



सत्यं शिवं सुन्दरम्

Estd. 1949

## PROSPECTUS

### M.Sc. (APPLIED MATHEMATICS / INDUSTRIAL MATHEMATICS)



**Dr. Bankim M. Shah**

**Head**

**Department of Applied Mathematics**

**Prof. (Dr.) C. N. Murthy**

**Dean**

**Faculty of Technology & Engineering**

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





## **M.Sc. (APPLIED MATHEMATICS) (Regular Programme)**



### **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 this 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. (APPLIED MATHEMATICS /INDUSTRIAL MATHEMATICS)

The Department of Applied Mathematics is conducting the Master of Science in Applied Mathematics programme since 1973. This programme is recognized by University Grants Commission (UGC).

## PROGRAMME OBJECTIVES

Primarily the course aims at developing the individual capacities with mastering the fundamental and advanced mathematical concepts and computational skills.

It aims to prepare a student to recognize the relationships between mathematical theories and other disciplines.

With the carefully designed programming practicals and soft skill development curricula S/he can implement various algorithms to solve practical problems.

Over and above the program aims to inculcate the skills of an individual student to deal with industrial problems.

Moreover, the advanced understanding of various diversified subjects prepares the students to qualify for different competitive exams to build their academic as well as industrial carrier.

Hands-on-Practice for self-preparation and developing presentation skills through projects, seminars and dissertations gives edge to personalities of students and along with that different electives in the final year suggests pathway to motivated students for selecting various research fields.

## CAREER PROSPECTS

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

1. **Academician in University:** Can make career in University / College.
2. **Faculty at School:** Serve in the schools as Mathematics subject teacher.
3. **For Higher Studies:** Pursue Ph.D in Mathematics / Applied Mathematics
4. **Research Associate / Data Scientist:** Serve in S/W industry / Hi-tech industry.
5. **Freelancer**



## PROGRAMME DETAILS

### Semester – I

Ordinary Differential Equations  
Numerical analysis  
Applied Analysis-I  
Programming using Java & Python  
Linear Algebra and Calculus of Variations  
Programming Practicals

### Semester – III

Numerical methods for Partial Differential Equations  
Optimization I  
Fluid Dynamics  
Simulation and Mathematical Modelling  
Electives for Applied Mathematics Students  
Elective - I: Applied Fourier Analysis  
Elective - II: Mathematical Control Theory - I  
Elective - III: Machine Learning  
Elective - IV: Special Theory of Relativity  
For Industrial Mathematics students  
Wavelets and Image Processing

### Practicals

For Applied Mathematics Stream  
Practicals on Numerical methods for  
PDE, and Optimization  
For Industrial Mathematics Stream  
Practicals on Numerical methods for  
PDE Wavelets and  
Image Processing and Optimization

### Seminar

(For Applied Mathematics Students)

### Modelling Seminar

(For Industrial Mathematics Students)

### Dissertation

(TO BE COMPLETED IN SEMESTER-III AND IV)

### Semester – II

Applied Statistics  
Partial Differential Equations  
Applied Analysis-II  
Mechanics  
Functional Analysis  
Practicals of Numerical Analysis and  
Statistical Methods

### Semester – IV

Applied Mathematics  
Discrete Mathematics  
Differential Geometry and Integral Equations  
Advance Analysis  
Elective – I: Wavelet Analysis  
Elective – II: Mathematical Control Theory – II  
Elective – III: Advanced Machine Learning  
Elective – IV: General Theory of Relativity

### Dissertation

(CONTINUED FROM SEMESTER-III)

Industrial Mathematics  
Optimization – II with practicals  
Computational Fluid Dynamics with practicals  
Neural Network and Fuzzy Systems with practicals

**Dissertation based on Industrial Problems**



## INFRASTRUCTURE IN THE DEPARTMENT

- 03 Computer Laboratories with advanced computing facility.
- 01 Seminar Room
- 01 Library
- 01 Meeting Room
- Class rooms with LCD Projector
- Equipped with Wi-Fi and LAN facility
- Water Cooler with water purifier

## ADMISSION PROCESS

Sanctioned Intake: 50

Mode of Admission: Merit

Duration of the Programme: 2 year

Regular / Part-Time: Regular Programme

Grant-in-aid / Higher Payment Programme: Grant-in-Aid



## ELIGIBILITY CRITERIA

Candidates who passed the B.Sc. Examination with Mathematics as a principle subject from The Maharaja Sayajirao University of Baroda and Secured in aggregate 45% or equivalent 4.5 CGPA are eligible. Candidates who passed B.Sc. Examination from other than The M.S. University of Baroda with Mathematics as a principle subject and secured 45% in aggregate or Equivalent CGPA are eligible OR Candidates who passed B.Sc. Examination with three subjects "Chemistry, Mathematics and Physics" with equal weightage must have secured at least in aggregate 50% or equivalent CGPA in Mathematics, and at least in aggregate 50% or equivalent CGPA marks.

## REQUIRED DOCUMENTS / CERTIFICATES AT THE TIME OF ADMISSION

Following is the List of Documents required at the time of Admission:

- (a) School Leaving Certificate.
- (b) Mark sheet of 12th Standard (H.S.C.).
- (c) Mark sheets of all semesters / years of B.Sc.
- (d) Final Degree Certificate / Provisional Degree Certificate.
- (e) Caste Certificate, (if applicable).
- (f) Non-Creamy Layer Certificate (for OBC candidates).
- (g) Transfer / Migration Certificate.
- (h) Thalassemia Blood Screening Report.

## OTHER REQUIRED INFORMATION

Maximum Gap of 5 years is allowed after B.Sc.