

M.TECH IN CONSTRUCTION TECHNOLOGY AND MANAGEMENT



CIVIL ENGINEERING DEPARTMENT, IIT BOMBAY, MUMBAI

The Department of Civil Engineering has been a part of IIT Bombay since its inception in 1958. Over the years, the department has grown tremendously, and is now recognized as one of the best and major engineering departments in the country and ranked highly in the World for Civil Engineering.

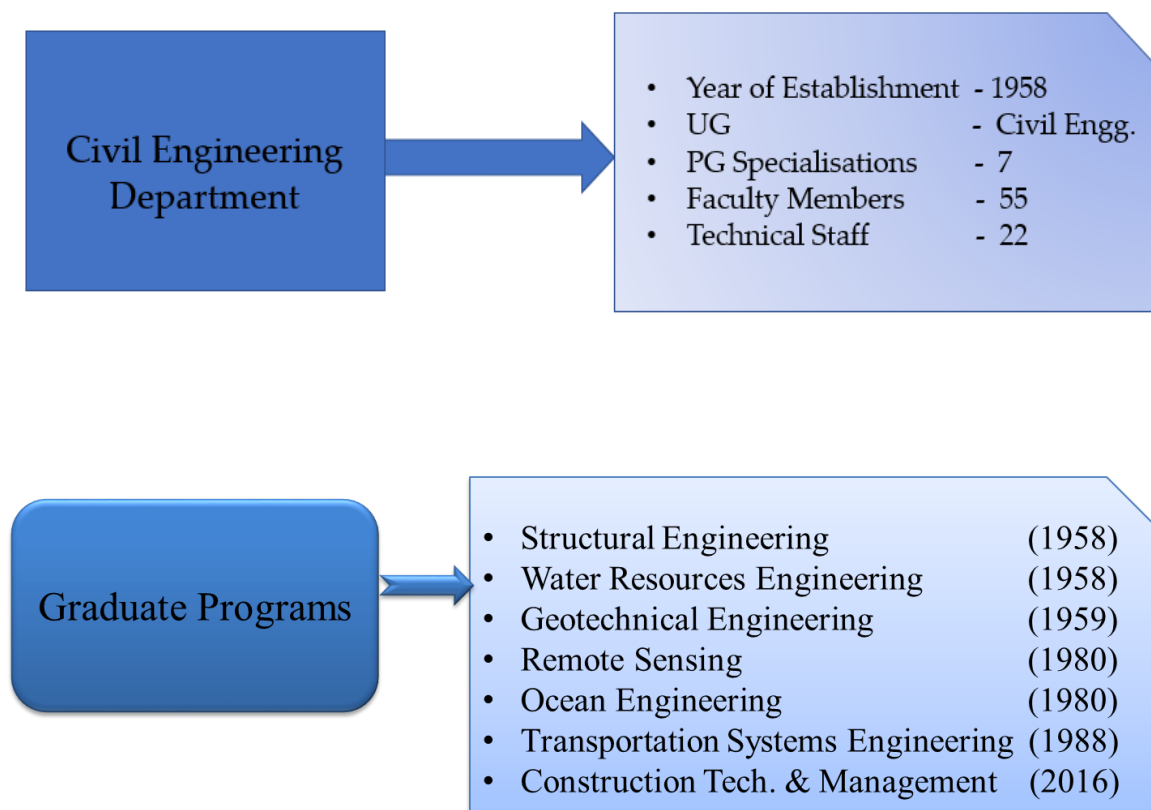


Figure 1 Overview of Civil Engineering Department, IIT Bombay

GRADUATE PROGRAMMES AT CIVIL ENGINEERING DEPARTMENT

The overview of the Civil Engineering Department is given in Fig.1. It offers graduate programmes in six specializations (Structural Engineering, Water Resources Engineering, Geotechnical Engineering, Remote Sensing, Ocean Engineering, Transportation Systems Engineering and Construction Technology And Management). These programmes include Dual Degree (B.Tech + M.Tech), M.Tech, PhD and Dual Degree (M.Tech. + PhD). With a faculty strength of 55, the department is offering about 50 theory courses and 6 laboratory courses every year at a post-graduate level. On the under-graduate level, the department is offering about 40 theory courses and 11 laboratory courses per year. The department currently has 441 students on roll (Table 1) in the seven specializations including both

years M.Tech and PhD. About 50-60 M.Tech students and 15-20 PhD students graduate each year from the department.

Table 1 Post-Graduate students (as on January 2023)

Specialisations	Current PG Students		
	PhD	M.Tech.	Total
Structural Engineering	53	37	90
Water Resources Engineering	60	24	84
Geotechnical Engineering	58	20	78
Remote Sensing	28	12	40
Transportation Systems Engineering	42	27	69
Ocean Engineering	10	12	22
Construction Tech. & Mgmt.	28	30	58
Total	279	162	441

NEED FOR THE M.TECH PROGRAMME

Construction industry plays a significant role in the economic development of a country. In the next few years, India plans to invest about 1 trillion USD in infrastructure development. In addition to the infrastructure development, it is envisaged that an equivalent or greater amount of investment would be made in various construction projects (both public and private) to support the growing economy. The demand for construction and development would further be boosted by the urban revival plans of the Government of India. In this context, the construction industry in the country would look at unprecedented growth in the future. An underlying significant requirement to achieve such huge objectives is to have skilled manpower and engineers competent enough to manage complex construction projects to their completion successfully. The industry is already witnessing a need to employ skilled project managers for the execution of the projects.

Leading construction industries in the country are looking for specialist engineers in construction technology and management to tackle the challenges of ever increasing complexity in the present day construction. Further, the growth which would be witnessed in the construction industry would create a strong demand for skilled engineers and construction managers in the field of construction technology and management.

CONSTRUCTION TECHNOLOGY AND MANAGEMENT IN OTHER UNIVERSITIES

World over, construction technology and management is considered an important specialization for civil engineering graduates. Top universities (like MIT, Stanford University, Georgia Institute of Technology etc.) in the world have a dedicated and dynamic research communities working in this area. In India, presently the construction technology and management programme is being offered only in very few prestigious institutes (IIT Madras, IIT Delhi, IIT Guwahati). IIT Bombay has been at the forefront in addressing the present day needs of industry at one hand and providing guidance on the opportunities of future development in technology through world-class research.

Major Thrust areas are Construction Materials & Technology, Construction Management, and Urban & Building Sciences

The acute need for specialists in construction technology and management both in industry and research would enable IIT Bombay to attract some of the best talent in civil engineering to the proposed M. Tech programme. In this context, it is deemed essential for the institute to address the concerns of the construction industry by introducing construction technology and management specialization in civil engineering to train students/practicing engineers. Further, establishing a research stream in construction technology and management would help IIT Bombay to contribute to the advances in construction industry in India.

OBJECTIVES OF THE M. TECH PROGRAMME

The objective of the proposed M Tech programme is to build quality manpower to effectively manage large construction projects including infrastructure projects throughout their lifecycle including planning, construction and maintenance; with in-depth understanding on the materials used in construction. The curriculum would offer detailed understanding of the materials especially concrete technology in construction. It would expose students to the latest advancements in construction materials, technology and management including latest quality management paradigms, policies and sustainability aspects in construction. Emphasis would be given to equip students with strong fundamentals on the respective areas and orient them to acquire skills to solve complex problems in construction. The curriculum would be designed to have close proximity to the challenges and advances in the industry to make the students more employable. The aim of the programme is to create leaders in the field of construction technology and management in the country.



Construction Technology and Management is offered by only a few academic institutions across the world and in India



COURSE STRUCTURE

Construction Materials & Technology; Construction Management and Urban & Building Sciences form the three major thrust areas for the proposed M.Tech. Programme. The students are expected to have in-depth expertise on the fundamental concepts in these areas when they graduate from

the institute. The course structure proposed for the programme is given in Table 2.

The course will normally span for four semesters. The students are expected to take theory and laboratory courses in the first two semesters. However, part time students will be completing the course requirements in a span of two years (first four semesters). This will be followed by a year-long project thesis based on a problem of the students' choice in both modes (full time and part time).

The courses will expose students to the advances in materials, construction management techniques, construction technology & practices, building services and functional design of buildings. The students are expected to earn 164 credits before they graduate from the institute.

Table 2 Course structure and credit requirements for M.Tech programme

Course structure	Semester I	Semester II	Semester III	Semester IV	Total Credits
Core Courses	14	6	-	-	20
Elective Courses	12	18	-	-	30
Institute Electives	-	6	-	-	6
Laboratories	4	4	-	-	8
Seminar	-	4	-	-	4
Communication Skills	6*	-	-	-	6*
Course Total	30+6*	38	0	0	68+6*
Project			48	42	90
Total Credits	30+6*	38	48	42	158+6*

COURSES OFFERED AS PART OF THE PROGRAMME

Semester wise courses to be offered for the programme are given in Table 3. The student has to earn a minimum of 164 credits to graduate. According to the institute, a credit is one hour of work towards the subject from the student. A 6 credit course would usually involve 3 hours of lecture followed by 3 hours of self-study/assignments by the student in a week. A laboratory would usually involve about 3 hours of work by student preparing and conducting prescribed experiments.

The students are expected to clear all the mandatory courses (core courses, indicated by 'C' in the Table 3) before graduating. Apart from these core courses, there are a number of Elective courses (designated as 'E' in Table 3) offered from a huge basket of electives as part of this programme. These courses would enable the student to pursue and gain in-depth knowledge in areas of her/his interest. Every student should pass a minimum of 5 electives to earn the required credits to graduate.

The core courses are aimed at giving the student an in-depth understanding of the construction materials used in construction with special emphasis on concrete technology. Advanced Construction Management course will dwell on time and cost management of the construction projects. Construction Contracts course will introduce the various fundamentals on construction contracts, standard forms of contracts, bidding processes etc. to familiarize students with the contract management aspects of construction. Apart from these core courses, the programme would also comprise of laboratory courses in material technology and construction management which are mandatory for the students.

Table 3 Semester wise course details

Sem.	Course Name	Credits	Core/ Elective
I	Advanced Concrete Technology	6	C
	Construction Planning and Control	8	C
	Elective I	6	E
	Elective II	6	E
	Construction Materials Laboratory	4	C
	Communication Skills	6*	C
	Semester total credits	30+6*	
II	Construction Contracts	6	C
	Elective III	6	E
	Elective IV	6	E
	Elective V	6	E
	Institute elective	6	E
	Construction Management Studio (Lab. Course)	4	C
	Seminar	4	C
	Semester total credits	38	
III	Dissertation I Stage (M.Tech Project)	48	C
IV	Dissertation II Stage (M.Tech Project)	42	C
	Total credits	158+6*	

Further, the students can choose the five elective courses from a list of electives offered as part of the programme as given in Table 4. In future, depending on the need of the programme, new electives will be added. The electives cover wide range of subjects in the major thrust areas of the programme. The five electives in the course structure would provide the students with enough freedom to choose the area of interest and pursue courses in that area. Care has been taken to ensure that all major themes of the thrust areas are covered as part of the basket of electives available for this programme. The students depending on their interest/industry requirement/dissertation can take courses beyond the list of electives provided here to gain sufficient knowledge to pursue their thesis.

FACILITIES AT IIT BOMBAY

At present, there are 6 faculty members associated to this programme, who have expertise in all the thrust areas. A fully functional construction materials laboratory and construction management studio would be available by the time when the programme start admitting students. The department is also planning to develop an integrated building sciences laboratory in future.

VALUE ADD TO STUDENTS

Both students with experience and fresh graduates out of engineering colleges would greatly benefit by the exposure this programme would create about the latest trends in construction technology, materials, management practices and building sciences as well. This programme will equip the students with all round skills ranging from knowledge on materials and practices in construction to management of complex construction projects. Government bodies, research organizations, infrastructure development

companies, large construction contracting companies, material manufacturing companies, consultants to construction projects should be interested in the graduates equipped with skill sets developed during the course of this programme. The placements for fresh graduates and the career paths for working professionals would be bright after this programme.

Table 4 List of electives offered for this programme

S. No	Course Name	Thrust
1	Construction equipments and personnel management	Construction Management
2	Construction economics and finance	Construction Management
3	Quality and safety in construction	Construction Management
4	Transportation Project Evaluation and Decision Making	Construction Management
5	Optimization in civil engineering	Construction Management
6	Organizational Behavior	Construction Management
7	Construction Materials	Materials and Technology
8	Formwork for concrete structures	Materials and Technology
9	Non Destructive Testing of Materials	Materials and Technology
10	Condition Assessment and Rehabilitation of Structures	Materials and Technology
11	Construction Techniques and Practices	Materials and Technology
12	Coastal, Port and Harbour Engineering	Materials and Technology
13	Offshore Construction	Materials and Technology
14	Introduction to Buildings: Functional Design and Science	Urban & Building Sciences
15	Fundamentals of urban science and engineering	Urban & Building Sciences
16	Research methods for urban science	Urban & Building Sciences
17	Management techniques for urban systems	Urban & Building Sciences
18	Green building design	Urban & Building Sciences
19	Environmental Impact Assessment	General
20	Applied Statistics	General

ADMISSION PROCEDURE

The proposed M.Tech programme would start admitting students from academic year starting in 2016. The notification for the admission would be issued in first week of March 2016 (through newspapers and IIT Bombay website). The candidates can be apply in any one of the following categories

- i. *Teaching Assistantship (TA)/ Teaching Assistantship through Project (TAP)/ Fellowship Award (FA)*
- ii. *Research Assistantship (RA)/ Research Assistantship through Project (RAP)*
- iii. *Project Staff (PS), for Project staff of IIT Bombay*
- iv. *Institute Staff (IS), for faculty/ staff of IIT Bombay*
- v. *Sponsored candidates (SW)*

The admission process would involve a test and/or interview by May 2016. The instruction for the programme would begin by July 2016. Further details can be obtained from the institute website (<http://www.iitb.ac.in/newacadhome/mtech.jsp>).

SPONSORSHIP CATEGORY (SW)

The sponsored candidates should be employees of reputed industrial organization / government bodies. They should either have a valid GATE score (in Civil Engineering Discipline) or a minimum of two years of relevant professional experience after the qualifying degree. The qualifying degree in this case is B.E/B.Tech in Civil Engineering (First class) or B.Arch (First class). The selection of the students into the programme shall be based on the performance in written test/interview conducted by the Civil Engineering Department, IIT Bombay. The candidates should have full financial support from the concerned sponsoring agency for the entire duration of the M.Tech programme. Only for the sponsored category, the candidates can pursue either a full time 2 year duration M.Tech or a part time 3 year duration M.Tech.

FULL TIME VS. PART TIME M.TECH

The full time M.Tech would involve first 2 semesters of course work, with 5 courses and 1 laboratory course in each semester followed by a year-long project work. The part time M.Tech course would have a relaxation on the number of courses taken per semester. The part-time would involve 4 semesters of the course work at a relaxed pace of about 3 courses per semester and a laboratory course for the first two semesters. This will be followed by a year of project work. It should be noted that the part time does not involve course work or classes in evenings/weekends. The courses would be offered at regular slots (anytime between 8:30 am to 8 pm on weekdays) of the institute. The student would be free to work in their sponsoring companies after attending classes in the institute. The project work in both full time and part time can be related to basic or applied research towards solving existing intricacies of the construction industry.

SPONSORSHIP MODES

Different sponsorship modes can be worked out between the potential candidates and the organizations. The department is willing to sign memorandum of understandings (MoU) based on the interest of various organizations. Interested organizations can contact the department for specific details. The sponsorship schemes relevant to each organization can be further discussed and detailed upon. Please note that the final cost will be determined only after finalizing the details of sponsorship with the respective organizations.

The notification for admissions to the M.Tech programme - March every year. Classes start in July

For further details contact:

The Head of the Department, Civil Engineering Department, IIT Bombay, Powai,
Mumbai – 400076

Phone: 022-2576-7301 | | **Fax:** 022-2576-7302 | | **Email:** hod@civil.iitb.ac.in