

IIT Kanpur Ph.D. (Economics) Admission Test Syllabus

The PhD entrance examination would have two different question papers: one for students with Economics background and another for students with Non-Economics background. Students should exercise their preference while appearing for the PhD Entrance Examination. The details of the syllabi are given below:

I. ECONOMICS BACKGROUND APPLICANTS

I.1 Macroeconomics:

- National Income Accounting
- Classical Theory: Economy in the Long Run
- Simple Keynesian Model
- IS-LM
- Phillips Curve, Natural Rate of Unemployment and Inflation
- Solow Model
- Open Economy Macroeconomics
- Fiscal and Monetary Policy

Suggested Readings:

- Olivier Blanchard. Macroeconomics. 7th edition. Pearson. 2020.
- Greg Mankiw and Mark Taylor. Macroeconomics. 4th edition. Cengage. 2017.

I.2 Microeconomics:

- Consumer Behaviour
- Production and Costs
- Markets – Perfect Competition, Monopoly, Oligopoly
- General Equilibrium and Welfare Economics
- Public Goods and Externalities
- Production Possibility Frontier, Absolute and Comparative Advantage, and the Ricardian Trade Model

Suggested Readings:

- Hal Varian. Intermediate Microeconomics. 8th edition. Norton. 2010.
- Walter Nicholson. Microeconomic Theory: Basic Principles and Extensions. 12th Edition. Cengage. 2017.
- Paul Krugman, Maurice Obstfeld, and Marc Melitz. International Economics. 10th edition. Pearson. 2017.

I.3 Mathematics:

- Matrix Algebra: Vectors and Matrices, Matrix Operations and Determinants
- Calculus: Functions, Limits, Continuity, Differentiation of Functions of One or More Variables. Definite and Indefinite Integrals, Integration by Parts and Integration by Substitution
- Constrained and Unconstrained Optimization: First and Second order conditions

Suggested Readings:

- Alpha Chiang and Kevin Wainwright. *Fundamental Methods of Mathematical Economics*. 4th edition. Tata Mc-Graw Hill. 2005.
- Carl Simon and Lawrence Blume. *Mathematics for Economists*. 1st Edition. Viva Books. 2018.

I.4 Probability, Statistics and Econometrics

- Elementary Probability Theory, Conditional Probability, Bayes' Theorem
- Probability Distributions – Binomial, Poisson, Uniform and Normal
- Measures of Central Tendency, Skewness, Kurtosis, Dispersion and Correlation
- Sampling Distribution, Point Estimation, Interval Estimation and Hypothesis Testing
- Simple Regression Model
- Multiple Regression Model: Estimation, Inference, Qualitative Information, Heteroskedasticity, Specification Issues, Multicollinearity.
- Basic Regression Analysis with Time Series Data, Serial Correlation and Heteroskedasticity in Time Series Regression

Suggested Readings:

- Irwin Miller & Marylees Miller. *John E. Freund's Mathematical Statistics with applications*. 8th edition. Pearson. 2013.
- Jeffrey Wooldridge. *Introductory Econometrics*. 4th edition. Cengage. 2005.
- James Stock and Mark Watson. *Introduction to Econometrics*. 3rd edition. Pearson. 2017.

II. NON-ECONOMICS BACKGROUND APPLICANTS

II.1 Basic Economics:

- Demand and Supply
- Scarcity, Work and Choice
- Social Interactions
- Public Policy: Fairness and Efficiency
- Banks, Money and the Credit Market
- Market Successes and Failures

Suggested Readings:

- The Core Team. Economy, Society and Public Policy. Available at <https://www.core-econ.org/espp/index.html>.
- Greg Mankiw. Principles of Macroeconomics. 7th edition. Cengage. 2015.

II.2 Mathematics:

- Matrix Algebra: Vectors and Matrices, Matrix Operations and Determinants, Eigenvalues and Eigenvectors.
- Calculus: Functions, Limits, Continuity, Differentiation of Functions of One or More Variables. Definite and Indefinite Integrals, Integration by Parts and Integration by Substitution
- Differential Equations (first order and second order constant coefficient linear equations)
- Constrained and Unconstrained Optimization: First and Second Order Conditions.

Suggested Readings:

- Gilbert Strang. Linear Algebra and its Applications. 4th edition. Cengage. 2007.
- George B. Thomas, Joel Hass, Christopher Heil, Maurice D. Weir. Thomas' Calculus. 14th edition. Pearson. 2018.
- E. Kreyzig. Advanced Engineering Mathematics. 10th edition. Wiley. 2015.

II.3 Probability and Statistics

- Probability and Counting, Conditional Probability

- Random Variables (Discrete and Continuous), Expectations, Moments, Conditional Expectations, Joint Distributions
- Law of Large Numbers, Central Limit Theorem
- Measures of Central Tendency, Skewness, Kurtosis, Dispersion and Correlation
- Sampling Distribution, Point Estimation, Interval Estimation and Hypothesis Testing
- Introduction to Linear Regression Model
- Multiple and Logistic Regression

Suggested Readings:

- David Freedman, Robert Pisani and Roger Purves. Statistics. 4th edition. Norton. 2007.
- Irwin Miller & Marylees Miller. John E. Freund's Mathematical Statistics with applications. 8th edition. Pearson. 2013.
- OpenIntro Statistics. Available at <https://www.openintro.org/book/os/>.
- Joseph Blitzstein and Jessica Hwang. Introduction to Probability. 2nd edition. CRC Press. 2019. Also Available at <https://projects.iq.harvard.edu/stat110/home>