

# Master of Technology in Computer Science and Engineering

Department of Computer Science and Engineering

## The overall credits structure

Category	PC	PE	OC	Total
Credits	21	27-33	Maximum of 4 Cr. in lieu of a PE (track B)	48-54

### Program Core

COD891	Minor Project	0	0	6	3
COD892	M.Tech. Project Part-I	0	0	14	7
COL702	Advanced Data Structures	3	0	2	4
COL765	Logic & Functional Programming	3	0	2	4
COP701	Software Systems Laboratory	0	0	6	3
<b>Total Credits</b>					<b>21</b>

**Bridge Courses** - Min. 6 credits, may be waived in exceptional cases on recommendation by DRC

COL632	Introduction to Data Base Systems	3	0	2	4
COL633	Resources Management in Computer Systems	3	0	2	4
COL671	Artificial Intelligence	3	0	2	4
COL672	Computer Networks	3	0	2	4

### Program Electives (PE)

COD893	Major Project Part-II	0	0	28	14
COP820	Processor Design Lab	0	0	8	4
COS799	Independent Study	0	3	0	3

**Specialization Streams** - At least 6 credits from PE; Project work relevant to specialization

#### 1. Architecture & Embedded Systems (AES)

COL718	Architecture of High Performance Computers	3	0	2	4
COL719	Synthesis of Digital Systems	3	0	2	4
COL720	Real Time Systems	3	0	2	4
COL788	Embedded Computing	3	0	0	3
COL812	System Level Design and Modelling	3	0	0	3
COL818	Principles of Multiprocessor Systems	3	0	2	4
COL821	Reconfigurable Computing	3	0	0	3
COL861	Special Topics in Hardware Systems	3	0	0	3
COP745	Digital System Design Laboratory	0	0	6	3
COP820	Processor Design Lab	0	0	8	4
COV881	Special Module in Hardware Systems	1	0	0	1

#### 2. Graphics & Vision (GV)

COL726	Numerical Algorithms	3	0	2	4
COL780	Computer Vision	3	0	2	4
COL781	Computer Graphics	3	0	3	4.5
COL783	Digital Image Analysis	3	0	3	4.5
COL785	Virtual and Augmented Reality	3	0	2	4
COL828	Advanced Computer Vision	3	0	2	4
COL829	Advanced Computer Graphics	3	0	2	4
COV877	Special Module on Visual Computing	1	0	0	1
SIL801	Special Topics in Multimedia Systems	3	0	0	3

#### 3. Software Systems (SS)

COL720	Real Time Systems	3	0	2	4
COL724	Advanced Computer Networks	3	0	2	4
COL728	Compiler Design	3	0	3	4.5
COL729	Compiler Optimization	3	0	3	4.5
COL730	Parallel Programming	3	0	2	4
COL731	Advanced Compiler Techniques for Optimization, Safety and Security	3	0	2	4
COL732	Virtualization and Cloud Computing	3	0	2	4
COL733	Cloud Computing Technology Fundamentals	3	0	2	4
COL740	Software Engineering	3	0	2	4
COL750	Foundations of Automatic Verification	3	0	2	4
COL768	Wireless Networks	3	0	2	4
COL818	Principles of Multiprocessor Systems	3	0	2	4
COL819	Advanced Distributed Systems	3	0	2	4
COL851	Special Topics in Operating Systems	3	0	0	3
COL852	Special Topics in Compilers	3	0	0	3
COL860	Special Topics in Parallel Computation	3	0	0	3
COL862	Special Topics in Software Systems	3	0	0	3
COL867	Special Topics in High Speed Networks	3	0	0	3

COL869	Special Topics in Concurrency	3	0	0	3
COL871	Special Topics in Programming Languages	3	0	0	3
COL874	Special Topics in Compilers and Language Implementation	3	0	0	3
COL876	Special Topics in Formal Methods	3	0	0	3
COL886	Special Topics in Operating Systems	3	0	0	3
COV880	Special Module in Parallel Computation	1	0	0	1
COV882	Special Module in Software Systems	1	0	0	1
COV887	Special Module in High Speed Networks	1	0	0	1
COV889	Special Module in Concurrency	1	0	0	1
SIL765	Networks & System Security	3	0	2	4
SIL769	Internet Traffic - Measurement, Modeling & Analysis	3	0	2	4

#### 4. Theoretical Computer Science (TH)

COL703	Logic for CS (LCS)	3	0	2	4
COL726	Numerical Algorithms	3	0	2	4
COL727	Rapid Mixing in Markov Chains	3	0	0	3
COL750	Foundations of Automatic Verification	3	0	2	4
COL751	Algorithmic Graph Theory	3	0	0	3
COL752	Geometric Algorithms	3	0	2	4
COL753	Complexity Theory	3	0	0	3
COL754	Approximation Algorithms	3	0	0	3
COL755	Algorithmic Game Theory	3	0	0	3
COL756	Mathematical Programming	3	0	0	3
COL757	Model Centric Algorithm Design	3	0	2	4
COL758	Advanced Algorithms	3	0	2	4
COL759	Cryptography & Computer Security	3	0	0	3
COL830	Distributed Computing	3	0	0	3
COL831	Semantics of Programming Languages	3	0	0	3
COL832	Proofs and Types	3	0	0	3
COL860	Special Topics in Parallel Computation	3	0	0	3
COL863	Special Topics in Theoretical Computer Science	3	0	0	3
COL866	Special Topics in Algorithms	3	0	0	3
COL869	Special Topics in Concurrency	3	0	0	3
COL871	Special Topics in Programming Languages	3	0	0	3
COL872	Special Topics in Cryptography	3	0	0	3
COL874	Special Topics in Compilers and Language Implementation	3	0	0	3
COL876	Special Topics in Formal Methods	3	0	0	3
COV879	Special Module in Financial Algorithms	2	0	0	2
COV883	Special Module in Theoretical Computer Science	1	0	0	1
COV886	Special Module in Algorithms	1	0	0	1
COV889	Special Module in Concurrency	1	0	0	1

#### 5. Data Analytics & AI (DAAI)

COL726	Numerical Algorithms	3	0	2	4
COL760	Advanced Data Management	3	0	2	4
COL761	Data Mining	3	0	2	4
COL762	Database Implementation	3	0	2	4
COL764	Information Retrieval and Web Search	3	0	2	4
COL770	Advanced Artificial Intelligence	3	0	2	4
COL772	Natural Language Processing	3	0	2	4
COL774	Machine Learning	3	0	2	4
COL775	Deep Learning	3	0	2	4
COL776	Learning Probabilistic Graphical Models	3	0	2	4
COL777	Deep Reinforcement Learning	3	0	2	4
COL778	Principles of Autonomous Systems	3	0	2	4
COL786	Advanced Functional Brain Imaging	3	0	2	4
COL864	Special Topics in Artificial Intelligence	3	0	0	3
COL868	Special Topics in Database Systems	3	0	0	3
COL870	Special Topics in Machine Learning	3	0	0	3
COL873	Special Topics in Natural Language Processing	3	0	0	3
COV878	Special Module in Machine Learning	1	0	0	1
COV884	Special Module in Artificial Intelligence	1	0	0	1
COV888	Special Module in Database Systems	1	0	0	1

**6. Applications & IT (ITA)**

COL707	Introduction to Ethical Issues in Computer Science	3	0	2	4	SIL763	Introduction to Blockchains	3	0	2	4
COL722	Introduction to Compressed Sensing	3	0	0	3	SIL769	Internet Traffic - Measurement, Modeling & Analysis	3	0	2	4
COL757	Model Centric Algorithm Design	3	0	2	4	SIL801	Special Topics in Multimedia	3	0	0	3
COL760	Advanced Data Management	3	0	2	4	SIL802	Special Topics in Web Based Computing	3	0	0	3
COL761	Data Mining	3	0	2	4	SIL861	Special Topics in Information & Communication Technologies for Development	3	0	0	3
COL762	Database Implementation	3	0	2	4	SIV813	Applications of Computer in Medicines	1	0	0	1
COL764	Information Retrieval and Web Search	3	0	2	4	SIV861	Information and Communication Technologies for Development	1	0	0	1
COL770	Advanced Artificial Intelligence	3	0	2	4	SIV864	Special Module on Media Processing Communication	1	0	0	1
COL786	Advanced Functional Brain Imaging	3	0	2	4	SIV871	Special Module in Computational Neuroscience	1	0	0	1
COL865	Special Topics in Computer Applications	3	0	0	3	SIV895	Special Module on Intelligent Information Processing	1	0	0	1
COV885	Special Module in Computer Applications	1	0	0	1						
COV888	Special Module in Database Systems	1	0	0	1						
SIL761	Introduction to Information and Communication Technologies for Development	3	0	2	4						

Sem.	Courses (Number, Abbreviated Title, L-T-P, credits)					Lecture courses	Contact h/week				Credits	
							L	T	P	Total		
I	COL702 Advanced Data Structures (3-0-2) 4	Bridge Course-1 (3-4)	COL765 Logic and Functional Programming (3-0-2) 4	COP701 Software Lab (0-0-6) 3		2-3	6-9	0	10-12	16-21	11-15	
II	PE-1 (3-4)	Bridge Course-2 (3-4)	COD891 Minor Project (0-0-6) 3	PE-2 (3-4)		2-3	6-9	0	10-12	16-21	9-15	
Track A (Requires a CGPA of atleast 7.25 after completing at least 20 credits of course work, eligible for specializations)												
III	PE-3 (3-4)	PE-4 (3-4)	COD892 M.Tech. Project Part-I (0-0-14) 7			2	6	0	14-18	20-24	13-15	
IV	COD893 M.Tech. Project Part-II (MTP-II) (0-0-28) 14 Continued in the summer						0	0	0	28	28	14
Track B (Student needs an approval from a committee to enter this track if CGPA>= 7.25, not eligible for specializations)												
III	PE-3 (3-4)	PE-4 (3-4)	PE-5/OC (3-4)			3	9	0	0-6	9-15	9-12	
IV	PE-6 (3-4)	PE-7 (3-4)	COD892 M.Tech. Project Part-I (0-0-14) 7			2	6	0	14-18	20-24	13-15	

**Total = 48-54**