Indian Institute of Technology Palakkad
Curriculum

Program **: Master of Technology**
Stream **: Structural Engineering**
Year **: 2025 Onwards**

Preamble

The department of Civil Engineering in IIT Palakkad was established in the year 2015. Currently the department has 20 faculty members, and is offering BTech in Civil Engineering and MTech in Geotechnical Engineering. There are 5 faculty members in the department who work in different areas related to structural engineering. The department is proposing to start an MTech program in "Structural Engineering". The program is envisioned to provide the students an excellent learning opportunity in different areas of structural engineering. The program is devised to equip the students to handle various industry related problems in structural engineering, as well as take up high quality research projects. The students will be able to choose their career specialization during the program, and will have the freedom to take a sufficient number of electives to achieve their career goals. The courses are designed in alignment with the "Program regulations- Master of Technology" which is applicable from 2024 admission onwards.

The curriculum is designed such that there is a good mixture of core and elective subjects in structural engineering. The core courses will help the students to lay a strong foundation in the areas of structural mechanics, dynamics, analysis and design, all of which are essential for a successful career in structural engineering. These core courses build on the basic undergraduate knowledge of the students, or on courses that are taught as part of the program. The program offers a sample template of courses to guide the students through the four semesters, the details of which are discussed below.

In the first semester, Advanced Mechanics of Solids, Advanced Design of Metal Structures, Structural Dynamics and Finite Element Method in Structural Mechanics are the recommended core courses. The students are also encouraged to take one program major elective, from a basket of electives offered by the department. In addition to the department core and elective courses, two general category courses,

namely, Communication Skills and Technical Writing, which are designated as mandatory core courses for all the MTech students are included. The students have to take a minimum of 17 credits in their first semester as per the designed template.

In the second semester, the template recommends two program based core courses, namely, Nonlinear Analysis of Structures and Advanced Design of Reinforced Concrete Structures. The Advanced Structural Engineering Lab is also part of the second semester. The experiments in the lab are designed to give the students hands-on training to understand the behaviour of reinforced concrete and steel structural members, use of non-destructive testing methods, deformation and strain measurement techniques and other advanced concepts. The template allows the students to take two more program based electives and one open elective during the second semester. Similar to the first semester, the students are expected to take a total of 17 credits in the second semester as well.

By the end of the second semester, the students are well equipped with the basic courses in structural engineering, which will serve them well for the summer internship / mini project that they are expected to do before the third semester. This is designed as a course without credits (CWC), to give the freedom to the students to explore industry and academic projects.

In the third semester, in addition to an open elective, the students have to enroll for a course on Structural Design Practice, which is a highlight of this program. This course, with one lecture hour and 3 hours of practice session per week, is designed to prepare the students to be industry-ready, starting from the conceptual design of structures, to the production of final design drawings and detailing. They will get an exposure to the design of different structures such as buildings, bridges, and water tanks using different codal provisions. They will also be exposed to the various software packages that are popularly used in practice. It is also planned to have a comprehensive viva as part of the third semester, the primary object of which is to evaluate their fundamental knowledge, and prepare them for competitive interviews.

The students will also have the opportunity to choose their final year projects, from a basket of projects. The project is distributed over two semesters with a total of 20 credits. The students will be working closely with a project mentor within the Structural Engineering division, with co-supervisors from other specializations and departments (if required).

A student has to earn a total of 60 credits, to be awarded the MTech degree in structural engineering, and is in accordance with the institute regulations. Overall the program is designed with a mission to equip the students with the background knowledge that is required to practice structural engineering as a career, and also give them an opportunity to have strong fundamentals to take academic/research careers.

Program Objectives

The MTech program in Structural Engineering is designed to

- To equip students with strong foundational technical knowledge to practice structural engineering as a career.
- To give hands-on training to analyze and design various structures, thus develop a strong sense of self-confidence to solve challenging problems.
- To expose and teach skills that are relevant to the structural engineering industry.
- To lay a foundation to take up research as a career, and to develop a desire for lifelong learning.

The credit requirement of the program is as follows:

Credit requirements:

Category of the course	Credits
Program Core (PMC)	23
Program Electives (PME)	09
Project Based Courses(PBC)	20
Open Electives (OE)	06
Humanities and Social Sciences Elective (HSE)	00
Communication Skills	1
Technical Writing	1
Total	60

The list of PMC's with their credits is below :

1	CE5515	Advanced Mechanics of Structures	3	0	0	3
2	CE5511	Advanced Design of Metal Structures	3	0	0	3
3	CE5513	Structural Dynamics	3	0	0	3
4	CE5011	Finite Element Method in Structural Mechanics	3	0	0	3
5	CE5XXX	Nonlinear Analysis of Structures	2	0	2	3
6	CE5518	Advanced Design of Reinforced Concrete Structures	3	0	0	3
7	CE5016	Advanced Structural Engineering Lab	0	0	3	2
8	CE5017	Structural Design Practice	1	0	3	3
9	CEXXXX	Comprehensive Viva	-	-	-	0
10	CEXXXX	Internship	-	-	-	0

To guide the students towards arriving at a feasible ordering of courses, a course plan is proposed below. It is not mandatory to follow this plan. Multiple variations of this plan may be possible. However, students need to ensure that the credit requirements as mentioned in the table above are met. While this system allows flexibility for students to take courses in an order different from that mentioned below, the constraint that prerequisites for each course have to be cleared in advance to be able to take it, necessitates a judicious choice to complete the program within the expected time frame.

Semester I

No.	Course code	Course Title	L	T	P	C	Category
1	CE5515	Advanced Mechanics of Structures	3	0	0	3	PMC
2	CE5511	Advanced Design of Metal Structures	3	0	0	3	PMC
3	CE5513	Structural Dynamics	3	0	0	3	PMC
4	CE5011	Finite Element Method in Structural Mechanics	3	0	0	3	PMC
5		Program Elective	3	0	0	3	PME
6		Communication Skills	1	0	0	1	
7		Technical Writing	1	0	0	1	
		Semester Total				17	

Semester II

No.	Course code	Course Title	L	T	P	C	Category
1	CE5XXX	Nonlinear Analysis of Structures	2	0	2	3	PMC
2	CE5518	Advanced Design of Reinforced Concrete Structures	3	0	0	3	PMC
3		Program Elective	3	0	0	3	PME
4		Program Elective	3	0	0	3	PME
5		Open Elective	3	0	0	3	OE
6	CE5016	Advanced Structural Engineering Lab	0	0	3	2	PMC
		Semester Total				17	

Semester III

No.	Course code	Course Title	L	T	P	C	Category
1	CE5017	Structural Design Practice	1	0	3	3	PMC
2		Open Elective	3	0	0	3	OE
3	CEXXXX	Comprehensive Viva	-	-	-	0	CWC-Pass/Fail
4	CEXXXX	Internship/Mini project	-	-	-	0	CWC - Pass/Fail
5	CEXXXX	MTech Project	-	-	20	8	PBC
		Semester Total				14	

Semester IV

No.	Course code	Course Title	L	T	P	C	Category
1	CEXXXX	MTech Project	-	-	30	12	PBC
		Semester Total				12	

A list of approved PME's can be found at (provide a link if available):

- CE 5625 Structural Reliability

- CE5516 Optimization Techniques in Engineering

- ME5011 Mathematics for Engineers

- ME5635 Mechanics of Composites materials

- ME 5001 Fracture Mechanics

- CE5510 Advanced Concrete Technology

- CE5624 Stability and Strength of Structures

- CE5628 Bridge Engineering

- CE5631 Analysis and Design of Prestressed Concrete Structures

- CE5632 Design of Structures for Wind and Earthquake Loads
- CE5629 Design of Plates and Shells
- CE6003 Earthquake Analysis and Design of Structures
- CE5630 Vibration control of structures
- CE6004 Advanced Finite Element Methods
- CE5633 Applied Statistics