M.Tech
Structural and Construction Engineering
M. Tech - Structural and Construction Engineering

M. Tech, in Structural and Construction Engineering is a program offered at the School of Engineering, Amrita Vishwa Vidyapeetham, Coimbatore campus. A clear and pressing need for competent structural and construction engineers has risen from the rapid growth of infrastructural development. To meet this need, the Structural and Construction Engineering program offers students advanced fundamental courses related to the mechanics and dynamics of structures. Additionally, students are taught courses on the recent developments in construction materials and technologies.

These courses will teach them innovative design techniques and implementation strategies for substructures and superstructures of different infrastructure facilities. Most courses incorporate laboratory work and industry-oriented projects to ensure that the students are industry ready at graduation. During their final year, students undertake research dissertations, which provide all-around development for design and construction engineers.
Program Outcome

The program aims to provide students with advanced technical knowledge of evolving structural systems integrated with solid fundamentals of design approaches. This program is designed for students and industry professionals seeking to advance their careers, and for academicians preparing for the challenges in research and teaching. The courses are designed to establish a fine balance between academic fundamentals and industry realities and requirements. At the end of the program, the student will be able to:

- Blend of exposure to strong fundamentals, practical design & construction approaches through adequate computational, analytical and execution skill development.
- Periodically updated Curriculum to meet the evolving challenges of construction and design industries.
- Opportunity to work in industries / research organizations/ international student exchange programs.
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Program Highlights and Career Opportunities

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To demonstrate a degree of mastery in order to identify, formulate and solve problems in the domains of Structural and Construction Engineering

To use the techniques, skills and modern engineering tools to analyze critically, carry out safe, economical and sustainable design

To independently carry out research /investigation and development work to solve practical problems

To write and report/document present a substantial technical

To engage in lifelong learning to gain knowledge of contemporary issues and adapt oneself to the changing needs of the society.

Program Curriculum

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Program Curriculum

**Third Semester**
- Programme Elective III/Live in Lab/Open Elective
- Structural Design Studio
- Industry Internship
- Research Methodology
- Dissertation I

**Fourth Semester**
- Dissertation II

**Elective Streams**

**Smart and Sustainable Infrastructure**
- Industrial Structures
- Bridge Engineering
- Prefabrication Engineering
- Design of Offshore Structures
- Structural Dynamics
- Pre-stressed Concrete Design
- Geotechnical Earthquake Engineering
- Soil Dynamics and Machine Foundations
- Seismic Design of Structure
- Wind Effects on Structures
- Analysis and Design of Substructures

**Sustainable Construction Practices & Project Management**
- Advanced Concrete Technology
- Construction Methods and Equipment
- Pavement Analysis and Design
- System Integration in Construction
- Quality Control and Safety in Construction
- Formwork, Scaffolding & Shoring
- Construction Economics & Finance
- Forensic Engineering and Rehabilitation of Structures
- Mechanics of Ground Improvement

**Structural Health Monitoring and Rehabilitation**
- Mechanics of Composite Materials
- Optimization Techniques
- Smart Materials and Structures
- Stability of Structures
- Theory of Plates and Shells
- Characterization of Materials
Learning Outcome

- Able to analyze the characteristics of concrete mix constituents and design mix for field applications.
- Able to implement various special concrete and Non Destructive Test (NDT) methods based on the field conditions.

Non-destructive test methods such as the Rebound Hammer, Ultrasonic Pulse Velocity, and Elcometer are used to evaluate the quality of concrete by examining its strength as well as other features such as cracking, void structure, and reinforcement corrosion.

Influence of admixture addition and temperature on the rheological characteristics and hydration kinetics of cementitious materials are evaluated using a temperature-controlled viscometer and calorimeter.

Accelerated Curing Tank with a facility for accelerated curing by boiling water method is used to find out 28 days compressive strength of concrete in 28 hours.

Equipment | Application
--- | ---
Acceptability of self-compacting concrete (SCC) is undertaken by evaluating its ability to flow through congested reinforcement without segregation and bleeding. Slump Flow, J Ring, L Box and V funnel are the few tests method to determine the SCC flowing ability, passing ability and segregation resistance.

Foam concrete with low density and good thermal and acoustical insulating characteristics is made by adding stable foams generated using a foam generator. Foam concrete is a sustainable construction material as it reduces the overall concrete consumption by reducing the self-weight of the structure.

The durability and functional attributes of both conventional and specialized concrete types are carried out using rapid chloride penetration test, sound absorption test, and thermal conductivity test. These specific tests provide insights into insulation, thermal and acoustic behavior, serving as crucial input parameters for the proper design of functional buildings and safe structures. This also provides as an input for numerical simulation.
### Equipment

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<td>This equipment is used to simulate earthquakes. Building models can be tested to evaluate their seismic safety using shake table. Additionally, seismic safety of non-structural elements can be quantified using the shake table. The table provides an opportunity to understand the concept related to structural dynamics and earthquake engineering through experimentation. With majority 60% of India in seismically active zones, the equipment offers students key insights into building behaviour and ensure no life loss during earthquakes.</td>
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<td>Test set up to understand non-linear behaviour of reinforced concrete, composite beams and framed structures. This test is usually undertaken as part of reinforced concrete design class and advanced reinforced concrete design.</td>
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<td>Data Acquisition (DAQ) is a crucial aspect of modern measurement and control systems, facilitating the acquisition, analysis, and utilization of data from various physical phenomena for a wide range of applications. DAQ is used to automatically assimilate data from test specimens. It can acquire strain, deflection and acceleration simultaneously.</td>
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Design and analysis of a multi-storied building is done using ETABS software. This software helps in modeling tools and templates, analyzes the methods, and provides solutions pertaining to code-based specifications. It helps with understanding of static and dynamic analysis of multi-storied structures.

Revit is used for designing buildings and creating 3D models of structural designs. It allows structural engineers to create detailed building designs, visualize the project in 3D and produce detailed documents of construction drawings.

CSi Bridge offers a single user interface to perform modeling, analysis, design, scheduling, load rating, and reporting. This software offers a wide range of code-based design features for steel frame, concrete frame, cold form steel, and aluminum frame.

Abaqus assists engineers to simulate complex real-world problems for a wide range of industries and rely on it for advanced engineering simulations. With an extensive library of element types, it can model nearly any geometry. Abaqus has an equally extensive library of material models.

**Learning Outcome**

- Equip the students with the skills and knowledge required for the design and detailing of multi-story buildings, infrastructures etc. encompassing the intricacies of creating structurally sound structures.

**Structural Design Studio Lab**

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**Skilling up for Professional Career**

**Construction Technology**

- Skill in the preparation of Building Information Model (BIM) for effective coordination of construction projects.
- Identify appropriate materials and techniques for construction of substructures, superstructures and special structures.
- Skills in construction material and concrete quality evaluation; Mix proportioning of high strength and special concretes.

**Smart and Sustainable Infrastructure**

- Design of advanced reinforced concrete and steel structural components to withstand the extreme demands such as cyclones and earthquakes.
- Hands-on experience on industry-relevant softwares
- Seismic analysis and design of buildings to reduce vulnerability
- Monitoring the health of bridges and buildings to enhance service life of infrastructural system
- Hands-on experience on sustainability concepts through material testing

**Project Management**

- Skill in preparation of construction schedule and progress updating.
- Enhanced knowledge in bidding process and contract laws pertaining to construction projects.
- Practical knowledge in project schedule preparation utilizing industry relevant software.
- Enhanced knowledge in bidding process and contract laws pertaining to construction projects.
Student Achievements

Sachin Venu Jaya, M Tech “Structural and Construction Engineering” student visited the “University of Twente, Netherlands” as a part of his student exchange programme during his final semester. During this period, he has completed four courses and one interdisciplinary project, along with Amrita major project.

Industry Sponsored Internship

The company is sponsoring Rs. 5 Lakh rupees (approx.) as the tuition, hostel and mess fee for the entire tenure of their M.Tech

Project Internship

CSIR – SERC, Chennai

International Opportunities: Student Exchange Programs/ Study Abroad Programs/ Dual Degree Programs/Research Internship Programs
Placements/Top recruiters

Alumni

WISHWESH, K. V. (2014-16), MANAGER - CIVIL (R&D DIVISION), PROPEL INDUSTRIES:

"AMRITA University has been paramount for enabling me reach the peak of my abilities. The University provides a great atmosphere for learning promoting personal and academic success. Faculty members are exceptionally qualified and demonstrate an unrelenting dedication to help students. My experience at Amrita was distinguished by a strong emphasis on industry-oriented learning and good career prospects. The faculty members and placement cell leave no stones unturned and that has been crucial in my placement as a Post Graduate Engineering Trainee in a reputed company like L&T Constructions."

Akshay Nadiger (2015-17)
Asst. Engineering Manager, L&T Construction

"My life at Amrita Vishwa Vidyapeetham has carved my profile to multidisciplinary portfolios. My Civil Engineering department has trained me as an efficient Engineer with major skill sets like a technical, coordination & Negotiations. Amrita Vishwa Vidyapeetham has also give me the divine energy interns of Spirituality thy enhances my ability to moderate the best I can in every work I do. I thank Amrita Vishwa Vidyapeetham and Civil Engineering Department for making my life wonderful."
Enrolling in the Structural and Construction Engineering master’s program at Amrita Vishwa Vidyapeetham, Coimbatore, marked a transformative phase in my life. I gained exposure to prominent companies for placements. Even amid the pandemic, the institution efficiently conducted virtual classes and their swift transition from offline to online mode of teaching truly impressed me. The experienced and supportive faculty members communicated effectively. The campus facilities reflect the university’s emphasis on both curricular and extracurricular activities. Nestled in the breath-taking beauty of the Western Ghats, the campus, especially the playground, offers a picturesque view. The remarkable recognition I receive beyond the campus underscores the impact of Amrita University.

My journey in the world of 3D concrete printing began at Amrita Vishwa Vidyapeetham, where my M.Tech. in Structural and Construction Engineering provided the bedrock for my success. Amrita's world-class infrastructure, its esteemed faculty, and its focus on practical skills were the cornerstone of an exceptional academic experience. The vibrant campus, with its diverse student body and international collaborations, fostered a dynamic learning environment. I gained valuable experience collaborating with peers from around the globe, honing my communication and teamwork skills. My master’s thesis, conducted in collaboration with a prestigious central government organization, proved to be a turning point. This invaluable experience exposed me to the forefront of the construction industry and solidified my passion for 3D concrete printing.

ANUPAMA.V.M. (2020-22)
STRESS ENGINEER, AIRBUS, BENGALURU

GREETSHMA GIRIDHAR (2020-22)
Doctoral Researcher, Loughborough University

Few other renowned alumni's

Anupa Anil (2015-17),
Director,
Rewocon Projects Pvt Ltd

Sharon T Abey (2016-18),
Modeller,
InfraBuild Australia

Kothamasu Varun Kumar
(2014-16)
Team Lead, Crux Prestressing Systems Pvt Ltd

Aswathi Viswam (2016-18)
Senior Design Engineer
BGR Energy Systems
Chennai

Gowri Vrinda P (2020-2022),
Senior Design Engineer L&T Construction, Chennai

Petrofac

Elizabeth Sherly George
(2021-23),
Graduate Engineer, Petrofac Engineering Services India Pvt. Ltd
(Civil & Structural Department)