

**SCHOOL OF COMPUTER SCIENCE AND  
ENGINEERING**

**B. Tech Computer Science with  
Specialization in Cyber Physical  
Systems**

B. Tech CSE (CPS)

Curriculum  
*(2019-2020 admitted students)*



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Vellore Institute of Technology  
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## **VISION STATEMENT OF VELLORE INSTITUTE OF TECHNOLOGY**

Transforming life through excellence in education and research.

## **MISSION STATEMENT OF VELLORE INSTITUTE OF TECHNOLOGY**

**World class Education:** Excellence in education, grounded in ethics and critical thinking, for improvement of life.

**Cutting edge Research:** An innovation ecosystem to extend knowledge and solve critical problems.

**Impactful People:** Happy, accountable, caring and effective workforce and students.

**Rewarding Co-creations:** Active collaboration with national & international industries & universities for productivity and economic development.

**Service to Society:** Service to the region and world through knowledge and compassion.

## **VISION STATEMENT OF THE SCHOOL OF COMPUTER SCIENCE & ENGINEERING**

To create and maintain an environment for Excellence in Instruction, Learning and Applied Research in the area of Computing Science and Engineering and allied disciplines so as to equip our students with necessary knowledge and skills for higher education/employment and to meet the societal demands.

## **MISSION STATEMENT OF THE SCHOOL OF COMPUTER SCIENCE & ENGINEERING**

- Produce graduates thoroughly acquainted with the principles of modern Computing Science who are able to apply the principles in the design and construction of reliable systems.
- To equip students with the fundamental understanding and practical skills needed by the potential organizers of a demanding profession.
- Provide cost-effective Information and Communication Technology (ICT)-based solutions and value-added services to a variety of organizations and to meet the expectations of stakeholders



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- Foster learning and creative community that strives to continuously advance the frontiers of knowledge and promote the deployment and usage of ICT-based applications for betterment of society.

## **B. Tech Computer Science with Cyber Physical Systems**

### **PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)**

1. Graduates will be engineering practitioners and leaders, who would help solve industry's technological problems.
2. Graduates will be engineering professionals, innovators or entrepreneurs engaged in technology development, technology deployment, or engineering system implementation in industry.
3. Graduates will function in their profession with social awareness and responsibility.
4. Graduates will interact with their peers in other disciplines in industry and society and contribute to the economic growth of the country.
5. Graduates will be successful in pursuing higher studies in engineering or management.
6. Graduates will pursue career paths in teaching or research.



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## **B. Tech Computer Science with Specialization in Cyber Physical Systems**

### **PROGRAMME OUTCOMES (POs)**

PO\_01: Having an ability to apply mathematics and science in engineering applications.

PO\_02: Having a clear understanding of the subject related concepts and of contemporary issues and apply them to identify, formulate and analyse complex engineering problems.

PO\_03: Having an ability to design a component or a product applying all the relevant standards and with realistic constraints, including public health, safety, culture, society and environment

PO\_04: Having an ability to design and conduct experiments, as well as to analyse and interpret data, and synthesis of information

PO\_05: Having an ability to use techniques, skills, resources and modern engineering and IT tools necessary for engineering practice

PO\_06: Having problem solving ability- to assess social issues (societal, health, safety, legal and cultural) and engineering problems

PO\_07: Having adaptive thinking and adaptability in relation to environmental context and sustainable development

PO\_08: Having a clear understanding of professional and ethical responsibility

PO\_09: Having cross cultural competency exhibited by working as a member or in teams

PO\_10: Having a good working knowledge of communicating in English – communication with engineering community and society

PO\_11: Having a good cognitive load management skills related to project management and finance

PO\_12: Having interest and recognise the need for independent and lifelong learning



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## **B. Tech Computer Science with Specialization in Cyber Physical Systems**

### **ADDITIONAL PROGRAMME OUTCOMES (APOs)**

APO\_01: Having an ability to be socially intelligent with good SIQ (Social Intelligence Quotient) and EQ (Emotional Quotient)

APO\_02: Having Sense-Making Skills of creating unique insights in what is being seen or observed (Higher level thinking skills which cannot be codified)

APO\_03: Having design thinking capability

APO\_04: Having computational thinking (Ability to translate vast data in to abstract concepts and to understand database reasoning)

APO\_05: Having Virtual Collaborating ability

APO\_06: Having an ability to use the social media effectively for productive use

APO\_07: Having critical thinking and innovative skills

APO\_08: Having a good digital footprint



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## **PROGRAMME SPECIFIC OUTCOMES (PSOs)**

On completion of B. Tech. CSE with (CPS) programme, graduates will be able to

- PSO1: Analyze, interpret and provide solutions to real life problems related to Cyber Physical Systems domain.
- PSO2: Develop competency for designing engineered systems that are built from seamless integration of physical system and cyber system.
- PSO3: Make the students expert in one or more application domain relevant to Cyber Physical Systems.



## **B. Tech Computer Science with Specialization in Cyber Physical Systems**

### **CREDIT STRUCTURE**

#### **Category-wise Credit distribution**

<b>Category</b>	<b>Credits</b>
University Core (UC)	<b>53</b>
Programme Core (PC- CSE - 38, CPS - 22)	<b>60</b>
University Elective (UE)	<b>12</b>
Programme Elective (PE - CSE – 6, CPS - 29)	<b>35</b>
<b>Total</b>	<b>160</b>



## B. Tech Computer Science with Specialization in Cyber Physical Systems

### DETAILED CURRICULUM

#### University Core

Course Code	Course Title	L	T	P	J	C	Remarks
CHY1701	Engineering Chemistry	3	0	2	0	4	
CHY1002	Environmental Sciences	3	0	0	0	3	Non Credit Course
CSE1001	Problem Solving and Programming	0	0	6	0	3	
CSE1002	Problem Solving and Object Oriented Programming	0	0	6	0	3	
EEE3999	Technical Answers for Real World Problems (TARP)	1	0	0	4	2	
EEE4098	Comprehensive Examination	0	0	0	0	1	
EEE4099	Co-op /Capstone Project	0	0	0	0	12	
ENG1901/ ENG1902/ ENG1903	Technical English I Technical English II Advanced Technical English	0/ 0/ 0	0/ 0/ 0	4/ 4/ 2	0/ 0/ 4	2	
ENG1000/ ENG 2000	Foundation English I Foundation English II	0	0	4	0	2	Non Credit Course
HUM1021	Ethics and Values	2	0	0	0	2	
MAT1011	Calculus for Engineers	3	0	2	0	4	
MAT2001	Statistics for Engineers	3	0	2	0	4	
MGT1022	Lean Start-up Management	1	0	0	4	2	
PHY1701	Engineering Physics	3	0	2	0	4	
PHY1999	Introduction to Innovative Projects	1	0	0	0	1	





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EXC4097	Extra & Co- Curricular Activities	0	0	0	0	2	Non Credit Course
EEE3099	Industrial Internship	0	0	0	0	1	
FLC4097	Foreign Language Courses Basket	2	0	0	0	2	
STS4097	Soft Skills	-	-	-	-	6	
Total Cerdits (A)						60	
Non Cerdit Course (B)						7	
University Core Courses (A-B)						53	



## **B. Tech Computer Science with Specialization in Cyber Physical Systems**

### **Programme Core**

Sl.No	Course Code	Course Title	L	T	P	J	C
1.	MAT2002	Applications of Differential and Difference Equations	3	0	2	0	4
2.	MAT1014	Discrete Mathematics and Graph Theory	3	1	0	0	4
3.	EEE1001	Basic Electrical and Electronics Engineering	2	0	2	0	3
4.	CSE2001	Computer Architecture and Organization	3	0	0	0	3
5.	CSE2003	Data Structures and Algorithms	2	0	2	4	4
6.	CSE1004	Network and Communication	3	0	2	0	4
7.	CSE2004	Database Management System	2	0	2	4	4
8.	CSE2005	Operating Systems	2	0	2	4	4
9.	CSE1003	Digital Logic Design	3	0	2	0	4
10.	CSE2006	Microprocessor and Interfacing	2	0	2	4	4
11.	XXXXXX	Introduction to Cyber Physical Systems	2	0	2	0	3
12.	XXXXXX	Communication for CPS	3	0	0	2	4
13.	XXXXXX	Sensors and Actuators	2	0	2	0	3
14.	XXXXXX	Distributed Real-Time Systems	2	0	2	4	4
15.	XXXXXX	CPS System Design	3	0	2	0	4
16.	XXXXXX	Basics of Control Systems	3	0	2	0	4



## B. Tech Computer Science with Specialization in Cyber Physical Systems

### Programme Elective

Domain	Course Code	Course Title	L	T	P	J	C	Pre-requisite
<b>General CSE</b>	CSE3002	Internet and Web Programming	2	0	2	4	4	-
	XXXXXX	Cryptography & Network Security	2	0	2	4	4	-
	CSE4015	Human Computer Interaction	3	0	0	4	4	-
	XXXXXX	Software Engineering Principles	2	0	2	0	3	-
	CSE4019	Image Processing	3	0	0	4	4	-
	XXXXXX	Blockchain Technology	2	0	2	0	3	-
<b>Healthcare Monitoring Systems</b>	XXXXXX (HMS1)	Smart Sensors for Healthcare	2	0	2	4	4	-
	XXXXXX	Biomedical Instrumentation	2	0	0	4	3	HMS1
	XXXXXX	Brain Computer Interface	2	0	2	4	4	HMS1
	XXXXXX	Wearable Health Monitoring Devices	2	0	2	0	3	HMS1
	XXXXXX	Telemedicine	2	0	2	0	3	HMS1
	XXXXXX	Ambient Assistive Living Technologies	2	0	0	4	3	HMS1
<b>Computing and Networking</b>	XXXXXX (CN1)	Cloud Computing	2	0	2	4	4	-
	XXXXXX	Machine Learning and its Applications	2	0	2	4	4	CN1
	XXXXXX	Security and Privacy of CPS	2	0	0	4	3	CN1
	XXXXXX	Next Generation Networks	3	0	0	0	3	CN1
<b>Controls and Robotics</b>	XXXXXX (CR1)	Robotics and Programming	2	0	2	4	4	-
	XXXXXX	Intelligent Manufacturing Automation	3	0	0	0	3	CR1
	XXXXXX	CPS Assurance	3	0	0	0	3	CR1
	XXXXXX	Control Discrete Event Systems	3	0	0	0	3	CR1
	XXXXXX	Medical Robotics	3	0	0	0	3	CR1



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<b>Smart Transportation Systems</b>	XXXXXX (ST1)	Computer Controlled Systems	2	0	2	4	4	-
	XXXXXX	Intelligent Transportation Systems	3	0	0	4	4	ST1
	XXXXXX	Machine Vision	2	0	0	4	3	ST1
	XXXXXX	In-vehicle Networking	2	0	0	4	3	ST1
	XXXXXX	E-Vehicles	3	0	0	0	3	ST1
<b>Smart City</b>	XXXXXX (SC1)	Context-Aware Computing	2	0	2	4	4	-
	XXXXXX	Internet of Things (IoT) for Smart Cities	2	0	0	4	3	SC1
	XXXXXX	Smart Farming and Agriculture	2	0	0	4	3	SC1
	XXXXXX	Smart Infrastructure	3	0	0	0	3	SC1
	XXXXXX	CPS for Internal and External Security	2	0	0	4	3	SC1



## University Elective Baskets

### Management courses

Sl.No	Code	Title	L	T	P	J	C
1	MGT1001	Basic Accounting	3	0	0	0	3
2	MGT1002	Principles of Management	2	0	0	4	3
3	MGT1003	Economics for Engineers	2	0	0	4	3
4	MGT1004	Resource Management	2	0	0	4	3
5	MGT1005	Design, Systems and Society	2	0	0	4	3
6	MGT1006	Environmental and Sustainability Assessment	2	0	0	4	3
7	MGT1007	Gender, Culture and Technology	2	0	0	4	3
8	MGT1008	Impact of Information Systems on Society	2	0	0	4	3
9	MGT1009	Technological Change and Entrepreneurship	2	0	0	4	3
10	MGT1010	Total Quality Management	2	2	0	0	3
11	MGT1014	Supply Chain Management	3	0	0	0	3
12	MGT1015	Business Mathematics	3	0	0	0	3
13	MGT1016	Intellectual Property Rights	3	0	0	0	3
14	MGT1017	Business Regulatory Framework For Start-ups	3	0	0	0	3
15	MGT1018	Consumer Behaviour	3	0	0	0	3
16	MGT1019	Services Marketing	3	0	0	0	3
17	MGT1020	Marketing Analytics	2	0	2	0	3
18	MGT1021	Digital and Social Media Marketing	3	0	0	0	3
19	MGT1022	Lean Start-up Management	1	0	0	4	2
20	MGT1023	Fundamentals of Human Resource Management	3	0	0	4	4
21	MGT1024	Organizational Behaviour	3	0	0	4	4
22	MGT1025	Foundations of Management And Organizational Behaviour	3	0	0	4	4
23	MGT1026	Information Assurance and Auditing	2	0	0	4	3
24	MGT1028	Accounting and Financial Management	2	2	0	4	4
25	MGT1029	Financial Management	2	1	0	4	4
26	MGT1030	Entrepreneurship Development	3	0	0	4	4
27	MGT1031	International Business	3	0	0	4	4
28	MGT1032	Managing Asian Business	3	0	0	4	4
29	MGT1033	Research Methods in Management	2	1	0	4	4
30	MGT1034	Project Management	3	0	0	4	4



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31	MGT1035	Operations Management	3	0	0	0	3
32	MGT1036	Principles of Marketing	3	0	0	4	4
33	MGT1037	Financial Accounting and Analysis	2	1	0	4	4
34	MGT1038	Financial Econometrics	2	0	0	4	3
35	MGT1039	Financial Markets and Institutions	2	0	0	4	3
36	MGT1040	Personal Financial Planning	2	0	0	4	3
37	MGT1041	Financial Derivatives	2	1	0	4	4
38	MGT1042	Investment Analysis and Portfolio Management	2	0	0	4	3
39	MGT1043	Applications in Neuro Marketing	3	0	0	4	4
40	MGT1044	Global Brand Marketing Strategies	3	0	0	4	4
41	MGT1045	Industrial Marketing	3	0	0	4	4
42	MGT1046	Sales and Distribution Management	3	0	0	4	4
43	MGT1047	Social Marketing	3	0	0	4	4
44	MGT1048	Political Economy of Globalization	3	0	0	4	4
45	MGT1049	Sustainable Business Models	3	0	0	4	4
46	MGT1050	Software Engineering Management	2	0	0	4	3
47	MGT1051	Business Analytics for Engineers	2	2	0	0	3
48	MGT1052	Bottom of the Pyramid Operations	3	0	0	0	3
49	MGT1053	Entrepreneurship Development, Business Communication and IPR	1	0	2	0	2
50	MGT1054	Product Planning and Strategy	2	2	0	0	3
51	MGT1055	Design Management	2	2	0	0	3
52	MGT1056	Accounting and Financial Management	3	0	0	4	4
53	MGT6001	Organizational Behaviour	2	0	0	4	3



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## Humanities courses

Sl.No	Code	Title	L	T	P	J	C
1	HUM1001	Fundamentals of Cyber Laws	3	0	0	0	3
2	HUM1002	Business Laws	3	0	0	0	3
3	HUM1003	Basic Taxation for Engineers	3	0	0	0	3
4	HUM1004	Corporate Law for Engineers	3	0	0	0	3
5	HUM1005	Cost Accounting for Engineers	3	0	0	0	3
6	HUM1006	Business Accounting for Engineers	3	0	0	0	3
7	HUM1007	Contemporary Legal Framework for Business	3	0	0	0	3
8	HUM1009	International Business	3	0	0	0	3
9	HUM1010	Foreign Trade Environment	3	0	0	0	3
10	HUM1011	Export Business	3	0	0	0	3
11	HUM1012	Introduction to Sociology	3	0	0	0	3
12	HUM1013	Population Studies	3	0	0	0	3
13	HUM1021	Ethics and Values	2	0	0	0	2
14	HUM1022	Psychology in Everyday Life	2	0	0	4	2
15	HUM1023	Indian Heritage and Culture	2	0	0	4	2
16	HUM1024	India and Contemporary World	2	0	0	4	2
17	HUM1025	Indian Classical Music	1	0	2	4	1
18	HUM1033	Micro Economics	3	0	0	0	3
19	HUM1034	Macro Economics	3	0	0	0	3
20	HUM1035	Introductory Econometrics	2	0	2	0	2
21	HUM1036	Engineering Economics and Decision Analysis	2	0	0	4	2
22	HUM1037	Applied Game Theory	2	0	0	4	2
23	HUM1038	International Economics	3	0	0	0	3
24	HUM1039	Community Development in India	2	0	0	4	2
25	HUM1040	Indian Social Problems	3	0	0	0	3
26	HUM1041	Indian Society Structure and Change	3	0	0	0	3
27	HUM1042	Industrial Relations and Labour Welfare in India	3	0	0	0	3
28	HUM1043	Mass Media and Society	2	0	0	4	2
29	HUM1044	Network Society	3	0	0	0	3
30	HUM1045	Introduction to Psychology	2	0	2	0	2
31	HUM1706	Business Accounting for Engineers	3	0	0	0	3