

DEPARTMENT OF COMPUTER SCIENCE & ENGG

Consolidated Proposal for UG Curriculum

The Department through a series of meetings and lengthy discussions has come up with the following basic framework for undergraduate programme in CSE as under:

Department Linked EA/ES & BS Courses

1. Probability and Stochastic Process (Maths)- 4cr
2. Signals & Systems (EE) – 4cr
3. Material Science (PHY) 3Cr
 - PHL 111: [Principles of Electronic Materials](#) OR
 - PHL 113: Physics of Nanomaterials
4. One of the following courses – 3-4cr
 - MAL 256 Modern Algebra
 - MAL 255 Linear Algebra: Theory, Methods and Applications
 - MAL 210 Optimization Methods and Applications

Total 14-15* cr

***If a student does 15 credits the extra 1 credit will count towards DE.**

	PROPOSED Departmental Core	LTP	Cr
1	CSL 160: Data Structures & Algorithms	3-0-4	5
2	CSL 202: Discrete Structures	3-1-0	4
3	CSL 215: Digital Logic & Design	3-0-4	5
4	CSL 216: Computer Architecture	3-0-2	4
5	CSL 226: Programming Languages	3-0-4	5
6	CSP 290: Design Practices	0-0-6	3
7	CSL 331: Operating Systems	3-0-4	5
8	CSL 333: Principles of Artificial Intelligence*	3-0-2	4*
9	CSL 334: Computer Networks	3-0-2	4
10	CSL 351: Algorithm Design & Analysis	3-1-0	4
11	CSL 352: Intro to Automata & Theory of Computation	3-0-0	3
12	CSL 362: Introduction to Database Management Systems*	3-0-2	4*
13	CSL 380: Intro to Parallel & Distributed Programming	2-0-2	3
14	CSP 490: B.Tech Project OR CSP 492: BTP Part 1	0-0-12	6
	Total 12 courses + 1 Design Lab + 1 Project		55

***Note: Student must do one of CSL333 or CSL362 as part of DC (if he does both, second course will count as DE)**

I. Requirements for B.Tech CSE Degree:

- Department Core + 11 Credits of DE
 - 3 Courses of 3-4 credits each
- Overall Credit Requirements:
 - Institute core 55 + Dept Core 55 + 14 (PL-EAS) = 124 core

- DE 11 + 10 (OC) = 21
- Total 145cr + 15 credits of Non Graded Core

**** Students are encouraged to do the 1-semester Project with Industry as part of one-semester Student Internship in 7th or 8th Semester. This may be combined with summer practical training.**

II. Proposed Departmental Specialization

- All students wishing to do specialization must apply at the end of Fifth Semester or upon completing 100 earned credits for specialization. Department shall set a minimum criterion which may usually be at least First Division for students wishing to do specialization and approve the applications.
- Requirements for specialization: Department Core + 31 credits
 - ADDITIONAL SPECIALIZATION CORE (SC) – 12 Cr

1	CSL703: Logic for Computer Science	3-0-2	4 cr
2	CSP494: B.Tech Project Part 2	0-0-16	8 cr

- Department Electives 19 Credits (6 Courses) of which at least 9 credits should be from specialization.
- In addition Project must be relevant to the specialization chosen
- Specializations offered
 - Advanced Topics in CS
 - Architecture & Embedded Systems (AES)
 - Graphics & Vision (GV)
 - Software Systems (SS)
 - Theoretical Computer Science (TH)
 - Data Analytics & AI (DAAI)
 - Applications & IT (ITA)

The list of available electives and relevant specialization is given in Annexure A.

Credits B.Tech with specialization: 124 + 31 (DE) = 155Cr + 15Cr Non Graded.

III. DUAL DEGREE: B.Tech + M.Tech

- Students for Dual Degree would be required to complete total of 139 UG (145-6 BTP) + 46 PG credits to earn the Dual Degree
Total 185 cr + 15 Non-Graded
- Dual students will not do B.Tech Project but do rest of regular B.Tech CSE requirements and do MTP of 24 credits over 3 semesters
- Continuation to M.Tech in Dual Programme would be subject to maintenance of **Minimum First Division (GPA 6.75)** in UG part of the programme.

Structure:

Institute Core 55 + DC 49 + PLES 14 + DE 11 + OC 10= 139

+

Program Core: 32 Cr

CSL 703: Logic for CS	3-0-2	4 cr
CSL 726: Numerical Algorithms	3-0-2	4 cr
CSL 890: M.tech Mini-Project	0-0-8	4 cr
CSL 891: M.tech Project Part I	0-0-16	8 cr
CSL 892: M.tech Project Part II	0-0-24	12 cr

+

Program Electives: 14 Cr

4 Electives from list of departmental 700/800 level electives

Annexure A: List of UG & PG Electives & Relevant Specialization

Course Number & Title	Status	L-T-P	Credits	Status	Stream
CSL341: Machine Learning	UG	3-0-2	4	Existing	DAAI
CSP315: Embedded System Design Laboratory	UG	0-1-6	4	Revised	AES
CSR310: Professional Practices (CS)	UG	1-0-2	3	Existing	
CSD300: DESIGN PROJECT	UG	0-0-4	2	NON-GRADED	
CSD310: Mini Project	UG	0-0-6	3	Existing	
CSS310: Independent Study (CS)	UG	0-3-0	3	Existing	
CSL333: Principles of Artificial Intelligence*	UG	3-0-2	4	Revised	DAAI & ITA
CSL362: Introduction to Database Management Systems*	UG	3-0-2	4	Revised	DAAI & ITA
CSL703: Logic for CS	UG/PG	3-0-2	4	Revised	TH/Core
CSL705: Theory of Computation	UG/PG	3-0-0	3	Revised	TH
CSL718: Architecture of High Performance Computers	UG/PG	3-0-2	4	Existing	AES
CSL719: Synthesis of Digital Systems	UG/PG	3-0-2	4	Existing	AES
CSL728: Compilers	UG/PG	3-0-3	4.5	Revised	SS
CSL729: Compiler Optimization	UG/PG	3-0-3	4.5	New	SS
CSL724: Advanced Computer Networks	UG/PG	3-0-2	4	Existing	SS
CSL726: Numerical Algorithms	UG/PG	3-0-2	4	New	TH
CSL730: Parallel Programming	UG/PG	3-0-2	4	Existing	SS&TH
CSL732: Virtualization and Cloud Computing	UG/PG	3-0-0	3	Existing	SS
CSL740: Software Engineering	UG/PG	3-0-2	4	Existing	SS
CSD745: Minor Project	PG	0-0-6	4	Existing	
CSL750: Foundations of Automatic Verification	UG/PG	3-0-2	4	Existing	TH
CSL751: Algorithmic Graph Theory	UG/PG	3-0-0	3	Revised	TH
CSL752: Geometric Computing	UG/PG	3-0-0	3	Revised	TH
CSL753: Complexity Theory	UG/PG	3-0-0	3	Revised	TH
CSL754: Approximation Algorithms	UG/PG	3-0-0	3	Revised	TH
CSL756: Mathematical Programming	UG/PG	3-0-0	3	Revised	TH
CSL757: Model Centric Algorithm Design	UG/PG	3-0-2	4	New	TH & ITA
CSL758: Advanced Algorithms	UG/PG	3-0-2	4	Existing	TH
CSL759: Cryptography & Computer Security	UG/PG	3-0-0	3	Revised	TH
CSL760: Advanced Data Management	UG/PG	3-0-2	4	New	DAAI & ITA
CSL762: Database Implementation	UG/PG	3-0-2	4	Revised	DAAI & ITA
CSL768: Wireless Networks	UG/PG	3-0-2	4	Existing	SS
CSL770: Advanced AI	UG/PG	3-0-2	4	New	DAAI & ITA
CSL772: Natural Language Processing	UG/PG	3-0-2	4	New	DAAI
CSL774: Machine Learning	UG/PG	3-0-2	4	New	DAAI
CSL776: Learning Probabilistic Graphical Models	UG/PG	3-0-2	4	New	DAAI
CSL780: Computer Vision	UG/PG	3-0-2	4	New	GV
CSL781: Computer Graphics	UG/PG	3-0-3	4.5	Existing	GV
CSL783: Digital Image Analysis	UG/PG	3-0-3	4.5	Existing	GV
CSL788: Embedded Computing	UG/PG	3-0-0	3	Revised	AES
CSL799: Independent Study	PG	0-3-0	3	Existing	**
CSL812: System Level Design and Modelling	PG	3-0-0	3	Existing	AES
CSL818 Principles of Multiprocessor Systems	PG	3-0-2	4	Existing	AES
CSL819: Advanced Distributed Systems	PG	3-0-2	4	New	SS
CSL821: Reconfigurable Computing	PG	3-0-0	3	Existing	AES
CSL830: Distributed Computing	PG	3-0-0	3	Existing	TH

CSL831: Semantics of Programming Languages	PG	3-0-0	3 Existing	TH
CSL832: Proofs and Types	PG	3-0-0	3 Existing	TH
CSL859: Advanced Computer Graphics	PG	3-0-2	4 Existing	GV
CSL860: Special Topics in Parallel Computation	UG/PG	3-0-0	3 Existing	SS & TH
CSL861: Special Topics in Hardware Systems	UG/PG	3-0-0	3 Existing	AES
CSL862: Special Topics in Software Systems	UG/PG	3-0-0	3 Existing	SS
CSL863: Special Topics in Theoretical Computer Science	UG/PG	3-0-0	3 Existing	TH
CSL864: Special Topics in Artificial Intelligence	UG/PG	3-0-0	3 Existing	DAAI
CSL865: Special Topics in Computer Applications	UG/PG	3-0-0	3 Existing	ITA
CSL866: Special Topics in Algorithms	UG/PG	3-0-0	3 Existing	TH
CSL867: Special Topics in High Speed Networks	UG/PG	3-0-0	3 Existing	SS
CSL868: Special Topics in Database Systems	UG/PG	3-0-0	3 Existing	DAAI
CSL869: Special Topics in Concurrency	UG/PG	3-0-0	3 Existing	DAAI & ITA
CSL870: Special Topics in Machine Learning	UG/PG	3-0-0	3 New	DAAI
CSL871: Special Topics in programming languages & Compilers	UG/PG	3-0-0	3 New	SS
CSL872: Special Topics in Cryptography	UG/PG	3-0-0	3 New	TH
CSV877: Special Module on Visual Computing	UG/PG	1-0-0	1 New	GV
CSV878: Special Module in Machine Learning	UG/PG	1-0-0	1 New	DAAI
CSV879: Special Module in Financial Algorithms	UG/PG	2-0-0	2 New	TH
CSV880: Special Module in Parallel Computation	UG/PG	1-0-0	1 Existing	SS
CSV881: Special Module in Hardware Systems	UG/PG	1-0-0	1 Existing	AES
CSV882: Special Module in Software Systems	UG/PG	1-0-0	1 Existing	SS
CSV883: Special Module in Theoretical Computer Science	UG/PG	1-0-0	1 Existing	TH
CSV884: Special Module in Artificial Intelligence	UG/PG	1-0-0	1 Existing	DAAI
CSV885: Special Module in Computer Applications	UG/PG	1-0-0	1 Existing	ITA
CSV886: Special Module in Algorithms	UG/PG	1-0-0	1 Existing	TH
CSV887: Special Module in High Speed Networks	UG/PG	1-0-0	1 Existing	SS
CSV888: Special Module in Database Systems	UG/PG	1-0-0	1 Existing	DAAI & ITA
CSV889: Special Module in Concurrency	UG/PG	1-0-0	1 Existing	DAAI & ITA
SIL765: Networks & System Security	UG/PG	3-0-2	4 Existing	SS
SIL769: Internet Traffic - Measurement, Modeling & Analysis	UG/PG	3-0-2	4 Existing	SS & ITA
SIL801: Special Topics in Multimedia System	UG/PG	3-0-0	3 Existing	GV & ITA
SIL802: Special Topics in Web Based Computing	UG/PG	3-0-0	3 Existing	ITA
SIV813: Applications of Computer in Medicines	UG/PG	1-0-0	1 Existing	ITA
SIV861: Information and Comm Technologies for Development	UG/PG	1-0-0	1 Existing	ITA
SIV864: Special Module on Media Processing & Communication	UG/PG	1-0-0	1 Existing	ITA
SIV895: Special Module on Intelligent Information Processing	UG/PG	1-0-0	1 Existing	ITA

* The courses CSL333 and/or CSL362 can be done as DE if not done in DC

Specialization Streams

Software Systems: SS

COMPUTER SCIENCE THEORY: TH

Computer Architecture & Embedded Systems: AES

IT & Computer Applications: ITA

Data Analytics & AI: DAAI

Graphics & Computer Vision: GV