INDIAN INSTITUTE OF TECHNOLOGY BOMBAY


# Information Brochure

## **Master of Science by Research**

Admissions 2026-2027

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## I. Important Guidelines for Master of Science by Research Application

1 Please read the instructions given in the brochure carefully before filling up the application form.

2 **Online Application Form & Information Brochure** (including the admission schedule along with the important dates) is available on the Institute website: https://acad.iitb.ac.in/admissions/masters/msbyresearch

There is a common application form for M.Tech and Master of Science by Research__ You are required to submit the application **ONLINE**. No downloadable forms will be available. After filling the form, you are advised to take a printout of your application and preserve it for your records.

3 The application fee for Master of Science by Research is as follows,

| Category | Application fee for Regular Period Without Fine (In Rs.) | Application fee for Extended period Without Fine (In Rs.) |
|---|---|---|
| Women candidates | 150/- | 650/- |
| SC/ST/PwD category candidates | 150/- | 650/- |
| All other candidates | 300/- | 800/- |

The fee is to be paid by SBI Internet Banking/ Online Payment System and you do not have to submit the hard copy of the application. **Applications without online payment details will not be considered.**

APPLICATION FEE IS NON-REFUNDABLE.

4 OBC-NC candidates may note that the limit of annual income is Rs. 8 lakhs for determining the creamy layer among Other Backward Classes (OBCs) candidates.

The OBC-NC certificate issued for the financial year 2026-27 by the Competent Authority in the prescribed format must be uploaded in the ONLINE application form and submitted at the time of admission.

The OBC reservation update Information is available in the public domain https://acad.iitb.ac.in/admissions/masters/msbyresearch under OBC Reservation update.

5 Economically Weaker Sections(EWS) candidates may note that the limit of annual income is Rs. 8 lakhs for determining the eligibility for benefit under Economically Weaker Sections(EWS) reservation.

The EWS certificate issued by the Competent Authority in the prescribed format must be uploaded in the ONLINE application form and submitted at the time of admission.

The EWS reservation update Information is available in the public domain https://acad.iitb.ac.in/admissions/masters/msbyresearch under EWS Reservation update.

6 PwD candidates will be given extra time, as per the government of India rules on request by the candidate. Such requests need to be addressed to the Head of the concerned academic units through email/hard copy at least two weeks in advance.

7 Please refer to the criteria for eligibility for admission to the MS by Research programme under section A.7.3 of this document.

8 Please follow the instructions in the brochure when you fill out the application form, including instructions on additional documents to be uploaded. Note that the Statement of Purpose (Appendix I) must be filled by all Master of Sciency by Research applicants.

9 You MUST upload the following while submitting the Master of Science by Research Application.

- Scanned version of photograph
- Scanned version of signature
- Marksheet of the last semester/ Consolidated marksheet of the qualifying degree (Exam pending/result awaited candidates have to upload their latest/previous semester marksheet).
- Caste Certificate (OBC-NC/SC/ST), if applicable. An affidavit for having applied in case the certificate is not yet received.
- Economically Weaker Sections(EWS) candidates needs to submit EWS certificate issued by the Competent Authority in the prescribed format.
- PwD Certificate, if applicable
- Statement of Purpose, if applicable
- Project Staff/ Institute Staff should submit No Objection Certificate (NOC)' a letter of recommendation from the Principal Investigator (PI)/ Head/Office-In-Charge at the time of application

10 You should check emails sent to the email address provided in your application, for all important communications and announcements. This is the ONLY way the institute will communicate with an applicant. Failure to respond to a query sent via email will result in you forfeiting the chance to be admitted.

11 Merely fulfilling eligibility criteria doesn't entitle a candidate to be called for the test and/or interview. Admission is based on GATE/Written test/Interview performance and additional eligibility criteria for different admission categories and, different disciplines and specializations are specified in Table A.7.3 of this brochure.

12 Candidates called for a written test/interview should bring the ( i ) original physical photo ID card with them (ii) Final year thesis / dissertation / report / publications / copy of certificates / Marksheets.

13 Candidates having a degree from foreign universities should submit an equivalence certificate from the Association of Indian Universities (AIU), New Delhi for the qualifying Exam and a proof of having secured a First class or 60% (55% for SC/ST) marks or equivalent in the qualifying examination.

14 Seats are reserved for Economically Weaker Sections(EWS)/ Other Backward Class Non-Creamy Layer (OBC-NCL)/ Scheduled Caste (SC)/ Scheduled Tribe (ST) and Person with Benchmark Disability (PwD) Categories , as per Government of India rules.

15 Read the Frequently Asked Questions (FAQ) given on Institute website https://acad.iitb.ac.in/admissions/masters/msbyresearch for more details.

16 Contact Details for Master of Science by Research applications: pgadm@iitb.ac.in

17 Students must submit self-attested copies of his/her qualifying degree certificate & final transcripts on or before **31st August, 2026**, failing which admission will stand cancelled.

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## II. IMPORTANT DATES : TENTATIVE SCHEDULE FOR ADMISSION TO Master of Science by Research PROGRAMME 2026-27 {AUTUMN SEMESTER}

**-as available on the webpage**
**https://acad.iitb.ac.in/admissions/masters/msbyresearch**

The results will be declared on the Common Offer Acceptance Portal (COAP) for TA/RAP category. The candidates need to login on COAP-2026 website to see offers and choose one of the options given.

The result of **written test and or interview for aster of Science by Research Admissions** will be declared on IIT website:

https://acad.iitb.ac.in/admissions/masters/msbyresearch by Academic Office.

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## A) GENERAL

### A.1) THE INSTITUTE

The Indian Institute of Technology Bombay (IIT Bombay) is one of the higher Institutes of Technology in the country set up with the objectives of making available facilities for higher education, research and training in various fields of Science and Technology. It was established in 1958.

The Institute is located at Powai in a campus extending over 220 hectares amidst picturesque surroundings with Vihar and Powai lakes on either side.

At present, Undergraduate (B.Tech.), Postgraduate (M.Tech.), Master of Science by Research ( MS ( R ) ) and Doctoral (Ph.D.) programmes are offered at IIT Bombay on the Institute website https://www.iitb.ac.in/newacadhome/toadmission.jsp

| Programmes | Discipline [Academic Unit : Department, Centre, Interdisciplinary Group] |
|---|---|
| M.Tech./M.Tech.+ Ph.D.(Dual Degree) | Aerospace Engineering, Biomedical Engineering, Chemical Engineering, Civil Engineering, Computer Science & Engineering, Earth Sciences, Electrical Engineering, Energy Systems Engineering, Environmental Science & Engineering, Geoinformatics and Natural Resources Engineering, Industrial Engineering & Operations Research,Mechanical Engineering, Metallurgical Engineering & Materials Science,Materials, Manufacturing and Modeling, Systems and Control Engineering, Technology and Development, Educational Technology, Centre for Climate Studies |
| M.Des. And M.Des. By Research Programmes | Industrial Design Centre |
| MBA | Shailesh J. Mehta School of Management |
| MBA (Executive) | Shailesh J. Mehta School of Management |
| M.Sc.-Ph.D. (Dual Degree) in Energy | Energy Science and Engineering |
| MPP | Centre for Policy Studies |
| Master of Science by Research | Computer Science & Engineering, Data Science and Artificial Intelligence (CMINDS), Healthcare Informatics (KCDH) |
| MA+Ph.D. (Dual Degree) in Philosophy | Humanities & Social Sciences |
| Master of Arts by Research(MA.Res. ) | Humanities & Social Sciences |
| Master in Development Practice (MDP) | Centre for Technology Alternatives for Rural Areas |
| Ph.D. | Aerospace Engineering, Biosciences and Bioengineering, Chemical Engineering, Chemistry, Civil Engineering, Climate Studies, Computer Science and Engineering, Industrial Design Centre, Earth Sciences, Educational Technology, Electrical Engineering, Energy Science & Engineering, Environmental Science and Engineering, Economics, Geoinformatics and Natural Resources Engineering Humanities and Social Sciences, Industrial Engineering & Operations Research, Management, Mathematics, Mechanical Engineering, Metallurgical |

| | |
|---|---|
| | Engineering and Materials Science, Collaborative Research on Science and Technology - (erstwhile CRNTS), Physics, Policy Studies, Systems & Control Engineering,Technology and Development, Urban Science & Engineering, Digital Health,Machine Intelligence and Data Science, Desai Sethi School of Entrepreneurship, Center for Defence Technology Innovations and Strategies, Centre for Traditional Indian Knowledge and Skills, Medical Technology Research and Innovation Centre, Motilal Oswal Centre for Capital Markets, |
| IIT Bombay – Tohoku University (Japan) Double Doctoral Degree Programme (IITB–TU DDDP<br>- New Programme from AY 2026-27 | Artificial Intelligence & Machine Learning, Digital Health, Disaster Mitigation, Energy & Sustainability, Materials Science, Quantum Computing, Robotics, Semiconductors, Thermals & Fluids, and Transportation. |

The Institute on an average admits 1751 candidates for the Undergraduate programmes and 2007 candidates for different Postgraduate and Doctoral programmes every year. Students from Bangladesh, Egypt, Ethiopia, Fiji, Iran, Iraq, Pakistan, Jordan, Mauritius, Malaysia, Nepal, Palestine, Sri Lanka, Vietnam and Yemen are also undergoing training in various programmes. In addition to these academic programmes, the Dean (Educational Outreach) organizes short, intensive courses in specialized topics both for practicing engineers as well as for teachers from engineering colleges; and also conducts seminar and conferences on current scientific and technological developments. Further, teachers from various engineering colleges also join Institute for the postgraduate and doctoral programmes. under Dean (Educational Outreach).

All the academic units of the Institute have well equipped research laboratories and workshop facilities. In addition, there are a number of central facilities, which include Computer Centre, Central Library and Central Workshop. The Central Library has a very large collection of books, back volumes of periodicals, standards specifications and other literature in print and electronic format. The Library now holds more than 5 lakh books and bound volumes, 20,000 e-books, and subscriptions to more than 20,000 current journals in the domains of science, engineering, humanities and social sciences, management, and associated fields. More than 30 databases, including Bloomberg terminal, financial, bibliographical, and citation databases, are also subscribed by the Central Library. Additionally, the Central Library offers users access to use research-supporting technologies like grammarly, overleaf, Turnitin, Drillbit plagiarism detection tools, and provides access to millions of electronic theses.

The Institute has many research collaborations with leading universities in USA, Europe, Japan, and other East Asian countries. As part of these collaborations, the post graduate students get opportunities to carry out joint research projects with faculty and students from these universities.

The location of IIT Bombay, in close proximity to several leading R&D Centers and major industrial establishments, offers excellent opportunities to interact with them and plan some research programmes in collaboration with them. The Industrial Research and Consultancy Centre (IRCC) coordinates collaborative projects with industry and other research organizations such as BARC, TIFR and CSIR. The Institute is actively collaborating with several organizations of other countries on a bilateral basis.

**A.2) RESEARCH FACILITIES**

All the academic units of the Institute have well equipped research laboratories and workshop facilities. In addition, there are a number of central facilities, which include Computer Centre, Central Library and Central Workshop. The Central Library has a very large collection of books, back volumes of periodicals, standards specifications and other literature in print and electronic format. The Library now holds more than 5 lakh books and

bound volumes, 20,000 e-books, and subscriptions to more than 20,000 current journals in the domains of science, engineering, humanities and social sciences, management, and associated fields. More than 30 databases, including Bloomberg terminal, financial, bibliographical, and citation databases, are also subscribed by the Central Library. Additionally, the Central Library offers users access to use research-supporting technologies like grammarly, overleaf, Turnitin, Drillbit plagiarism detection tools, and provides access to millions of electronic theses.

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**A.3) STUDENTS AMENITIES**

The Institute is fully residential and has 18 hostels for students. Each hostel is an independent entity with its own mess facilities, recreation areas, etc. Some flatlets are available for married research scholars.

Extra-curricular activities are provided by the Students' Gymkhana. These activities include Sports, Cultural programmes and Social Service. Various clubs of the Gymkhana encourage individual talents of students in hobbies such as painting, modeling, music, photography, aeromodelling and fabrication of electronic devices. A swimming pool is an additional facility. A well-planned Student Activities Centre (SAC) routinely organizes several vibrant extra curricular events.

**A.4) MASTER OF SCIENCE BY RESEARCH PROGRAMME**

The Institute has a Master of Science by Research programme in the following departments/ centers:

- Department of Computer Science and Engineering (CSE)
- Center for Machine Intelligence and Data Science (CMiNDS)
- Koita Center for Digital Health (KCDH)

The aim of the programme is to provide training to students in carrying out research and to contribute to expanding the frontiers of knowledge.

The highlight of this program is its flexible duration and focus on research. Students graduate when they complete the required coursework and defend a high quality MS(R) thesis based on their research work. The maximum duration for fulfilling these requirements is 3 years. However, early completion (as early as at the end of 1.5 years) is also possible. Students are admitted to the programme under the categories of Teaching Assistantship (TA), Research Assistantship through Project (RAP) and external (EX) categories.

Please look up the department website for additional details of the programme such as course requirements, typical course schedule, list of courses, areas of research etc.
For CSE, the website is: https://www.cse.iitb.ac.in/admissions/pg
For CMiNDS, the website is: https://www.minds.iitb.ac.in/academic-details/ms-by-research-in-ds-ai
For KCDH, the website is: https://www.kcdh.iitb.ac.in/academics#ms_by_research

Also refer to the Rules and Regulation document https://acad.iitb.ac.in/academics/rules/pg for details with regards to the programme, graduation criteria, continuation in the programme, and other rules and regulations of the programme. Candidates are also encouraged to the webpages of individual faculty members to learn about his/her research interest.

**ADMISSIONS**

Eligible applicants will be shortlisted for the admissions process on the basis of their GATE score. Admissions will be based on a written test and interview given to shortlisted candidates. Candidates are admitted to the Master of Science by Research programme based on a shortlisting test conducted by the concerned department, followed by an interview. The admissions are given based on a total score produced by 30% weightage to the shortlisting test and interview, and 70% weightage to the GATE score.

**Economically Weaker Sections(EWS)/Other Backward Class Non-Creamy Layer(OBC-NCL)/Scheduled Caste (SC)/ Scheduled Tribe (ST) and Person with Benchmark Disability (PwD) Categories**

Seats are reserved for Economically Weaker Sections(EWS)/ Other Backward Class Non-Creamy Layer(OBC-NCL)/Scheduled Caste (SC), Scheduled Tribe (ST) and Person with Benchmark Disability (PwD) categories as per Government of India rules. Scheduled Caste and Scheduled Tribe candidates are offered direct admission solely based on their GATE score and their preferences.

**Admission for IIT B.Tech. degree holders**

For information on GATE exemptions for IIT BTech degree holders, please refer to section A.7.2 of this document.

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## A.5) APPLICATION CATEGORIES AND FINANCIAL SUPPORT

The Institute admits Master of Science By Research candidates under the following categories

i. Teaching Assistantship (TA)
ii. Research Assistantship (RA))
iii. Research Assistantship through Project (RAP)
iv. External (EX)
v. Project Staff (PS)

Admissions to all categories are subject to availability of seats. The continuation of the financial support and the registration for the selected programme will be subject to satisfactory performance of the duties assigned by the Academic Unit as well as satisfactory academic performance and fulfillment of the other academic and non-academic requirements, as per rules.

### A.5.1) TEACHING ASSISTANTSHIP (TA)

A.5.1.1) Candidates in this category are selected subject to (i) a valid GATE score (except for GATE waivers offered to eligible IIT BTech degree holders as per Section A.7.2 of this document), and (ii) Performance in Test / Interview.

A.5.1.2) As per MHRD directives, a student holding Teaching Assistantship (TA) shall not accept or hold any appointment, paid or otherwise, or receive any emoluments, salary or stipend from any source, apart from their TA stipend/salary, during the tenure of the award.

A.5.1.3) The students joining the programme under this category will be considered for Teaching Assistantships. Assistantship will be paid on the basis of monthly attendance and following the rules and regulations of the Institute,

i. Students getting assistantship will be required to assist / work for courses, laboratory, or any other related academic / administrative work to the extent of 8 hours per week as assigned by the concerned Academic Unit.

ii. The assistantship will be available for a maximum period of 36 months.

iii. Assistantship will be paid on the basis of monthly attendance.

A.5.1.4) Employees on the rolls (with or without pay) of any organization are not eligible for admission under this category.

### A.5.2) RESEARCH ASSISTANTSHIP (RA)

A.5.2.1) A valid GATE score is mandatory. Passing an additional Test / Interview may be needed.

A.5.2.3) Candidates admitted as RA shall not accept or hold any appointment (paid or otherwise) or receive any emoluments, salary, stipend from any other source during RA tenure.

A.5.2.4) Candidates admitted as RA will be considered for a financial assistantships of Rs.13,400 (per month) for a maximum period of 36 months subject to serving as a research assistant in a course / laboratory for 20 hours per week as assigned by the concerned academic unit. The assistantship will be paid on the basis of monthly attendance.

A.5.2.5) The continuation of assistantship will be subject to monthly attendance and satisfactory academic performance

A.5.2.6) Upon joining IITB after admission, a candidate in the TA category is not allowed to be on the rolls (with or without pay) of any other organization.

A.5.2.7) The information of availability of RA seats will be available with / published by individual academic units.

### A.5.3) RESEARCH ASSISTANTSHIP THROUGH PROJECT (RAP)

A.5.3.1) Candidates to this category are selected subject to (i) a valid GATE score (except for GATE waivers offered to eligible IIT BTech degree holders except for GATE waivers offered to eligible IIT BTech degree holders as per Section A.7.2 of this document) and (ii) Performance in Test / Interview.

A.5.3.2) The students joining the programme under this category will be considered for Assistantships supported under Sponsored Research Project being carried out at the Institute based on the following norms:

i. Research Assistants have to work in the assigned Sponsored R&D project. They are required to work for about 20 hours a week on the Sponsored Research Project.

ii. They will do their thesis / dissertation in the same project area.

iii. They will have to be registered in the programme for the full duration of 3 years.

A.5.3.3) Only some disciplines/specializations have RAP seats.

A.5.3.4) Employees on the rolls (with or without pay) of any organization are not eligible for admission under this category.

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### A.5.4) EXTERNAL CATEGORY (EX)

The candidates employed in recognized R&D organizations, well-equipped scientific institutions, laboratories, and industrial organizations engaged in research based activities, and desirous of pursuing the Master of Science by Research programme while in employment may apply for admission as external candidates.

These candidates must have a Supervisor (internal) from the Institute (IITB) and **may have** an external supervisor from their parent organization where they will be doing the research work.

The admissions are based on the following norms:

The competence of these candidates will be assessed along with the regular candidates. After joining, the rules and regulations as specified by the Institution (IITB) for regular candidates with regard to academic performance will remain applicable for candidates under EX category also.

The candidate should submit, a Sponsorship Certificate (**Appendix II**) from the organization, in which s/he is employed, at the time of application giving an undertaking that s/he would be released from the duties to fulfil the course-work requirement (and qualifier examination, if applicable). The certificate should also provide details of facilities relevant to the research programme and available to the candidate.

The candidate has to complete the course-work immediately after joining the programme within a period of two semesters. Depending on the student's background and the programme requirements, an additional semester may be needed to complete the coursework examination. After fulfilling the course-work at the Institute, these candidates will be allowed to **register for the MS(R) Thesis.**

To promote interaction between the internal and external supervisors, regular meetings between them should be arranged at least once in a year in the Institute or in the sponsoring organization.

At the time of joining the programme, the selected candidate will have to produce a “Relieving Certificate” from his / her employer that s/he has been fully relieved from the duties to complete the coursework at IITBombay.

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### A.5.5) PROJECT STAFF (PS)

This category is valid only for the persons employed in a sponsored research project at IITB. Completion of 6 months of service in a project at the time of application and a valid GATE score are mandatory. Passing an additional Test / Interview will be needed. The requirement of valid GATE score is waived if a candidate has a total experience of 2 years (after the qualifying degree) of which 6 months is in the sponsored project at IITB (The waiver of valid GATE score requirement is NOT APPLICABLE for CSE department).

The students admitted in Project Staff (PS) category will continue to work on the sponsored project and carry out the tasks as assigned by the Principal Investigator of the concerned project and undertake the M.S. dissertation work under the same Project Investigator(s).

The candidates should upload ‘No Objection Certificate (NOC)’ a letter of recommendation from the Principal Investigator (PI) of the project where he/she is working as ‘Project Staff’ at the time of filling the application is given in Appendix-III .

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## A.6) FEES AND DEPOSITS

Various fees, deposits and Hostel Rent are listed in Table A.1

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## A.7) ELIGIBILITY FOR MASTER OF SCIENCE BY RESEARCH PROGRAMME

### A.7.1) General Eligibility for Master of Science by Research Programme in all Academic Units (Departments, Centres, Schools, Interdisciplinary Groups, Cross-Departmental Programmes)

Candidates with First class or 60% (55% marks for SC/ST) marks in B.E./ B.Tech./ B.Sc. (Engineering)/ M.Sc./ M.C.A./ MBBS/ M.Pharm./ B.Pharm.(4 yr. Degree)/ BDS (4 yr. Degree)/ Associate Membership Examinations conducted by recognized professional bodies (like Institution of Engrs. (India), Institute of Chemical Engrs., Aeronautical Society of India, Institute of Electronics & Telecommunication Engrs., Indian Institute of Metals, etc.) and recognized as equivalent to B.E. / B.Tech. Degree.

Eligibility criteria for the different disciplines and specializations, qualifying examinations, GATE (or other Postgraduate Admission Examination) and requirements for admission under different admission categories are given in **Table A.3** of this brochure.

### A.7.2) Admission for IIT B.Tech. degree holders

Candidate having a B.Tech. Degree from IITs and having a CGPA/CPI score of 8.00 (on 0-10 scale) and above are exempted from requirement of GATE qualification. They may be admitted to Master of Science by Research Programme under TA/RAP positions through written test and/or interview.

### A.7.3) Eligibility Requirement for PG admission at IIT Bombay

The overall institutional requirement for admission to PhD/PG programme of the Institute is meeting ANY ONE of the following criteria :

**For GN/EWS/OBC (NC) category**

(1) a minimum of 60% marks in aggregate in the qualifying degree.
OR
(2) a First Class as specified by the University.
OR
(3) a minimum Cumulative Grade Point Average (CGPA)/ Cumulative Performance Index (CPI) of 6.0 on the scale of 0-10; or an equivalent to 6.0 on other corresponding proportional requirements when the scales are other than 0-10. in the qualifying degree.

**For SC/ST/PwD category**

(1) a minimum of 55% marks in aggregate in the qualifying degree.
OR
(2) a minimum Cumulative Grade Point Average (CGPA)/ Cumulative Performance Index (CPI) of 5.5 on the scale of 0-10; an equivalent to 5.6 on other corresponding proportional requirements when the scales are other than 0-10. in the qualifying degree.

## A.8) GUIDELINES FOR FILLING UP THE APPLICATION FORM

Please refer to the Institute website https://portal.iitb.ac.in/mtechapp/Help.jsp under “Instructions for filling ONLINE application form”.

## A.9) Termination of Studentship

Failure to meet academic performance criterion set by the Institute for the Master of Science by Research programme will cause termination of studentship.

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**Table A.1 : Fees, Deposits & Hostel Rent for Master of Science by Research Students ( subject to revision as per MoE/BoG decision)**

-as available on the following webpage

Various fees and deposits for the programme **- as available on the following webpage https://acad.iitb.ac.in/fees-structure-prospective-students**

For Academic Fees: **- https://acad.iitb.ac.in/files/Fee%20Circular_PG_PhD.pdf**

- For Hostel Fees : **https://acad.iitb.ac.in/files/Hostel%20Fees%20for%20New%20PG%20Autumn%20Semester%202025-26.pd**

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**Table A.2 : Summary of Master of Sceience by Research Programmes**

| Discipline [Academic Unit : Department, Centre, Interdisciplinary Group] | Specialization | Code |
|---|---|---|
| Computer Science & Engineering [Department of Computer Science and Engineering] | Computer Science & Engineering | CS |
| Data Science & Artificial Intelligence (Center for Machine Intelligence and Artificial Intelligence) | Data Science & Artificial Intelligence | DS |
| Healthcare Informatics (Koita Center for Digital Health) | Healthcare Informatics | DH |

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**TABLE-A.3: ELIGIBILITY FOR MASTER OF SCIENCE BY RESEARCH ADMISSION**

| Discipline [Academic Unit : Department, Centre, Interdisciplinary Group]/ Specialization | Degree/Qualifying Discipline<br>First class or 60% marks (55% marks for SC/ST) as specified in the clause A.5.1. | GATE Requirement |
|---|---|---|
| Master of Science by Research in Computer Science and Engineering | Eligibility for admission to the Master of<br>Science by Research programme will be identical to that for M. Tech. in CSE<br>(i). B.E./B.Tech. or equivalent in any engineering discipline. OR<br>(ii) Bachelor degree in Science (BS) (4 year degree)<br>(iii). M.Sc. or equivalent in any science or mathematical discipline. OR<br>(iv) MCA (with an undergraduate degree BCA or B.Sc. with Mathematics and Physics as a subject) or equivalent) | Valid GATE score (CS) is required for all applicants except those having B.Tech. Degree in any discipline from IITs with CGPA/ CPI of 8.00 (on 0-10 scale) or above. |
| Master of Science by Research (Data Science and Artificial Intelligence in CMInDs) | First Class or 60% marks (55% marks for SC/ST), as specified in the General Eligibility Criteria, in any of the following qualifying degrees:<br>i) B.E./B.Tech./AMIE or equivalent in any engineering discipline.<br>ii) Four-year Bachelor of Science degrees such as 4-year B.S., B.Sc (Honours), or B.Sc (Honours with Research) in any science, mathematical, or engineering discipline.<br>iii) M.Sc. or equivalent in any science, statistics, or mathematical discipline.<br>iv) MCA (with Physics & Mathematics at B.Sc. level) or equivalent | Valid GATE score in: AE, BM, BT, CE, CH, CS, CY, DA, EC, EE, ES, IN, MA, ME, MN, MT, PH, PI, ST, XE, XL |
| Written test and interview:<br>All applicants will be required to take the written-test, and if shortlisted, will be required to appear for interviews for final selection.<br><br>Only eligible applicants with valid GATE scores equal to or above the cut-off specified by the institute in the above listed papers will be called for the written-test.<br><br>Applicants with four-year Bachelor degrees from IITs (admitted through JEE) with CGPA/CPI (normalized to a 10 point scale) of 8.00 and above can be exempted from the GATE requirement if the application is submitted in the IIT BTech category. Please note, there are only limited seats available for this category. | | |
| | | |
| Master of Science by Research in Healthcare Informatics {Koita Centre for Digital | B.E./B.Tech. /AMIE or equivalent in any engineering discipline.<br>OR<br>M.Sc. or equivalent in any science discipline. | Any discipline |

| | | |
|---|---|---|
| Health (KCDH)} | OR<br>MCA (with Physics & Mathematics at B.Sc. level)<br>. OR | |
| | MBBS, BDS, BPharm, BVSc, BPTh, BOTh (degree programme to be of 4 years or more) with 60 percent aggregate | AND qualifying All India level post graduate entrance examination for corresponding disciplines such as AIIMS/ NEET-PG / MCI/ JIPMER /PGI Chandigarh/ AFMC-Pune/ for MBBS/ BDS or GPAT (for Pharmacy graduates) or a valid CSIR/ UGC/DBT/ICMR JRF not linked to ICMR project (for FA any fellowship that will provide scholarship for 2 years |
| Valid GATE score in any discipline is required for all applicants except commissioned officers of the armed forces and those having B.Tech. Degree from IITs with CGPA/CPI of 8.00 and above (on 0-10 scale).<br>The Center may additionally conduct a written test and/or an interview for all applicants to shortlist candidates to be selected. | | |

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## B) MASTER OF SCIENCE BY RESEARCH PROGRAMMES

Currently, the Department of Computer Science and Engineering, CMINDS, KCDH is offering the Master of Science by Research programme

### B.1) Computer Science and Engineering (CS) [Department of Computer Science and Engineering]

The CSE department invites curious and motivated students who love exploring ideas and building new things to apply to our Master of Science by Research programme. If you enjoy deep thinking, tackling tough technical problems, and spending time turning ideas into real contributions, this program is for you. We're looking for students with a strong foundation in core computer science and engineering, along with the creativity and persistence to push boundaries. Admissions to the CSE department are organized under three streams — Intelligent Systems, Computing Systems, and Theoretical Systems. Refer to the department web page (https://www.cse.iitb.ac.in/admissions/pg ) for more information about various panels and the research areas in the streams. Candidates are also encouraged to visit individual faculty members' home pages to learn about his/her current research interests.

ELIGIBILITY FOR ADMISSION- as given in Table A.3 - Eligibility for Admission to Different Disciplines.

AREAS OF RESEARCH

**Computing Systems**
Computer Networks: Data center networks and cloud computing, Network Function Virtualization and Software Defined Networking, Kernel-bypass-based optimizations, Scalable design of wired and wireless networks, Performance modeling and measurement analysis of networked and distributed systems.

Database and Information Systems: Query Optimization, with a focus on parallel and distributed databases (aka Big Data systems), Holistic optimization of database applications,data generation for testing and grading SQL queries, real-time databases, and database support for Embedded and IoT systems, and Spatial databases.

Software Engineering and Paradigms: Software Architecture, Program Synthesis, and Analysis, Design, Abstractions and Paradigms, Design Quality of Program Structure.

Computer Security and Applied Cryptography: Network Security and Privacy, Web Security, Cryptographic Engineering and Secure Computing Systems, Blockchain

Programming languages and Compilers: Programming languages and Compilers: Program analysis, code optimization, compilers, interpreters, and virtual machines, functional and object-oriented programming languages.

**Intelligent Systems**
Natural Language Processing and Information Retrieval: Token-based and neural text representation, Sequence modeling, labeling and generation tasks, Semantics and information extraction, record filling, Summarization and translation, Token-based and neural text retrieval and ranking, Multi-lingual and cross-lingual applications, Reasoning, context management, and dialog, Multi-modal applications with text, images, voice, and video

Visual Computing: Computer vision, Image and video processing and analysis, Medical image computing, Statistical signal processing and high-dimensional statistics, Statistical image modeling and inference, Computer graphics, animation, rendering and geometry processing, Augmented and virtual reality, robot vision, and machine learning in visual computing

Machine Learning: Data integration models and algorithms, Graphical models, Information extraction and retrieval, Forecasting and smart e-business, Text and Web data mining. Integrated mining with relational DBMS, Temporal mining, Integrating mining with OLAP

Decisions and Agents: reinforcement learning, multi-armed bandits, online learning, exploration-exploitation trade-offs, sequential decision-making under uncertainty, game theory, algorithmic mechanism design, auctions, social choice, voting, matching, fair division, cooperative games, planning and control in multi-agent systems, decentralized and distributed learning, autonomous robots, human-robot interaction, decision-making under partial observability, adaptive and interactive robots, human-in-the-loop learning

**Theoretical Computer Science**
Theoretical Computer Science: Algorithms, Combinatorial Optimization, Combinatorics, Complexity Theory, Cryptography, Graph Theory, and Computational Geometry.

Formal Methods: Formal specification, design, and verification of hardware and software systems; Trustworthy Artificial Intelligence; Logic, automata theory, and their applications in reasoning about systems; Automated theorem proving; Model checking;

Refer to the department web page (https://www.cse.iitb.ac.in/admissions/pg ) for more information about various RESEARCH AREAS. Candidates are also to the webpages of individual faculty members to learn about his/her research interest.

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**B.2) Centre for Machine Intelligence and Data Science (C-MInDS)**

The Centre for Machine Intelligence and Data Science (C-MInDS) at IIT Bombay is the institute's main academic division for cutting-edge research and education in Artificial Intelligence and Data Science. With over 50 faculty members from diverse departments across IIT Bombay, C-MInDS is committed to advancing research and developing technologies for the AI era.

The Master of Science by Research program in Data Science and Artificial Intelligence provides students with an extensive coursework covering a vast breadth of topics with sufficient depth, and emphasis on scientific research so as to equip them with the knowledge and proficiency to excel in industry centric R&D careers. Furthermore, the program provides an opportunity for interested students to transition into a dual degree Ph.D program and graduate with Master of Science by Research and Ph.D degrees.

Admissions eligibility requirement: as mentioned above in Table A.3

Course work requirements

Given the diverse academic backgrounds of the students, five breadth topics have been defined, and the students are required to obtain proficiency in each of them. These are:
Computing
Probability & Statistics
AI/ML
Linear Algebra
Optimization

For admissions details please visit www.minds.iitb.ac.in/admissions
For program details, please visit https://www.minds.iitb.ac.in/academic-details/msr
for research, please visit www.minds.iitb.ac.in/research

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## B.3) Master of Sciencey by Research in Healthcare Informatics

Welcome to the Koita Centre for Digital Health (KCDH) at IIT Bombay, India's leading hub for academic programs, research, and industry partnerships in Digital Health.

**About KCDH**
Since June 2021, KCDH has been offering a Minor and Interdisciplinary Dual Degree Program in "Healthcare Informatics" for IIT B.Tech Students, and a Ph.D. program in "Digital Health" from June 2022. We collaborate with leading hospital systems, government departments, healthcare research, and academic institutions to address the growing need for professionals in this field.

**Why Choose Our Master of Science by Research Program?**
Our Master of Science by Research program provides a flexible and enriching R&D experience, serving as an entry point for those interested in exploring the world of research without immediate commitment to a Ph.D. journey.
Here's why KCDH is the right choice for you:

- Successful track record of running Minors, IDDDP & Ph.D. Courses in Healthcare Informatics and Digital Health from 2021 and 2022 respectively.
- Over 110 students in a short span of 2 years.
- More than 54 courses offered to IIT Bombay students.
- Over 900 students taking Digital Health courses in the Academic year 2023-24.
- Collaboration with over 65 associated IIT Bombay faculty members.
- Strong partnerships with over 25 government & private organizations.
- A growing core KCDH faculty.
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ELIGIBILITY FOR ADMISSION- as given in Table A.3 - Eligibility for Admission to Different Disciplines

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**Research Focus**

The following focus areas and themes have been identified for MS by Research program

The research areas include

1. **Large Language Models in Healthcare**
- Diagnosis assistance and improved patient care
- Advancing medical research and knowledge
- AI enabled crisis management
- Data driven policy changes

2. **Healthcare Applications**
- EHR, EMR and clinical applications
- Medical imaging
- Medical devices software
- Payers and life sciences application

3. **Healthcare Data Management**
- Data interoperability and standards
- Data Privacy and Security
- Healthcare data warehousing & management
- Federated data management

4. **Healthcare Analytics and AI/ML.**
- Healthcare AI/ML
- Medical image analytics
- Clinical decision support
- Preventive & prescriptive analytics

5. **Consumer Health & Tele-medicine**
- Consumer health devices
- Mobile Health applications
- Tele-medicine applications
- Remote patient monitoring

6. **Computational Biology and Bioinformatics**
- Proteomics
- Genomics
- Pathway analysis
- Disease diagnosis

7. **Population Health & Public Health Policy**
- Disease surveillance & analytics
- Population health analytics
- Epidemiology & disease management
- Public health policy

**Program Structure**

Students are expected to register for at least:
30 credits in semester I.
22 credits in semester II.
6 credits in semester III.

| Sem I | | Sem II | | Sem III | | Sem IV/V/VI | Total Credits |
|---|---|---|---|---|---|---|---|
| Courses | Credits | Courses | Credits | Courses | Credits | Courses | Credits |
| DH 605: R&D project-I | 6 | Seminar (DH694) | 4 | Elective VI from any group | 6 | MS Thesis | -- |
| DH 302 (Compulsory) | 6 | Elective IV from any group | 6 | MS Thesis | -- | | |
| Elective I from any group | 6 | Elective V from any group | 6 | | | | |
| Elective II from any group | 6 | DH 604 R&D project I | 6 | | | | |
| Elective III from any group | 6 | | | | | | |
| | | DH 899: Communication Skills | PP/NP 6** | | | | |
| Total-Credits | 30 | | 22+6** | | 6 | | 58+6** |

**Potential career paths for students**

The field of healthcare informatics is vast and rapidly evolving. These are just a few examples of the many sectors where opportunities exist for healthcare informatics professionals. The skills and knowledge you gain from the Master of Science by Research program could also be applied to many other roles within these sectors. The possibilities are truly endless!

1. **Healthcare Sector**: Hospitals, clinics, and health departments often employ healthcare informatics professionals to manage and analyze health data, implement and optimize clinical information systems, and oversee IT projects.
2. **Pharmaceutical Industry**: Pharmaceutical companies need healthcare informatics professionals to manage and analyze clinical trial data, develop software for drug discovery, and ensure regulatory compliance.
3. **Biotechnology Industry**: Biotech firms employ bioinformatics specialists to analyze complex biological data, such as genomic and proteomic data.
4. **Health Insurance Industry**: Health insurance companies need healthcare informatics professionals to analyze claims data, manage electronic health records, and develop predictive models for risk assessment.
5. **Government Agencies**: Government health departments and agencies employ healthcare informatics professionals to manage public health data, conduct epidemiological studies, and develop health policy.
6. **Research Institutions**: Universities and research institutions employ healthcare informatics professionals to conduct research, analyze research data, and teach healthcare informatics.
7. **Health IT Companies**: Companies that develop health IT solutions, such as electronic health records systems, telemedicine platforms, and health apps, employ healthcare informatics professionals for software development, data analysis, and project management.
8. **Consulting Firms**: Consulting firms that specialize in healthcare often employ healthcare informatics professionals to provide advice to healthcare organizations on how to best use information technology to meet their healthcare objectives.

**Future Research Opportunities**

The field of Healthcare Informatics is rapidly evolving, offering numerous opportunities for groundbreaking research. Here are some potential areas for future exploration:

1. **Personalized Medicine**: With the rise of genomics and proteomics, there's a growing need for informatics solutions that can help deliver personalized treatment plans based on a patient's unique genetic makeup.
2. **Predictive Analytics**: The use of machine learning and AI to predict disease outbreaks, patient outcomes, and healthcare trends is a promising area of research.
3. **Telemedicine**: As healthcare becomes more digitized, there's a need for research into effective telemedicine practices, including patient privacy, data security, and the efficacy of remote patient monitoring.
4. **Healthcare Interoperability**: With numerous electronic health record systems in use, research into data interoperability standards and solutions is crucial.
5. **AI and Machine Learning in Healthcare**: The application of AI and machine learning in diagnosing diseases, predicting patient outcomes, and optimizing treatment plans is a rapidly growing field of research.
6. **Blockchain in Healthcare**: Research into how blockchain technology can be used to secure patient data and improve interoperability is an emerging field.
7. **Ethics of Health Informatics**: As more health data is collected and analyzed, there's a growing need for research into the ethical implications, including data privacy, consent, and the use of AI in healthcare decisions.

For programme details, please visit https://www.kcdh.iitb.ac.in/academics#ms-by-research-healthcare-informatics

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**Appendix I: STATEMENT OF PURPOSE(SoP)/Additional information**

Statement of Purpose (SoP) is your opportunity to share with the admission committee your motivation for Postgraduate studies at IIT Bombay. Include a brief description of past project/ research work done by you. Restrict yourself to 500-600 words. The personal SOP will aid the admission committee in evaluating your application.

1. **Name**: _____

2. **Programme of study:** Master of Science by Research Discipline **:** _____

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**Appendix II: Sponsorship Certificate for Master of Science by Research Programme External Registration (EX)**

(To be typed on letterhead of the Sponsoring Organization)

Name of the sponsoring organization: _____
Address: _____
_____
Present Designation of the applicant:
_____
_____

Present status of the applicant:_____
(Permanent/Quasi Permanent/Temporary)

Division where research work is proposed to be done:
_____
_____

Name of supervisor from the sponsoring organization: _____
(Bio-data of supervisor to be enclosed giving details of designation, qualification, research experience etc.)

Details of facilities relevant to the research problem which will be made available to the candidate by the organization.

**Statement of proposed Co-supervisor (external)**

If Shri / Kum. / Smt._____ is registered for the Masters of Science by Research degree, I agree to act as his/ her research Co-supervisor along with the research Supervisor from IIT Bombay.

Signature of proposed Co-supervisor (external)

If Shri. / Kum. / Smt. _____ is admitted to the Master of Science By Research programme, we shall allow him/ her to undergo the programme of studies at IIT Bombay.

Further, if Shri. / Kum./ Smt. _____ is admitted to the Masters of Science by Research programme, we shall fully relieve him/her from duties to complete the course work requirement (and qualifier examination, if applicable) at IIT Bombay.

During the period of Masters of Science by Research programme, the candidate will be permitted to carry out his / her research work at our laboratories / organization and will be given the required facilities.

Any Intellectual Property developed by Shri./ Kum./Smt. _____ during the course of his / her Masters degree / Masters of Science by Research programme will be owned by IIT Bombay, unless the sponsoring organization enters into a separate MoU/Agreement with IIT Bombay specifying the terms of IP ownership, before the enrolment of the candidate.

We also give our consent to _____ of our organization to be the Co-supervisor (external) of the Masters of Science by Research thesis, along with a faculty member of IIT Bombay as the Supervisor.

Signature and Seal of the Sponsoring Authority

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**Appendix-III : No Objection Certificate (NOC) from Principal Investigator (PI)**

This is to certify that _____ (name) has been working in Project _____ from dt. _____.

The duration of the project is _____ years. Appointment of _____ _____ (Name) is for the period of _____ years. His / Her appointment is likely to be extended for the further period.

I have no objection if he/she register for Master of science by Research. Programme in _____ (academic unit) under Project Staff category.

Signature _____

Prof. _____

Principal Investigator: _____

Project Code : _____

Project Title : _____

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