CEPT UNIVERSITY

FACULTY OF TECHNOLOGY

PROGRAM BROCHURE

M.TECH GEOMATICS

FACULTY OF TECHNOLOGY

Table of Contents


C
E
P
T
BUILDING

About CEPT University

CEPT University, established in 1962, is focussed on understanding, designing, planning, constructing, and managing human habitat. Its teaching programs are designed to build thoughtful professionals and its research programs aim to deepen the understanding of human habitat. CEPT University also undertakes advisory projects human habitat.

CEPT University has been recognized as a Centre of Excellence by the Government of Gujarat. CEPT's alumni are leaders in their respective fields in private practice, consulting firms, government organizations, multilateral institutions, and academic institutions across the world.

The University comprises of five faculties-

Faculty of Architecture (FA)
Faculty of Planning (FP)
Faculty of Technology (FT)
Faculty of Design (FD)
Faculty of Management (FM)

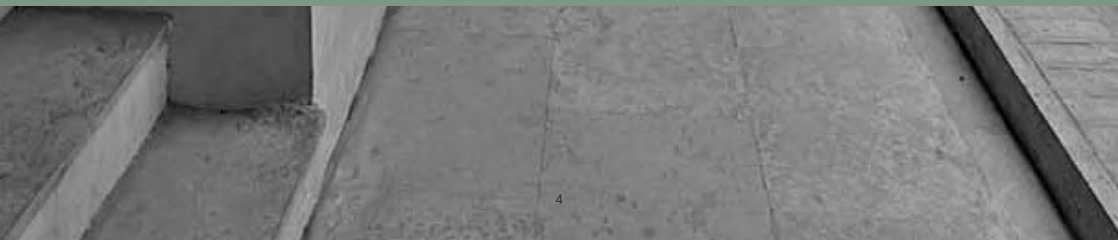
About Faculty of Technology at CEPT Univeristy

With the Indian construction industry rapidly expanding multifold, there is an increasing need for efficient and qualified professionals to sustain this growth. Our courses lays the foundation for students to engage in the dynamics of the industry and understand the construction and design process. With a strong foot-hold on fundamentals and well- rounded exposure, students step out well-equipped to plan, design and construct human habitats.

CEPT established the School of Building Science and Technology (SBST) in 1982 that focuses on issues concerning Planning, Design, Construction & Management of Human Habitats. SBST has now been renamed as Faculty of Technology (FT).

FT offers total of 5 programs:

Bachelor's in Civil Engineering (Honors) - (BCE)
Master's in Building Energy Performance - (MBEP)
Master's in Construction Engineering & Management - (MCEM)
Master's in Geomatics - (MGeo)
Master's in Structural Engineering Design - (MSED)



What is unique about Programmes at FT?

Studio Based Pedagogy:
o Teacher Student Ratio 1:8
o Creative Problem Solvers
o Innovative Engineers

Pre-Admission Scholarships

Earning while Learning

Study abroad
o Polimi University, Italy

Practical Training

Cutting edge Library and workshops NABL accredited laboratory
o Surveying & Levelling

Computer lab
o ArcGIS
o ENVI
o ERDAS

Master’s in Geomatics

MGeo is a multidisciplinary course that attracts people from diverse academic backgrounds and integrates the acquisition, management, analysis, modeling and visualization of Geo-spatial information. The program is intended to be application-based, with a strong focus on urban environments.

With the growing importance and adaptation of Geospatial technology, the program offers courses on recent technological advancements in the field and strives to become one of the country's leading Geomatics program. Students develop skills in solving problems using big data, monitoring and managing changing environments by means of GIS and remote sensing. Support in creating computer-aided data visualization, communication and geospatial information, and conducting web processing and analysis through open source spatial data to name a few. Moreover, the faculty members are drawn from both industry and academia and bring a lot of expertise and problem solving experience to the class room environment.

Over the last two decades, the program has evolved with a new pedagogy and curriculum, making it a unique futuristic course that aims to prepare professionals that meet the industry demands. The graduates of the Geomatics program are not only learning logical and analytical skills but are also well-versed in data visualization, presentation and other soft skills. They excel in research, academia, and the corporate world due to their varied skill sets. The strength and reputation of CEPT's Geomatics program encourages industry involvement, and students benefit from the opportunity to connect with the private sector and communicate with future employers.

200+ Alumni making impact in the industry - leaders in their respective fields in private practice practice, consulting firms, government organizations, multilateral institutions and academic institutions across the world.

Dean's Message

Dr. Aanal Shah
Dean
Faculty of Technology

"CEPT University offers teaching programs, aimed to build thoughtful professionals, where the students are engaged with studios offering well-designed life-like problems.

Faculty of Technology is one of the five faculties of CEPT University offering a Postgraduate Program in Geomatics. The M.Tech Geomatics (MGeo) program is a technologically enriched course imparting multiple skills to the students from a multi-disciplinary background to cater smart and sustainable decision making in various applications of built habitats.

With learning from a unique blend of subjects like remote sensing, Geographic Information System, spatial data analysis, programming languages, machine learning and photogrammetry, our students are able to contribute to multidisciplinary fields of Engineering, Information Technology, Architecture, Construction, Infrastructure, Utilities, Environment, Planning, Management, and Governance. Students of this program are also exposed to exchange programs, national and international seminars, workshops and summer schools pertaining to the Geo-spatial industry. We take pride in seeing the Graduates from this program getting successfully placed nationally and internationally. Many of them have also been successful in starting and establishing a consultancy firm providing Geo-spatial solutions to the challenges of the society. I am sure these dynamic students of the Geomatics program will be an asset in any organization as they are trained to face the professional challenges and solve the larger issues of the society."

Program Chair's Message

Dr. Dhwanilnath Gharekhan

Program Chair |Geomatics

The MGeo Program at CEPT University stands out for its distinctive studio-based teaching and learning approach. The faculty members bring a wealth of experience from diverse backgrounds, combining practical expertise with scientific rigor in the classroom. Students not only delve into various Geomatics subjects but also explore innovative applications in the built environment.

Over the course of two years, the program exposes students to fundamental GIS and RS concepts, progressing to advanced topics such as modelling, spatial data science, customization, and web app development. Leveraging extensive Dataset and cloud-based platforms, students acquire the necessary analytical and programming skills to analyze, interpret, and visualize spatial data in alignment with the latest advancements.

I am confident that graduates from this CEPT program consistently strive for excellence in the field of geo-spatial technology. They are well-equipped to contribute as valuable assets to any organization they join.


Development o
This is how Dubai ha
CEPT
Google

Course Pedagogy

Geomatics refers to the science and technology to study geo-spatial information. earlier trend of Geo-spatial technology, which was mostly focused on mapping, is now being pushed to include industrial processes, transparency, productivity, safety, and project management.

MGeo offers a unique and comprehensive professional course encompassing machine learning, remote sensing, GIS, and visualization across various disciplines. Through subjects such as Photogrammetry, GPS, Big Data Analytics, Web and Mobile GIS, Programming, and Database Management, students delve into diverse topics. This program presents a distinctive opportunity to explore the extensive applications in multidisciplinary fields including engineering, IT, architecture, construction, agriculture, infrastructure, utilities, environment, planning, management, and governance.

The program emphasizes on theory, practical applications through hands-on exercises, studio (real-time case studies) and dissertation. Faculty members are drawn from scientific and academic institutions, experienced professionals with in-depth theoretical and practical knowledge who brings applied knowledge to the classroom. A wide exposure and encouragement to be a part of rich knowledge exchange programs such as national and international seminars, workshops and summer schools pertaining to the Geo-spatial industry, have remained a key strength of the program over the years, since its inception at CEPT University in 1987.

Core Competencies

The Master's program in Geomatics allows students to broaden and deepen their expertise in Geo-spatial data acquisition, data analysis and visualization. Along with theoretical learning, studios, lab work, and elective/SWS courses expose students to cutting-edge research and advanced methodologies, as well as real-world problems and case studies, which promote key transferable skills such as teamwork, problem solving, critical thinking and communication.

At the end of the two years of the program, students develop the following core competencies, in order to meet the changing demands of the industry and excel in their workplace:

1. Geographic Information System (GIS)
2. Optical, Hyper-spectral and Microwave
3. Global Navigation Satellite System (GNSS)
4. Photogrammetry & Unmanned Aerial Vehicle (UAV)
5. Geospatial Programming and Web-GIS
6. Database Management System (DBMS)
7. Artificial Intelligence and Machine Learning (AI & ML)
8. Geo-spatial Analysis and Modelling
9. Spatial/Urban Data Science
10. Applied Statistics


Multiple Kernel Active Learning (MKL)
F Multi-source data
Construct kernels
Solve optimal weights
SVM classifier
Classified data
Labeled set L
Unlabeled candidates U
Selected candidates
Select samples whose distance to hyperplane is smallest
Remaining candidates
Labeled by user S
24

Course Curriculum

Semester –I

Geo-visualization and Spatial Analysis

This studio is designed with a focus on inculcating the culture of mapping and learning geo-visualization. - Specifically, the emphasis would be on understanding the basics of GIS and spatial databases to create meaningful maps for providing geospatial solutions to problems/issues/challenges. Geo visualization using vector and raster-based data models will be taught in depth. As a part of the studio, to facilitate the student's ability to develop thematic geo-visualization skills using GIS software a modular component on Introduction to GIS and cartography shall be covered. As a part of the studio, several interactions with experts and planners will be carried out to understand and solve problems using geospatial technology. Towards the end, the students would be able to solve or propose probable spatial solutions.

Remote Sensing: Theories and Practices

This course provides the fundamentals of remote sensing and satellite image processing. The remote sensing data acquisition principles along with satellite image processing techniques would be covered. Specifically, several image enhancement techniques and classification algorithms will be covered with suitable examples.

Effective Communication

The course presents new paradigms of leadership communications in the form of maneuvers that can act as game changers in complex scenarios that require critical thinking, comprehending ever-evolving mutable market scenarios and interlacing changes in organizational structures, crucial decision making, and persuasive merits in interacting with internal and external stakeholders. The course presents new strategic frameworks of communication both theoretical and practical demonstrating their applications in diverse domestic and international corporate cases.

Geospatial Programming Methodology

This course deals with programming skills and database development in the field of geospatial technology. The programming languages like html and java would be covered. Apart from the programming skills, the spatial database development component would be taught with hands on sessions.

Course Curriculum

Semester –II

Python Programming for Spatial Analysis

This subject emphasizes learning programming centered around geospatial applications. The students will be taught logic and sequence, the models and designs useful to write a program applied to geospatial data. Learning programming, their structure, and flow in Python and getting acquainted with libraries curated for dealing with geospatial data, would enable learners to see solutions to real-time world problems through powerful capabilities offered by Python libraries.

GIS for Smart Cities Studio

This studio is designed with a focus on applying geospatial technology for building smart cities. The purpose of smart cities is to drive economic growth and improve the quality of life of people by enabling local area development and harnessing technology, especially technology that leads to smart outcomes. Specifically, the emphasis would be on the use of spatial datasets, tools, and techniques for providing geospatial solutions to smart city problems, undefined issues undefined challenges. Through this studio, the students learn how to handle the methods and challenges of GIS implementation in smart cities and develop unique geospatial applications.

Advance Remote Sensing

This course provides the theoretical foundation of Microwave and Hyper-spectral remote sensing. The Synthetic-aperture radar (SAR) polarimetry and interferometry techniques will be covered along with the hyper-spectral data processing and analysis.

Spatial Analysis Techniques

The course provides different methods and techniques for analysing spatial data. Several thematic areas such as watershed analysis, multi-criteria decision analysis (MCDA), nearest and neighborhood, network analysis, spatial interpolation point pattern analysis, spatial regression, and hot spot analysis will be taught with several case studies.

Course Curriculum

Semester –III

Geospatial Modelling and Application

In the studio, students will explore different methods, techniques, and technologies to build a 3D model and work with different 3D data structures, tools, and algorithms to handle the third-dimensional aspect of the real world. All the data collection, creation, and application pertaining to 3D will be carried out in an urban environment to address real-world problems. Also, students will be working with open-source software/tools to interact with the 3D objects and customize the model as per the given application. The application and importance of the 3D model will be further explored in thematic areas in the GIS environment.

Applications of Spatial Big Data & Analytics

This course shall cover the fundamental concepts of Machine Learning, Artificial Intelligence, and Deep Learning with special emphasis on Geospatial applications and spatial and Nonspatial. From forecasting to estimations to classification techniques. The tools themselves can assist in analyzing as well as predicting key parameters within themes for various applications like traffic estimation, weather forecasting, error detection, material identification, etc.

Digital Photogrammetry and Terrain Analysis

This subject covers the principles of Photogrammetry with conventional and modern approaches. The emerging UAV technologies and their application will be covered towards 3D spatial object reconstruction. Also, the latest developments in scanning and LIDAR technology will be covered with suitable examples. Through this course, students will be able to Understand the theoretical basics of photogrammetry and Extract 3D models using photogrammetric approach.

Web GIS and Server Architecture

The course will teach students to set up web services for creating maps, web services for managing spatial data, and webservices for processing spatial data. This course will challenge students to exercise critical thinking and technical knowledge needed to evaluate and develop successful Web GIS projects.

Semester –IV - DRP

Total Credits = 80

Studios Credits = 12 Each,

Mandatary Course Credits = 2 Each | DRP Credits = 14 | Other

(Elective + SWS) = 12

Note: Curriculum is subject to change to cater the challenging problems of the industry and society

Elective & Summer Winter School

CEPT University cherishes the individual interests and abilities of its students. Students get a chance to chart their learning paths by completing a portion of their credits by choosing from a wide range of elective courses offered at any of the five faculties at the University. It gives them a greater exposure to a wide range of disciplines related to the built- environment and an opportunity to collaborate on a multi-disciplinary campus. The Summer Winter School (SWS) programs differ from the regular semesters in terms of structure, approach, and content. The keywords that capture the spirit of SWS are experiment, variety, and innovation. They explore emerging areas, provide space to test new ideas and methods, facilitate in situ experience, help understand critical sites and situations, and create opportunities to learn by making. The courses in SWS are intense and are for short durations of between two to four weeks. Following is an indicative list of electives and SWS courses offered to students:

ELECTIVES:

- Machine Learning and Artificial Intelligence for Spatial Analysis
- Tackling Urban Climate Change Using Systems Thinking
- GIS for Engineers
- GIS for Cities
- GIS for Public Health
- Spatial Hydrology
- Applied Statistics with Python and Excel
- Data Science and Machine Learning with Python
- Graph Theory
- Geospatial Technology for Analyzing urban climate change

SWS COURSES:

- Urban Data Science
- Location Intelligence
- Image Processing and its applications with Python
- Python for Beginners
- Google Earth Engine for Beginners

Teaching Team

Dhwanilnath Gharekhan (PhD)

Manushi Bhatt

Shiv Mohan (PhD)
Project Director ISRO (retd.)

Kirtika Chhetia (PhD)
Manager Program for NID' Business Incubation Center - NDBI

Santosh Gaikwad
Director Geo Solution
Nascent Info

Pratik Mehta
Principal Consultant
Amnex Infotechnologies Pvt. Ltd

Lectures & Webinars

The University invites some of the brightest minds from around the world to speak to students on cutting-edge developments in construction, architecture, planning, design, urban habitat development, and other global issues. Following is an indicative list of webinars hosted at Faculty of Technology in association with IEEE GRSS SB:

2022

•A lecture on **Radar Polarimetry methods for the diagnosis of Geo / Environmental Hazards** by Dr. Gulab Singh, Professor from IIT-B

•A lecture on **GNSS Remote Sensing & its applications** by Dharmendra Kumar Pandey, Scientist from SAC, ISRO

2023

•A lecture on **Scope and Capabilities of smart cities** by Manthan Soni, Associate director from PwC, India

•A lecture on **Rajkot: A Smart City** by Heema Patel, Senior Consultant from PwC, India

•A lecture on **Geospatial in smart city- improving standard of living** by Vinay babu adimulam, National Head - BD, Strategic Account from Hexagon

•A lecture on **Essential Geospatial Skills for students and Researchers** by Ujjaval Gandhi, Founder from Spatial thoughts

•A lecture on **Application of Geospatial Technologies for Smart Cities** by AGI

•A lecture on **Mangalyaan: India's First Mars Orbiter Mission (MOM)** by Sampa Roy, Scientist from SAC,ISRO

•A lecture on **Remote Sensing: Earth and Beyond** by Nilesh Desai, Director from SAC,ISRO

•A lecture on **GeoBIM: Current and Future Trend**s by Satej Panditrao, Technical manager from AGI |Chandrashekhar Sayankar, Vice President from Ceinsys |Roma Malik, Senior Presales Engineer from ESRI India |Ramana Reddy, Senior Vice President from Avineon

•A lecture on **Introduction to Google Earth Engine** by Aakash Malik, Program Associate - Urban Water Resilience from World Resources Institute

Learning Environment & Campus Life

The atmosphere on CEPT campus is lively and conducive to free thinking. Interdisciplinary learning is encouraged and students get to collaborate with other built-environment professionals within the ecosystem of CEPT University.

The state-of-the-art library has a wide variety of books, foreign journals, and other resources available to all students making CEPT University one of the best for built- environment resources in the country. Students have access to various labs and several GIS and image processing softwares (ArcGIS, ERDAS, ENVI, LPS, ContextCapture) for processing Geo-spatial data.

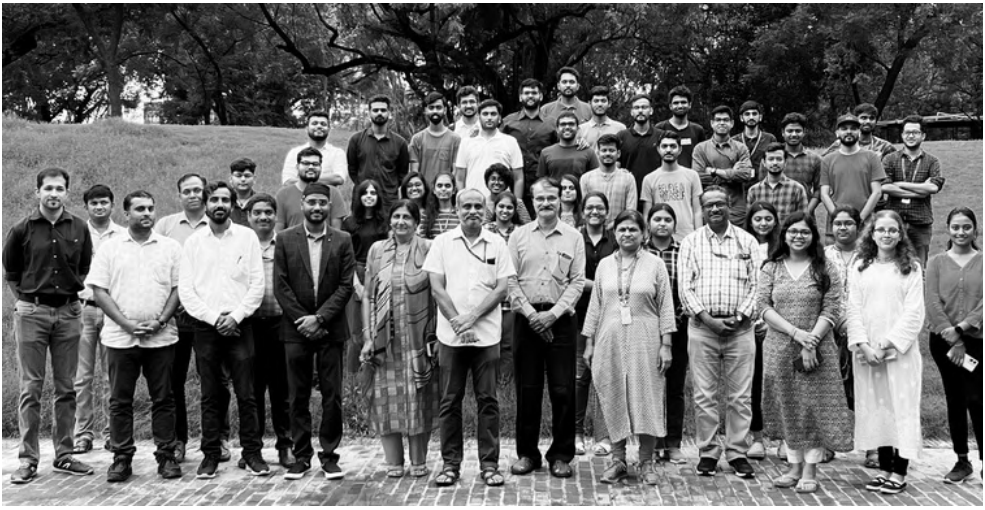
There are in-house IT support, premium printing and stationery facilities, student service office, university press and other services are some additional facilities that enhance the learning environment at the university.

Student Activities

CEPT University boasts of a multifaceted culture on and off-campus, reinforcing its image as an institute that inculcates all-round development of its students. The diverse community comes together to celebrate traditional and regional festivals on-campus throughout the year. Sports competitions such as the Amity Cricket Cup, Volleyball Tournament, Box Cricket League and others fosters a positive environment, giving ample opportunities to participate.

At the Faculty of Technology, Student Chapters organize online and oncampus events for students to meet and learn from industry professionals and engage with peers. The FT newsletter is published by the student body quarterly, highlighting student/ faculty activities and achievements, important events, alumni interactions, placement and internship details, and insights on industry. Our strong alumni network gives students a chance to get in touch with them about future career prospects through the Student- Alumni Interaction platform.

Our students also actively participate in national scholarship programs, conferences, and technical competitions. The Faculty of Technology also collaborates with premier institutes such as ESRI and celebrates Engineer's Day, GIS day, and Remote Sensing day with active students participation. During Engineer's Day each year, students work around a topic to create awareness through role-play activities, lecture from eminent personalities, quiz contests etc.



Collaboration

The Faculty of Technology (FT) is keen to develop collaborations with renowned industries under the umbrella of MOU and EOI on a willingness to undertake activities related to research and development in the construction sector. The 3 major domains of collaborations are within the industry (DRP, placements, and/or Internships), international universities for exchange programs, and students' chapters with professional associations.
The following are the updates till date-for the year-2021-2023.

(A) Industry MOUs

1. Association of Geospatial Industries (AGI)
2. NeoGeo Technologies Private Ltd.
3. ESRI India
4. Indian Space and Research Organization

The following are with CRDF - MGEO Academic Collaborations:

1. Indian Institute of Public Health (IIPH)
2. Pixxel Pvt. Ltd.

(B) FT International Universities - Exchange Programs

1. Polimi University - Italy

Student's chapters

Student's Chapters are formed with various objectives, some subject-specific, but broadly these chapters shall bridge the gap between standard academic courses and the current industrial practices. Students learn to work in groups, organize events, the opportunity to interact with industry experts, and participate in events and competitions.

They facilitate:
1.Better connection with associations and their activities.
2.Can participate in online webinar series, e-courses, expert lectures, and other programs offered by such organizations.
3.Students get the opportunity to volunteer for association events, thereby enhancing their organizational skills.
4.Opportunities for interaction with professionals for a future career path, recent trends, research, etc.
5.Association helps to promote events within their group resulting in better participation.
6.Institute gets resource persons for their academic programs and juries.

Below are the student chapters initiated by The Faculty of Technology

1. IEEE GRSS - Geoscience and Remote Sensing Society -Established in October 2022

Past Recruiters

Alumni Testimonials

Shravya Attri | Engineer
ESI Technologies Pvt. Ltd

Being part of CEPT's M. Tech Geomatics program has enriched my professional experience by honing both technical and soft skills. The studio-based learning approach ensured a thorough understanding of core concepts, applicable to real-life scenarios. Interactions with industry professionals, engagement in events like workshops, and collaboration with peers from diverse backgrounds have enhanced my problem-solving perspective. The supportive environment created by the Faculty of Technology and respected faculty members has brought out the best in my two-year journey.

Vikhyat Gupta
WebGIS Developer
WWF - India

Studying at CEPT has been an amazing experience, with a curriculum ensuring comprehensive coverage of GIS & Remote Sensing topics. The program also exposes students to relevant industry technologies. The studio-based learning provides a unique platform to solve real-world problems, applying classroom knowledge to understand how GIS technology can benefit society. Supportive faculties and mentors offer constant feedback for improving the quality of studio work. Each semester includes an exhaustive list of elective courses, spanning disciplines like planning and architecture, broadening perspectives on how Geomatics can be integrated across various sectors for meaningful insights.

Dr. Pooja Shah
PostDoc, University of Tasmania, Australia

During my two years (2016-2018) in the M.Tech Geomatics Program, I have worked on many research projects, studios, international summer school and have been acknowledged at international level for my work. It has been the most rewarding experience of my life and I am always glad to share that I received my M.Tech in Geomatics from CEPT, where I was taught by highly experienced faculty members. The program combines academic knowledge and professional skills that one can immediately transfer and apply into their work environments.

Shraddha Kulkarni
Research Associate
CRDF

"CEPT University provides a wonderful learning atmosphere in which you can enjoy the studies and learning process. The Master's program in Geomatics assisted me in gaining in-depth knowledge of remote sensing, machine learning, GIS technology, and other similar topics. Studio learning allows students to apply what they've learned in the classroom to real-world situations. My classmates were a big support during online group studies. Having peers from varied background, from geography to engineering has really broadened my horizon. The all-time support and motivation of faculty member has enlightened me throughout this wonderful journey."

Gaurang M. Patel
MD, SmartX City India

"Studying Geomatics at CEPT University has been a very fulfilling experience. The program offers both hands on practical experience and theoretical understanding on concepts. The mentors at CEPT University helped me enhance my academic and interpersonal skills. My two years have been a wonderful experience of learning with a prolific exposure to the industry."

Aakash Malik
Senior Consultant,
Alluvium Consuting
India

"Pursuing Master's from the Geomatics program of CEPT university was one of the best decisions I have made till date. It has shaped my future in a very exquisite manner. Studying in the course has given me major insights on how GIS and remote sensing can intersect with different programs and create value whether it is architecture, urban planning or construction management. I believe one cannot get so much of cross cutting interdisciplinary experience in any other university which is much needed when you are studying in the field of Geomatics."

UNIVERSITY DETAILS

CEPT University, K.L. Campus, University Road, Navrangpura, Ahmedabad- 380 009 Gujarat, India

Tel No. +91- 7926302470
Visit: www.cept.ac.in

Follow Us for Master's in Geomatics

@geomatics-cept-university

@mgeomatics_cept_official

@Mgeomatics

@mgeomatics.ft.cept

Follow Us for Faculty of Technology

@Faculty of Technology CEPT University

@facultyoftechnologyceptuniversity

@ftpg_cept

For further details, scan this QR code

For Admission

Visit www.admission.cept.ac.in and submit your application via email at ft.admission.cept.ac.in