Strategic Plan

(2018-2023)

DEPARTMENT OF MATHEMATICS

FACULTY OF SCIENCES

J C BOSE UNIVERSITY OF SCIENCE AND TECHNOLOGY, YMCA
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ABOUT THE DEPARTMENT

Department of Mathematics is one of the important pillars of the University which provides the foundation and vision for the future to the students and to make the students to see the wider spectrum of the life. From the construction of pyramids, to precision architecture in temple building, to coding enigmas, mathematics has guided and steered the other fields- continuing the leadership in digital era. We probe areas where mathematical tools could be developed and used for problem-solving. From abstract and theoretical mathematics to mathematics in our daily lives, this subject has a panoramic importance for mankind.

The university through its department of Mathematics seeks to explore and envisage a programme where the most frontline problems and precepts in mathematics will be used to evoke the curiosity nascent in the youngest minds. The department's mission to impart the knowledge, clear and deep understanding of the subject and to prepare the students, so they can face the challenges and use their knowledge to make a better world.

Investigations and queries in the area of both theoretical and applied mathematics are encouraged to inspire original scholarly approach. Students are made aware of real significance of strides in the field of computational mathematics and ideas floating on the international scene are used as a springboard for further research.

Our focus is on cultivating niche areas for indigenous mathematics while keeping abreast of state- of the- art research on the interdisciplinary international panorama. Our students are equipped for career in the world thanks to our multi-pronged approach that balances teaching along with various activities like Expert's Talks, Seminars, Workshops, Conferences, and Quizzes etc.

Our target is to be one of the renowned institutes of research in mathematics and its application as well as in teaching and learning. The M.Sc. Mathematics course is running since 2010 and in 2018, the department has started a new undergraduate course B.Sc. honors in Mathematics. The postgraduate course at the department is being run with the objectives to develop mathematical attitude in students, nurture their interests towards mathematics and motivate them for research in mathematical sciences.

The department also offers Doctorate degree in fields of Mathematics like Partial Differential Equations, Quantum Optics, Queuing Theory, Numerical Analysis, Reliability Theory, and Operations Research. Presently, the department is headed by Prof. Neetu Gupta. The Department has qualified faculty members. It has necessary infrastructure and facilities required for courses. The Department focuses on holistic personality development of the students. It works towards preparing socially conscious professionals with a defined VISION and MISSION. With a laid out future road map, the Department intends to be a Centre of Excellence in times to come.

VISION

To emerge as a department of science, which will provide strong foundations in the areas of Pure and Applied Mathematics in order to develop innovative minds for interdisciplinary research.

MISSION

To fulfill the Departmental as well as University's Vision, the mission of Department is:

- To develop strong communication skills among students.
- To develop strong moral values.

- To develop strong foundations in mathematics to have sound analytical and critical thinking ability for innovative solutions in practical problems.
- To continuously improve the basic infrastructure in pursuit of providing necessary environment for academic excellence.
- To develop a nurturing environment for lifelong learning.

STRATEGIC GOALS

- The Department of Mathematics is committed to fulfill the Vision and Mission of the University and working hard to achieve the Mission of the University as well as the department.
- The strategic goals of the department are, as such, aimed at benefitting the students, taking the department towards constant progress/ betterment, contributing towards community growth and social causes, national development as well as nation building.
- Strategic planning regarding the period **2018-19 to 2022-23** has been done keeping in view the various parameters and quality indicators of NAAC as well as NIRF.
- Enhance the experience and success of all students we serve.
- Increase student involvement in high-impact learning experiences and co-curricular activities.
- Expand existing resources and develop new resources.
- Enhance diversity and inclusiveness within our department, particularly among our faculty.
- Enhance the professional status of faculty by expanding resources for professional development and providing greater opportunities for involvement in department activities.

- The Department of Mathematics wishes to continue its leadership role in connection with the integration of computational methods in the Faculty's education and research. We want to be active in developing courses, support the activities of the faculty and participation in joint research projects.
- Our goal is to provide students with the best available courses in mathematics, a solid mathematical foundation within their individual subject areas.
- We will significantly strengthen teaching at UG/PG level and carry out a comprehensive analysis and restructure the department's courses (if necessary).

SWOC ANALYSIS

Strength

- Well defined Vision, Mission and Value System of the Department.
- Meritorious students in UG as well as in PG course.
- Experienced, qualified and dedicated faculty.
- Computer lab is equipped with updated software.
- Workshop, Faculty development programs conducted by department on regular basis.
- Well planned and well defined syllabus of UG & PG courses with a mix of theoretical/ practical papers relevant to the needs of academics.
- Active interaction between the faculty members (Mentors) and students (Mentees) to cater to the academic, personal, career guidance needs.

Weakness

- PG course is running under self financing scheme.
- Shortage of space for faculty and research scholars.
- Lack of Research lab.

- Campus placement of students.
- Shortage of Conference room and Research lab.
- Lack of diverse student profile i.e. less number of students from other states.

Opportunity

- Opportunity to provide consultancy for training and placement.
- Opportunity to provide quality education along with social and moral values.
- Interaction with latest and advanced ICT.
- Opportunity to advance in the field of research and development.
- To start new courses with flexible timings.
- Opportunity to leveraging the alumni network of the department to enhance placements of the students.

Challenges

- To adapt with frequent changes in curriculum and implementation according to CSIR NET/JRF
- Maintaining and updating of good academic environment as per the growing expectations of Stakeholders.
- To invent new approaches to education.
- To motivate and inspire the post graduate students towards research and competitive examination.
- To provide more opportunities for career placements for the students.
- To get more funding for infrastructure development and expansion of the department.

PROGRAM OUTCOMES OF UG/PG PROGRAM

PO1	Knowledge	Capable of demonstrating comprehensive disciplinary knowledge gained during course of study
PO2	Research Aptitude	Capability to ask relevant/appropriate questions for identifying, formulating and analyzing the research problems and to draw conclusion from the analysis
PO3	Communication	Ability to communicate effectively on general and scientific topics with the scientific community and with society at large
PO4	Problem Solving	Capability of applying knowledge to solve scientific and other problems
PO5	Individual and Team Work	Capable to learn and work effectively as an individual, and as a member or leader in diverse teams, in multidisciplinary settings.
PO6	Investigation of Problems	Ability of critical thinking, analytical reasoning and research-based knowledge including design of experiments, analysis and interpretation of data to provide conclusions
PO7	Modern Tool usage	Ability to use and learn techniques, skills and modern tools for scientific practices
PO8	Science and Society	Ability to apply reasoning to assess the different issues related to society and the consequent responsibilities relevant to the professional scientific practices
PO9	Life-Long Learning	Aptitude to apply knowledge and skills that are necessary for participating in learning activities throughout life
PO10	Ethics	Capability to identify and apply ethical issues related to one's work, avoid unethical behavior such as fabrication of data, committing plagiarism and unbiased truthful actions in all aspects of work
PO11	Project Management	Ability to demonstrate knowledge and understanding of the scientific principles and apply these to manage projects

PROGRAM SPECIFIC OUTCOMES (PSOs)

The program specific outcomes (PSO's) are the statement of competencies/abilities that describes the knowledge and capabilities of the undergraduate and postgraduate will have by the end of program studies.

B. Sc. (H) Mathematics Course:

After successful completion of B. Sc. (Hons.) Mathematics, the students will be able to

PSO1	Acquire an understanding and in-depth knowledge of core areas of mathematics like algebra, calculus, geometry, differential equations. This also leads to study of related areas like computer science and statistics. Thus, this programme helps learners in building a solid foundation for higher studies in mathematics
PSO2	Learn to logically question assertions, to recognize patterns and to distinguish between essential and irrelevant aspects of problems. They also share ideas and insights while seeking and benefitting from knowledge and insight of others. This helps them to learn behave responsibly in a rapidly changing interdependent society. They will be capable to present mathematics clearly and precisely, make vague ideas precise by formulating them in the language of Mathematics, describe mathematical ideas from multiple perspectives and explain fundamental concepts of Mathematics to non-mathematicians.
PSO3	Attain abilities of critical thinking, problem mapping and solving using fundamental principles of Mathematics, systematic analysis and interpretation of results, and unambiguous oral and writing/presentation skills. This programme has a strong foundation in basic and practical aspects of Mathematics enabling the students to venture into research in front-line areas of mathematical sciences, to pursue higher studies in Mathematics, and to enhance their employability for teaching jobs, government jobs, jobs in banking, insurance and investment sectors, data analyst jobs etc.

M. Sc. Mathematics Course:

After successful completion of M. Sc. MATHEMATICS program, the students will be able to

PSO1	Work as a mathematical professional, or to qualify for training as scientific researcher. Students shall be proficient in fundamentals of Pure and Applied Mathematics.
PSO2	Utilize the mathematical problem-solving methods such as analysis, modeling, and programming and mathematical software applications in addressing the practical issues. Apply Mathematical Techniques in various computer software such as C, C++ and MATLAB.
PSO3	Pursue higher studies and to take up the career in various mathematical computer science based industries and in teaching field.

PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

B. Sc. (H) Mathematics Course:

PEO-1: To make students proficient in basic knowledge, scientific temper, research potential and advanced techniques.

PEO-2: To enable students to use their textbook knowledge for investigating, formulating and analyzing different problems of pure and applied Mathematics.

PEO-3: To cause to grow student's interest for pursuing higher studies and research.

PEO-4: To encourage students to achieve the need for and to develop the ability to engage in life-long learning.

M. Sc. Mathematics Course:

PEO-1: To equip students with knowledge, skills and insight in Mathematics and related fields.

PEO-2: To enable students to work as a mathematical professional, or to employ as a scientific researcher.

PEO-3: To develop the ability to utilize the mathematical problem solving methods such as analysis, modeling, programming and mathematical software applications in addressing the practical issues.

PEO-4: To encourage students to recognize the need for and to develop the ability to engage in life-long learning.

ACTION PLAN

The Five Year Plan of the Department consists of multi- pronged activities for growth and development of the department.

2018-19

- The Department will work for Academic interaction so as to facilitate practical skill development of the students and their career placement(s).
- Organizing National Seminar/Workshop on IPR/Statistics.
- Organizing various academic, and awareness programmes in the department for the benefit of the students.
- Organizing Expert talks on Mathematical Modeling/ Research Methodology.
- Organizing social outreach engagement programmes with local community to create social awareness on contemporary social issues.

2019-20

- Organizing a Workshop on various relevant topics of Mathematics.
- Organizing Short term course on applications of Mathematics.
- Visit to reputed education organizations like IIT's, NIT's for knowledge update and practical exposure of students.
- Organizing Career Guidance & Counseling programmes by inviting Professionals.
- The Alumni Forum of the Department will be made more active with greater Department - Alumni Interaction(s).

- Department plans to establish SMART classroom (if funds are made available for the purpose by the University).
- Organizing Expert talks on topic like Mathematical computations.

2020-21

- Organizing workshop for the research scholars of the department.
- Organizing various academic, co- curricular, social outreach activities in the department.
- Development of Advanced research Lab.
- Organizing academic/career guidance & counseling programmes.
- Revision of Course Curriculum as per new trends and developments.
- Organizing National Workshop on Applications of the subject.
- Competitive classes for the students to improve their performance in various examinations like NET/JRF, GATE, IIT-JAM.
- Recruitment of capable, well qualified and research oriented Faculty members.

2021-22

- Boost up of research activities of Research Lab.
- Research project funded by DST, UGC, AICTE and other institutes of repute.
- Set up of Department Library.
- Develop/ Introduce Value Added course(s) on the subject.
- Display of portraits of Prominent Personalities, Mathematicians, Inspiring Icons in the Department.
- Ensuring academic tie- ups with organizations/ institutions like IIT's, NIT's, AICTE etc.

2022-23

- Value-Added Course on MATLAB/PYTHON/C++/LaTex.
- Organizing various academic, co- curricular, social outreach activities in the department.
- Organizing National Conference.
- Organizing National Workshop on Vedic mathematics.
- Organizing sponsored Seminar on Applications of the subject.
- Organizing Expert talk on Optimization techniques.