ఆంధ్రప్రదేశ్ కేంద్రీయ విశ్వవిద్యాలయం

आंध्रप्रदेश केंद्रीय विश्वविद्यालय

Central University of Andhra Pradesh

Jnana Seema, Ananthapuramu

School of Arts, Humanities and Social Sciences

Department of Economics

Vidya Dadati Vinayam

(Education Gives Humility)

PG Diploma in Business Analytics and Econometrics

w.e.f. Academic Year 2025 – 2026

CONTENTS

PG Diploma in Business Analytics and Econometrics

Introduction to the Programme

The PG Diploma in Business Analytics and Econometrics is designed to equip learners with analytical tools and decision-making frameworks essential for modern business environments. It blends economic reasoning with data science techniques to address real-world challenges in industry and policy. The duration of the course is one year (2 semesters).

Programme Vision

To develop data-savvy professionals capable of integrating economic insights with analytical technologies for strategic and evidence-based decision-making across sectors.

Programme Objectives

The purpose of this programme is to:

- Build foundational knowledge in economics, statistics, and quantitative methods relevant to business and policy analysis.
- Develop practical skills in data handling, visualization, and modeling using tools like Power BI, R, and Python.
- Train students in econometric techniques for forecasting, impact evaluation, and evidence-based decision-making.
- Enable application of business intelligence tools to solve real-world problems in finance, marketing, operations, and public policy.
- Foster independent analytical thinking through hands-on labs, MOOCs, and a dissertation focused on applied research.

Learning Outcomes

Upon successful completion of the programme, students will be able to:

- Analyze business and economic data using statistical, econometric, and machine learning techniques.
- Design interactive dashboards and models using tools like Power BI, R, and Python for strategic decision-making.
- Apply quantitative methods to solve real-world problems in finance, marketing, operations, and public policy.
- Conduct independent research with methodological rigor, ethical awareness, and effective data communication.
- Integrate theory and practice through hands-on labs, MOOCs, and a dissertation focused on applied analytics.

Pedagogy of the Programme

The programme adopts a blended learning approach that integrates classroom instruction with digital and experiential components. Students engage in lectures for conceptual grounding, seminars and tutorials for collaborative discussion and clarification, and MOOCs for flexible, self-paced learning curated by the department. Hands-on lab sessions using tools like Power BI, R, and Python reinforce technical skills through guided exercises. Emphasis is placed on experiential learning via case studies, real-world datasets, and scenario-based problem solving. The programme culminates in a dissertation project, where students apply analytical methods to investigate a business or policy issue, fostering independent research and professional readiness.

Programme Structure

The diploma spans two semesters totaling 40 credits. Semester I covers core subjects like Business Economics, Quantitative Methods for Business Analytics, Power BI for Strategic Business Intelligence and two MOOCs as recommended by the Department from time to time. Semester II focuses on Basic Econometrics, Data Analytics with R/Python, two MOOCs recommended by the Department, and a dissertation. The structure balances theory (30 credits), dissertation (6 credits), and practical labs (4 credits), ensuring holistic skill development.

Programme Structure

I Semester					
Course Code	**Course Title**	**Credits**	**Credit Distribution**		
			L*	**T***	**P***
PDBAE101	Business Economics	4	3	1	0
PDBAE102	Quantitative Methods for Business Analytics	4	3	1	0
PDBAE103	Power BI for Strategic Business Intelligence	4	2	0	2
PDBAE111	MOOC- I #	3	3	0	0
PDBAE112	MOOC- II #	3	3	0	0
PDBAE125	Case Study/ Internship	2	0	0	2
Total		**20**	**14**	**2**	**4**
II Semester					
Course Code	**Course Title**	**Credits**	**Credit Distribution**		
			L*	**T***	**P***
PDBAE201	Basic Econometrics	4	3	1	0
PDBAE202	Data Analytics with R/Python	4	2	0	2
PDBAE211	MOOC- I #	3	3	0	0
PDBAE212	MOOC- II #	3	3	0	0
PDBAE228	Dissertation	6	6	0	0
	Total	**20**	**17**	**1**	**2**

Note: * **L:** Lectures**; P/S:** Presentation/Seminars**; T/L:** Tutorials/Lab
#: Appropriate online content, as recommended by the department at the time of enrollment/Semester Registration

Note: 1. MOOCs are chosen by the student based on the availability of the courses offered on SWAYAM & other related platforms as suggested/recommended by the Department.
2. The desired changes may be made by the Department in the programme structure as and when necessary with the prior approval of the BOS.

Credit Distribution

Semester	Total Credits
1	20
II	20
Total	**40**

Important Information to the Student

1. Eligibility:
   i. CUAP/Non-CUAP students pursuing/completed any PG/PhD Programmes can enrol for PG Diploma Programme offered by the University.
   ii. Non-CUAP students shall have to appear for an Entrance Examination conducted by the University.
   iii. A student can enrol for as many PG Diploma Programmes as he/she wishes.
2. The minimum duration for completion of any Postgraduate Diploma Programme is two semesters (one academic year).
3. Maximum duration of completion of programme is two years.
4. A student should have minimum 75% attendance in classes, seminars, practical/ lab in each course of study without which he/she will not be allowed for the Semester -end examination.
5. All theory courses in the programme shall have Continuous Internal Assessment (CIA) component of 40 marks and a Semester-end component of 60 marks. The minimum pass marks for a course is 50%.
6. The student has to appear 3 CIA tests of 15 marks each per semester in each course from which the best 2 performances shall be considered for the purpose of calculating the marks. A record of the continuous assessment is maintained by the department. The remaining 10 marks are awarded based on participation and performance in:
   - Assignments
   - Class presentations
   - Seminars
   - Quizzes
7. A student should pass separately in both CIA and the Semester-end Examination.
8. Semester-end examination shall consist of objective type questions, descriptive type questions, short answer questions and case studies or any others.
9. A student failing to secure the minimum pass marks in the CIA is not allowed to take the semester-end examination of that course. She/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 semester-end examination.
10. Students failing a course due to lack of attendance should redo the course.

SEMESTER-I

Course Code : **PDBAE101** Course Type : **Core** No. of Credits : **4.00** No. of Hours : **60**	**Business Economics**

Course Objectives:
The course aims:

- To provide a foundation of the economic analysis of business problems.
- To Introduce concepts of demand, supply, production, cost, and pricing across market structures.
- To focus on the determination of market prices in production and consumption structures.

Course Learning Outcomes:
After the completion of the course, the student will be able to:

- **CO1**: Explain basic business economics and apply demand–supply concepts to business decisions.
- CO2: Summarize the role of Utility Analysis and Indifference Curves.
- CO3: Demonstrate the concepts of Production and Cost with reference to business firms.
- CO4: Classify Pricing in different market conditions.

Course Outline:

Unit-I: [12 Hours]

Introduction to Business Economics: Basic concepts, Nature and scope of business economics, Basic problems of an economy, Concept of Demand and Supply: Different concepts of demand, demand curve, Determinants of demand, Law of demand, Demand forecasting methods, Concepts of elasticity. Concept of supply, supply curve, Conditions of supply, Elasticity of supply.

Unit-II: [12 Hours]

Production and Cost Analysis: The production function, Short-run and Long-run production function, law of diminishing returns and returns to scale. Fixed, variable and other cost concepts, least cost-input combination, Relationship between production and cost. BEP Analysis

Unit-III: [12 Hours]

Pricing in different Market Structures: Market, Types, Structures, Features, Price determination (long run and short run) in Perfect Competition, Monopoly, Monopolistic and Oligopoly markets, pricing strategies.

Unit-IV: [12 Hours]

Money and Banking – Money and Banking– Concept of Money - Its Functions; Quantity Theory of Money; Credit Creation– Central Bank (Reserve Bank of India) - Role and Functions– Commercial Banks - Role and Functions.

Unit-V: [12 Hours]

Indian Capital Market: Capital: Importance of Capital- Types of Capital, Factors influencing working capital- Sources of capital- Capital Budgeting – Process- Methods of capital budgeting.

Suggested Reading:

P N Chopra, Business Economics Kalyani Publications.
P. L. Mehta, Managerial Economics, Sultan Chand & Sons

References

D. M. Mithani, Managerial Economics Theory and Applications, Himalaya Publishing House.
Mithani & Murthy, Business Economics, Himalaya Publishing House.
M L Jhingan, Micro Economic Theory 2014, Vrinda Publications.
Ahuja, A. L, Advanced Economic theory 2014, S. Chand and company Ltd.
A Koutsoyiannis, Modern Micro Economics 2003, Palgrave Macmillan U.K.
H S Agarwal, Principles of Economics 2013, Global Professional Publishing Ltd.

Course Code : **PDBAE102** Course Type : **Core** No. of Credits : **4.00** No. of Hours : **60**	**Quantitative Methods for Business Analytics**

Course Objectives:

The course aims:

- To equip students with essential quantitative tools and models used in business analytics.
- To Equip students with basic statistical and mathematical tools for business data analysis
- To enable better reporting for decision making.
- To highlight the benefits as well as the limits of quantitative analysis in a real-world context.
- To Introduce hypothesis testing and its appropriate applications

Course Learning Outcomes:

After the completion of course, the student shall be able to:

- CO1: Apply statistical measures for data-driven decision making.
- CO2: Use probabilistic distributions to solve business problems.
- CO3: Demonstrate understanding of hypothesis testing for various sample sizes.
- CO4: Solve linear programming problems using graphical and simplex methods.
- CO5: Interpret quantitative models in decision-making.

Course Outline:

Unit-I: [12 Hours]

Introduction to Mathematical for Business Anglistics: Understanding data; Mathematical Modeling Concepts; Linear Equations and Their Forms (two-point, intercept, point-slope, slope-intercept); Types of Functions and Relationships; Indices and Exponential Rules; Multivariable Functions; Logarithmic Functions and Properties.

Unit-II [12 Hours]

Introduction to Statistics for Business Anglistics: Data Types; Types of Measurements; Applications of Descriptive Statistics; Measures of dispersion; Skewness and Kurtosis. Data Visualization; Sampling Methods.

Unit-III [12 Hours]

Probability and Probability Distributions: Probability: Concepts of Probability- Binomial distribution, Poisson Distribution and Normal Distribution.

Unit-IV: [12 Hours]

Hypothesis Testing: Type I and Type-II Errors- Large Sample Tests, Mean Test Difference between Two Means- Small Sample Tests: Mean Test- Difference between Means of Two Independent Samples - Difference between Two Dependent Samples or Paired Observations.

Unit-V: [12 Hours]

Linear programming: Mathematical formulations of LP for product mix problems, graphical and simplex method of solving LP problems. Transportation problems and Game theory-concept of game, two-person zero sum game, pure and mixed strategy games, saddle point, odds method, dominance method.

Suggested Reading:

S.C. Gupta and V K. Kapoor, *Fundamentals of Mathematical Statistics*, Sultan Chand & Sons,
Chiang, A.C, et. al, Fundamental Methods of Mathematical Economics, McGraw Hill, 4th Edition, 2004.

References:

Vohra N.D., *Quantitative Techniques in Management*, Tata McGraw Hill, New Delhi.
Prem Kumar Gupta, D.S. Hira, *Operations Research*, S. Chand & Company ltd.
Dr. T.K.V. Iyengar, Dr. B. Krishna Gandhi, et al., "*Probability and Statistics*, S. Chand.
J. K. Sharma, *Quantitative methods Theory and Applications*, Macmillan.
Gupta, S.C*., Business Statistics*, Himalaya Publishing House, Bombay.

Course Code : **PDBAE103** Course Type : **Core** No. of Credits : **4.00** No. of Hours : **60**	**Power BI for Strategic Business Intelligence**

Course Objectives:

The course aims to:

- Introduce the fundamentals of data visualization and business intelligence using Power BI
- Develop skills in importing, transforming, and modeling data for strategic decision-making
- Enable learners to create interactive dashboards and reports for business insights
- Foster analytical thinking through real-time data analysis and performance tracking
- Equip students to apply Power BI tools in solving business problems across domains

Course Learning Outcomes:

After completing the course, students will be able to:

- **CO1**: Understand the role of Power BI in business intelligence and analytics
- **CO2**: Import, clean, and model data using Power BI tools
- **CO3**: Create dynamic dashboards and visual reports for strategic decisions
- **CO4**: Apply DAX functions for advanced data analysis
- **CO5**: Use Power BI to monitor KPIs and generate actionable business insights

Course Outline:

Unit-I: [12 Hours]

Introduction to Business Intelligence and AI: Overview of Business Intelligence and its strategic role: The role of AI in Business Intelligence.

Unit-II: [12 Hours]

Introduction to Power BI: components, interface, and workflow; Connecting to data sources: Excel, databases, web, cloud; Data loading and transformation using Power Query.

Unit-III: [12 Hours]

Data Modeling and Relationships: Data types and tables in Power BI; Creating relationships and data models; Introduction to DAX (Data Analysis Expressions); Calculated columns, measures, and KPIs.

Unit-IV: [12 Hours]

Data Visualization and Dashboard Design: Visual elements: charts, maps, slicers, cards; Designing interactive dashboards and reports; Custom visuals and formatting techniques; Drill-downs, filters, and bookmarks.

Unit-V: [12 Hours]

Strategic Applications and Publishing: Real-time analytics and business scenario modeling; Sharing reports via Power BI Service; Data security, access control, and workspace management; Case studies: finance, marketing, operations, and HR analytics.

Suggested Readings:
Microsoft Power BI Documentation (docs.microsoft.com)
Chandraish Sinha, *Mastering Power BI*, BPB Publications

References:
Reza Rad, *Power BI Pro Architecture*, Apress
Alberto Ferrari & Marco Russo, *The Definitive Guide to DAX*, Microsoft Press
Devin Knight et al., *Power BI Cookbook*, Packt Publishing

SEMESTER-II

Course Code : **PDBAE201** Course Type : **Core** No. of Credits : **4.00** No. of Hours : **60**	**Basic Econometrics**

Course Objectives:
The course aims:

- Introduce students to the foundational concepts and techniques of econometric analysis.
- Develop proficiency in estimating and interpreting linear regression models.
- Familiarize students with functional forms and model specification.
- Equip learners to diagnose and address violations of classical regression assumptions.
- Provide exposure to maximum likelihood estimation and models for limited dependent variables

Course Learning Outcomes:
After the completion of course, the student shall be able to:

- CO1: Apply OLS to estimate and interpret regression models.
- CO2: Use and assess functional forms in regression analysis.
- CO3: Identify and correct key econometric issues.
- CO4: Implement maximum likelihood estimation for limited dependent variables.
- CO5: Analyze Probit, Logit, and Multinomial models in economic contexts.

Course Outline:

Unit-I: [12 Hours]

The Linear Regression Models: Bi-variate and multi-variate linear regression models, CLRM assumptions, Ordinary Least Squares estimation, Properties of OLS and the Gauss- Markov theorem; Hypothesis testing, goodness of fit; matrix approach to linear regression models.

Unit-II: [12 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: [12 Hours]

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

Unit-IV: [12 Hours]

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

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:

Greene, William H, *Econometric Analysis*. Prentice Hall, 6th Edition, 2008.
Gujarati, D and Porter, *Basic Econometrics*, McGraw Hill/Irwin, 5th Edition, 2009.

References:

Greene, William H, Econometric Analysis, Prentice Hall, 6th Edition, 2008.
Johnston J. and DiNardo, J, Econometric Methods. McGraw-Hill, 4th Edition, 1997.
Ramanathan, Ramu, Introductory Econometrics with Applications, Thomson Asia Pvt Ltd., 5th Edition.
Stock, James H, et. al., Introduction to Econometrics, Addison-Wesley Series in Economics, 2nd Edition.
Wooldridge, J., Introductory Econometrics: A Modern Approach. Nelson Education, 2015.
G. S. Maddala, Introduction to Econometrics. Wiley Publishers, 4th Edition, Indian Edition, 2009.
Christopher Dougherty, Introduction to Econometrics. OUP, 3rd Edition, Indian Edition, 2007.

Course Code : **PDBAE202** Course Type : **Core** No. of Credits : **4.00** No. of Hours : **60**	**Data Analytics with R/Python**

Course Objectives:
The course aims to:

- Introduce students to data analytics concepts and workflows using R/Python
- Develop practical skills in data cleaning, visualization, and statistical modeling
- Enable learners to apply programming tools for economic and business data analysis
- Foster hands-on experience with real-world datasets and reproducible research practices
- Prepare students for advanced analytics tasks including machine learning and econometrics

Course Learning Outcomes:
After completing the course, students will be able to:

- **CO1**: Understand the fundamentals of data analytics and programming in R/Python
- **CO2**: Perform data wrangling, visualization, and exploratory analysis
- **CO3**: Apply statistical and econometric models using R/Python libraries
- **CO4**: Build and evaluate predictive models for business and policy applications
- **CO5**: Conduct reproducible and ethical data analysis using open-source tools

Course Outline:

Unit-I: [12 Hours]

Introduction to Data Analytics: Overview of data analytics and its role in economics and business; Introduction to R and Python environments (RStudio, Jupyter Notebook).

Unit-II: [12 Hours]

Data Types and Data Access: Data types, variables, operators, and control structures; Importing and exporting data from various formats (CSV, Excel, JSON).

Unit-III: [12 Hours]

Data Wrangling and Visualization: Data cleaning: handling missing values, outliers, and duplicates; Data transformation using dplyr, pandas, and numpy; Visualization tools: ggplot2, matplotlib, seaborn; Creating dashboards and interactive plots.

Unit-IV: [12 Hours]

Statistical Analysis and Probability: Descriptive statistics: Measures of moments – Central Tendency, Variance, Skewness and Kurtosis; Correlation analysis; Probability theory and applications.

Unit-V: [12 Hours]

Hypothesis and Econometric Analysis: Hypothesis testing: t-tests, chi-square tests, ANOVA, etc.; Confidence intervals and p-values; non-parametric tests; Linear regression, logistic regression, and time series models; Model diagnostics and interpretation.

Suggested Readings:
Hadley Wickham & Garrett Grolemund, *R for Data Science*, O'Reilly
Wes McKinney, *Python for Data Analysis*, O'Reilly

References:
James et al., *An Introduction to Statistical Learning*, Springer
Alan Downey, *Think Stats*, Green Tea Press
Online resources: RStudio Cloud, Jupyter Notebooks, Kaggle datasets

Course Code : **PDBAE228** Course Type : **Core** No. of Credits : **6.00**	**Dissertation**

Course Overview:

This core course enables students of the PG Diploma in Business Analytics and Econometrics to undertake an independent research project under faculty guidance. It integrates analytical skills and domain knowledge acquired throughout the program, emphasizing original inquiry, critical thinking, and methodological precision. Students will identify a business or policy-relevant problem, conduct literature review, analyze data using appropriate tools, and present findings in a structured format. The course promotes hands-on experience in fieldwork, data analytics, and econometric modeling, preparing learners for roles in consulting, industry, research, and policy analysis.