

Bachelor of Technology in Mathematics and Computing

Indian Institute of Technology Dharwad is starting a four-year B. Tech. program in *Mathematics and Computing* from the academic year 2022. Senior secondary students who qualify in the JEE Advanced examination are eligible to apply. The major emphasis of this program is on providing the students an opportunity to explore the intersection areas of Computer Science and Mathematics, two disciplines which interact heavily with each other. The main goal of the program is to educate and train students in the overlapping segments of both the fields along with an exposure to different aspects of Arts, Humanities, Social Sciences, and Engineering. This will contribute to the holistic development of the students. The design of the course is expected to allow the students to pursue higher academic or professional careers in areas where the knowledge from both disciplines is essential.

The four year program is divided into eight semesters. The first semester of the course will be common for all undergraduate students at the institute. The students are eligible for branch/program change as per the institute rules and regulations (refer to branch change rules) after the completion of the first semester. In the next three semesters, in addition to fundamental computer science and mathematics courses, students will be exposed to variety of other courses. Fifth to eighth semesters will offer flexibility and the students can make suitable choices of some courses depending on their area of interest. Through the core courses, the students will get a rigorous exposure to topics such as Data Science, Artificial Intelligence and Mathematical Finance at the level suitable for the program. The students can opt for a Bachelor thesis in the final year of their curriculum. In addition to this, the students can obtain a minor in interdisciplinary areas by fulfilling extra credit requirements.

Overall, the program maintains a fine balance between flexibility and rigor. Students can earn nearly one fourth of their total credits through different electives. The core requirements of the program are divided almost equally between Mathematics and Computer Science and the theoretical courses are backed up by state-of-the-art laboratory experiences. In addition to this, students are also encouraged to explore their interest with industries by undertaking internships/co-op programs. They can also work towards setting up start-ups and take steps to become future entrepreneurs.

Semester wise Course Structure and Credits

Semester wise total credits

Semester	Total credits
I	37
II	37
III	38
IV	36
V	36
VI	32
VII	18
VIII	18
Grand total	252

- Institute Core - 64 credits (First Semester + Data Analysis + Introduction to Probability + Economics + Environmental Sciences + Data Structures and Algorithms)
- Program Core - 122 Credits
 - Maths - 42 credits , CSE - 46 credits , Others - 34 credits
- Total Elective credits - 66 credits (11 electives)
 - Minimum Program Elective - 30 credits (6 electives)
 - (Math -6 credits, CSE- 6 credits, Math/CSE - 18 Credits)
 - Minimum 2 HSS electives - 12 credits

Semester I

Course Code	Course Name	L	T	P	Credits
	Calculus-1	3	1	0	4
	Calculus-2	3	1	0	4
PH101	Quantum Physics and Applications	2	1	0	6
CH 101	Fundamental concepts and applications of chemistry	3	0	0	6
BB 101	Introduction to Modern biology	3	0	0	6
	Hands on Science Laboratory	0	0	3	3
	Introduction to Programming -1 (Using C)	3	0	2	4
	Introduction to Programming -2 (Using Python)	3	0	2	4
HS 101	Introduction to Fine Arts				P/NP
HS 102	Design Thinking and Creativity				P/NP
NO 101	National Sports Organization				P/NP
Total credits					37

Semester II

Course Code	Course Name	L	T	P	Credits
MA 102	Linear Algebra	3	1	0	4
MA 103	Differential Equations - I	3	1	0	4
CS201	Data structures and Algorithms	3	0	0	6
CS211	Data structures and Algorithms Lab	0	0	3	3
ME111	Engineering Graphics Laboratory	1	0	3	5
EE101	Introduction to Electrical Systems and Electronic Circuits	3	0	0	6
PH102	Electricity and Magnetism	2	1	0	6
ME113	Hands on Engineering	0	0	3	3
NO 102	Sports	0	0	0	P/NP
Total credits					37

Semester III

Course Code	Course Name	L	T	P	Credits
EE 227	Data Analysis	3	0	0	3
EE 221	Introduction to Probability	3	0	0	3
CS 304	Graph Theory and Combinatorics	3	0	0	6
CS 203	Discrete Structures	3	0	0	6
CS 205	Design and Analysis of Algorithms	3	0	0	6
CS 213	Software Systems Lab	3	0	2	8
HS 201	Economics	3	0	0	6
Total credits					38

	Mathematics
	Computer Science and Engineering
	Electrical Engineering
	Humanities and Social Sciences

Semester IV

Course Code	Course Name	L	T	P	Credits
MA XXX	Statistics	3	0	0	6
MA XXX	Real Analysis	2	1	0	6
CS 301	Computer Architecture	3	0	0	6
CS 311	Computer Architecture lab	0	0	3	3
CS 302	Artificial Intelligence	3	0	0	6
CS 312	Artificial Intelligence Lab	0	0	3	3
CH 301	Environmental Studies	3	0	0	6
Total credits					36

	Mathematics
	Computer Science and Engineering
	Electrical Engineering
	Humanities and Social Sciences
	Chemistry

Semester V

Course Code	Course Name	L	T	P	Credits
MA XXX	Stochastic Models	3	0	0	6
MA XXX	Introduction to Math Finance 1	3	0	0	6
CS 427	Mathematics for Data Science	3	0	0	6
	CSE Elective 1				6
	Maths Elective 1				6
HSS XXX	HSS Elective I*	3	0	0	6
Total credit					36

	Mathematics
	Computer Science and Engineering
	Electrical Engineering
	Humanities and Social Sciences

Semester VI

Course Code	Course Name	L	T	P	Credits
MA XXX	Group Theory	2	1	0	6
MA XXX	Introduction to Math Finance 2	3	0	0	6
CS 202	Automata Theory	3	1	0	8
HSS XXX	HSS Elective II*	3	0	0	6
	MA Elective /CSE Elective /R&D project	3	0	0	6
Total credit					32

	Mathematics
	Computer Science and Engineering
	Electrical Engineering
	Humanities and Social Sciences

* Students may be permitted to opt for HSS electives in the 7th and 8th Semester. Course adjustments and other related things need to be managed in consultation with the faculty advisor.

Semester VII

Course Code	Course Name	L	T	P	Credits
XX7.1	Institute Elective/BTP	3	0	0	6
XX7.2	MA Elective /CSE Elective	3	0	0	6
XX7.3	Institute Elective	3	0	0	6
Total credit					18

Semester VIII

Course Code	Course Name	L	T	P	Credits
XX8.1	Institute Elective/BTP	3	0	0	6
XX8.2	MA Elective /CSE Elective	3	0	0	6
XX8.3	Institute Elective	3	0	0	6
Total credit					18

Departmental Electives

Dependency of MA Electives		Dependency of CS Electives	
Elective name	Prerequisite(s)	Elective name	Prerequisite(s)
Rings and Modules	Group theory	Statistical Pattern Recognition	
Advanced Graph theory	Graph Theory and Combinatorics	Statistical Pattern Recognition lab	
Functional Analysis	Measure Theory	Reinforcement Learning	
Perfect Graphs and Graph Algorithms	Advanced Graph Theory	Reinforcement Learning Lab	
Measure Theory	Real Analysis	Software Development for Scientific Computing	
Numerical Linear Algebra	Linear Algebra	Computer Networks	
		Computer Networks Lab	
		Operating Systems	
		Operating Systems Lab	
		Databases and Information Systems	
		Databases and Information Systems Lab	
		Compilers	

		Compilers lab	
		Parameterized Algorithms and Complexity	

*The prerequisite core courses are not mentioned in this list. The student is advised to consult the detailed syllabus before choosing an elective and make sure to have cleared all prerequisite core and elective courses as required.