓
CO4	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
CO5	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Course Outline:

Unit-I: [12 Hours]

Introduction to Public Economics and Government Intervention: Nature and Scope of Public Finance – Public Economics - Role of Government in Economic Activities - Mixed Economy - Market Failure and Externalities - Public Goods and Merit Goods - and Allocation Mechanism.

Unit-II: [10 Hours]

Taxation and Public Revenue: Indian Tax System - Revenue of Union, State, and Local Governments - Direct and Indirect Taxes - GST and Tax Reforms - Tax and Non-Tax Revenue - Principles of Taxation

Unit-III: [14 Hours]

Public Expenditure and Welfare Policies: Trends in Public Expenditure - Causes and Effects of Public Expenditure - Theories of Public Expenditure - Social Security Measures - Income Distribution and Welfare

Unit-IV: [12 Hours]

Public Debt: Sources and Importance of Public Borrowing - Effects and Burden of Public Debt - Tax versus Debt Financing - Debt Redemption Methods - Issues in Public Debt Management in India.

Unit-V: [12 Hours]

Fiscal policy and Monetary policy: Instruments of Fiscal policy and Monetary policy; Theories of fiscal and monetary policies; Fiscal Federalism in India; Finance Commission and Resource Transfers.

Suggested Readings:

Musgrave, R. A., & Musgrave, P. B. (2017). *Public finance in theory and practice*. McGraw-Hill Education.
Rosen, H. S., & Gayer, T. (2014). *Public finance* (10th ed.). McGraw-Hill Education.
Gruber, J. (2016). *Public finance and public policy* (5th ed.). Worth Publishers.

References:

Atkinson, A. B., & Stiglitz, J. E. (1980). *Lectures in public economics*. McGraw-Hill.
Auerbach, A. J., Chetty, R., Feldstein, M., & Saez, E. (Eds.). (2013). *Handbook of public economics* (Vol. 5). Elsevier.
Cullis, J., & Jones, P. (1998). *Public finance and public choice*. Oxford University Press.
Srivastava, D. K. (2005). *Issues in Indian public finance*. New Century Publications.
Goode, R. (1986). *Government finance in developing countries*. Tata McGraw-Hill.
Government of India, Ministry of Finance. (Various years). *Union budget documents*. Government of India.
Chelliah, R. J., et al. (2012). *Development and public finance: Essays in honour of Raja J. Chelliah*. Sage Publications.

Course Code : MED111 Course Type : Elective-I No. of Credits : 4.00 No. of Hours : 60 (L 45 + T 15)	Course Title Money and Banking
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Course Objectives:

The objectives of this course are to;

- To develop an understanding of the concepts, theories, and functions of money and banking and their role in the modern economic system.
- To analyze the functioning of monetary policy, financial institutions, and banking systems in maintaining economic stability and promoting economic growth.
- To examine contemporary issues in banking, including digital banking, financial inclusion, regulation, and risk management in the evolving financial environment.

Course Learning Outcomes:

By the end of the course, students are expected;

- **CO1:** Explain the concepts, theories, and functions of money and banking in the context of the modern economic system.
- **CO2:** Analyze the role of monetary policy, central banks, and financial institutions in maintaining economic stability and promoting economic growth.
- **CO3:** Evaluate the structure and functioning of banking systems, including commercial banks, digital banking services, and financial intermediation.
- **CO4:** Examine issues related to financial inclusion, digital payments, banking regulations, and risk management in the contemporary financial environment.
- **CO5:** Assess current trends and challenges in the banking sector, including technological innovations, financial stability, and regulatory practices.

COs /POs Mapping:

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	–	✓	–	✓	–	✓	–	✓	–	✓
CO2	✓	✓	✓	✓	✓	✓	✓	✓	–	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	–	✓	✓	✓
CO4	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
CO5	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Course Outline:

Unit-I: [12 Hours]

Foundations of Money and Banking in the Digital Economy: Concept and functions of money in a modern and digital economy. Role of money in macroeconomic stability - monetary policy, inflation control, and output stabilization in real-world contexts. Banking ecosystem - financial intermediation and evolving roles of commercial banks, RRBs, and NBFCs in inclusive and technology-driven finance.

Unit-II: [12 Hours]

Money Demand, Supply, and Data-Driven Analysis: Theories of money demand. Money supply process – role of central bank, money multiplier, and liquidity creation. Empirical analysis of money demand and supply in India using real data, trends, and basic analytical tools.

Unit-III: [12 Hours]

Monetary Policy and Transmission in Practice: Monetary policy framework of RBI - objectives, instruments, and targets. Transmission mechanisms – interest rate, credit, and expectations channels. Inflation targeting in India – policy design, implementation, and real-time challenges in a dynamic economy.

Unit-IV:**[12 Hours]**

Financial Inclusion and Digital Banking: Financial inclusion – concept, importance, and role in sustainable development. Digital banking ecosystem – UPI, mobile banking, internet banking, digital payments, and fintech innovations. Government initiatives and role of RBI in digital regulation, cybersecurity, and consumer protection. Challenges – digital divide, financial literacy, data security, and access in rural areas.

Unit-V:**[12 Hours]**

Banking Regulation, Risk Management, and Financial Stability: Regulatory role of RBI and global best practices in banking supervision (CAMELS framework). Risk management in banks – credit, market, and operational risks in modern financial systems. NPAs and banking sector health – recent trends, causes, policy responses, and impact on economic stability.

Suggested Readings:

Mishkin, Frederic. (2008). *The Economics of Money, Banking, and Financial Markets*, Pearson Addison Wesley, New York, 7th Edition, 2008.

Pierce D.G. and P.J. Tysome. (1985). *Monetary Economics: Theories, Evidence and Policy*, 2nd Edition, Butterworths, London.

References:

Enoch, Charles and John H. Green (ed.) (1997). *Banking Soundness and Monetary Policy: Issues and Experiences in the Global Economy*, International Monetary Fund.

Reserve Bank of India: *Report on Currency and Finance*, various issues.

Samantaraya, Amaresh, (2015). *Conduct of Monetary Policy in India: Changing Dimensions in the Post-reform Period*, TR Publications, Chennai.

Chishti, S., & Barberis, J. (2016). *The FINTECH book: The financial technology handbook for investors, entrepreneurs and visionaries*. John Wiley & Sons.

Course Code : MED111 Course Type : Elective-I No. of Credits : 4.00 No. of Hours : 60 (L 45 + T 15)	Course Title Sustainability and Climate Economics
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Course Objectives:

- Prepare students for professional and academic careers in Sustainable Development and Climate Change.
- Develop analytical and practical understanding of sustainability and climate issues with economic perspectives.
- Train students to conduct innovative research and apply knowledge to real-world environmental challenges.

Course Outcomes (COs):

By the end of the course, students can be able to;

- **CO1:** Recall and define key concepts of Sustainable Development and Climate Change.
- **CO2:** Evaluate the tools and techniques of Sustainable Development and Climate Change.
- **CO3:** Apply theoretical models relating to Sustainable Development and Climate Change Sectors.
- **CO4:** Critically analyze the Sustainable Development and Climate Change and able to work out quantitative examples to increase intuitive understanding of theoretical models for the development of Sustainable Development and Climate Change Sectors.
- **CO5:** Design and conduct case-based projects or research applications integrating Sustainable Development and Climate Change Sectors and climate policies for practical problem-solving.

COs /POs Mapping:

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	–	–	–	–	✓	✓	–	–	–	–	✓
CO2	✓	✓	✓	✓	✓	✓	✓	✓	–	✓	–	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	–	✓	–	✓
CO4	✓	✓	✓	✓	✓	✓	✓	✓	–	✓	–	✓
CO5	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Course Outline:

Unit-I: [12 Hours]

Introduction to Sustainability: Concept of Sustainability; Three Pillars of Sustainability; Importance of Sustainability in the Process of Economic Development; Concept of Planetary Boundaries and the Approach to Global Sustainability.

Unit-II: [12 Hours]

Environmental Sustainability: Concept of Environmental Sustainability; Pillars of Environmental Sustainability; Importance of Environmental Sustainability; Threats to Environmental Sustainability; Climate Change and Environmental Sustainability; Sustainable Practices to promote Environmental Sustainability.

Unit-III: [12 Hours]

Economics of Climate Change: Nature and the Global Economy; Green House Gas Emission Reductions; Carbon Pricing Strategies and Climate Stabilization Goals; Sustainable Financial System and Investing in Resilience; Climate Change and Financial Risk; Strategy to limit Green House Gases and Global Warming.

Unit-IV: [12 Hours]

Sustainable Development: Concepts of Economic Sustainability and Sustainable Development; United Nations Sustainable Development Goals and Agenda 2030; Progress in the achievement of SDGs at Global level and at India Level.

Climate Assessment and Climate Policy: The Economics of Climate Change: Costs, Benefits, and the Transition to a Green Economy, Integrated Assessment Models (IAMs) and the Social Cost of Carbon; Choice of Discount Rate for Climate Policy; Social Aspects of Adaptive Capacity in Climate Change.

Suggested Readings:

- Ackerman, F. and Stanton E. (2013), *Climate Economics: State of the Art*, Routledge.
 IMF (2019), *The Economics of Climate*, Finance and Development, December 2019.
 Nordhaus, W. (2008): *A Question of Balance*, Yale University Press.
 United Nations (2016), *World Economic and Social Survey 2014/2015*, Department of Economic and Social Affairs, <http://www.un.org/en/development/desa/policy/wess/index.shtml>
 United Nations (2025), *The Sustainable Development Goals Report 2025*.
 Weitzman, M.L. (2009), *On modeling and interpreting the economics of catastrophic climate change*, The Review of Economics and Statistics, 91(1), pp.1-19.

References:

- Adger, W.N. (2003) *Social Capital, Collective Action and Adaptation to Climate Change*, Economic Geography, 79, 387-404. <https://doi.org/10.1111/j.1944-8287.2003.tb00220.x>
 Adger, W. N. (2003), *Social aspects of adaptive capacity*, in *Climate Change, Adaptive Capacity and Development*, eds J. B. Smith, R. J. T. Klein, and S. Huq (London: Imperial College Press), 29–49. https://doi.org/10.1142/9781860945816_0003
 Amelia Browne (2022), *Explainer: What is Sustainability and Why is it Important?* Earth.Org
 Ian Gough (2013), *Climate Change, Social Policy and Global Governance*, Journal of International and Comparative Social Policy, Vol.29, Issue 3, Pages 185–203. <https://doi.org/10.1080/21699763.2013.852128>
 IERE Team (2025), *What is Environmental Sustainability?*
 John Philip Selel and Mark B. Mukundi (2023), *The Economics of Climate Change: Costs, Benefits, and the Transition to a Green Economy*, Greener Journal of Social Sciences, Vol. 13(1), pp. 159-171, <https://doi.org/10.15580/gjss.2023.1.122024209>

SEMESTER-II

Course Code : **MED201**
 Course Type : **Core**
 No. of Credits : **4.00**
 No. of Hours : **90 (L 30 + P 60)**

Course Title

Data Analytics with R

Course Objectives:

- Build foundational knowledge of R programming, data import, transformation, and visualization for economic datasets.
- Apply R for statistical analysis, econometric modeling, time series forecasting, and big data handling.
- Develop analytical and problem-solving skills through R-based projects integrating econometrics, machine learning, and policy analytics.

Course Outcomes (COs):

By the end of the course, students can be able to;

- **CO1:** Recall and define R programming fundamentals, data structures, and packages.
- **CO2:** Apply R for data import, transformation, visualization, and statistical analysis.
- **CO3:** Analyze economic data using R for descriptive statistics, correlation, hypothesis testing, and regression models.
- **CO4:** Evaluate econometric and machine learning models (trees, forests, logistic regression) using performance metrics.
- **CO5:** Design predictive models and dashboards integrating time series, big data, and R based decision making tools.

COs /POs Mapping:

Cos/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	–	✓	✓	✓	✓	✓	–	✓	–	✓
CO2	✓	✓	✓	✓	✓	✓	✓	✓	–	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	–	✓	✓	✓
CO4	✓	✓	✓	✓	✓	✓	✓	✓	–	✓	✓	✓
CO5	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Course Outline:

Unit-I: [18 Hours]

A. Introduction to R programming: Overview of R programming, Environment setup with R Studio, R commands, variables and data types, control structures, R packages; **B. Reading and getting data into R (External Data):** Using csv files, xml files, web data, json files, databases, excel files; Data transformation, data integration and manipulation; Working with R charts and graphs.

Unit-II: [18 Hours]

Statistical Analysis in using R: Descriptive statistics: mean, median, mode, variance, etc.; Correlation analysis and heatmaps; Univariate and bivariate analysis; Probability and Hypothesis testing: t-tests, chi-square tests, ANOVA, etc.; Confidence intervals and p-values; non-parametric tests; Interpreting statistical results.

Unit-III: [18 Hours]

Econometric Modelling in R: Linear regression: simple and multiple regression; qualitative response models; classification; Decision trees and random forests; Model evaluation metrics: R-squared, MAE, RMSE, accuracy, precision, recall, etc.; Model assumptions and diagnostics; Overfitting, underfitting and model selection using caret and glmnet; Prediction and decision making.

Unit-IV: [18 Hours]

Time Series Analysis Using R: Time series components: trend, seasonality, noise; Decomposition techniques; Time series modelling in R; Time series forecasting methods: moving average, ARIMA, exponential smoothing.

Big Data and machine learning using R: Handling large datasets; R packages for big data (data.table, dplyr, sparklyr); introduction to machine learning using R using mlr and h2o; Case studies - Applications of big data and ML models in socio-economic forecasting, market analysis, and policy evaluation.

Suggested Readings:

Venables, W. N., Smith, D. M., & R Core Team. (2013). An Introduction to R: Notes on R – A Programming Environment for Data Analysis and Graphics. CRAN.

Gardener, M. (2012). Beginning R: The Statistical Programming Language. Wiley.

Lander, J. P. (2013). R for Everyone: Advanced Analytics and Graphics. Pearson Education.

An Introduction to R, Notes on R: *A Programming Environment for Data Analysis and Graphics*. W. N. Venables, D.M. Smith and the R Development Core Team. Version 3.0.1 (2013-05-16). URL: <https://cran.r-project.org/doc/manuals/r-release/R-intro.pdf>

Reference:

Dunlop et. al. (2000), *Statistics and Data Analysis: From Elementary to Intermediate*. Prentice Hall.

G Casella and R. L. Berger, (2002), *Statistical Inference*, Thomson Learning.

Hastie, Trevor, et. al., (2009) *The elements of statistical learning*. Vol. 2.No. 1. New York: springer.

Jared P Lander, *R for Everyone: Advanced Analytics and Graphics*, Pearson Education, 2013

Joseph F Hair, William C Black et. Al., (2013), “*Multivariate Data Analysis*”, Pearson Education, 7th Edition.

Mark Gardener, (2012). “*Beginning R - The Statistical Programming Language*”, John Wiley & Sons, Inc.

Michael Berthold, David J. Hand, *Intelligent Data Analysis*, Springer, Latest Edition.

Montgomery, et. al. (2010), *Applied statistics and probability for Engineers*. John Wiley & Sons.

P. Dalgaard. (2008), *Introductory Statistics with R*, 2nd Edition. (Springer)

W. N. Venables, D. M. Smith and the R Core Team (2013), “*An Introduction to R*”.

Course Code : MED202 Course Type : Core No. of Credits : 4.00 No. of Hours : 75 (L 45 + P 30)	Course Title Time Series Econometrics
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Course Objectives:

- To familiarize students with time series econometric techniques, commonly used in financial analysis, policy formulation and academic research.
- To provide lab sessions where students apply these concepts using relevant data.
- To develop students' ability to apply time series methods and diagnostic techniques in empirical research, including handling problems such as cointegration, Vector Auto Regression and spectral analysis

Course Outcomes (COs):

By the end of the course, students can be able to;

- **CO1:** Understand the fundamental concepts of time series analysis including stochastic and deterministic processes, stationarity, unit roots, and data generating processes.
- **CO2:** Apply univariate time series models such as AR, MA, ARMA, ARIMA, and SARIMA models for forecasting and economic analysis using the Box–Jenkins methodology.
- **CO3:** Analyze multivariate time series relationships using cointegration techniques, Vector Autoregressive (VAR) models, Error Correction Models (ECM), ARDL, and NARDL frameworks.
- **CO4:** Model and interpret volatility in financial and economic data using ARCH, GARCH, TGARCH, EGARCH, and related econometric models
- **CO5:** Understand and apply Bayesian econometric methods including prior and posterior estimation, Gibbs sampling, and Markov Chain Monte Carlo (MCMC) techniques in time series analysis.

COs /POs Mapping:

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	–	✓	–	–	–	–	–	–	–	✓
CO2	✓	✓	✓	✓	✓	–	–	–	–	✓	–	✓
CO3	✓	✓	✓	✓	✓	✓	✓	–	–	✓	✓	✓
CO4	✓	✓	✓	✓	✓	✓	✓	–	–	✓	✓	✓
CO5	✓	✓	✓	✓	✓	–	–	✓	✓	✓	✓	✓

Course Outline:

Unit-I: [15 Hours]

Basic concepts of Time series: The concept of data generating process - Stochastic process and Deterministic process, white noise process, stationary and non-stationary stochastic process – with and without intercept and trend, difference stationery and trend stationary process, concept of unit root, tests for detecting unit root.

Unit-II: [15 Hours]

Univariate Time Series Models: Autoregressive (AR) model, Moving Average (MA) model, ARMA, ARIMA and SARIMA models, Box Jenkins Methodology – model identification, diagnostics, forecasting – dynamic vs static forecasts, Smooth transition models

Unit-III: [15 Hours]

Multivariate time series models: Cointegration – Engle Granger and Johansen Juselius methodology, error correction model - VAR models –lag length selection, factorization – Cholesky decomposition and structural factorization, Causality tests in VAR framework, impulse response functions, variance decomposition - ARDL approach – cointegration with mix of I(0) and I(1) variables, bounds testing, error correction model; NARDL model.

Unit-IV:**[15 Hours]**

Volatility modelling: Modelling high frequency data; testing for ARCH effect, estimating ARCH models – ARCH, GARCH, ARCH – M, TGARCH, EGARCH, diagnostic checks.

Unit-V:**[15 Hours]**

Introduction to Spectral Analysis and Bayesian Approach: Time domain and Frequency domain, The spectrum and its properties, Spectral representation for weekly stationary process, spectrum estimation, Wavelet coherence analysis. Bayesian analysis – Overview of classical and Bayesian views on probability, the role of priors, posterior estimation, Gibbs sampling, Markov Chain Monte Carlo (MCMC) methods.

Suggested Readings:

Gujarati, D and Porter, (2009). *Basic Econometrics*. Fifth Edition, McGraw Hill/Irwin.

Greene, William H, (2008). *Econometric Analysis*. 6th Edition, Prentice Hall.

Koopmans, L. H., (1995). *The spectral analysis of time series*. Elsevier.

James D. Hamilton, (1994). *Time Series Analysis*. Princeton University Press.

References:

Kerry Patterson, (2000). *An Introduction to Applied Econometrics*. Palgrave Macmillan.

Chris Brooks, (2002). *Introductory Econometrics for Finance*. Cambridge UP.

Pesaran, M. H. (2015). *Time series and panel data econometrics*. Oxford University Press.

Walter Enders, (2015). *Applied Econometric Time Series*, 4th Edition, Wiley.

Bernardo, Jose M. and Adrian F. M. Smith, (1994). *Bayesian Theory*. Wiley Series in Probability and Statistics, John Wiley & Sons.

Chan, Joshua, Gary M. Koop, Dale J. Poirier and Justin L. Tobias, (2019). *Bayesian Econometric Methods*, 2nd Edition, Cambridge University Press.

Davidson, R., & MacKinnon, J. G., (2004). *Econometric theory and methods*. (Vol. 5). New York: Oxford University Press.

Peter Kennedy, (2008). *A Guide to Econometrics*, 6th Edition, Blackwell Publishing.

Priestley, M. B. (1981). *Spectral analysis and time series: probability and mathematical statistics*, Academic Press.

Verbeek, M. (2008). *A guide to modern econometrics*. John Wiley & Sons.

Course Code : MED203 Course Type : Core No. of Credits: 4.00 No. of Hours : 60 (L 45 + T 15)	Course Title Indian Economy
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Course Objectives:

- Provide comprehensive understanding of the structure and performance of the Indian Economy and examine sectoral development and contemporary economic challenges in India.
- Familiarize students with planning, public policy, social infrastructure, and welfare measures.
- Develop analytical understanding of India's foreign trade and globalization and enable students to evaluate government policies and economic reforms critically

Course Outcomes (COs):

By the end of the course, students can be able to;

- CO1:** Explain the structure, characteristics, and development indicators of the Indian economy.
- CO2:** Analyze the growth and performance of agriculture, industry, and service sectors in India.
- CO3:** Examine economic planning, policy reforms, and initiatives for industrial and entrepreneurial development
- CO4:** Evaluate social infrastructure and social security measures in India.
- CO5:** Assess India's foreign trade, balance of payments, globalization, and role in international organizations.

COs /POs Mapping:

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	–	✓	–	✓	✓	✓	–	✓	–	✓
CO2	✓	✓	✓	✓	✓	✓	✓	✓	–	✓	–	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	–	✓	✓	✓
CO4	✓	✓	✓	✓	✓	✓	✓	✓	–	✓	✓	✓
CO5	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Course Outline:

Unit-I: [12 Hours]

Characteristics of Indian Economy: Features of Indian Economy - Demographic characteristics - Development indices - Poverty - Inequality - Unemployment - Inflation - Trends in National Income - Sectoral contribution to GDP - Human Development Index - Healthcare and Education in India.

Unit-II: [12 Hours]

Sectoral Development in India: Agriculture: Growth, productivity, agricultural reforms, issues and challenges. Industry: Industrial growth - industrial policies – MSMEs - industrial problems and prospects. Service Sector: Growth - contribution to GDP - employment and emerging trends.

Unit-III: [12 Hours]

Economic Planning and Policy Reforms: Economic Planning in India - Objectives and achievements of Five-Year Plans - Planning Commission - Liberalization, Privatization and Globalization (LPG) reforms - and NITI Aayog - Make in India - Start-up India - Industry 4.0 initiatives.

Unit-IV: [12 Hours]

Social Infrastructure and Social Security: Social Infrastructure - Education and Health systems in India - Social security measures - Poverty alleviation programmes - Food Security Act - Public Private Partnership, physical infrastructure - water and sanitation - transportation - energy and communication - its role in economic growth.

India and the Global Economy: India's Foreign Trade - Composition and direction of trade - Balance of Payments since 1991 - Foreign Capital Flows - WTO and India - Globalization and Indian Economy - Impact of Global Financial Crisis on India - Trade Policies in India

Suggested Readings

Puri, V. K., & Misra, S. K. (2021). *Indian economy* (39th ed.). Himalaya Publishing House.

Datt, G., & Mahajan, A. (2024). *Indian economy*. S. Chand Publishing.

References

Singhania, N. (2023). *Indian economy*. McGraw Hill Education Pvt. Ltd.

Bhagwati, J., & Srinivasan, T. N. (1993). *India's economic reforms*.

Panagariya, A. (2004). *India's trade reform*. *India Policy Forum*.

Bourguignon, F. (2015). *The globalization of inequality*. Princeton University Press.

Gupta, S. B. (Latest ed.). *Monetary planning in India*. Oxford University Press.

Drèze, J., & Sen, A. (2013). *An uncertain glory: India and its contradictions*. Princeton University Press.

Kapila, U. (2021–2022). *Indian economy since independence: A comprehensive and critical analysis of India's economy, 1947–2021*. Academic Foundation.

Course Code : **MED204**
 Course Type : **Core**
 No. of Credits : **4.00**
 No. of Hours : **75 (L 45 + P 30)**

Course Title

Economics Institutions and Databases Systems

Course Objectives:

- Provide an understanding of international, national, and Indian economic institutions and their role in shaping policy, trade, and development.
- Train students in database concepts and applications relevant to economics, including SQL, MySQL, and data management systems.
- Develop analytical skills by integrating institutional knowledge with database applications for empirical research and policy analysis.

Course Outcomes (COs):

By the end of the course, students can be able to;

- **CO1:** Recall and define the structure, functions, and roles of major international and Indian economic institutions.
- **CO2:** Apply database concepts (SQL/MySQL) to organize and manage economic data.
- **CO3:** Interpret institutional frameworks and their impact on economic development, trade, and policy.
- **CO4:** Analyze datasets using database tools to evaluate institutional performance and socio-economic indicators.
- **CO5:** Design case-based projects integrating institutional economics with database applications for policy evaluation and decision making.

COs /POs Mapping:

Cos/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	–	✓	✓	✓	–	✓	–	✓	–	✓
CO2	✓	✓	✓	✓	✓	–	–	✓	–	✓	–	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	–	✓	✓	✓
CO4	✓	✓	✓	✓	✓	✓	✓	✓	–	✓	✓	✓
CO5	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Course Outline:

Unit-I: [15 Hours]

International Economic Institutions and Databases: Accessing IMF (IFS, WEO), World Bank (World Development Indicators, Databank), WTO (Trade Statistics), UNCTAD (Statistical Database); Data Structures - Time series - Panel data - Metadata formats; Indices and Indicators – GDP - Trade flows - Balance of payments - FDI - Development indicators.; API Access and Downloads - Using APIs (World Bank API, IMF API, UNCTADstat API).

Unit-II: [15 Hours]

Indian Economic Institutions and Databases: Institutional Databases - RBI (Handbook of Statistics on Indian Economy) - SEBI (Market Statistics) - NABARD (Agricultural & Rural Credit Data) - EXIM Bank (Trade Finance Data) - NITI Aayog (Planning & Development Reports); Data Structures - Macroeconomic time series - Financial market datasets - Rural credit statistics; Indices and Indicators – Inflation - interest rates - stock indices - agricultural productivity - export/import indicators; API Access and Downloads - RBI Data Portal APIs - SEBI datasets - NABARD reports - EXIM Bank trade APIs.

Unit-III: [15 Hours]

Database Concepts in Economics: Introduction to database fundamentals and relational database management systems, with emphasis on SQL/MySQL basics. Covers data storage, retrieval, and organization techniques for managing economic datasets.

Unit-IV:**[15 Hours]**

Applied Database Tools: Focuses on database design, queries, joins, and normalization, with practical applications in managing economic datasets. Emphasizes efficient data handling and integration with statistical packages for analysis.

Unit-V:**[15 Hours]**

Institutions and Databases in Practice: Applies institutional knowledge through case studies supported by database analysis. Focuses on empirical evaluation of trade, finance, and development indicators using institutional datasets.

Suggested Readings:

Raghu Ramakrishnan, *Database Management Systems*, McGraw Hill Education; 3rd Edition, 2002.

Thomas Nield, *Getting Started with SQL*, O'Reilly Media publishers, 1st Edition, 2016.

Coronel, C., & Morris, S. (2019). *Database Systems: Design, Implementation, and Management* (13th ed.). Cengage Learning.

Reference:

Allen G. Taylor, *SQL All-in-One for Dummies*, John Wiley & Sons; 2nd Edition, 2011.

Ben Forta, *SQL in 10 Minutes*, Sams Publishing; 4th Edition, 25 October 2012.

Hector, Jeff, and Jennifer, *Database Systems: The Complete Book*, Pearson; 2nd Edition, 4 September 2008

Elmasri, R., & Navathe, S. B. (2016). *Fundamentals of Database Systems* (7th ed.). Pearson.

WTO Reports. World Trade Report. World Trade Organization.

Todaro, M. P., & Smith, S. C. (2020). *Economic Development* (13th ed.). Pearson.

Stiglitz, J. E. (2002). *Globalization and Its Discontents*. W. W. Norton & Company.

Course Code : MED211 Course Type : Elective-II No. of Credits : 4.00 No. of Hours : 60 (L 45 + T 15)	Course Title Financial Economics
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Course Objectives:

- Provide a comprehensive understanding of the functioning of financial markets in the context of deregulation, globalization, and economic development.
- Equip students with analytical tools and technical skills to evaluate financial markets, institutions, and investment opportunities.
- Develop the ability to critically assess regulatory frameworks, ethical practices, and governance mechanisms in financial systems.

Course Learning Outcomes:

On successful completion of this course, students can be able to:

- **CO1:** Explain the fundamental concepts, theories, and functions of financial economics, including financial systems, financial intermediation, risk–return relationships, and the role of financial markets in economic development.
- **CO2:** Analyze capital structure decisions and interpret financial statements using ratio analysis and other basic financial analysis tools for evaluating company performance.
- **CO3:** Apply investment analysis techniques such as equity valuation models, CAPM, fundamental analysis, and technical analysis to assess securities and investment opportunities.
- **CO4:** Examine the functioning of derivative markets, including futures, options, swaps, and their pricing mechanisms, along with their role in risk management and financial markets.
- **CO5:** Evaluate the regulatory framework, ethical practices, and governance mechanisms in financial markets, including the role of SEBI, market regulations, compliance standards, and prevention of financial frauds and insider trading.

COs /POs Mapping:

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	–	✓	✓	✓	✓	✓	–	✓	–	✓
CO2	✓	✓	✓	✓	✓	✓	–	✓	–	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	–	✓	✓	✓
CO4	✓	✓	✓	✓	✓	✓	✓	✓	–	✓	✓	✓
CO5	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Course Outline:

Unit-I: [12 Hours]

Foundations of Financial Economics: Nature and scope of Financial Economics, Financial systems and financial intermediation, Risk and return, Time value of money, financial markets and institutions Behavioural finance: Meaning and concepts, Role of financial markets in economic development.

Unit-II: [12 Hours]

Capital Structure and Financial Analysis: Role and Importance, Real assets and financial assets, capital structure theories, Introduction to Ratio analysis and Basic financial statement analysis for real companies.

Unit-III: [12 Hours]

Investment Analysis: Supply of securities; regulations governing issuance; government bonds, corporate securities, Equity valuation and pricing: Shares as claims on future dividends and corporate net worth; basic valuation models. Capital Asset Pricing Model (CAPM) and its applications. Fundamental analysis: Macroeconomic analysis (GDP, inflation, interest rates); industry analysis; company analysis using technical analysis of equity markets.

Unit-IV:**[12 Hours]**

Derivative Market: Future prices: relation among spot prices and future prices - Financial futures, Commodity futures, Options and Option Pricing: institutional aspects - Exchange traded stock options - The payoffs from buying and selling options - The put-call parity – Swaps.

Unit-V:**[12 Hours]**

Regulations of Financial Markets and Ethics: The ethics of finance and economic function of financial markets - The purpose of regulation - levels of regulation - Securities Contract Regulation Act - SEBI. Market frauds, insider trading, and regulatory actions. compliance, ethics, and governance practices in modern financial markets.

Suggested Readings

Campbell, J.Y, A.W. Lo and A.C. Mackinlay, (1997) *The Econometrics of Financial Markets*. PUP.
Chandra, P, (1999) *Financial Management: Theory and Practice*. Galgotia Publishers.

References:

- Benninga, S, (1997) *Financial Modelling*. MIT Press.
- Bhole, L.M, (1991) *Financial Institutions and Markets: Structure, Growth and Innovation*. Tata McGraw-Hill Publishing Company Limited, New Delhi.
- Black, F., Jensen, M. C., & Scholes, M. A. (1972). The capital asset pricing model: Some empirical tests. In M. C. Jensen (Ed.), *Studies in the theory of capital markets* (pp. 79–121). Praeger.
- Brahmaiah, B. and P. Subba Rao, (1998) *Financial Futures and Options*, Himalaya Publishing House, Mumbai.
- Chi-Fu Huang and R.H. Litzenberger, (1988) *Foundations for Financial Economics*. North Holland, New York.
- Damodharan, Aswath, (1997) *Corporate Finance Theory and Practice*, John Wiley and Sons.
- Elton, E. J., & Gruber, M. J. (2014). *Modern portfolio theory and investment analysis* (9th ed.). Wiley.
- Chishti, S., & Barberis, J. (2016). *The FINTECH book: The financial technology handbook for investors, entrepreneurs and visionaries*. John Wiley & Sons.
- Lewis, A. (2018). *The basics of bitcoins and blockchains: An introduction to cryptocurrencies and the technology that powers them*. Mango Publishing.
- Schoenmaker, D., & Schramade, W. (2019). *Principles of sustainable finance*. Oxford University Press.

Course Code : MED211 Course Type : Elective-II No. of Credits : 4.00 No. of Hours : 60 (L 45 + T 15)	Course Title Energy Economics
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Course Objectives:

- Prepare students for managerial, advisory, academic, and professional roles in the energy sector at national and international levels.
- Develop students' analytical and practical understanding of energy economics, management, environmental issues, and related applications.
- Train students to become innovative professionals capable of conducting research and applying theoretical knowledge to real-world energy and climate challenges.

Course Outcomes (COs):

By the end of the course, students can be able to;

- **CO1:** Recall and define key concepts of energy economics and climate policy.
- **CO2:** Evaluate the functioning of international energy markets, tools and techniques of energy production and management with emphasis on climate change.
- **CO3:** Apply theoretical models relating to energy markets, energy regulation and policy, environmental issues, risk management in the energy sector.
- **CO4:** Critically analyze the energy sustainability and able to work out quantitative examples to increase intuitive understanding of theoretical models for the development of energy sector.
- **CO5:** Design and conduct case-based projects or research applications integrating energy sector and climate policies for practical problem-solving.

COs /POs Mapping:

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	–	–	–	–	✓	✓	–	–	–	–	✓
CO2	✓	✓	✓	✓	✓	✓	✓	✓	–	✓	–	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	–	✓	–	✓
CO4	✓	✓	✓	✓	✓	✓	✓	✓	–	✓	–	✓
CO5	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Course Outline:

Unit-I: [12 Hours]

Introduction to Energy Economics: Scope and Importance of Energy Economics; Importance of Energy in the Process of Economic Development; Factors determining the demand for Energy; Renewable and Non-Renewable Sources of Energy Production; Effects of Energy Shortage.

Unit-II: [12 Hours]

Energy Conservation: Economics of Energy Conservation; Efficiency in Energy Conservation; Energy Service Companies (ESCOs) and their Energy Saving Models: Guaranteed Saving Model and Shared Saving Model; Growth of ESCOs in India.

Unit-III: [12 Hours]

Energy Planning and Demand Management: Objectives and Need for Energy Planning and Demand Management; Energy Planning for Market Optimization; Market Failures and Non-Market Objectives of Energy Planning; Policy Tools and Constraints of Energy Planning.

Unit-IV: [12 Hours]

Energy Pricing: Objectives of Energy Pricing; Integrated Framework for Energy Pricing; Basic Pricing Principles; Short-Run V/S Long-Run Marginal Cost Pricing; Peak-Load and Off-Load Pricing; Pricing of Exhaustible/ Non-renewable Energy Sources.

Energy Policy: Objectives of Energy Policy; Energy Policy for Sustainable Energy Security; Main Features of India's Energy Policy 2025; Mapping India's Energy Policy 2025 towards Green Energy.

Suggested Readings:

Mohan Munasinghe & Gunter Schramm (1983), *Energy Economics, Demand Management and Conservation Policies*, Van Nostrand Reinhold Company, New York.

Mohan Munasinghe & Peter Meier (2009), *Energy Policy Analysis and Modelling*, Cambridge Energy & Environment Series.

International Institute for Sustainable Development (2025), *Mapping India's Energy Policy 2025*, IISD Report.

References:

Mohan Munasinghe & Peter Meier (2009), *Energy Policy Analysis & Modelling*, Cambridge Energy & Environment Series.

Parikh Jyoti (1997), *Energy Models for 2000 and Beyond*, Tata McGraw Hill.

Chopra S.K (2004), *Energy Policy for India: Towards Sustainable Energy Security in India in 21st Century*, Oxford & IBH Publishers.

Guido Buenstorf (2004), *Economics of Energy and Production Processes: An Evolutionary Approach*, Edward Elgar Publishing.

Course Code : MED211 Course Type : Elective-II No. of Credits : 4.00 No. of Hours : 60 (L 45 + T 15)	Course Title Insurance Economics
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Course Objectives:

The main aim of this course is to:

- To understand basic concepts of insurance, risk, and types of insurance and their role in economic security.
- To learn how life, health, and general insurance work, including policies, underwriting, and risk management.
- To understand how insurance markets work, the role of IRDAI, and new trends like digital insurance and AI.

Course Learning Outcomes:

By the end of the course, students are expected;

- **CO1:** Understand basic concepts of insurance economics such as risk, risk pooling, insurance types, and their role in economic security.
- **CO2:** Explain the principles of life and health insurance, including plans, underwriting, policy provisions, and pension schemes.
- **CO3:** Apply concepts of risk and uncertainty in insurance decisions, including risk management, moral hazard, and reinsurance.
- **CO4:** Describe the principles and legal aspects of general insurance, including key terms like indemnity, insurable interest, and good faith.
- **CO5:** Analyze insurance markets and modern developments, including IRDAI regulations, distribution channels, and emerging trends like InsurTech and digital insurance.

COs /POs Mapping:

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	–	✓	✓	✓	✓	✓	–	✓	–	✓
CO2	✓	✓	✓	✓	✓	✓	✓	✓	–	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	–	✓	✓	✓
CO4	✓	✓	✓	✓	✓	✓	✓	✓	–	✓	✓	✓
CO5	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Course Outline:

Unit-I: [12 Hours]

Introduction to Insurance Economics: Economic Security; Role and definition of insurance; Risk pooling and risk transfer; Economic and legal perspectives, Social and private insurance; Life and non-life insurance; Classification of life, health and general insurance policies.

Unit-II: [12 Hours]

Fundamentals of Life & Health Insurance: Functions of life & health insurance; Mathematical basis of life insurance; Plans of life insurance; Legal aspects; Provisions of policies; Individual health insurance; Uses and types of evaluation; Principles of underwriting of life & health insurance; Group insurance and superannuation.

Unit-III: [12 Hours]

Uncertainty & Risk in Insurance: Pure risk & speculative risk; Expected utility and decision-making under uncertainty; Moral hazard and insurance demand Unit- Concept of risk management; Essentials of risk management; Elements of risk assessment; Risk control & risk financing. Reinsurance distribution systems.

Unit-IV: [12 Hours]

General Insurance: Concept of short-term risk, Common law, equity, proposal/accidence, indemnity, insurable interest, contribution subrogation; representation; utmost good faith, material fact, physical hazard, moral hazard, policy endorsements.

Insurance Markets, Regulation, and Emerging Trends: Insurance industry structure, distribution channels, and regulatory framework in India including the role of IRDAI and consumer protection. Emerging trends in insurance such as InsurTech, digital platforms, and the use of AI in underwriting, along with challenges in developing economies.

Suggested Readings:

D'Souza, E. (2008). *Macroeconomics*. Pearson Education.
Romer, D. (2012). *Advanced macroeconomics* (4th ed.). McGraw-Hill Irwin

References:

Blanchard, O., & Fischer, S. (1989). *Lectures on macroeconomics*. MIT Press.
Snowdon, B., & Vane, H. R. (2005). *Modern macroeconomics: Its origins, development and current state*. Edward Elgar Publishing.
Dornbusch, R., Fischer, S., & Startz, R. (2008). *Macroeconomics* (10th ed.). Tata McGraw-Hill.
Mankiw, N. G. (2014). *Principles of macroeconomics* (7th ed.). Cengage Learning.
Obstfeld, M., & Rogoff, K. (1996). *Foundations of international macroeconomics*. MIT Press.
Samuelson, P. A., & Nordhaus, W. D. (2012). *Macroeconomics*. McGraw-Hill.
Scarh, W. (2010). *Macroeconomics: An introduction to advanced methods*. Titles on Demand.

Course Code : MED213 Course Type : CCC - I No. of Credits : 4.00 No. of Hours : 90 (L 30 + P 60)	Course Title Introduction to Artificial Intelligence and Machine Learning
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Course Objectives:

- Provide To provide students with a strong foundation in the concepts, principles, and applications of Artificial Intelligence, including problem solving, knowledge representation, machine learning, and intelligent systems.
- To develop programming skills in Python, enabling students to write programs, apply control structures, functions, lists, and strings, and solve computational problems effectively.
- To enable students to understand and apply AI techniques such as machine learning, natural language processing, computer vision, and reasoning methods for solving real-world problems.

Course Outcomes (COs):

By the end of the course, students can be able to;

- **CO1:** Explain the fundamental concepts, characteristics, and applications of Artificial Intelligence and intelligent agents.
- **CO2:** Apply problem-solving and searching techniques, including uninformed, informed, and constraint satisfaction approaches, to AI problems.
- **CO3:** Demonstrate knowledge representation, logical reasoning, probabilistic reasoning, and automated planning techniques in AI systems.
- **CO4:** Analyze basic machine learning models and AI applications such as NLP, speech recognition, and computer vision.
- **CO5:** Develop Python programs using functions, control structures, strings, and lists to solve computational and AI-related problems.

COs /POs Mapping:

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	–	✓	✓	✓	✓	✓	–	✓	–	✓
CO2	✓	✓	✓	✓	✓	✓	✓	✓	–	✓	–	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	–	✓	✓	✓
CO4	✓	✓	✓	✓	✓	✓	✓	✓	–	✓	✓	✓
CO5	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Course Outline:

Unit-I: [18 Hours]

Introduction To Artificial Intelligence: Definition – Future of Artificial Intelligence - Characteristic of Intelligent Agents – Typical Intelligent Agents –Problem Solving Approach to Typical AI problems. Problem solving by Searching: Uninformed and informed strategies and implementation; Path planning; Constraint Satisfaction Problems (CSP).

Unit-II: [16 Hours]

Knowledge Representation: Logical Agents– Propositional and first order Predicate logic - inference - Knowledge representation and Automated Planning– Uncertain Knowledge and Reasoning: Quantifying uncertainty– probabilistic reasoning.

Unit-III: [16 Hours]

Machine learning & AI Applications: Machine learning basics - Learning from examples - forms of learning (supervised, unsupervised, reinforcement learning) - simple models (linear and logistic regression) - Deep Learning AI applications: Natural Language Processing - Language Models - Machine Translation; Speech Recognition; Computer Vision - Image classification.

Unit-IV:**[20 Hours]**

Python Programming: Introduction-The Python Programming Language, History, features, Installing Python, Running Python program, Debugging: Syntax Errors, Runtime Errors, Semantic Errors - Experimental Debugging, Formal and Natural Languages, The Difference between Brackets, Braces, and Parentheses. Variables and Expressions: Values and Types - Variables, Variable & Keyword Type conversion - Operator and Operands – Expressions - Interactive - Mode and script Mode, Order of Operations. Conditional Statements: if, if- else, nested if - else - Looping: for, while, nested-loops. Control statements: Terminating loops, skipping specific conditions.

Unit-V:**[20 Hours]**

Functions: Function Calls, Type Conversion Functions, Math Functions, Adding New Functions, Definitions and Uses, Flow of Execution, Parameters and Arguments, Variables and Parameters. Strings: Strings, String Slices, Strings are immutable, and Searching–Looping–and counting String methods - the in operator–String Comparison – String operations Lists: Values and Accessing Elements, Lists are mutable, traversing a List, Deleting elements from List–, Built-in List Operators, Concatenation, In Operator, Built-in List functions and methods.

Suggested Readings:

M.Tim Jones, (2008) *Artificial Intelligence: A Systems Approach (Computer Science)*, Jones and Bartlett Publishers, NC.; 1 st Edition, 2008.

Burkhard A Meier, *Python GUI programming Cookbook*, Packt Publication 2nd Edition.

S. Russell and P. Norvig, (2022) *Artificial Intelligence: A Modern Approach*, Prentice Hall, 4th Edition.

References:

Barry, P., (2016) *Head first Python: A brain-friendly guide*, O'Reilly Media, Inc. Lutz.

Lavika Goel, (2021) *Artificial Intelligence: Concept and Applications*, Willy.

Mark Lutz, (2013) *Learning python: Powerful object-oriented programming*, O'Reilly Media, Inc.

Nils J. Nilsson, (2009) *The Quest for Artificial Intelligence*, Cambridge University Press.

SEMESTER-III

Course Code : **MED301**
 Course Type : **Core**
 No. of Credits : **4.00**
 No. of Hours : **90 (L 30 + P 60)**

Course Title

Data Analytics with Python

Course Objectives:

- Provide a strong foundation in Python programming fundamentals, data preprocessing, and exploratory analysis for economic datasets.
- Train students to apply Python for statistical analysis, econometric modeling, time series forecasting, and machine learning.
- Develop analytical and problem-solving skills through Python-based projects integrating econometrics, visualization, and predictive modeling.

Course Outcomes (COs):

By the end of the course, students can be able to;

- **CO1:** Recall and define Python programming fundamentals, libraries, and data preprocessing techniques.
- **CO2:** Apply Python for data visualization, descriptive statistics, and hypothesis testing.
- **CO3:** Analyze economic data using regression, classification, and statistical models in Python.
- **CO4:** Evaluate machine learning models (trees, forests, logistic regression) using performance metrics and diagnostics.
- **CO5:** Design predictive time series models and case-based projects integrating Python applications for economic decision making.

COs /POs Mapping:

Cos/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	–	✓	✓	✓	–	✓	–	✓	–	✓
CO2	✓	✓	✓	✓	✓	–	–	✓	–	✓	–	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	–	✓	✓	✓
CO4	✓	✓	✓	✓	✓	✓	✓	✓	–	✓	✓	✓
CO5	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Course Outline:

Unit-I: [18 Hours]

A. Introduction to Python Programming: Overview of Python, data analysis libraries (NumPy, pandas, Matplotlib, Seaborn); data preprocessing and cleaning; handling missing data, outliers, anomalies; data transformation, integration, and manipulation.

Unit-II: [18 Hours]

Data Visualization and Exploratory Analysis: Descriptive statistics, histograms, box plots, scatter plots; correlation analysis; hypothesis testing (t-tests, χ^2 , ANOVA); confidence intervals, p-values, non-parametric tests; interpretation of statistical results.

Unit-III: [18 Hours]

Econometric Models in Python: Linear regression (simple, multiple), logistic regression, decision trees, random forests; model evaluation metrics (R^2 , MAE, RMSE, accuracy, precision, recall); assumptions, diagnostics, overfitting/underfitting, model selection.

Unit-IV: [18 Hours]

Time Series Analysis in Python: Components of time series (trend, seasonality, noise); decomposition techniques; forecasting methods (moving average, exponential smoothing, ARIMA); introduction to ML applications in time series.

Applied Machine Learning and Case Studies: Introduction to ML libraries (scikit-learn, TensorFlow basics); supervised and unsupervised learning; case studies in economic forecasting; Project work integrating Python models with economic datasets.

Suggested Readings:

McKinney, W. (2012). *Python for Data Analysis: Data Wrangling with Pandas, NumPy, and IPython*. O'Reilly Media.

Swaroop, C. H. (2003). *A Byte of Python*. Python Tutorial.

Stewart, S. (2019). *Python Programming for Beginners*. Platinum Press LLC.

Reference:

Anderson, Sweeney, & Williams. (2011). *Statistics for Business and Economics*. Cengage Learning.

Hosmer, D. W., & Lemeshow, S. (2000). *Applied Logistic Regression*. Wiley.

Montgomery, D. C., & Runger, G. C. (2002). *Applied Statistics & Probability for Engineering*. Wiley.

Devore, J. L. (2011). *Probability and Statistics for Engineering and the Sciences*. Cengage Learning.

Han, J., & Kamber, M. (2006). *Data Mining: Concepts and Techniques*. Morgan Kaufmann.

Kaufman, L., & Rousseeuw, P. J. (1990). *Finding Groups in Data: An Introduction to Cluster Analysis*. Wiley.

Course Code : **MED302**
 Course Type : **Core**
 No. of Credits : **4.00**
 No. of Hours : **75 (L 45 + P 30)**

Course Title
Research Methodology

Course Objectives:

- Develop an understanding of the concepts, principles and significance of social science research, research methodology and research design.
- Enable students to identify research problems, formulate objectives and hypotheses, and apply qualitative and quantitative methods of data collection, sampling and statistical analysis in research.
- Equip students with academic writing, data analysis and research documentation skills using statistical tools, SPSS and LaTeX for preparing research proposals, dissertations and scholarly publications.

Course Outcomes (COs):

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

- **CO1:** Explain the concepts, methods and significance of social science research and research design.
- **CO2:** Formulate research problems, objectives and hypotheses using appropriate research methodologies.
- **CO3:** Apply suitable methods of data collection, sampling and ethical research practices in empirical studies.
- **CO4:** Analyze and interpret qualitative and quantitative data using statistical tools, SPSS and hypothesis testing techniques.
- **CO5:** Prepare research proposals, dissertations and academic papers using appropriate referencing styles, SPSS and LaTeX.

COs /POs Mapping:

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	–	✓	–	✓	✓	✓	–	✓	–	✓
CO2	✓	✓	✓	✓	✓	✓	✓	✓	–	✓	–	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	–	✓	✓	✓
CO4	✓	✓	✓	✓	✓	✓	✓	✓	–	✓	✓	✓
CO5	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Course Outline:

Unit-I: [12 Hours]

Foundations of Social Science Research: Meaning, nature and objectives of social science research; significance and types of research; identification and formulation of research problems; research design; review of literature; formulation of research objectives and hypotheses; preparation of research proposal.

Unit-II: [12 Hours]

Methods of Data Collection and Sampling Techniques: Concept and types of data – primary and secondary data; sampling design and sampling techniques; determination of sample size and sampling errors; methods of primary data collection – observation, interview, questionnaire and schedule; pilot survey and case study method; Challenges in primary data collection process.

Unit-III: [16 Hours]

Data Processing, Analysis and Hypothesis Testing: Processing of data – editing, coding and classification; tabular and graphical presentation of data; qualitative and quantitative methods of data analysis; hypothesis testing; formulation of null and alternative hypotheses; types of errors in hypothesis testing; interpretation of statistical results.

Unit-IV:**[15 Hours]**

Research Writing, Publication and Ethics: Research report writing; structure and presentation of dissertation and thesis; use of footnotes, endnotes, bibliography and references; referencing styles; writing research papers for seminars, conferences and journals; plagiarism and methods of plagiarism detection.

Unit-V:**[20 Hours]**

Statistical Analysis Using SPSS and LaTeX: Introduction to SPSS and its applications in social science research; tabulation and graphical presentation of data; descriptive statistics; data transformation and selection techniques; correlation and linear regression analysis; estimation and hypothesis testing using SPSS; introduction to LaTeX for academic writing and research documentation; preparation of tables, equations, references and bibliography using LaTeX.

Suggested Readings:

Bryman, A. (2004). *Social research methods* (2nd ed.). Oxford University Press.

Fink, A., & Kosecoff, J. (1998). *How to conduct surveys: A step-by-step guide*. Sage Publications.

Neuman, W. L. (2012). *Social research methods: Quantitative and qualitative approaches*. Pearson Education.

References:

Bernard, H. R. (2010). *Analysis of qualitative data*. Sage Publications.

Bose, P. K. (1995). *Research methodology*. Indian Council of Social Science Research (ICSSR).

Bryman, A. (1998). *Quality and quantity in social research*. Unwin Hyman.

Goode, W. J., & Hatt, P. K. (Latest ed.). *Methods in social research*. McGraw-Hill.

Hoyle, R. H., Harris, M. J., & Judd, C. M. (2002). *Research methods in social relations*. Wadsworth Publishing.

Hughes, J. (1987). *The philosophy of social research*. Longman.

Keith, F. N. (1986). *Introduction to methodology*. Sage Publications India Pvt. Ltd.

Modern Language Association of America. (2009). *MLA handbook for writers of research papers*. Modern Language Association.

Monette, D. R., Sullivan, T. J., & DeJong, C. R. (2002). *Applied social research: Tool for the human services* (5th ed.). Harcourt College Publishers.

Young, P. V. (Latest ed.). *Scientific social surveys and research*. Prentice Hall India Pvt. Ltd.

Course Code : MED303 Course Type : Core No. of Credits : 4.00 No. of Hours : 75 (L 45 + P 30)	Course Title Applied Econometrics
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Course Objectives:

- Develop an understanding of econometric theory, economic data structures and the Classical Linear Regression framework for empirical economic analysis.
- Enable students to formulate, estimate and evaluate econometric models using appropriate statistical, diagnostic and econometric techniques.
- Equip students with analytical and practical skills in qualitative response models, panel data and time series econometrics for forecasting, policy analysis and empirical research.

Course Outcomes (COs):

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

- **CO1:** Explain the nature, scope and applications of econometrics and different types of economic data and econometric models.
- **CO2:** Estimate and interpret regression models using the Classical Linear Regression framework and hypothesis testing procedures.
- **CO3:** Analyze econometric problems such as multicollinearity, heteroskedasticity, autocorrelation and model misspecification using diagnostic techniques.
- **CO4:** Apply qualitative response models, time series econometric techniques, and Logit, Probit, VAR and cointegration models.
- **CO5:** Demonstrate the ability to conduct empirical economic research using econometric methods for forecasting, policy analysis and decision-making.

COs /POs Mapping:

Cos/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	–	✓	✓	✓	–	✓	–	✓	–	✓
CO2	✓	✓	✓	✓	✓	–	–	✓	–	✓	–	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	–	✓	✓	✓
CO4	✓	✓	✓	✓	✓	✓	✓	✓	–	✓	✓	✓
CO5	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Course Outline:

Unit-I: [14 Hours]

Applied Regression Analysis and Economic Data Modelling: Meaning, nature and scope of econometrics; structure and types of economic data; basics of data handling; Classical Linear Regression Model; properties of estimators, goodness of fit and interpretation of regression coefficients; hypothesis testing – t-test, F-test and confidence intervals; forecasting and prediction; economic applications of regression analysis.

Unit-II: [15 Hours]

Diagnostic Testing and Corrective Econometric Techniques: Consequences of violating CLRM assumptions; multicollinearity; heteroskedasticity; autocorrelation; model specification errors and misspecification bias; diagnostic testing in econometrics; generalized least squares and robust estimation methods; economic applications.

Unit-III: [14 Hours]

Applied Qualitative and Limited Dependent Variable Models: Nature and use of dummy variables; intercept and slope dummy models; interaction effects and seasonal dummy variables; Chow test and tests for structural stability; qualitative and limited dependent variable models; Linear Probability Model (LPM); Logit and Probit models; Tobit model and censored regression; model evaluation and interpretation of results.

Unit-IV:**[16 Hours]**

Applied Time Series and Financial Econometrics: Nature and characteristics of time series data; autoregressive and moving average processes; ARIMA models and Box–Jenkins methodology; forecasting; ARCH and GARCH models; Vector Autoregressive (VAR) models and Granger causality tests; non-stationarity and unit-root tests; cointegration and Error-Correction Models (ECM); identification in standard and cointegrated systems; economic applications.

Unit-V:**[16 Hours]**

Panel Data Econometrics and Policy Evaluation Models: Introduction to panel data; fixed effects and random effects models; estimation and interpretation of panel regression models; Hausman specification test; dynamic panel data models; simultaneous equation models and identification problem; instrumental variable estimation and two-stage least squares; economic applications using real-world datasets.

Suggested Readings:

Studenmund, A. H. (2014). *Using econometrics: A practical guide* (6th ed.). Pearson Education Limited.

References:

Asteriou, D., & Hall, S. G. (2011). *Applied econometrics* (2nd ed.). Palgrave Macmillan.

Mills, T. C., & Patterson, K. (Eds.). (2009). *Palgrave handbook of econometrics: Volume 2, Applied econometrics*. Palgrave Macmillan.

Course Code : MED304 Course Type : Core No. of Credits : 4.00 No. of Hours : 60 (L 45 + T 15)	Course Title International Economics
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Course Objectives:

- Provide an understanding of theories of international trade, trade policies, balance of payments, international institutions, economic integration, and India's trade policies.
- Improve the analytical skills of students to relate theoretical frameworks with current trade affairs.
- Develop the ability to critically evaluate global trade issues and design research based policy recommendations for emerging economies.

Course Outcomes (COs):

By the end of the course, students can be able to;

- **CO1:** Explain the major theories of international trade including Absolute Advantage, Comparative Advantage, Heckscher–Ohlin theory, and related trade models.
- **CO2:** Analyze the gains from international trade and terms of trade determination using offer curves and trade equilibrium concepts
- **CO3:** Evaluate the impact of trade policies such as tariffs, quotas, subsidies, dumping, and export restrictions on welfare, production, and international competitiveness.
- **CO4:** Interpret balance of payments and exchange rate mechanisms using macroeconomic models such as the Mundell–Fleming model, Purchasing Power Parity, and monetary approaches to exchange rates.
- **CO5:** Examine the role of regional economic integration and international institutions such as ASEAN, NAFTA, the European Union, IMF, IBRD, and WTO in global trade and economic cooperation.

COs /POs Mapping:

COs/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	–	✓	✓	✓	✓	✓	–	✓	–	✓
CO2	✓	✓	✓	✓	✓	✓	✓	✓	–	✓	–	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	–	✓	✓	✓
CO4	✓	✓	✓	✓	✓	✓	✓	✓	–	✓	✓	✓
CO5	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Course Outline:

Unit-I: [08 Hours]

International Trade; Meaning and Concept; Trade, Growth, and Economic Interrelatedness, Trade and National Characteristics, Structure of Trade, Gains from trade with homogenous and heterogeneous agents, Offer curves: derivation; properties, related elasticities; Equilibrium Terms of Trade.

Unit-II: [14 Hours]

Trade Theories: Absolute Advantage; The Ricardian comparative advantage model. Heckscher-Ohlin model, Stolper-Samuelson, Rybczynski theorem and factor-price equalization theorem, Leontief paradox; Specific-factor model as short-run Approximation.

Unit-III: [14 Hours]

Strategic Trade Policy: Tariffs and welfare dynamics for small and large countries perspective; Tariffs versus quantitative restrictions; the optimum tariff; Empirical modelling of trade policy; Monopolistic competition models of trade, Tariff versus quota under monopoly. Voluntary import expansion and export restrictions. Export Quotas, Subsidy, Forms of Dumping - Antidumping. Metzler Paradox; Effective. Rate of protection.

Unit-IV:**[12 Hours]**

Balance of Payments and Macro Adjustment Mechanisms: Balance of Payments, Capital Flows, National Accounts Determinants and Foreign exchange Market Equilibrium, The Elasticity Approach, Marshall-Lerner Condition, Multipliers, Mundell- Fleming Model, Purchasing Power Parity, Monetary Approach, Monetary Policy and Fiscal Policy, Fixed and Flexible Exchange Rate Regimes, Sterilization, Devaluation and BoP Crisis, Capital Flight.

Unit-V:**[12 Hours]**

Economic Integration and International Institutions: Forms of Economic and regional Integration; Regional Agreements ASEAN, NAFTA, European Union, Customs Union- Partial Equilibrium Analysis of Customs Union Trade Creation and Trade Diversion. Objectives and functions of IMF, IBRD, WTO, Free trade areas.

Suggested Readings:

Krugman, P. R., & Obstfeld, M. (2006). *International economics: Theory and policy* (5th ed.). Addison Wesley.
Södersten, B., & Reed, G. (1998). *International economics* (3rd ed.). Macmillan Press.
Salvatore, D. (2000). *International economics* (8th ed.). Wiley India.
Bhagwati, J., Panagariya, A., & Srinivasan, T. N. (1998). *Lectures on international trade* (2nd ed.). MIT Press.

References:

Carbaugh, R. J. (1994). *International economics* (11th ed.). Thomson South-Western.
Pilbeam, K. (2001). *International finance* (3rd ed.). Palgrave Macmillan.
Feenstra, R. C. (2009). *Advanced international trade: Theory and evidence*. Princeton University Press.
Van Marrewijk, C. (2007). *International economics*. Oxford University Press.
Caves, R. E., Frankel, J. A., & Jones, R. W. (1993). *World trade and payments: An introduction*. Addison-Wesley.
Krugman, P. R., & Obstfeld, M. (2005). *International economics*. Pearson Education.
Dornbusch, R. (1980). *Open economy macroeconomics*. Basic Books.
Caves, R. E., Frankel, J. A., & Jones, R. W. (2007). *World trade and payments: An introduction*. Pearson Education.
Gerber, J. (2013). *International economics* (6th ed.). Pearson Education.
Thompson, H. (2009). *International economics: Global markets and competition* (2nd ed.). Cambridge University Press.

Course Code : MED311 Course Type : Elective-III No. of Credits : 4.00 No. of Hours : 60 (L 45 + T 15)	Course Title Financial Econometrics
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Course Objectives:

- Familiarize students with the fundamental concepts and techniques of Financial Econometrics, including regression analysis, time series analysis, cointegration, and error correction models.
- Develop students' understanding of the application of econometric methods in analyzing financial markets, financial data, and economic relationships.
- Provide practical exposure through lab sessions using real financial data and econometric software tools for empirical analysis and interpretation.

Course Outcomes (COs):

By the end of the course, students can be able to;

- **CO1:** Understand the fundamental concepts and scope of Financial Econometrics, including the behavior and distributional properties of financial time series data.
- **CO2:** Apply univariate time series models such as AR, MA, and ARMA for analysing, estimating, and forecasting financial and economic data.
- **CO3:** Analyze volatility clustering in financial markets using ARCH/GARCH family models and interpret time-varying volatility patterns.
- **CO4:** Develop and estimate multivariate time series models such as VAR, VMA, and VARMA to study dynamic interrelationships among economic and financial variables.
- **CO5:** Evaluate high-frequency financial data and market microstructure characteristics, including trade durations, bid-ask spreads, and intraday volatility modelling.

COs /POs Mapping:

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	–	✓	✓	✓	✓	✓	–	✓	–	✓
CO2	✓	✓	✓	✓	✓	✓	–	✓	–	✓	–	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	–	✓	✓	✓
CO4	✓	✓	✓	✓	✓	✓	✓	✓	–	✓	✓	✓
CO5	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Course Outline:

Unit-I: [08 Hours]

Financial Econometrics: Scope and Methods: The Data Generating Process – Financial Econometrics at Work – Time Horizon of Models – The Behavior of Financial Variables – Distributions of Returns – Multivariate Returns – Empirical Properties of Returns.

Unit-II: [14 Hours]

Modelling Univariate Time Series: Stationarity – Correlation and Autocorrelation Function – Autoregressive and Moving Average Models; AR, MA, ARMA, and ARIMA; Goodness of Fit; Identification and Estimation; Forecasting.

Unit-III: [14 Hours]

Time-varying Volatility Models: Characteristics of Volatility, Stylized Facts, The ARCH Model- Properties and Weaknesses of ARCH Models, The GARCH Model; Extensions to the basic GARCH model, Asymmetric GARCH models, Stationary ARMA-GARCH Models, Lagrange Multiplier Test, Multivariate GARCH Formulations.

Unit-IV:**[12 Hours]**

Multivariate Time Series Analysis: Weak Stationarity and Cross-Correlation Matrices, Cross-Correlation Matrices, Vector Autoregressive Models- Reduced and Structural Forms, Estimation and Forecasting with VAR Models, Impulse responses and variance decompositions, Vector Moving-Average Models, Vector ARMA Models.

Unit-V:**[12 Hours]**

High-Frequency Data Analysis: Modelling High Frequency Data – Data Sources and Filtering – Modelling the Time between Trades – Intraday Volatility and Forecasting Volatility – Bid-Ask Spread – Empirical Characteristics of Transactions Data- Models for Price Changes – Duration Models

Suggested Readings:

Brooks, Christopher (2002), *Introductory Econometrics for Finance*, Cambridge University Press.
Campbell, Lo and Mackinlay (1997), *The Econometrics of Financial Markets*, Princeton University Press.
Gourieroux, Christian and Jasiak, Joann (2001), *Financial Econometrics*, Princeton University Press.

References:

Baltagi, B.H. (2008), *Econometric Analysis of Panel Data*, 4th Edition, Wiley
Gujarati, D and Porter, *Basic Econometrics*. Fifth Edition, McGraw Hill/Irwin, 2009.
Greene, William H, *Econometric Analysis*. 6th Edition, Prentice Hall, 2008.
Koopmans, L. H., *The spectral analysis of time series*. Elsevier, 1995
James D. Hamilton, *Time Series Analysis*. Princeton University Press, 1994
Gujarati, Damodar and Porter, Dawn (2009), *Essentials of Econometrics* 4th Ed., McGraw-Hill/Irwin.
Hamilton James (1994), *Time Series Analysis*, Princeton.
Dougherty, Christopher (2007), *Introduction to Econometrics*, 3rd Ed., Oxford University Press.
Studenmund, A. H. (2010), *Using Econometrics: A Practical Guide*, 6th Ed., Addison-Wesley.
Tsay, Ruey S. (2002): *Analysis of Financial Time Series*, Wiley Series in Probability and Statistics.

Course Code : MED311 Course Type : Elective-III No. of Credits : 4.00 No. of Hours : 60 (L 45 + T 15)	Course Title Digital Economy
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Course Objectives:

- To develop an understanding of the concepts, structure, and evolution of the digital economy, including digital transformation, data-driven markets, digital infrastructure, and the role of technology in economic development and inclusion.
- To analyze the functioning of digital platforms, e-commerce models, fintech systems, and online market dynamics, with special emphasis on platform economics, consumer behavior, network effects, and rural digital marketplaces.
- To examine the regulatory, ethical, and sustainability dimensions of the digital economy, including data governance, cybersecurity, digital policies, platform regulation, and sustainable business models in technology-driven markets.

Course Outcomes (COs):

By the end of the course, students can be able to;

- **CO1:** Explain the concepts, characteristics, and evolution of the digital economy, including digitization, digital transformation, digital infrastructure, and the role of data as an economic asset.
- **CO2:** Analyze the functioning of e-commerce, rural digital markets, fintech systems, and online business models, including pricing strategies, consumer behavior, and digital payment ecosystems.
- **CO3:** Examine the economics of digital platforms, network effects, multi-sided markets, platform governance, and the role of digital platforms in the gig and sharing economy.
- **CO4:** Evaluate issues related to data governance, cybersecurity, digital regulation, ethical AI, intellectual property rights, and competition policies in the digital economy.
- **CO5:** Assess sustainable business practices in the platform economy, including circular platform models, responsible consumption, and corporate sustainability strategies in technology-driven markets.

COs /POs Mapping:

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	–	–	–	✓	✓	–	–	✓	–	✓
CO2	✓	✓	✓	✓	✓	✓	–	–	–	✓	✓	✓
CO3	✓	✓	✓	✓	–	✓	✓	–	✓	✓	✓	✓
CO4	✓	✓	✓	✓	–	✓	✓	✓	–	✓	✓	✓
CO5	✓	✓	✓	–	–	✓	✓	✓	–	✓	✓	✓

Course Outline:

Unit-I: [12 Hours]

Foundations of the Digital Economy: Evolution of digital economy, characteristics of the digital economy, digitalization, and digital transformation, digital products, data as an economic asset, e- infrastructure and internet economy.

Unit-II: [12 Hours]

Digital Markets and E-Commerce: Economics of e-commerce, online marketplaces and digital business models, pricing strategies in digital markets, long-tail economics, digital payments and fintech, consumer behavior in online environments, digital advertising and attention economy, ViCart and AgriBolo.

Unit-III:**[12 Hours]**

Economics of Digital Platforms: Introduction to platform economics, two-sided and multi-sided markets, network effects and platform externalities, platform governance and ecosystem management, matchmaking platforms and gig'economy, competition among digital platforms.

Unit-IV:**[12 Hours]**

Data Economy, Regulation, and Digital Policy: Data governance and privacy, cybersecurity and digital trust, intellectual property in digital environments, antitrust issues in digital markets, algorithmic bias and ethical AI, taxation in the digital economy, national digital policies and digital governance frameworks.

Unit-V:**[12 Hours]**

Sustainable Business Models: Platform economy and sustainability challenges, sharing economy, sustainable platform design, circular platform models (reuse and recycle platforms), responsible consumption and production in digital markets, and corporate sustainability in technology firms.

Suggested Readings:

Tapscott, D. (1996). *The digital economy: Rethinking promise and peril in the age of networked intelligence*. McGraw-Hill.

Parker, G. G., Van Alstyne, M. W., & Choudary, S. P. (2016). *Platform revolution: How networked markets are transforming the economy and how to make them work for you*. W. W. Norton & Company.

Varian, H. R. (2004). *The economics of information technology*. Cambridge University Press.

Kathuria, R. (Ed.). (2019). *Digital economy and society*. Springer.

References:

Brynjolfsson, E., & McAfee, A. (2014). *The second machine age: Work, progress, and prosperity in a time of brilliant technologies*. W. W. Norton & Company.

Zuboff, S. (2019). *The age of surveillance capitalism: The fight for a human future at the new frontier of power*. PublicAffairs.

Tapscott, D., & Tapscott, A. (2016). *Blockchain revolution: How the technology behind bitcoin is changing money, business, and the world*. Portfolio/Penguin.

Jeffrey, R., & Doron, A. (2013). *Digital India: Understanding information, communication and social change*. Orient Blackswan.

Course Code : MED311 Course Type : Elective -III No. of Credits: 4.00 No. of Hours : 60 (L 45 + T 15)	Course Title Entrepreneurship Development
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Course Objectives:

- Enable students to understand the concepts and characteristics of entrepreneurship and entrepreneurial behaviour and to develop entrepreneurial competencies for identifying business opportunities and managing risks.
- Familiarize students with project planning, feasibility analysis, and venture creation processes and to provide conceptual understanding of business planning and financial management for start-ups.
- Equip students with practical knowledge for converting innovative ideas into successful business ventures.

Course Outcomes (COs):

By the end of the course, students can be able to;

- **CO1:** Explain the concepts, traits, and types of entrepreneurship and entrepreneurial culture.
- **CO2:** Analyze entrepreneurial opportunities, project feasibility, and market potential for new ventures.
- **CO3:** Develop business plans and project reports for establishing entrepreneurial ventures.
- **CO4:** Evaluate various sources of finance and funding mechanisms for start-ups and enterprises.
- **CO5:** Apply entrepreneurial knowledge and managerial skills for venture creation and business growth.

COs /POs Mapping:

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	–	–	–	✓	✓	–	–	✓	–	✓
CO2	✓	✓	✓	✓	✓	✓	–	–	–	✓	✓	✓
CO3	✓	✓	✓	✓	–	✓	✓	–	✓	✓	✓	✓
CO4	✓	✓	✓	✓	–	✓	✓	✓	–	✓	✓	✓
CO5	✓	✓	✓	–	–	✓	✓	✓	–	✓	✓	✓

Course Outline:

Unit-I: [12 Hours]

Introduction to Entrepreneurship: Definitions and concepts of entrepreneurship – Types of entrepreneurship – Traits and qualities of entrepreneurs – Barriers to entrepreneurship – Entrepreneurial culture – Stages in entrepreneurial process – Women entrepreneurship in India.

Unit-II: [12 Hours]

Entrepreneurship Development and Project Analysis: Opportunity identification and evaluation – Generation and screening of project ideas – Market analysis – Break-even analysis – Cost-benefit analysis – Network analysis – Project formulation – Procedures for setting up enterprises.

Unit-III: [12 Hours]

Business Planning Process: Meaning and importance of business plan – Business planning process – Advantages of business planning – Components of a business plan – Preparation of model project reports for starting a new venture – Team-based entrepreneurial project work.

Unit-IV: [12 Hours]

Funding and Sources of Finance: Meaning and types of capital – Factors affecting capital requirements – Long-term, medium-term, and short-term finance – Venture capital and venture capital process – Business angels – Commercial banks – Government grants, subsidies, and entrepreneurship development schemes.

Unit-V: [12 Hours]

Innovation, Start-ups and Entrepreneurial Management: Innovation and entrepreneurship – Start-up ecosystem in India – Digital entrepreneurship – MSMEs and economic development – Entrepreneurial ethics and social responsibility – Challenges of start-ups – Strategies for entrepreneurial success and sustainability.

Suggested Readings

- Reddy, P. N. (2010). *Entrepreneurship: Text and cases*. Cengage Learning.
- Kuratko, D. F., & Rao, T. V. (2012). *Entrepreneurship: A South Asian perspective*. Cengage Learning.
- Leach, J. C., & Melicher, R. W. (2018). *Entrepreneurial finance* (6th ed.). Cengage Learning.
- Khanka, S. S. (2019). *Entrepreneurial development*. S. Chand Publications.
- Sharma, S. (2017). *Entrepreneurship development*. PHI Learning.

References

- Barringer, B. R. (2015). *Entrepreneurship: Successfully launching new ventures* (5th ed.). Pearson Education.
- Bessant, J., & Tidd, J. (2018). *Innovation and entrepreneurship* (4th ed.). Wiley.
- Desai, V. (2019). *Small scale industries and entrepreneurship*. Himalaya Publishing House.
- Kuratko, D. F. (2021). *Entrepreneurship: Theory, process, and practice* (11th ed.). Cengage Learning.
- Hisrich, R. D., Peters, M. P., & Shepherd, D. A. (2020). *Entrepreneurship* (11th ed.). Tata McGraw-Hill.
- Roy, R. (2011). *Entrepreneurship*. Oxford University Press.
- Stokes, D., & Wilson, N. (2017). *Small business management and entrepreneurship* (7th ed.). Cengage Learning.

Course Code : MED313 Course Type : CCC-II No. of Credits : 2.00 No. of Hours : 30 (L 30)	Course Title Building Mathematical Ability and Financial Literacy
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Course Objectives:

The main objectives of this course are:

- Solving skills through mathematical reasoning, quantitative aptitude, and data interpretation, enabling them to apply these concepts in academic, professional, and real-life scenarios.
- Familiarize students with investment options, banking structures, financial institutions, taxation, insurance, and the roles of RBI and SEBI in the financial system.
- Enable students to make informed financial decisions through understanding of investment planning, risk management, digital payments, and awareness of financial frauds.

Course Learning Outcomes (COs):

By the end of the course, students can be able to;

- **CO1:** Enhance logical thinking and decision-making through structured problem-solving.
- **CO2:** Demonstrate competence in fractions, simple and compound interest ratio and proportion, and percentage-based problems.
- **CO3:** Calculate mean, median, and mode to summarize data effectively. Present data using bar charts, pie charts, and line charts for clear communication.
- **CO4:** Prepare budgets, track expenses, manage savings, and set financial goals using basic money management principles
- **CO5:** Evaluate financial risks, use digital payment systems securely, and adopt appropriate strategies for financial planning and risk reduction.

COs /POs Mapping:

Cos/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	–	–	–	–	–	–	–	–	–	–	–
CO2	✓	✓	–	–	–	–	–	✓	–	–	–	–
CO3	✓	✓	✓	–	✓	–	–	–	–	–	–	–
CO4	–	✓	–	✓	–	✓	✓	–	–	–	–	✓
CO5	–	–	✓	✓	✓	–	✓	✓	–	–	–	–

Course Outline:

Unit-I [7 Hours]

Logical Reasoning: Number series, letter series, coding-decoding, problems on ages. **Basic Set Theory:** Operations on sets, Venn diagrams, and cardinality of sets.

Unit-II [5 Hours]

Mathematical aptitude: Fractions, time and work, time and distance, ratio and proportion, percentage, profit and loss, discount, simple interest, compound interest, mensuration.

Unit-III [6 Hours]

Basic Statistics: Sources and classification of data, data interpretation, quantitative and qualitative data, graphical representation (bar chart, pie chart, line chart), mean, median, and mode for ungrouped data.

Unit-IV [5 Hours]

Foundations of Financial Literacy: Introduction to financial literacy and its process and structure, personal finance, income, expenditure, savings, and budgeting, financial goals, financial discipline, money management skills, awareness of financial frauds, basic budgeting and expense tracking activities.

Financial Institutions: Banking system and credit process, recent innovations in the banking system, Reserve Bank of India role and functions, monetary policy tools. **Capital Market;** Primary market, secondary market, financial decision-making, SEBI. **Digital Finance:** Digital payments system and digital currency.

Suggested Readings:

Arihant, (2019). *Teaching and Research Aptitude (General Paper 1)*. Arihant Publication (India) Limited.
Jain, L. & Vashistha, K. C. (2024). *Teaching and Research Aptitude (General Paper 1)*. Upkar Prakashan Agra.
Lewis, M. K. (2000). *Monetary economics*. Oxford University Press, New York.

References:

Aggarwal, R.S. (n.d). *Quantitative Aptitude*. S. Chand.
C Rangarajan. (1991). *Indian economy: Essays in money and finance*. UBS Publishers' Distributors Ltd.
Lewis, M. K. (2000). *Monetary economics*. Oxford University Press.

Course Code : MED314 Course Type : SIP No. of Credits : 2.00 No. of Hours : 6 Weeks	Course Title Summer Internship Programme
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Course Objectives:

- Provide students with practical exposure to economic concepts and econometric applications in organizational settings.
- Strengthen analytical and problem-solving skills by applying classroom knowledge to real world economic and business operations.
- Develop professional competencies through report writing, presentation, and viva voce evaluation.

Course Outcomes (COs):

By the end of the course, students can be able to;

- **CO1:** Identify and understand how organizations apply economic concepts and econometric techniques.
- **CO2:** Demonstrate practical knowledge through project/field work in chosen specialization areas.
- **CO3:** Prepare structured internship reports documenting tasks, learning, and organizational practices.
- **CO4:** Present internship findings effectively in departmental seminars.
- **CO5:** Defend applied knowledge and insights during viva voce evaluation.

COs /POs Mapping:

Cos/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	–	–	–	–	–	–	–	–	–	–	✓
CO2	–	✓	✓	✓	✓	–	–	–	–	✓	✓	–
CO3	✓	✓	–	–	–	–	–	–	–	✓	✓	–
CO4	–	✓	✓	✓	✓	–	✓	✓	–	✓	✓	–
CO5	✓	✓	✓	✓	✓	–	✓	✓	✓	✓	✓	✓

Course Outline:

- I. Duration:** 6 weeks during summer vacation (May–June).
- II. Nature of Work:** Internship must align with student's specialization
- III. Report Submission:** Students submit a detailed internship report along with a certificate from the host organization.
- IV. Evaluation:**
 - Internship Report (External Examiner): 60 Marks
 - Viva-Voce (Department): 40 Marks
- V. Supervision:** Each student will work under the guidance of a faculty supervisor.
- VI. Final Submission:** Dissertation must follow university rules and formatting guidelines.

Suggested Readings:

Kothari, C. R. (2014). *Research Methodology: Methods and Techniques*. New Age International.

Gujarati, D. N., & Porter, D. C. (2009). *Basic Econometrics*. McGraw-Hill.

Wooldridge, J. M. (2016). *Introductory Econometrics: A Modern Approach*. Cengage Learning.

Creswell, J. W. (2018). *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches*. Sage Publications.

SEMESTER-IV

Course Code : **MED401**
 Course Type : **Core**
 No. of Credits : **4.00**
 No. of Hours : **60 (L 45 + T 15)**

Course Title

Economic Growth and Development

Course Objectives:

- Introduce key concepts, theories, and debates in development economics and economic growth.
- Provide analytical tools to understand poverty, inequality, human resources, and institutional roles in development.
- Strengthen research capabilities by applying growth and development theories to real-world economic challenges.

Course Outcomes (COs):

By the end of the course, students can be able to;

- **CO1:** Distinguish between the concepts of economic growth and development.
- **CO2:** Explain classical and modern theories of development and growth.
- **CO3:** Analyze poverty, inequality, and human resource challenges in developing economies.
- **CO4:** Evaluate growth models and their relevance to policy and institutional frameworks.
- **CO5:** Apply development economics concepts to case studies, policy debates, and empirical research.

COs /POs Mapping:

Cos/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	–	✓	–	✓	✓	✓	–	✓	–	✓
CO2	✓	✓	✓	✓	✓	✓	✓	✓	–	✓	–	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	–	✓	✓	✓
CO4	✓	✓	✓	✓	✓	✓	✓	✓	–	✓	✓	✓
CO5	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Course Outline:

Unit-I:

[16 Hours]

Introduction to Classical Theories: Growth vs. Development; Classical Theories (Smith to Schumpeter); Partial Theories; Rostow's Stages of Growth; Balanced vs. Unbalanced Growth; Big Push Theory; Myrdal's Cumulative Causation; Dualism; Neo-Marxist Perspectives.

Unit-II:

[10 Hours]

Theories of Economic Growth: Harrod-Domar Model; Solow Growth Model; Role of Resources – Technology -and Institutions; Instability and Convergence Debate; Joan Robinson's Golden Age; Endogenous Growth Theories.

Unit-III:

[10 Hours]

Neo-Keynesian Models of Growth and Distribution: Kaldor Model; Pasinetti Model; Contributions of Hicks - Harrod - Solow; Rosenstein-Rodan and Hirschman; Denison's Growth Accounting; Labour, Capital, and Technology Contributions; Embodied vs. Disembodied Technical Change; Tobin and Johnson on Money and Growth.

Unit-IV:

[12 Hours]

Labour Surplus Models and Human Resources: Lewis Surplus Labour Model; Fei-Ranis Model; Human Resources and Economic Development; Population and Development; Malthusian Theory; Simon's Optimistic View; Demographic Indicators; Demographic Dividend; Labour Market Structures; Segmented Labour Markets; Informal Labour Markets; Disguised Unemployment.

Poverty, Inequality and Human Development: Development Gap; Poverty Concepts and Measurement; Money Metric Measures; Capability Approach; Human Development Index (HDI); Human Poverty Index (HPI); Horizontal and Vertical Inequality; Lorenz Curve; Gini Index.

Suggested Readings:

Y. Hayami (2001). *Development Economics: From Poverty to the Wealth of Nations*. OUP.
Alain De Janvry & Elisabeth Sadoulet (2016). *Development Economics: Theory and Practice*. Routledge.
Debraj Ray (1999). *Development Economics*. Oxford University Press.
Sen, A. (2000). *Development as Freedom*. Oxford University Press.
Perkins, Radelet, Lindauer & Block (2012). *Economics of Development* (7th ed.). W.W. Norton.

References:

H.G. Jones. *An Introduction to Modern Theories of Economic Growth*. McGraw-Hill.
K. Basu (1997). *Analytical Development Economics*. MIT Press.
Barro, R. J. & Sala-i-Martin, X. *Economic Growth*. McGraw-Hill.
Jones, C. I. *Introduction to Economic Growth*. W.W. Norton.
Bardhan, P. & Udry, C. *Development Microeconomics*. Oxford University Press.
Agenor, P-R. & Montiel, P. J. (2008). *Development Macroeconomics*. Princeton University Press.
Thirlwall (2006). *Growth and Development with Special Reference to Developing Countries*. Palgrave Macmillan.
Ghatak, S. (2003). *An Introduction to Development Economics*. Routledge.
Krugman, P. (1995). *Development, Geography and Economic Theory*. MIT Press.

Course Code : **MED402**
 Course Type : **Core**
 No. of Credits : **4.00**
 No. of Hours : **60 (L 45 + T 15)**

Course Title
Game Theory and Strategic Analysis

Course Objectives:

- Develop an understanding of the fundamental concepts, principles and applications of game theory in economics, strategic interactions and decision-making under complete and incomplete information.
- Enable students to analyze static, dynamic, cooperative and non-cooperative games using equilibrium concepts such as Nash equilibrium, Bayesian equilibrium and subgame perfect equilibrium.
- Equip students with analytical skills to apply bargaining, coalition formation, repeated and differential game models to real-world economic, managerial and policy-related problems.

Course Outcomes (COs):

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

- **CO1:** Explain the concepts, scope and significance of game theory and different forms of strategic games.
- **CO2:** Analyze static and dynamic games using solution concepts such as Nash equilibrium, mixed strategies and backward induction.
- **CO3:** Apply Bayesian and sequential equilibrium concepts to games involving incomplete and imperfect information.
- **CO4:** Evaluate cooperative games, bargaining models and coalition structures in strategic decision-making.
- **CO5:** Demonstrate the ability to use game theoretic reasoning in analyzing market competition, policy decisions and strategic interactions.

COs /POs Mapping:

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	—	✓	✓	✓	✓	✓	—	✓	—	✓
CO2	✓	✓	✓	✓	✓	✓	✓	✓	—	✓	—	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	—	✓	✓	✓
CO4	✓	✓	✓	✓	✓	✓	✓	✓	—	✓	✓	✓
CO5	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Course Outline:

Unit-I: **[10 Hours]**

Static and Dynamic Games of Complete Information: Introduction to game theory and strategic interaction; games of complete information; solution concepts – dominant strategies, Nash equilibrium, pure and mixed strategies, extensive form games, backward induction and subgame perfect equilibrium; repeated games and strategic cooperation.

Unit-II: **[14 Hours]**

Games of Incomplete and Imperfect Information: Nature of incomplete and imperfect information; static Bayesian games and Bayes–Nash equilibrium; dynamic games of incomplete information; beliefs and strategies in dynamic settings; equilibrium refinements – weak perfect Bayesian equilibrium, sequential equilibrium; forward induction and signaling behaviour.

Unit-III: **[12 Hours]**

Cooperative Game Theory and Coalition Formation: Concept and characteristics of cooperative games; transferable utility and non-transferable utility games; coalition formation and coalition structures; Shapley Value and fair allocation of payoffs; credibility and stability of coalitions; matching games and assignment problems.

Unit-IV:**[10 Hours]**

Bargaining Theory and Negotiation Models: Bargaining with complete information; bargaining as an extensive form game; Rubinstein alternating-offer bargaining model; axiomatic bargaining theory and Nash bargaining solution; bargaining under incomplete information; one-sided and two-sided uncertainty.

Unit-V:**[14 Hours]**

Repeated and Differential Games : Repeated games and intertemporal strategic interaction; differential games and dynamic optimization; commitment and credibility in dynamic games; subgame perfection in continuous-time settings; Markov-perfect equilibrium; hierarchical games.

Suggested reading

Osborne, M. J. (2003). *An introduction to game theory*. Oxford University Press.

Gibbons, R. (1992). *A primer in game theory*. Harvester Wheatsheaf.

References

Dixit, A. K., Skeath, S., & Reiley, D. H. (2020). *Games of strategy* (5th international student ed.). W. W. Norton & Company.

Fudenberg, D., & Tirole, J. (1991). *Game theory*. MIT Press.

Muthoo, A. (1999). *Bargaining theory with applications*. Cambridge University Press.

Osborne, M. J., & Rubinstein, A. (1994). *A course in game theory*. MIT Press.

Course Code : **MED411**
 Course Type : **Dissertation**
 No. of Credits : **8.00**
 No. of Hours : **One Semester**

Course Title
Dissertation

Course Objectives:

- Enable students to undertake independent research in economics and data analytics, applying theoretical knowledge to practical problems.
- Strengthen analytical, methodological, and writing skills through supervised dissertation work.
- Encourage students to design case-based projects or field studies that integrate specialization areas with empirical evidence.

Course Outcomes (COs):

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

- **CO1:** Identify and formulate a research problem in their chosen specialization.
- **CO2:** Conduct literature review and develop a coherent theoretical framework.
- **CO3:** Apply appropriate research methodologies, statistical tools, and econometric techniques.
- **CO4:** Analyze data, interpret results, and draw evidence-based conclusions.
- **CO5:** Present research findings in a structured dissertation and defend them in viva voce.

COs /POs Mapping:

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	✓	✓	✓	✓	✓	✓	–	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓	✓	✓	–	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	–	✓	✓	✓
CO4	✓	✓	✓	✓	✓	✓	✓	✓	–	✓	✓	✓
CO5	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Course Outline:

- I. Synopsis Submission:** Students must submit a synopsis on a selected research topic as per prescribed guidelines.
- II. Research Work:** Dissertation must be related to the specialization area chosen (e.g., Labour Economics, Financial Economics, Digital Economy, Development Studies).
- III. Evaluation:**
 - Dissertation (External Examiner): 60 Marks
 - Viva-Voce (Department): 40 Marks
- IV. Supervision:** Each student will work under the guidance of a faculty supervisor.
- V. Final Submission:** Dissertation must follow university rules and formatting guidelines.

Suggested Readings

Kothari, C. R. (2014). *Research Methodology: Methods and Techniques*. New Age International.
 Gujarati, D. N., & Porter, D. C. (2009). *Basic Econometrics*. McGraw-Hill.
 Wooldridge, J. M. (2016). *Introductory Econometrics: A Modern Approach*. Cengage Learning.
 Creswell, J. W. (2018). *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches*. Sage Publications.