![DA-IICT logo — Dhirubhai Ambani Institute of Information and Communication Technology]

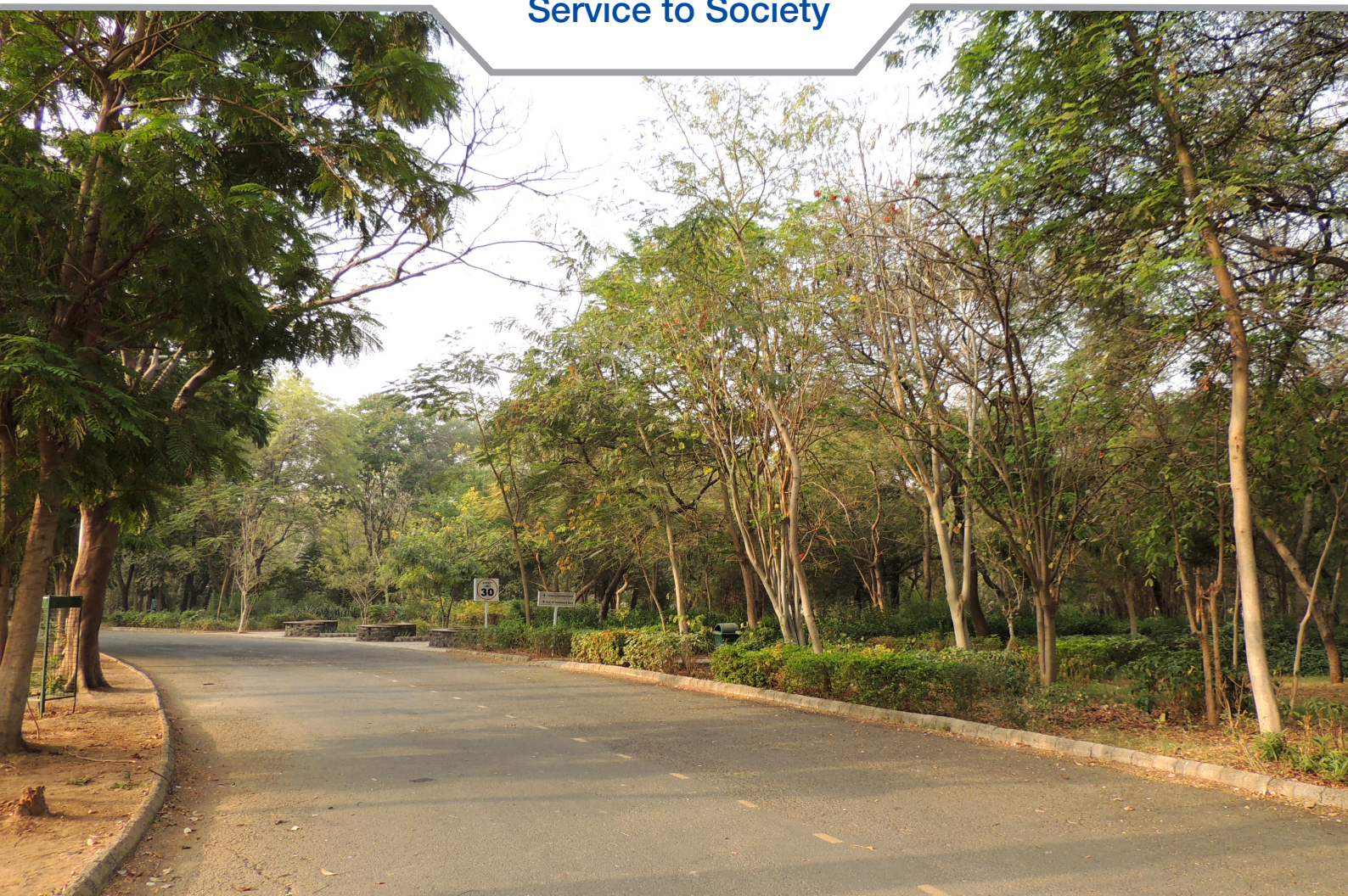**ENGINEERS WITH SOCIAL RESPONSIBILITY**

# B.Tech.

# MATHΣMATICS & COMPUTING

Academics

Research & Innovation

## DA-IICT

Service to Society

**DA-IICT** was founded in 2000 as a unique university devoted to the cutting-edge interdisciplinary area of Information and Communication Technology (ICT). ICT was emerging as the technology of the future bringing in the fourth Industrial Revolution. Well known and highly qualified faculty members joined DA-IICT and developed a curriculum and research program steeped in all aspects of ICT, societal, scientific, and technical. This spirit has been nurtured for the last 23 years and DA-IICT wants to continue its excellence in interdisciplinary teaching and research well into the future.

The Act No. 6 of 2003 of the Gujarat Legislature provided for the establishment of the DA-IICT and conferred on it the status of a University. On 30 November 2004, the DA-IICT was included in the list of Universities maintained by the University Grants Commission under Section 2(f) of the UGC Act, 1956. DA-IICT is a member of the Association of Indian Universities (AIU) as approved by the AIU at its 84th Annual Meeting held during 12-14 November 2009. The National Assessment and Accreditation Council, Government of India has accredited DA-IICT with an **A$^+$ Grade in 2023**.

**Vision and Mission**
The vision of the institute is to become a globally recognized institution that offers innovative programs, outstanding faculty, an atmosphere of innovation, a responsive administration, a vibrant campus and a collaborative learning environment that continuously adapts to the changing landscape of research and innovation and the future of work. Toward this, we plan to design and deliver academic programs in both disciplinary and multidisciplinary domains to prepare students for a rapidly evolving work environment.

**Ranked among top 100 Engineering Institution by MHRD, Govt of India (NIRF-2019 rankings)**

**NAAC (Accreditation): A$^+$ Grade (Year- 2023)
Selected for Center of Excellence award
Annual Student Scholarships: INR 3-4 Crores**

**First Private University** to mentor PPP model based (central, state and industry funded) Institute - IIIT Vadodara (build academics and provided faculty support)

Only **Anchor Institute** in Gujarat to mentor the Faculty members of Engineering Colleges in Gujarat

Awarded the **Best University** in Innovation in Gujarat by Govt. of Gujarat in 2017

# Academics and Research at DA-IICT

## Interdisciplinary and Multidisciplinary Research Oriented Academic Programs

| Level | Name of the Program | Duration | Unique Features |
|---|---|---|---|
| Doctoral | PhD | 4-6 years | - Entry through national level entrance test & interview<br>- Fellowship (PM) **INR 35000 - 40000** |
| PG | **MTech** (ICT)<br><br>**MSc** (IT)<br>**MSc** (Data Science)<br>**MSc** (Agriculture Analytics)<br>**MDes** (CD) | 2 years<br><br>2 years<br>2 years<br>2 years<br>2 years | - Four specializations: **ML, SS, VLSI** & **ES** and **WCSP**<br>- Industry oriented IT program<br>- Hands-on & case study-based program<br>- In collaboration with **AAU, IIRS**<br>- Fusion of ICT and Design |
| UG | **BTech** (ICT)<br><br>**BTech** (Hons in ICT; minor in Computational Science)<br><br>**BTech (**Mathematics and Computing (MnC)<br><br>**BTech** (EVD)<br>Electronics & VLSI Design | 4 years<br><br>4 years<br><br><br>4 years<br><br><br>4 years | - 1st Institute in India to offer **unique program** in ICT in 2001<br>- 1st Institute in India to offer UG program in Computational Science<br><br>- Intersection of Computer Science & Applied Mathematics to solve complex problems<br>- 1st Institute in Gujarat to offer |



Extra Mural Grant Few Tens of Crores for R&D
Institutional h-index : 35
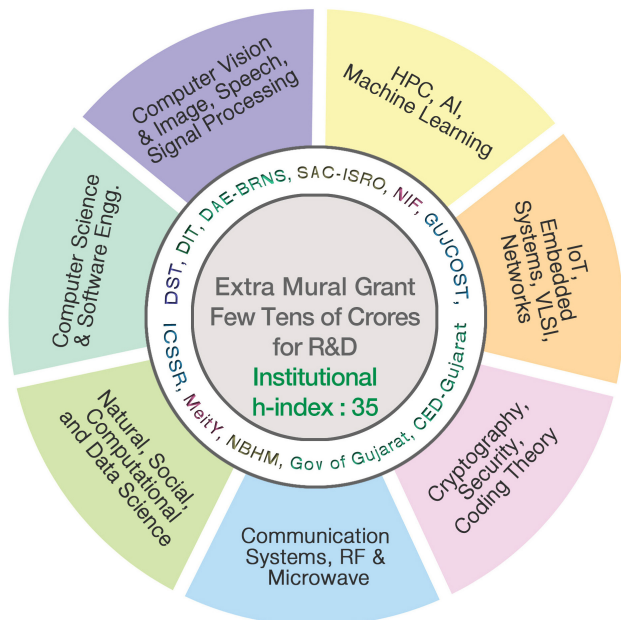
**International Projects**
NSF-USA, Indo-French, Indo-Spain

**Industry / Consultancy Projects**
nVIDIA (USA). FactSet (UK), Vista (India), ISRO
Amnex Technology, GoG (Climate Dept.)

**Major MOUs / LOUs**
Univ. of Oregon (USA), Univ. of Auckland (NZ),
Univ. of Swaziland (UoS), Univ. of Dayton (USA),
Univ. of Hildesheim (Germany),Univ. Mara (Malaysia)
Univ. of Evora (Portugal), ISEP (France),
ISRO, Indian Navy, ISI Kolkata, TCS, Samsung
R&D, IIT Gandhinagar, IIT Jammu, IIIT Vadodara,
SVNIT Surat, C R Rao AIMSCS, EDII

# Program Overview

## Why a B.Tech program in MnC?

The past few decades have witnessed large scale technological advancements which have facilitated probing at scales that was not accessible earlier. No wonder, we have information like never before, however, unravelling the mysteries hidden in them remains a challenge. Industry, academia and innovators have realized that such problems cannot be looked at through the eyes of any single discipline, but rather, requires interdisciplinary and multidisciplinary approaches. The combined knowledge area of mathematics and computer science provides access to many different approaches that can be adopted for the exploration of such information and thereby creating new pathways for future scientific developments and innovation. Not surprisingly, graduates with a strong foundation in mathematics and computer science have created a unique niche for themselves and there has been an increasing requirement of graduates of these disciplines.

## DA-IICT philosophy, vision and MnC

DA-IICT since its inception has been an institute of interdisciplinarity and contemporary domains. B Tech programs in ICT and ICT honours with minor in computational science are testimonials to this. With its experience and expertise at institutional innovation and knowledge reform, DA-IICT is well-poised to provide knowledge and training to young minds to provide solutions to the challenges mentioned earlier. The BTech program in Mathematics and Computing (MnC) at DA-IICT, started in 2020, is therefore a strong step in this direction.

MnC embodies the fusion of Mathematics and Computer Science. It is obtaining wide acceptance as a distinct discipline dealing with Mathematics as a fundamental intellectual tool in computing and with Computing as a primary component of mathematical problem solving. The curriculum focuses on expanding mathematical, algorithmic and computational thinking abilities of the students. A strong mathematical foundation will enable the students to study and analyse abstract concepts and to model many real life problems as mathematical problems. Algorithmic thinking will enable them to solve these mathematical problems in an automated way while computational thinking will enable them to evaluate the efficiency of these solutions. The rigour in curriculum's content will provide an adequate and solid foundation as well as opportunities for skill development in MnC. The wide variety of competence acquired through the curriculum will make the students eligible to apply for a whole range of occupations and for research and managerial careers in later life.
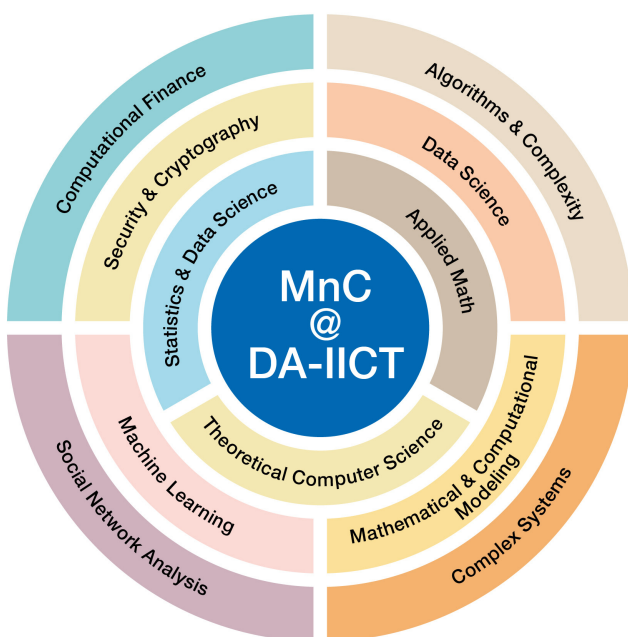
ENGINEERS WITH
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MnC program at DA-IICT has been carefully designed in consultation with leading experts from industry and academia from India and abroad. The curriculum blends together foundational aspects of mathematics and computer science with emerging areas in contemporary science and technology. The core course component in the first two years aims to build a solid foundation in mathematics, computer science and humanities and social sciences. Emphasis here is on both technical and communication and creative skills. Core courses in humanities also bring in the role and importance of ethics in technological developments. Elective courses provide exposure in several related disciplines and enable the students to choose and pursue the path of their interest. Overall, the curriculum is a syllabus of courses that ensures competence, quality and adaptability of the graduates.

## Salient Features of the program
- The program is designed keeping in mind the emergent areas in modern science and technology.
- The program structure is contemporary with blend of courses in traditional as well as new emergent areas.
- A rigorous program that also provides flexibility in learning. It has a strong foundation and at the same time inculcates interdisciplinary thinking and provides the required skill.
- The program core consists of 42% courses in computer science, 36% in mathematics and 22% in humanities and social sciences and combined knowledge areas of math and computing
- MnC electives in the broad areas of theoretical computer science, applied math and statistics and data science.
- Open electives in the areas of engineering arts and design, humanities, social science & management.
- Independent projects, rural, industrial and research internships that help the students to expand their knowledge base and pursue the path of their own interest.

## Careers
Apart from the available prospects in traditional computer science and IT, graduates of the BTech (MnC) program from DA-IICT will be suitably prepared for jobs in emerging niche areas in data science, computational finance, mathematical modelling and large-scale computer simulation. Our graduates will also be able to pursue career paths in higher education in areas of applied maths, computer science and computational sciences.



MnC @ DA-IICT

Algorithms & Complexity · Data Science · Applied Math · Mathematical & Computational Modeling · Complex Systems · Theoretical Computer Science · Machine Learning · Social Network Analysis · Statistics & Data Science · Security & Cryptography · Computational Finance

# Course Curriculum

## Semester-1
Mathematical, Algorithmic, & Computational Thinking
Computer Organization and Programming
Discrete Mathematics
Digital Logic Design
Language and Literature

## Semester-2
Functions of Single Variable and ODEs
Object Oriented Programming
Data Structures and Algorithms
Linear Algebra
Approaches to Indian Society

## Semester-3
Probability and Random Processes
Operating Systems
Design and Analysis of Algorithms
Functions of Several variables and PDEs
Database Management Systems
Science, Technology, Society

## Semester-4
Mathematical Statistics
Theory of Computation
Parallel and Distributed Algorithms
Real and Complex Analysis
Numerical and Computational Methods
Environmental  Studies

## Semester-5
Mathematical Optimization
Modelling and Simulation
Algebraic Structures
Principles of Economics
MnC Elective-1
MnC Elective-2

## Semester-6
Machine Learning
Open Elective – 1
MnC Elective – 3
MnC Elective – 4
MnC Elective – 5
Independent Project – 1/ MnC Elective – 6

## Semester-7
MnC Elective – 6 / Independent Project – 1
MnC Elective – 7
MnC Elective -8
Open Elective – 2
MnC Elective – 9
Independent Project – 2 / MnC Elective – 10 /BTP – 1

## Semester-8
MnC Elective – 10 / BTP-1
BTP-2

## Representative list of electives

| | | |
|---|---|---|
| Graph Theory and Algorithms | Data Mining and Visualization | Stochastic Simulation |
| Approximation Algorithms | Human Computer Interaction | Dynamical Systems |
| Computational Complexity | Natural Language Processing | Computational Number Theory |
| Randomized Algorithms | Network Science | Fluid Dynamics |
| Quantum Computing | Time Series Analysis | Game Theory |
| Introduction to Cryptography | Software Engineering | Queuing theory |
| Block Chain and Cryptocurrencies | Hypothesis Testing | Operations Research |
| Adversial Machine Learning | Multivariate Statistics | Functional Analysis |
| Machine Learning and Security | Bayesian Analysis | Stochastic calculus for finance |
| Introduction to coding theory & Applications | Financial Data Analysis | Computational finance |
| Compilers | Machine Learning in Finance | |

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## Total Seats: 50

33% of the seats are reserved under Gujarat Category. Seats under Gujarat Category will be filled as per the guidelines of ACPC. The candidate has to apply to ACPC, GoG, separately.

### Eligibility Criteria

The minimum academic qualification for admission to the programs is that the candidate must have passed or appearing in 2024 in the final examination of 10+2 (Class XII) or its equivalent with Mathematics, Physics and any one of Chemistry/Bio-technology/Computer Science/Biology.

### Selection Process

Admission to the B. Tech (ICT) program will be based on the All India Rank of Joint Entrance Examination 2024 (JEE-2024) Main, which is conducted by the National Testing Agency, Government of India.

The short-listed candidates will be offered admission (confirmed/waitlisted) in order of their merit (based on the All India Ranking of JEE Main 2024) and preferences selected.

## How to Apply

Candidates submit an online application by clicking on the link given on the Institute website.

## Fees Structure*

**Tuition Fee:** Rs. 1,50,000 per Semester
*Subject to revision every Academic Year from 8 to 10%.

## Important Dates

| | |
|---|---|
| Online application website opens | 14th March 2024 |
| Last date for submission of online applications | 17th June 2024 |

## Scholarships

**DA-IICT Merit and Merit-cum-Means Scholarships**:
A few students admitted to the program are awarded merit and merit-cum-means scholarships equivalent to full tuition fees.

**Mukhya Mantri Yuva Swavalamban Yojna, Government of Gujarat**:
The Scheme provides financial support to bright and needy students whose parents yearly income is upto Rs. 6.00 lakh. Students are encouraged to apply for different other scholarships as follows:

**Hon. Chief Minister Scholarship Scheme
Digital Gujarat Portal
National Scholarships Portal**

**Cybage Scholarships**:
This scholarship is granted to students whose parents annual income is upto Rs. 3.00 lakh. The scholarship is limited to 80% of the semester tuition fee.

**Education Loan:**
The Institute will facilitate the students to avail educational loan from selected banks.

For Inquiries
Email: ug_admissions@daiict.ac.in   |   Voice call: 079 69 08 08 08
For more details please visit: www.daiict.ac.in