

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

Proposal for MTech (CSE) Curriculum

A. M.Tech (CSE)

- Students for M.Tech Degree would be required to complete minimum of 48 PG credits and 6 credits for Bridge courses (BC) to earn the Degree.
 - ♦ The requirement of Bridge Credits may be fully or partially waived off based on recommendation of the DRC keeping in view prior background of the student.
- The department proposes to offer two types of MTech Programme
 - ♦ MTech with coursework option with 10 credit project component (Minor project+Major Project Part I) and
 - ♦ MTech with dissertation (thesis) with 24 credit project work over 3 semesters.
 - To opt for dissertation based M.Tech, student must have a minimum CGPA of 7.5 after 2nd semester and MTP-1 with B and above grade.
 - In exceptional cases DRC may waive the CGPA requirement.
 - Students may choose specialization based on credits earned in a particular specialization (refer section C)
- MTech (CSE) Structure Template

MTech Category	Category Name	Credits
General Credit Structure	Bridge Courses :	0 - 6
	Program Core (PC)	21
	Core Courses	11
	Project component (minor project+MTP-I)	10
	Program Electives(PE)	27 - 28
	Restrictive Elective General Electives	3 - 4 24 - 25
Min 48		
MTech by Coursework		
	PC	21
	Program Electives	27
	Restrictive Elective	3 - 4
	Electives (Courses only)	20
	PE/OC course	4
Min 48		
MTech by Thesis		
	PC	21
	Program Electives	27
	Restrictive Elective	3 - 4
	Electives (Courses only)	10
	MTP-II	14
Min 48		

B. Description of Structure: M.Tech Options I & II

I. Bridge Credits: 0-6 As per recommendation of DRC

II. Program Core: Requirement: Min 18cr L-T-P **Total: 21cr**

• COL701: Software Systems Lab	0-0-6	3 cr
• COL702: Advanced Data Structures	3-0-2	4 cr
• COL765: Logic & Functional Programming	3-0-2	4 cr
Project Component		
• COP 891: Minor Project	0-0-6	3cr
• COD 892: M.Tech Project Part I (MTP-I)	0-0-14	7cr

III. Program Electives (PE): Requirement: Min 12cr *Total: Min 27-28cr*

Restricted Elective: One of the following three courses 4 / 3cr

• COL703: Logic for CS (LCS)	3-0-2	4cr
• COL 726: Numerical Algorithms (NA)	3-0-2	4cr
• COL705: Theory of Computation (TOC)	3-0-0	3cr

a) MTECH OPTION I: COURSEWORK OPTION:

• Program Elective (PE) courses from 700/800 level:	20 cr (Min)
• One PE / Open Category elective (from 700/800 level, outside the department):	4 cr (Max)

b) MTECH OPTION II: DISSERTATION BASED:

• COP893: MTP-II (DISSERTATION):	0-0-28	14 cr
• PE courses		10 cr

C. Departmental Streams/Specialization for Option II

Student may opt for one of the following Specializations in his/her degree.

- Architecture & Embedded Systems (AES)
- Graphics & Vision (GV)
- Software Systems (SS)
- Theoretical Computer Science (TH)
- Data Analytics & AI (DAAI)
- Applications & IT (ITA)

Requirements for Specialization:

- At least 6 credits in PE from the specialization.
- MTP-I and MTP-II must be relevant to the specialization.
- Student has to apply for specialization and Institute may issue a certificate after verification
- The list of electives and relevant specialization courses (Refer Annexure A).

Indicative Course Schedule

Sem	Lect Course I	Lect Course II	Lect Course III / Project	Lect Course IV	Comments	Credits
I	COL 702: Advanced Data Structures 4Cr	BC1 4 cr	COL 765: Logic and Functional Programming 4 cr	COL 701: Software Lab 0-0-6 3 cr		11 - 14
II	One of these LCS/NA/TOC 4 cr/ 3cr	PE1 4 cr / 3cr	COL 891: Minor Project 3-0-0 3cr	BC2 4 cr		11 - 15
III	PE2 4 cr	PE3 4 cr	COL 892: MTech Project part 1(MTP-1) 0-0-14 7 cr			15
M.Tech Option I COURSEWORK						
IV	PE4 4 cr	PE5/OC 4 cr	PE6 4 cr			12
M.Tech Option II Thesis						
IV	COL 893: MTech Project part 2(MTP-2) 0-0-28					14
Summer		MTP-2 (Contd)				
Complete MTech Requirement					Total Credits	≥ 48

Annexure A

List of PG courses

Course Number & Title	Status	L-T-P	Credits	Stream
COL632: Introduction to Data Base Systems	BC	3-0-2	4	
COL633: Resource Management in Computer Systems	BC	3-0-2	4	
COL671: Artificial Intelligence	BC	3-0-2	4	
COL672: Computer Networks	BC	3-0-2	4	
COP701: Software Systems Laboratory	PC	0-0-6	3	
COL702: Advanced Data Structure	UG/PG	3-0-2	4	TH/Core
COL703: Logic for CS	UG/PG	3-0-2	4	TH/Core
COL705: Theory of Computation	UG/PG	3-0-0	3	TH
COL718: Architecture of High Performance Computers	UG/PG	3-0-2	4	AES
COL719: Synthesis of Digital Systems	UG/PG	3-0-2	4	AES
COL722: Introduction to Compressed Sensing	UG/PG	3-0-0	3	ITA
COL728: Compilers	UG/PG	3-0-3	4.5	SS
COL729: Compiler Optimization	UG/PG	3-0-3	4.5	SS
COL724: Advanced Computer Networks	UG/PG	3-0-2	4	SS
COL726: Numerical Algorithms	UG/PG	3-0-2	4	TH
COL730: Parallel Programming	UG/PG	3-0-2	4	SS&TH
COL732: Virtualization and Cloud Computing	UG/PG	3-0-2	4	SS
COL733: Cloud Computing Technology Fundamentals	UG/PG	3-0-2	4	SS
COL740: Software Engineering	UG/PG	3-0-2	4	SS
COD745: Minor Project	PG	0-0-6	4	SS
COL750: Foundations of Automatic Verification	UG/PG	3-0-2	4	TH
COL751: Algorithmic Graph Theory	UG/PG	3-0-0	3	TH
COL752: Geometric Computing	UG/PG	3-0-0	3	TH
COL753: Complexity Theory	UG/PG	3-0-0	3	TH
COL754: Approximation Algorithms	UG/PG	3-0-0	3	TH
COL756: Mathematical Programming	UG/PG	3-0-0	3	TH
COL757: Model Centric Algorithm Design	UG/PG	3-0-2	4	TH & ITA
COL758: Advanced Algorithms	UG/PG	3-0-2	4	TH
COL759: Cryptography & Computer Security	UG/PG	3-0-0	3	TH
COL760: Advanced Data Management	UG/PG	3-0-2	4	DAAI & ITA
COL762: Database Implementation	UG/PG	3-0-2	4	DAAI & ITA
COL765: Introduction o Logic and Functional Programming	UG/PG	3-0-2	4	DAAI & ITA
COL768: Wireless Networks	UG/PG	3-0-2	4	SS

COL770: Advanced AI	UG/PG	3-0-2	4	DAAI & ITA
COL772: Natural Language Processing	UG/PG	3-0-2	4	DAAI
COL774: Machine Learning	UG/PG	3-0-2	4	DAAI
COL776: Learning Probabilistic Graphical Models	UG/PG	3-0-2	4	DAAI
COL780: Computer Vision	UG/PG	3-0-2	4	GV
COL781: Computer Graphics	UG/PG	3-0-3	4.5	GV
COL783: Digital Image Analysis	UG/PG	3-0-3	4.5	GV
COL786: Advanced Functional Brain Imaging	UG/PG	3-0-2	4	DAAI, ITA
COL788: Embedded Computing	UG/PG	3-0-0	3	AES
COS799: Independent Study	PG	0-3-0	3	**
COL812: System Level Design and Modelling	UG/PG	3-0-0	3	AES
COL818 Principles of Multiprocessor Systems	UG/PG	3-0-2	4	AES
COL819: Advanced Distributed Systems	UG/PG	3-0-2	4	SS
COL821: Reconfigurable Computing	UG/PG	3-0-0	3	AES
COL829: Advanced Computer Graphics	UG/PG	3-0-2	4	GV
COL830: Distributed Computing	UG/PG	3-0-0	3	TH
COL831: Semantics of Programming Languages	UG/PG	3-0-0	3	TH
COL832: Proofs and Types	UG/PG	3-0-0	3	TH
<u>COL851: Special Topics in Operating Systems</u>	UG/PG	3-0-0	3	SS
<u>COL852: Special Topics in Compilers</u>	UG/PG	3-0-0	3	SS
<u>COL860: Special Topics in Parallel Computation</u>	UG/PG	3-0-0	3	SS & TH
<u>COL861: Special Topics in Hardware Systems</u>	UG/PG	3-0-0	3	AES
<u>COL862: Special Topics in Software Systems</u>	UG/PG	3-0-0	3	SS
<u>COL863: Special Topics in Theoretical Computer Science</u>	UG/PG	3-0-0	3	TH
<u>COL864: Special Topics in Artificial Intelligence</u>	UG/PG	3-0-0	3	DAAI
<u>COL865: Special Topics in Computer Applications</u>	UG/PG	3-0-0	3	ITA
<u>COL866: Special Topics in Algorithms</u>	UG/PG	3-0-0	3	TH
<u>COL867: Special Topics in High Speed Networks</u>	UG/PG	3-0-0	3	SS
<u>COL868: Special Topics in Database Systems</u>	UG/PG	3-0-0	3	DAAI
<u>COL869: Special Topics in Concurrency</u>	UG/PG	3-0-0	3	DAAI & ITA
COL870: Special Topics in Machine Learning	UG/PG	3-0-0	3	DAAI
COL871: Special Topics in programming languages & Compilers	UG/PG	3-0-0	3	SS
COL872: Special Topics in Cryptography	UG/PG	3-0-0	3	TH
COV877: Special Module on Visual Computing	UG/PG	1-0-0	1	GV
COV878: Special Module in Machine Learning	UG/PG	1-0-0	1	DAAI
COV879: Special Module in Financial Algorithms	UG/PG	2-0-0	2	TH
<u>COV880: Special Module in Parallel Computation</u>	UG/PG	1-0-0	1	SS
<u>COV881: Special Module in Hardware Systems</u>	UG/PG	1-0-0	1	AES
<u>COV882: Special Module in Software Systems</u>	UG/PG	1-0-0	1	SS
<u>COV883: Special Module in Theoretical Computer Science</u>	UG/PG	1-0-0	1	TH

<u>COV884: Special Module in Artificial Intelligence</u>	UG/PG	1-0-0	1	DAAI
<u>COV885: Special Module in Computer Applications</u>	UG/PG	1-0-0	1	ITA
<u>COV886: Special Module in Algorithms</u>	UG/PG	1-0-0	1	TH
<u>COV887: Special Module in High Speed Networks</u>	UG/PG	1-0-0	1	SS
<u>COV888: Special Module in Database Systems</u>	UG/PG	1-0-0	1	DAAI & ITA
<u>COV889: Special Module in Concurrency</u>	UG/PG	1-0-0	1	DAAI & ITA
COP891: Minor Project	PG	0-0-6	3	**
COP 892: Major Project Part 1	PG	0-0-14	7	**
COP 893: Major Project Part 2	PG	0-0-28	14	**
SIL765: Networks & System Security	UG/PG	3-0-2	4	SS
SIL769: Internet Traffic - Measurement, Modeling & Analysis	UG/PG	3-0-2	4	SS & ITA
SIL801: Special Topics in Multimedia System	UG/PG	3-0-0	3	GV & ITA
SIL802: Special Topics in Web Based Computing	UG/PG	3-0-0	3	ITA
SIV813: Applications of Computer in Medicines	UG/PG	1-0-0	1	ITA
SIV861: Information and Comm Technologies for Development	UG/PG	1-0-0	1	ITA
SIV864: Special Module on Media Processing & Communication	UG/PG	1-0-0	1	ITA
SIV895: Special Module on Intelligent Information Processing	UG/PG	1-0-0	1	ITA
** Area of specialization				