

Programme Specification

Programme: M. Tech. in Structural Engineering	
Faculty	Engineering and Technology
Department	Civil Engineering
Programme	M.Tech in Structural Engineering
Dean of Faculty	Dr. M. Arulanantham
HOD	Dr. H. M. Rajashekhar Swamy

	1. Title of the Award
	M. Tech. in Structural Engineering
	2. Modes of study
	Both Full Time and Part Time
	3. Awarding Institution / Body
	M. S. Ramaiah University of Applied Sciences – Bengaluru, India
	4. Joint Award
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	5. Teaching Institution
	Faculty of Engineering & Technology
	M S Ramaiah University of Applied Sciences - Bengaluru, India
	6. Date of Programme Specification
	20/06/2019
	7. Date of Programme Approval by the Academic Council of MSRUAS
	24/07/2019
	8. Next Review Date
	23/07/2023
	9. Programme Approving Regulatory Body and Date of Approval
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	10. Programme Accrediting Body and Date of Accreditation
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	11. Grade Awarded by the Accreditation Body
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	12. Programme Accreditation Validity
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	13. Programme Benchmark
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	14. Rationale for the Programme
	<p>Civil engineering is primarily infrastructure development involving planning, design, construction, and operation of facilities essential to modern life, ranging from transit systems to offshore structures to space satellites. Major disciplines within civil engineering that are closely interrelated are structural, environmental, geotechnical, water resources, transportation, construction and urban planning.</p> <p>Till recently civil engineering teaching was limited to planning, analysis, design and execution of different types of infrastructure like buildings, roads, bridges, dams and power plants. However, increasing technological sophistication and demand for higher living standards fueled by economic growth and concerns about environmental impact have changed the scope of civil engineering curriculum.</p> <p>Structural engineering is a field of engineering dealing with the analysis and design of structures that support or resist loads. Structural engineering is usually considered a specialty within civil engineering. Structural engineers are most commonly involved in the design of buildings and large non-building structures; but they can also be involved in the design of machinery, medical equipment, vehicles or any item where structural integrity affects the item's function or safety.</p> <p>The complexity of modern structures often requires a great deal of creativity from the engineer in order to ensure the structures support and resist the loads they are subjected to. The role of a structural engineer demands a significant understanding of both static and dynamic loading and the structures that are available to resist them. Presently, structural engineers need to combine traditional structural engineering expertise with an understanding of a wide range of issues related to design of zero carbon buildings.</p> <p>Though there are a large number of institutions world over which are producing civil engineers there is a significant shortage of structural engineers. The FET at MSRUAS would like to offer civil engineering programme to produce imaginative, creative and innovative civil engineers.</p> <p>MSRUAS is offering Civil Structural Design programme at the postgraduate level. The programme focuses on addressing the professional services needs of construction industry by producing structural engineers with the requisite knowledge, skills, and expertise to deal efficiently with complex issues for designing structurally sound and environmentally sustainable buildings.</p> <p>The graduates will get opportunities in well-known construction companies and will be effective and efficient problem solvers providing economical and sustainable infrastructure solutions in India and abroad.</p> <p>The faculty of engineering and technology plans further development of civil structural engineering and compete with the best universities in the world and attract high quality graduates as well as teaching talent from all over the country and abroad.</p>

15. Programme Aim

The aim of the programme is to produce postgraduates with advanced knowledge and understanding of civil structural design; higher order critical, analytical, problem solving and transferable skills; ability to think rigorously and independently to meet higher level expectations of civil construction industry, academics, research or take up entrepreneurial route.

16. Programme Objectives

Students will be able to apply the knowledge, understanding and skills acquired to carry out engineering design, simulation, analysis, synthesis and evaluation of structural components/systems. Emphasis will be placed on imaginative and creative approach to structural engineering design and development.

The objectives of the programme are to enable the students to:

1. Modelling, simulation, analyses, design and validation of structural components/systems
2. Modern construction technologies and materials Selection of materials, manufacturing processes and development of structural components and systems
3. Experiments on structural components/systems and evaluate their performance
4. Use of commercially available software for analysis and design
5. General perspective and opportunities for a career in structural engineering design and analysis in industry, the public sector and non-governmental organisations
6. Teamwork, lifelong learning and continuous improvement

17. Intended Learning Outcomes of the Programme

The Intended Learning Outcomes (ILOs) are listed under four headings:

1. Knowledge and Understanding, 2. Cognitive Skills 3. Practical Skills and 4. Capability / Transferable Skills.

1. Knowledge and Understanding

After undergoing this programme, a student will be able to:

- KU1:** Recognize and understand the major features of structural engineering with the perspective of structures' safety and sustainability; explain working, theoretical principles and design of various structural systems
- KU2:** Describe the factors critical in designing structures for their structural, handling and safety requirements and approach for design to meet the requirements of national and other codes
- KU3:** Explain the design requirements for structural stability, serviceability and durability and disaster prevention in civil structural system; explain the design requirements for structures to withstand forces due to temperature, creep, cracking and imposed loads
- KU4:** Understand research techniques including information retrieval, experimental design, theoretical derivation, and/or modelling, discuss various structural materials and systems

2. Cognitive Skills

After undergoing this programme, a student will be able to:

- CS1:** Identify, design and analyse structural engineering problems and solve using a multidisciplinary approach
- CS2:** Analyse and propose design changes essential to balance costs, buildability, safety and environmental impact and sustainability

- CS3:** Integrate and apply professional judgements to critically evaluate different design options relevant to limitations of local, national and international standards, codes of practice and building regulations
- CS4:** Acquire and implement broad research and analytical skills related to structural engineering and arrive at innovative structural design

3. Practical Skills

After undergoing this programme, a student will be able to:

- PS1:** Create structural drawings, working drawings, 3D geometric models of different Stages of construction as per national and international standards, codes of practice
- PS2:** Create Finite Element, CFD and static and dynamic analyses models using CAE Tools
- PS3:** Conduct physical tests on structural materials and structural components
- PS4:** Obtain design information relevant to the site, including carrying out of site investigation, field tests and laboratory tests for soil, wind, earthquake and/or other environmental parameters

4. Capability / Transferable Skills

After undergoing this programme, a student will be able to:

- TS1:** Manage information, develop technical reports and make presentations
- TS2:** Build, Manage and Lead a team to successfully complete a project and communicate across teams and organizations to achieve professional objectives
- TS3:** Work under various constraints to meet project targets
- TS4:** Adopt to the chosen profession by continuously upgrading his/her knowledge and understanding through Life-long Learning philosophy

18. Programme Structure

The Programme consists of four semesters as shown below. A student is required to successfully complete the following courses and earn credits for the award of the degree.

Complete details of each of the courses such as ILO's, content, resources, teaching-learning processes and other related information are outlined in Course Specification of the respective programme.

SEMESTER 1

Sl.No.	Code	Course Title	Theory (h/W/S)	Tutorials (h/W/S)	Practical (h/W/S)	Total Credits	Max. Marks
1	19STC501A	Advanced Concrete Technology and Modern Construction Techniques	3	--	2	4	100
2	19STC502A	Direct Stiffness Method and Finite Element Analysis	3	1	2	5	100
3	19STC503A	Structural Dynamics and Earthquake Resistant Design	3	1	2	5	100
4	19STE51XA	<i>Refer elective course table</i>	4	--	--	4	100
5	19STE52XA	<i>Refer elective course table</i>	4	--	--	4	100
6	19FET508	Research Methodology & IPR	2	--	--	2	50
7	19FET509	Professional Communication	1	--	--	--	--
Total			20	2	6	24	550
Total number of contact hours per week			28 hours				
Number of credits can be registered			Minimum	19	Maximum	24	

SEMESTER 2

Sl.No.	Code	Course Title	Theory (h/W/S)	Tutorials (h/W/S)	Practical (h/W/S)	Total Credits	Max. Marks
1	19STC511A	Advanced Design of RCC Structures	3	1	--	4	100
2	19STC512A	Theory of Elasticity and Plasticity	3	1	--	4	100
3	19STC513A	Advanced Design of Steel Structures	3	1	--	4	100
3	19STE53XA	<i>Refer elective course table / Online courses/ MOOC</i>	4	--	--	4	100
4	19STE54XA	<i>Refer elective course table / Online courses/ MOOC</i>	4	--	--	4	100
5	19FET510A	Value Education	1	--	--	--	--
Total			18	3	0	20	500
Total number of contact hours per week			21 hours				
Number of credits can be registered			Minimum	16	Maximum	20	

SEMESTER 3

Sl.No.	Code	Course Title	Theory (h/W/S)	Tutorials (h/W/S)	Practical (h/W/S)	Total Credits	Max. Marks
1	19STP521A	Internship / Other activities as specified	--	--	10	4	100
2	19STP522A	Group Project	--	--	12	8	200
3	19STP523A	Dissertation and Publication Phase 1					
		Total	0	0	22	12	300
		Total number of contact hours per week	22 hours				
		Number of credits can be registered	Minimum	12	Maximum	12	

SEMESTER 4

Sl.No.	Code	Course Title	Theory (h/W/S)	Tutorials (h/W/S)	Practical (h/W/S)	Total Credits	Max. Marks
1	19STP523A	Dissertation and Publication Phase 2	--	--	24	24	400
		Total	0	0	24	24	400
		Total number of contact hours per week	24 hours				
		Number of credits can be registered	Minimum	24	Maximum	24	

Elective Courses List			
Stream / Specialization	S. No.	Course Code	Course Title
Stream -1	E11	19STE511A	Design of Masonry, Timber Structures and Form Work
	E21	19STE521A	Design of RCC, PSC and Steel Bridges
	E31	19STE531A	Design of Tall Structures
	E41	19STE541A	Design of Membrane Structures
Stream-2	E12	19STE512A	Geotechnical Earthquake Engineering
	E22	19STE522A	Advanced Foundation Design and Machine Foundation
	E32	19STE532A	Reinforced Soils
	E42	19STE542A	Design of Offshore Structures
Stream-3	E13	19STE513A	Advanced Structural Mechanics
	E23	19STE523A	Advanced Structural Materials
	E33	19STE533A	Theory of Plates, Shells and Composites
	E43	19STE543A	Fracture Mechanics
Stream-4	E14	19STE514A	Probability and Statistics for Civil Engineers
	E24	19STE524A	Green Construction and Alternative Building Materials
	E34	19STE534A	Fire and Safety Engineering Design
	E44	19STE544A	Condition Assessment, Repair, Rehabilitation and AI

19. Programme Delivery Structure

A Programme is delivered from Monday to Saturday of the week as per the Time-Table for every batch.

20. Teaching and Learning Methods

The course delivery comprises of a combination of few or all of the following:

1. Face to Face Lectures using Audio-Visuals
2. Workshops, Group Discussions, Debates, Presentations
3. Demonstrations
4. Guest Lectures
5. Laboratory/Field work/Workshop
6. Industry Visit
7. Seminars
8. Group Exercises
9. Project Exhibitions
10. Technical Festivals

21. Courses

Programme has six Professional core courses, four Professional elective courses, two audit courses, and one compulsory course followed by Group Project, Internship and Dissertation & Publication courses.

Core courses are Programme Specialization courses which normally include both theory and laboratory sessions. Alternate activities are planned in case of laboratory sessions do not exist in a course.

Compulsory course is Research Methodology and IPR course which is mandatory.

All courses of the programmes are categorized as indicated in the **Annexure I**.

22. Electives

There are 4 electives in the programme. The electives are grouped such a way that a student can choose a set of electives to specialize in a chosen field/stream. However, if the student wishes to opt for elective course that spans multiple streams, the case may be considered subject to the affordability of academic logistics and approval by the course leader, HODs and Deans.

For every elective offered, there will be a minimum and a maximum number of registrations that is decided by the department.

There is also a provision for the students to choose Electives through on-line mode such as MOOC's, SWAYAM, NPTEL and other equivalent platforms. The guidelines prescribed by the University for such courses to be adhered to. The student can also earn 3 or 4 credits by participating in the international competitions like technical presentation/ conference/ publications in the journal etc and winning the award in that. In that case he/she can be exempted from one of the elective courses of the programme.

23. Group Project

The main objective of group project is to provide an ambiance to work in groups towards achieving a common goal. A group shall have up to 5 students. In case of Group Project work is based on interdisciplinary in nature, team can be constituted with members from across departments of the Faculty.

The students are required to develop a report for assessment and also need to demonstrate the working of the product. The IPR rights of all such work lies with the University only. The project should be approved by a committee constituted by respective HoDs before the start of the project. For further details related to the Group Project refer to Course Specification of the respective programmes

24. Industry Internship/Other Activities

A student can opt for an internship in an industry, a business or research organization during the course.

Alternately, can undertake a mini-project requiring self-directed study that can be perused within the affiliated Faculty.

Prior approval of the internship / mini-project by the HoD and Dean is mandatory. It is also necessary for the student to submit a report and make a presentation to the members of the panel constituted by the HoD for assessment.

For further details related to this course, please refer to Course Specification of the respective programmes.

25. Dissertation and Publication

This course has two parts – Dissertation and Publication.

Every student, has to undertake the dissertation work individually on a chosen relevant topic. The topic needs to be approved by the committee constituted by HoD.

Publication is a stage wherein dissertation work of the student is converted into a technical paper to be published in reputed conferences/journals.

For further details related to the this course refer to Course Specifications of the respective programmes

26. Course Assessment

1. Every course will be assessed for a weight of 100%
2. There are two components-Component-1 and Component-2
3. Component-1 carries a weight of 50% and Component -2 carries a weight of 50%
4. Component -1 (CE) is subdivided into Term Tests , Assignments and laboratory examinations / technical presentation
Test carry 25 Marks
Assignment carry 50 Marks.
Laboratory assessment/ technical presentation carry 25 Marks
Total 100 marks will be reduced to 50 Marks.
5. Component -2 (SEE) is Written Examination for 100 Marks. It will be reduced to 50 Marks.
6. A minimum of overall 40% is required for a pass with 40% in each of the Components
7. The marks distribution for each course is given in the programme structure-section 20.
Other flexibilities(exceptions) as per the programme regulations

27. Failure in Course and Makeup Examinations

Makeup Examinations are provided for the students who are not able to meet all pass criteria prescribed for a course during the regular term and fail in the course.

For further details related to makeup examination, please refer to M.Tech. Programme Academic Regulations document.

28. Attendance

Please refer to M.Tech. Programme Academic Regulations document for attendance requirements and condonation related details.

29. Award of Grades

As per the M.Tech. Programme Academic Regulations document.

30. Student Support for Learning

Students are provided with various facilities to support learning such as the following:

1. Course notes
2. Reference books in the library
3. Magazines and Journals
4. Internet facility

5. Computing facility
6. Laboratory facility
7. Workshop facility
8. Staff support
9. Lounges for discussions
10. Any other support that enhances their learning

31. Quality Control Measures

Following are the Quality Control Measures:

1. Review of course notes
2. Review of question papers and assignment questions
3. Student Feedback Analysis
4. Moderation of assessed work
5. Opportunities for the students to see their assessed work
6. Review by external examiners and external examiners reports
7. Staff Student Consultative Committee meetings
8. Student exit feedback analysis
9. Subject Assessment Board (SAB)
10. Programme Assessment Board (PAB)

32. Curriculum Map

Course Code	Intended Learning Outcomes											
	Knowledge and Understanding				Cognitive (Thinking) Skills (Critical, Analytical, Problem Solving, Innovation)				Practical Skills			
	KU1	KU2	KU3	KU4	CS1	CS2	CS3	CS4	PS1	PS2	PS3	PS4
19STC501A	x			x	x		x			x	x	
19STC502A	x	x	x	x	x	x	x		x			
19STC503A	x	x	x		x		x			x		x
19STE511A	x	x	x	x	x		x		x			x
19STE521A	x	x	x	x	x		x		x			x
19STE531A	x	x	x	x	x		x		x			x
19STE541A	x	x	x	x	x		x		x			x
19STE512A	x	x	x	x	x		x		x			x
19STE522A	x	x	x	x	x		x		x			x
19STE532A	x	x	x	x	x		x		x			x
19STE542A	x	x	x	x	x		x		x			x
19FET508	x	x	x	x	x	x	x	x	x			
19FET509	x	x	x	x	x	x	x	x	x			
19STC511A	x	x	x	x	x	x		x	x			x
19STC512A	x	x	x					x				
19STC513A	x	x	x	x	x	x		x	x			x
19STE513A	x	x	x	x	x		x		x			x
19STE523A	x	x	x	x	x		x		x			x
19STE533A	x	x	x	x	x		x		x			x
19STE543A	x	x	x	x	x		x		x			x
19STE514A	x	x	x	x	x		x		x			x
19STE524A	x	x	x	x	x		x		x			x
19STE534A	x	x	x	x	x		x		x			x
19STE544A	x	x	x	x	x		x		x			x
19FET510A	x	x	x	x	x	x	x	x	x	x	x	x
19STP521A	x	x	x	x	x	x	x	x	x	x	x	x
19STP522A	x	x	x	x					x	x	x	x
19STP523A	x	x	x	x	x	x	x	x	x	x	x	x

33. Capability / Transferable Skills Map

Course Code	Group work	Self-learning	Research Skills	Written Communication Skills	Verbal Communication Skills	Presentation Skills	Behavioural Skills	Information Management	Personal management/ Leadership Skills
19STC501A		x		x	x	x	x	x	
19STC502A		x		x	x	x	x	x	
19STC503A		x		x	x	x	x	x	
19STE511A		x		x	x	x	x	x	
19STE521A		x		x	x	x	x	x	
19STE531A		x		x	x	x	x	x	
19STE541A		x		x	x	x	x	x	
19STE512A		x		x	x	x	x	x	
19STE522A		x		x	x	x	x	x	
19STE532A		x		x	x	x	x	x	
19STE542A		x		x	x	x	x	x	
19FET508		x	x	x	x	x	x	x	
19FET509		x		x	x	x	x	x	
19STC511A		x		x	x	x	x	x	
19STC512A		x		x	x	x	x	x	
19STC513A		x		x	x	x	x	x	
19STE513A		x		x	x	x	x	x	
19STE523A		x		x	x	x	x	x	
19STE533A		x		x	x	x	x	x	
19STE543A		x		x	x	x	x	x	
19STE514A		x		x	x	x	x	x	
19STE524A		x		x	x	x	x	x	
19STE534A		x		x	x	x	x	x	
19STE544A		x		x	x	x	x	x	
19FET510A		x	x	x	x	x	x	x	
19STP521A	x			x	x	x	x	x	x
19STP522A		x		x	x	x	x	x	
19STP523A		x	x	x	x	x	x	x	x

34. Co-curricular Activities

Students are encouraged to take part in co-curricular activities like seminars, conferences, symposium, paper writing, attending industry exhibitions, project competitions and related activities to enhance their knowledge and network.

35. Cultural and Literary Activities

To remind and ignite the creative endeavors, annual cultural festivals are held and the students are made to plan and organize the activities.

36. Sports and Athletics

Students are encouraged to develop a habit of taking part in outdoor and indoor games on regular basis.

