M.Tech Programmes

Curricula and Academic Regulations (Highlights)

M.Tech in Computer Science and Engineering

The objective of the two-year M.Tech (CSE) programme is to produce post-graduates with advanced knowledge in one or more areas of Computer Science. The programme is designed such that a student can complete it based on advanced coursework alone. However, the students are given the facility to concentrate on a problem by substituting some of the courses with equivalent project work.

The first semester of the M.Tech programme is aimed at providing the necessary breadth in Computer Science and at integrating the students with the instructional philosophy of IIIT, Hyderabad. The subsequent semesters provide avenues for specializing in one or more of the streams. The semester wide distribution of courses is given under the curriculum section.

Curriculum

Semester I		
Course Code	**Course Name**	**Credits**
CS 3000	Advance problem solving	4-0-4-6
CS 3301	Operating Systems	3-1-0-4
CS 3001	Scripting & Comp Environments	3-0-2-4
MA 3201	Direct Maths and algorithms	4-2-0-6
Semester II		
Student choose a specialization		
Course Code	**Course Name**	**Credits**
	Bouquet core	3-0-1-4

	Bouquet core	3-0-1-4
	Area electives	3-0-1-4
	Bouquet core / Area elective / open elective / other elective / project / Independent study	3-0-1-4
	Institute Seminar	1-0-0-(P/F)
	Summer Break	
	Student spend the summer with a research center	optional but recommended
Semester III		
Course Code	**Course Name**	**Credits**
	Bouquet core	3-0-1-4
	Area elective	3-0-1-4
	Semester project / Bouquet core / Area elective	3-0-1-4
	Bouquet core / Area elective	3-0-1-4
	Institute seminar	1-0-0-P/F
Semester IV		
Course Code	**Course Name**	**Credits**
	Area elective / Bouquet core	3-0-1-4
	Area elective / Bouquet core	3-0-1-4
	Area project	8 credits
	OR	
	Area elective / CS Elective / Open elective / Other elective	3-0-1-4
	Area elective / CS Elective / Open elective / Other elective	3-0-1-4
	Total Credits	**68**

- **List of Area / CS / Open / Other Electives will be made available during the registration of every semester**

M.Tech CSE - Academic Regulations (Highlights)

Credit Requirements:

- Minimum credits required for graduation is 68. Each semester, every student must register for at least 16 credits and at most 20 credits.
- Every student must register for 20 bouquet core credits. Of the 20 bouquet core credits, at least two must be from the foundations and at least two must be from the systems stream. Further, at least two of these bouquet core courses must be done in the second semester and at least one in the third semester. List of Bouquet courses are given below.
- The first semester is common for everyone and is for 20 credits. After the first semester, the student can choose an area to specialize in. The list of areas is given below.
- Every student must register for at least 12 area elective credits from the areas given below. Of these, at least one must be in the second and the third semester each.
- There will be a seminar course mandatory in the second and the third semesters. As part of this course, every student must attend at least half of the notified seminars, presently, notified seminars include M.S. thesis public presentations, faculty candidate talks, and distinguished seminars.
- The areas along with typical topics are as follows. For every elective at the 400+ level, the area under which it belongs shall be made available before registration every semester.

Bouquet Electives

Foundation Courses

CSE411 Complexity and Advanced Algorithms
CSE471 Statistical Methods in AI
CSE415 Principles of Programming Languages
CSE481 Optimization Methods
CSE418 Principles of Information Security

Systems Courses

CSE431 Distributed Systems
CSE441 Database Systems
CSE435 Computer Networks
CSE419 Compilers
CSE461 Software Engineering

Areas of Specialization:

1. **Theory and foundations:** Algorithms, Theory, Parallel Algorithms, Parallel Programming, Foundations of Computer Science, Distributed algorithms.
2. **Systems:** Compilers, Operating Systems, Virtualization/Cloud computing, Advanced Computer Architecture, Embedded Systems, Multi-core Architectures.
3. **Software engineering:** Software engineering, middle ware systems.
4. **Analytics:** Data analytics, Data warehousing, Data mining, Pattern Recognition, Machine Learning, Information Retrieval, Artificial neural networks.

5. **Artificial Intelligence:** Natural Languages, Computer Vision, Speech Systems, Cognitive Science, Robotics.
6. **Security:** Systems and Networks Security, Information Security: Research and Management, Information Security Audit and Assurance.

Project Work:

- Of the remaining 16 credits, at most 12 credits can be converted to project credits/independent study credits. The 12 shall be split as (at most) 4 credits in the third semester and (at most) 8 credits in the fourth semester.
- If a student wishes not to do a project, then there is no restriction on the nature of courses that can otherwise be registered for to satisfy these 16 credits. However, these should be 400+ level courses.

Academic Performance:

A student should complete the requirements with a minimum CGPA of 6.5 to receive the M.Tech degree.

Residency Requirements:

- Full-time students: Students will have minimum of 4 semesters and maximum of 6 semesters to complete the graduate requirements, failing which they will be terminated from the programme.

- Part-time students: Students will have minimum of 4 semesters and maximum of 8 semesters to complete the graduate requirements, failing which they will be terminated from the programme.

Fees:

The student has to pay full-time post-graduate fees for the first 4 semesters of study. The fees will be pro-rated to the number of credits registered for thereafter according to the institute's policies.

BACK

M.Tech in VLSI and Computer Engineering

About the Program:

This is an interdisciplinary graduate program that helps shaping the future leaders of VLSI industry. The program emphasizes on the interface between VLSI Design and Computer Engineering and focuses on the application of VLSI Design to Computer Systems Design and Development and also on the algorithmic approach to computer engineering as extended to the area of VLSI design. With recent and rapid upsurge in the area of hardware software codesign for the development of embedded systems, the course is designed to cater to the needs in producing engineers trained in both hardware and software areas bridging the gap between the two communities.

Objectives:

1. To develop engineers trained in both hardware and software ready to develop embedded systems including hardware-software codesign

2. To disseminate VLSI design in an approach of encompassing within its folds both the high level algorithmic details and low level circuit details

Advantages (for the student):

The student gets the advantage of being trained in software/hardware interfacing aspects along with complete knowledge of VLSI Circuits and Layouts preparing them for Industries and Academia.

Curriculum (Semester-wise):

Semester -1

Course Code	Course Name	Credits
CS 3000	Advance problem solving	4-0-4-6
MA 3201	Direct Maths and algorithms	4-2-0-6
CS 3301	Operating Systems	3-1-0-4
	Analog & Mixed Signal Design	3-1-0-4

Semester -2

Course Code	Course Name	Credits
ECE361	Introduction to VLSI Design	3-1-0-4
ET5650	Architectural Design with ICs	3-1-0-4
	Elective 1	3-1-0-4
	Elective 2	3-1-0-4

Semester -3

Course Code	Course Name	Credits
	Elective 3	3-1-0-4
	Elective 4	3-1-0-4
	Elective 5	3-1-0-4
	Project	4 credits

Semester -4

Course Code	Course Name	Credits
	Project	12
	Elective 6	4

ELECTIVES:

<u>Electives in VLSI Stream</u>

1) Mobile Robotics 3-1-0-4
2) VLSI Algorithm 3-1-0-4

3)	RFIC Design	3-1-0-4
4)	Photonics	3-1-0-4
5)	Design for Testability	3-1-0-4
6)	Analog & Mixed Signal Design	3-1-0-4
7)	Biomedical Embedded Systems	3-1-0-4
8)	Advanced Analog VLSI Circuits & Systems	3-1-0-4
9)	Computer Architecture*	3-0-1-4

Electives in Computer Engineering Stream

1)	Compilers	3-1-0-4
2)	Parallel Computing	3-1-0-4
3)	Concurrent Data Structures	3-1-0-4
4)	Advanced Compilers	3-1-0-4
5)	Mobile Robotics	3-1-0-4
6)	VLSI Algorithm	3-1-0-4
7)	Distributed Systems	3-1-0-4
8)	Principles of information security	3-1-0-4
9)	Computer Architecture*	3-0-1-4

* Compulsory elective for both streams

Academic Regulations (Highlights)

Breadth/Depth Requirements:

A student should take the basic courses in both the stream areas and at least one advanced course in 2 stream areas to qualify for the Masters.

Credit Requirements:

- Minimum credits required for graduation is 68. Each semester, every student must register for at least 16 credits and at most 20 credits.
- Electives Regulations are as follows

  - A student has to take minimum of 3 Electives in the stream in which he/she wants to specialize.
  - A student has to take one elective compulsory from the other stream.
  - A student can take one elective from any of the two streams.
  - A student has to take Computer Architecture as one elective.

For example:-

If a student wants to specialize in VLSI Stream, then 6 electives should be taken as follows:

1. Three electives from VLSI Stream
2. One elective from CE stream
3. One elective can be taken from either of the VLSI or CE stream
4. One elective should be Computer Architecture course

Project Work:

A student has to do a 16 credit hour project under a faculty member in III & IV semesters. Students are expected to be here in Summer.

Academic Performance:

A student should complete the requirements with a minimum CGPA of 6.5 to receive the M.Tech. degree.

Residency Requirements:

- Full-time students: Students will have minimum of 4 semesters and maximum of 6 semesters to complete the graduate requirements, failing which they will be terminated from the programme.
- Part-time students: Students will have minimum of 4 semesters and maximum of 8 semesters to complete the graduate requirements, failing which they will be terminated from the programme.

Fees:

The student has to pay full-time post-graduate fees for the first 4 semesters of study. The fees will be pro-rated to the number of credits registered for thereafter according to the institute's policies.

BACK

M. Tech in Computer Science and Information Security

The objective of the two-year M.Tech(CSIS) programme is aimed at producing the much needed highly skilled manpower in the area of Information Security, at the same time well versed with fundamentals of Computer Science.

Curriculum

Semester I

A bridge semester, just like regular M.Tech(CSE)

Course Code	Course Name	Credits
	Advanced Problem Solving	4-0-4-6
	Scripting & Comp. Environments	3-0-2-4
	Discrete Mathematics & Algorithms	4-2-0-6
	Operating Systems	3-1-0-4

Semester II

A mix of stream and bouquet courses as suitable for the CSIS program

Course Code	Course Name	Credits
	Computer Networks	3-0-0-4
	System and Network Security	3-0-1-4
	Bouquet Core Elective	3-0-0-4
	Principles of Information Security	3-0-0-4
	Summer Break	
	Project initiation. Project not graded but is mandatory	

Semester III
A mix of project and course options

Course Code	Course Name	Credits
	Project I	4
	Information Security: Research and Management	3-0-1-4
	Benquet core elective	3-0-0-4
	Bouquet/ Area/ CS/ It Elective	3-0-1-4

Semester IV
A mix of project and course options. Ideally a continuation of Project I

Course Code	Course Name	Credits
	Project II	8
	information Security Audit and Assurance	3-0-0-4
	Bouquet/Area/CS/IT Elective	3-0-0-4

Total Credits	**68**

Academic Regulations (Highlights)

Credit Requirements:

- Minimum credits required for graduation is 68. Each semester, every student must register for at least 16 credits and at most 20 credits.
- Every student must register for 24 area credits out of which 12 credits of project can do.
- Every student must register for 20 credits of Bouquet electives. Of these 2 courses namely Computer Networks and Principles of Information Security are mandatory. Of the remaining 3, at least 1 must be from Foundations and 1 must be from Systems.
- Student can register for 4 credits from other courses.

Bouquet Electives

Foundation Courses

CSE411 Complexity and Advanced Algorithms
CSE471 Statistical Methods in AI
CSE415 Principles of Programming Languages
CSE481 Optimization Methods
CSE418 Principles of Information Security

Systems Courses

CSE431 Distributed Systems
CSE441 Database Systems
CSE435 Computer Networks
CSE419 Compilers
CSE461 Software Engineering

Project Work:

- Every student must register for 12 credits of projects in 3rd and 4th semesters 4 and 8 credits respectively.

Academic Performance:

A student should complete the requirements with a minimum CGPA of 6.5 to receive the M.Tech. degree.

Residency Requirements:

- Full-time students: Students will have minimum of 4 semesters and maximum of 6 semesters to complete the graduate requirements, failing which they will be terminated from the programme.
- Part-time students: Students will have minimum of 4 semesters and maximum of 8 semesters to complete the graduate requirements, failing which they will be terminated from the programme.

Fees:

The student has to pay full-time post-graduate fees for the first 4 semesters of study.

The fees will be pro-rated to the number of credits registered for thereafter according to the institute's policies.

BACK

M. Tech in Bioinformatics

The objective of the two-year M.Tech in Bioinformatics programme is to strengthen the natural sciences background, and to provide in-depth knowledge in the area of bioinformatics and computational biology.

Curriculum

Semester I

Course Code	Course Name	Credits
SCI 550	Mathematics and Statistics	4
SCI 541	Advanced Biomolecular Architecture	4
CSE602	Computer Problem Solving	4
CSE505	Scripting and Computer Environments	4

Semester II

Course Code	Course Name	Credits
SCI XXX	Prepartory course in Maths & Science	0
CS 3010	Computing Tools	4
SCI 551	Introduction to Bioinformatics	4
	Bouquet Core	4
	Bouquet Core	4
	Domain / IT Elective	4
	Summer Break	
	Summer Project	

Semester III

Course Code	Course Name	Credits
SCI XXX	CCNSB Seminar	0
SCI 622	Advanced biology	4
SCI 651	Advanced bioinformatics	4
SCI 764	Project	4
	Bouquet core	4

Semester IV

Course Code	Course Name	Credits
SCI XXX	CCNSB Seminar	0
SCI XXX	Project	8
	Topics in CNSB	4
	Domain elective	4

	Total Credits	**70**

Bouquet core:
Molecular modeling
Systems biology
Computer aided drug design
Computational structural biology
Biophysical chemistry

Electives:
Thermodynamics and kinetics
Statistical mechanics
Classical and quantum mechanics
Quantum mechanics II
Quantum computing
Introduction to nanotechnology
Pattern recognition

Academic Regulations (Highlights)

Credit Requirements:

- Minimum credits required for graduation is 70. Each semester, every student must register for at least 16 credits and at most 20 credits.
- Out of 70, course credits are 58 and project credits are 12.
- Out of 58 credits Stream credits are 30, Bouquet credits 12, Elective credits 8, and 4 credits of Open Elective

Project Work:

- Every student must register for 12 credits of projects in 3rd and 4th semesters 4 and 8 credits respectively.

Academic Performance:

A student should complete the requirements with a minimum CGPA of 6.5 to receive the M.Tech. degree.

Residency Requirements:

- Full-time students: Students will have minimum of 4 semesters and maximum of 6 semesters to complete the graduate requirements, failing which they will be terminated from the programme.

- Part-time students: Students will have minimum of 4 semesters and maximum of 8 semesters to complete the graduate requirements, failing which they will be terminated from the programme.

Fees:

The student has to pay full-time post-graduate fees for the first 4 semesters of study.

The fees will be pro-rated to the number of credits registered for thereafter according to the institute's policies.

BACK

M. Tech in Computer Aided Structural Engineering

The objective of the two-year M.Tech(CASE). programme is to include recent advances in the development and use of computer methods for the solution of scientific and engineering problems related to structures.

The students join this program with a background in civil engineering. The course provides an excellent grounding in the fundamentals of structural engineering subjects. It also engages in a comprehensive study of computer science subjects such as programming, databases, graphics, visualization etc.

Curriculum

Semester I

Course Code	Course Name	Credits
CSE602	Computer Problem Solving	3-1-0-4
CEA611	Theory of Elasticity	3-1-0-4
CEG631	Foundation Engineering and Design	3-1-0-4
CES631	Structural Dynamics	3-1-0-4
	CASE Project	3-1-0-4

Semester II

Course Code	Course Name	Credits
	Computing Tools	4 Credits
	SE/CS Elective	4 Credits
	SE Elective	4 Credits
	SE Elective/Project	4 Credits
	Summer Break	
	Students are encouraged to do projects in the institute or outside	

Semester III

Course Code	Course Name	Credits
	CS/BE Elective	4 Credits
	SE Elective	4 Credits
	Open Elective	4 Credits
	Project (can take upto 8 credits	4 Credits

Semester IV

Course Code	Course Name	Credits
	SE Elective	4 Credits
	SE Elective	4 Credits
	SE Elective	4 Credits
	Project (Can register upto 8 credits	4 Credits

Total Credits	**68**

List of Electives

SE Electives
Theory of Elasticity
Advanced Structural Analysis

Numerical Methods in Structural Mechanics
Earthquake Engineering
Geotechnical Earthquake Engg
Finite Element Method
Computer Aided Structural Design
Advanced Concrete Technology
Foundation Engineering
Soil dynamics
Rock Mechanics
CASE Project
CASE Seminar

CS Electives:
DBMS
Numerical Methods
Computer Graphics
Scientific Visualization
Applied Graphics

Other Electives:
Spatial Informatics
Intelligent buildings
Building Automation
Understanding Work and Life

Academic Regulations (Highlights)

Credit Requirements:

- Student has to acquire a minimum of 68 credits in 4 semesters to become eligible to receive M. Tech in CASE degree.
- They have to acquire a minimum of 24 credits from domain structural engineering subjects (Maximum 52).
- Minimum of 12 credits from computer science subjects (Maximum 20).

Project Work:

- And minimum 4 credits from projects (Maximum 24).

Academic Performance:

A student should complete the requirements with a minimum CGPA of 6.5 to receive the M.Tech degree.

Residency Requirements:

- Full-time students: Students will have minimum of 4 semesters and maximum of 6 semesters to complete the graduate requirements, failing which they will be terminated from the programme.

- Part-time students: Students will have minimum of 4 semesters and maximum of 8 semesters to complete the graduate requirements, failing which they will be terminated from the programme.

Fees:

The student has to pay full-time post-graduate fees for the first 4 semesters of study.

The fees will be pro-rated to the number of credits registered for thereafter according to the institute's policies.

BACK