Courses

Core courses

Mathematics: Analysis and Linear Algebra I, II, Probability and Statistics, Basic Analysis, Introduction to Algebraic Structures.

Computing: Algorithms and Programming, Introduction to Computer Systems, Discrete Mathematics, Data Structures and Algorithms, Automata Theory and Computability, Introduction to Numerical Methods.

EECS: Introduction to Electronics and Electrical Engineering, Introduction to AI and ML.

Breadth Soft Core: 12 credits from a selection of Physics, Chemistry, Biology, Material Science, Earth and Environmental Science subjects.

Humanities: 9 credits.

Soft Core Courses

The soft core consists of the Mathematics and Computing streams. Students have to take at least 6 credits in each stream from the specified lists of courses. Students have to take at least 21 credits from the list of soft core courses. Courses from the list of soft core courses can also be taken as electives.

Mathematics Computing

For details on each of these Mathematics Courses, please click on each course.

- MA 212 Algebra I (http://www.math.iisc.ac.in/all-courses/ma212.html)
- MA 218 Number Theory (http://www.math.iisc.ac.in/all-courses/ma218.html)
- MA 219 Linear Algebra (http://www.math.iisc.ac.in/all-courses/ma219.html)
- MA 232 Introduction to Algebraic Topology (http://www.math.iisc.ac.in/all-courses/ma232.html)
- MA 200 Multivariable Calculus (http://www.math.iisc.ac.in/all-courses/ma200.html)
- MA 222 Measure and Integration (http://www.math.iisc.ac.in/all-courses/ma222.html)
- MA 223 Functional Analysis (http://www.math.iisc.ac.in/all-courses/ma223.html)
- MA 224 Complex Analysis (http://www.math.iisc.ac.in/all-courses/ma224.html)
- MA 231 Topology (http://www.math.iisc.ac.in/all-courses/ma231.html)
- MA 235 Introduction to Differential Manifolds (http://www.math.iisc.ac.in/all-courses/ma235.html)
- MA 241 Ordinary Differential Equations (http://www.math.iisc.ac.in/all-courses/ma241.html)
- MA 242 Partial Differential Equations (http://www.math.iisc.ac.in/all-courses/ma242.html)
- MA 262 Introduction to Stochastic Processes (http://math.iisc.ac.in/all-courses/ma262.html)
- MA 361 Probability Theory (http://www.math.iisc.ac.in/all-courses/ma361.html)

Study Tracks

The programme structure encourages interested students to pursue a study track should they wish to do so. Here is an indicative list of study tracks and their corresponding courses.

Mathematics

AI & ML

Computational Science

Theoretical Computer Science

Quantum Computing

Computational Biology

Signal Processing

Mathematical Finance

Suggested Electives

- MG 201 Economics, MG 265 Data Mining, MG 221 Applied Statistics, MG 226 Time Series Analysis and Forecasting, MG 258 Financial Instruments and Risk Management.
- PH 204 Quantum Mechanics, PH 202 Statistical Mechanics, Electromagnetic theory, Computational Photonics, Basics of Quantum Information.
- BC 302 Current Trends in Drug Discovery, Applied Bioinformatics.
- ME 286 Numerical methods for partial differential equations.
- EC 201 Theoretical and Mathematical Ecology, EC 303 Spatial and Stochastic Dynamics in Biology.
- NE 250 Entrepreneurship, Ethics and Societal Impact.
- Stochastic Approximation, Random Topology and Geometry, Topological Data Analysis.
- Machine Learning for Geosciences, Data Analytics, Applied Statistics, Computational Epidemiology, Foundations of Robotics, Computational Robotics, Computational Physics, Multivariate Analysis for Machine Learning, Mathematical Biology, Linear and Integer Programming, Network Optimization.

Projects

- Sem 7 & 8: Independent Study/Research Experience project (ISP)* (6 credits).
- Sem 8: Research/Industry project* (12 credits).
- Project availability is subject to the student finding a supervisor.
- Faculty or Research Groups can advertise projects and students can apply and be selected.
- Students will be encouraged to carry out project work in the industry.

Semester-wise Course Requirements

For details on these courses, please click here (https://btech-ug.iisc.ac.in/MathandComputing/course-details/).

Semester 1 Semester 2 Semester 3 Semester 4 Semester 5 Semester 6

Semester 7 Semester 8

Course	Credits
UMA 101 Analysis and Linear Algebra I	4:0
UENG 101 Algorithms and Programming	3:1
UH 101 Ways of Knowing	2:0
Any two of: UBL101 Biology I UCY101 Physical Chemistry UPH101 Physics I	3:1+3:1
Total	18

All students must complete a total of at least 128 credits comprising courses and other components like projects, as specified in the course requirements above. The course load for the first semester is fixed. Each subsequent semester has a “Normal”, “Reduced” and “Enhanced” course load, as specified in Table 1. Based on their CGPA and previous-term TGPA, students must register for an appropriate course load as specified in Table 2 below. In Semesters II and III, only courses listed in Sems I to IV can be credited towards an Enhanced load. Any deviation from the recommended load will be allowed only with the permission of the Dean.

Recommended Course Load

Criteria	Course Load
CGPA ≤ 6.0 AND Prev-TGPA ≤ 5.5	Reduced in Sems II to IV, Normal in Sems V to VIII
6.0 < CGPA < 8.0 OR 5.5 < Prev-TGPA < 8.0	Normal in Sems II to VIII
CGPA ≥ 8.0 AND Prev-TGPA ≥ 8.0	Normal in Sems II and III, Enhanced in Sems IV to VIII

Course Instructors

2022-23

SEMESTER 1 – August 2022

Course	Credits	Instructors
UMA 101 Analysis and Linear Algebra I	4:0	Purvi Gupta (http://math.iisc.ac.in/~purvigupta/)

UENG 101 Algorithms and Programming	3:1	Viraj Kumar (http://dccc.iisc.ac.in/vk.html), Y Narahari (https://gtl.csa.iisc.ac.in/hari/)
UH 101 Ways of Knowing	2:0	Aparna C, Nitin M
UBL 101 Introductory Biology I	3:1	Rohini Balakrishnan (https://ces.iisc.ac.in/?q=user/23), Jayanta Chatterjee (http://mbu.iisc.ac.in/people.htm)
UCY 101 Physical Principals of Chemistry	3:1	Anshu Pandey (https://sscu.iisc.ac.in/pandey/), Atanu Bhattacharya (https://ipc.iisc.ac.in/ab.php), Chinmoy Ranjan (https://ipc.iisc.ac.in/cr.php)
UPH 101 Introductory Physics I	3:1	Banibrata Mukhopadhyay (http://www.physics.iisc.ernet.in/~bm/), Jaydeep Kumar Basu (http://www.physics.iisc.ernet.in/~basu/), Binita Tongbram (https://scholar.google.com/citations?user=2HSnYgQAAAAJ&hl=en)

SEMESTER 2 – January 2023

Course	Credits	Instructors
UMA 102 Analysis and Linear Algebra II	4:0	Ved Datar (http://math.iisc.ac.in/~vvdatar/)
UENG 102 Electrical and Electronics Engg	3:1	Kaushik Basu (https://ee.iisc.ac.in/~basu/)

UMC 102 Computer Systems	3:0	Matthew T. Jacob (https://www.csa.iisc.ac.in/~mjt/)
UBL 102 Introductory Biology II	3:1	Dipshikha Chakravortty (https://mcbl.iisc.ac.in/dipshikhachakravortty/), Sachin Kotak (https://mcbl.iisc.ac.in/sachin-kotak/), Arun Kumar (https://mrdg.iisc.ac.in/arun-kumar/)
UCY 102 Basic Inorganic Chemistry	3:1	Debasis Das (https://ipc.iisc.ac.in/dd.php), Partha Sarathi Mukherjee (https://ipc.iisc.ac.in/~psm/), Sandya Sukumaran
UPH 102 Introductory Physics II	3:1	Srimanta Middey (http://www.physics.iisc.ac.in/~srimanta/?page_id=474), Ramesh K (http://www.physics.iisc.ernet.in/~kramesh/index.html), Prasad V Bhotla (http://www.physics.iisc.ac.in/~vishnu/)
UENG 103 Earth and its Environment	3:0	Ramananda Chakrabarti (https://ceas.iisc.ac.in/author/ramananda-chakrabarti/), Sambuddha Misra (https://ceas.iisc.ac.in/author/sambuddha-misra/), Prasenjit Ghosh (https://ceas.iisc.ac.in/author/prosenjit-ghosh/), Sajeev Krishnan (https://ceas.iisc.ac.in/~sajeev/)
UMC 103 Discrete Mathematics	3:0	C. Pandu Rangan (https://eecs.iisc.ac.in/people/pandu-rangan/)
UH 102 Ways of Seeing	2:0	Nakula Somana, Mahesh Pattar

Last Updated on March 14, 2023