Proposed List of Courses (To be implemented from 2025 Autumn semester)
2 year M.Sc Curriculum

Department of Mathematics and Statistics
Indian Institute of Science Education and Research Kolkata
To be implemented from 21MSc batch of students.

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The Aim of This Syllabus

This document describes the courses in the proposed two-year M. S. program by the Department of Mathematics and Statistics (DMS) at Indian Institute of Science Education and Research (IISER) Kolkata. The curiosity of understanding fundamental mathematical phenomena has always been at the core of knowledge seekers. In the present era, due to various applications of mathematics in biology, computer science, linguistics, apart from its classical use in physics and other basic sciences, a solid understanding of basic mathematics has become more important. In particular, the courses in our proposed M. S. program will provide fundamental knowledge in mathematics beyond the bachelors level with rigorous training.

A few salient features of the curriculum are the following:

- *Core Courses:* These consist of Analysis (Real Analysis, Complex Analysis, Functional Analysis), Algebra, Geometry. It is desirable that a student in Mathematics masters knows these topics well.

- *Electives:* The Department offers a diverse bouquet of elective courses that range from certain introductory course in advanced topics to the frontiers of current research. Most of the elective courses are designed keeping research towards that as focus. Therefore, the students will get certain views toward current research in the elective courses, which may play certain role in their own viewpoint of research.

- *Masters Project:* In the fourth semester a student of this two-year M. S. program will get a hands-on experience of research as a masters' project under a faculty member of the DMS.

- All 4-credit theory courses will have 3 hours of theory and 1 hour of tutorial.

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DMS Course Structure for M.Sc (2 years) Program
IISER Kolkata

1st Semester: 20 credits

- MA3101: Multivariable calculus (4 credits)
- MA3110: Ring theory (4 credits)
- MA3103: Introduction to graph theory & Combinatorics (4 credits)
- MA3104 Advanced Linear algebra (4 credits)
- MA3106: Topology and metric spaces(4 credits)

2nd Semester: 16 credits

- Groups & Modules (4 credits)
- Measure & Integration (4 credits)
- Complex Analysis (4 credits)
- MA4202: Ordinary Differential Equations (4 credits)

3rd Semester: 20 credits

- MA4101: Field and Galois theory (4 credits)
- MA4102: Functional Analysis (4 credits)
- MA4103: Geometry of curves and surfaces (4 credits)
- MA4104: Algebraic Topology (4 credits)
- MA5102: Partial Differential Equations (4 credits)

4th Semester: 24 credits

- Advanced measure theory & applications (4 credits)
- MA4205: Differential Geometry (4 credits)
- MA4204: Representation theory (4 credits)
- MA4210: MS Project (12 credits)