



सत्यं शिवं सुन्दरम्

Estd. 1949

## PROSPECTUS

### M.Sc. (FINANCIAL MATHEMATICS)

### HIGHER PAYMENT PROGRAMME (HPP)



**Dr. Jaita Sharma**  
(Programme Asst. Director)  
Department of Applied Mathematics

**Dr. Bankim M. Shah**  
(Programme Asso. Director)  
Head  
Department of Applied Mathematics

**Prof. (Dr.) C. N. Murthy**  
(Programme Director)  
Dean  
Faculty of Technology & Engineering

**Department of Applied Mathematics**  
Faculty of Technology and Engineering  
The Maharaja Sayajirao University of Baroda, Vadodara





# HIGHER PAYMENT PROGRAMME (HPP) M.Sc. (FINANCIAL MATHEMATICS)

## DEPARTMENT OF APPLIED MATHEMATICS OVERVIEW

Department of Applied Mathematics of The Maharaja Sayajirao University of Baroda, has been recognized as one of the most active and distinguished department in India. The department was established in the year 1973, in the Faculty of Technology and Engineering which is located in the central part of the Vadodara city. The Department encourages its staff and students, not only to study Mathematics for its own sake, but also to explore the applications of Mathematics in science, engineering and industry.

Department of Applied Mathematics is offering various post graduate degree programs like:

1. Ph. D. in Applied Mathematics.
2. M.Sc.(Applied Mathematics)/(Industrial Mathematics) (2 Year programme).
3. Post Graduate Diploma in Computer Applications (PGDCA)(1 Year programme).
4. M.Sc.(Financial Mathematics) (2 Years Self-finance programme under HPP)

However, the Department is uniquely identified because of its intense involvement in Industrial Mathematics. The Department initiated collaborative projects with Industries in and around Vadodara, since 1983 and since then Department has interacted with number of Industries like ONGC, ABB, Apollo Tyres, Patwa Kinariwala, Metal Powers, Mumbai, Jyoti Ltd. etc. and team of this Department along with Expert from industry have made tremendous efforts to solve these industrial problems up to the satisfaction level of each industry. In this direction Since 1994 department, in collaboration with Industrial Mathematics Group (IMG) of Department of Mathematics, I. I.T. Bombay and Oxford centre for Industrial and Applied Mathematics, U.K., has organized number of National and International Modelling weeks and Study group meetings on Live Problems of Industrial Mathematics. All these activities truly justify that the department is recognized at the national level as one of the few departments offering professional courses in Industrial Mathematics as well as in Financial Mathematics.

On research front, various topics are explored intensively by faculty and students in the Department of Applied Mathematics, which include Industrial Mathematics, Bio-Mathematics, Relativity Theory, Tribology, Soft Computing, Fractional Differential Equations, Optimization, Numerical Methods for Partial Differential Equations, Computational Fluid Dynamics, Neural Networks and Fuzzy Analysis, Wavelets, Signal and Image Processing, Control Theory and Fourier Analysis.

## VISION OF THE DEPARTMENT

Educational outreach that increases Mathematical and computing literacy of students for inculcating their well rounded development for sustainable progress of the nation.

## MISSION OF THE DEPARTMENT

1. Create and sustain an environment of academic excellence and innovative research in Applied Mathematical Science.
2. Fostering collaborations with institutes and industries.
3. Enhancing well rounded development of the students through extracurricular activities.



## ABOUT M.Sc. (FINACIAL MATHEMATICS)

The Department of Applied Mathematics is conducting the M.Sc. (Financial Mathematics) course since 2010. Financial Mathematics is the branch of Mathematics focused on financial market. There are two separate branches of finance that require advanced quantitative techniques: derivatives pricing, and risk and portfolio management. In this course our students are studying optimization techniques and stochastic analysis which can be implemented for the optimum prediction of stocks and its derivatives. The content of Mathematical finance is to develop a Mathematical model arising from financial economics and their proper Mathematical treatment.

## PROGRAMME OBJECTIVES

- This program aims to prepare students having science or engineering background for high-tech careers in the banking and financial sectors.
- The curriculum provides training on statistical and computing tools in quantitative finance, risk management, and the understanding of financial models and their applications in derivative products traded in the markets.
- This program upgrades students' knowledge of mathematical methods, probability, statistics and stochastic calculus. Also, through the courses on the quantitative aspects of pricing exotic derivative products and managing portfolio of assets, students will attain a real understanding of the underlying assumptions and create an ability to critically ascertain the applicability and limitations of various mathematical models in derivative pricing and credit risk analysis. Upon completion of the program, students are expected to achieve the following intellectual abilities:
  - Broad knowledge and understanding of the financial products commonly traded in the markets and various practical aspects of risk management.
  - Use of mathematical and statistical tools to construct quantitative models in derivative pricing, quantitative trading strategies, risk management, and scenario simulation, including appropriate solution methods and interpretation of results.

## CAREER PROSPECTS

**After completion of the M.Sc. (Financial Mathematics) course successfully, one can start his/her career in any of the following:**

1. **Financial Institution:** Brokerage firms, banks and insurance companies all need individuals who can compile and analyse data, forecasts, predict financial trends and carry out credit risk analysis. Statistical knowledge would help graduates to build risk-forecast models which allow firms to design strategies for their future investments.
2. **Stock Market:** Market researchers conduct focus groups, carry out surveys and utilize test markets to collect data. Individuals with degrees in financial mathematics are sought out to analyse such marketing data. Masters in Financial mathematics offer the ability to bring not only the knowledge of how to quantify the data, but also how this data translates into financial information that can help a company make sound decisions
3. **University:** May pursue a career in teaching or research at the university level.
4. **Freelancer:** Can become Financial Analyst or Financial Advisor.
5. **Higher Studies:** Pursue higher professional degrees such as Actuarial Science, Charter Financial Analysis (CFA), etc.



## PROGRAMME DETAILS

### Semester – I

Ordinary Differential Equations

Fundamentals of Statistics

Practical on Fundamental of statistics

Scientific programming and Mathematical software

Practical on Scientific programming and Mathematical software

Differential Equations

Stochastic Methods in Finance

Practical on stochastic Methods in Finance

### Semester – II

Numerical Techniques in Finance

Practical on Numerical Techniques in Finance

Optimization techniques

Practical on Optimization techniques

Macro Economics Analysis and Financial Reporting

Theory of Interest

Practical on Theory of Interest

Modelling and Simulation

### Semester – III

Discrete Time Modelling and Derivative securities

Portfolio Theory and Asset Allocation

Portfolio Theory and Asset Allocation

Financial Risk Management

Modelling of Bonds, Term Structure, and Interest Rate Derivatives

Practical on Modelling of Bonds, Term Structure, and Interest Rate Derivatives

Stochastic Calculus and Black-Scholes Theory

Practical on Stochastic Calculus and Black-Scholes Theory

### Semester – IV

Financial Mathematics Project\*

\*Financial Project work is to be carried out in any Financial Firm or Institute during this semester.



## INFRASTRUCTURE IN THE DEPARTMENT

03 Computer Laboratories with advanced computing facility.

01 Seminar Room

01 Library

01 Meeting Room

Classrooms with LCD Projector

Equipped with Wi-Fi and LAN facility

Water Cooler with water purifier

## ADMISSION PROCESS

Sanctioned Intake : 25

Mode Of Admission : Merit

Duration of course : 2 year

Regular/ Part time : Regular Programme

Grant in aid/ Higher payment : Higher Payment Programme



## ELIGIBILITY CRITERIA

Graduation with Mathematics/ Statistics/ Economics / Engineering / Physical Science and secured 40% marks or equivalent CGPA are eligible.

## DOCUMENTS/CERTIFICATES REQUIRED AT THE TIME OF ADMISSION

- School Leaving Certificate
- 12<sup>th</sup> Marksheet
- Final UG Degree Marksheet of all semester/years
- Final Degree Certificate/Provisional Degree certificate
- Caste certificate for ST
- Non creamy layer (OBC) for SEBC
- Transfer/migration certificate
- Thalassemia Blood screening report

## OTHER REQUIRED INFORMATION

Maximum Gap of 8 years is allowed after B.Sc.