

**CURRICULUM**  
**2023**  
**(Autonomous)**  
Draft  
Version 1.0

**B.TECH**  
**Computer Science and Engineering (CSE)**



**MAR BASELIOS COLLEGE OF ENGINEERING  
AND TECHNOLOGY**

**Mar Ivanios Vidyanagar, Nalanchira,  
Thiruvananthapuram – 695 015  
August 2023**



**MAR BASELIOS COLLEGE OF ENGINEERING AND TECHNOLOGY**

**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING**

**B.TECH DEGREE PROGRAMME**

**IN**

**COMPUTER SCIENCE AND ENGINEERING**

**CURRICULUM AND FIRST YEAR SYLLABI**

**2023 SCHEME**

<b>Items</b>	<b>Board of Studies (BOS)</b>	<b>Academic Council (AC)</b>
<b>Date of Approval</b>	<b>10/7/2023</b>	<b>09/08/2023</b>

**Head of the Department**  
**Chairman, Board of Studies**

**Principal**  
**Chairman, Academic Council**



B.Tech in Computer Science and Engineering 2023-24

**CURRICULUM**  
**FOR**  
**B. TECH DEGREE PROGRAMME**  
**IN**  
**COMPUTER SCIENCE AND ENGINEERING**

**2023 SCHEME**  
**(AUTONOMOUS)**



**MAR BASELIOS COLLEGE OF ENGINEERING AND TECHNOLOGY**  
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Technological University) MAR IVANIOS VIDYANAGAR, NALANCHIRA,  
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## **MAR BASELIOS COLLEGE OF ENGINEERING AND TECHNOLOGY**

### **Vision and Mission of the Institution**

**Vision:**

To be an Institution moulding globally competent professionals as epitomes of Noble Values.

**Mission:**

To transform the Youth as technically competent, ethically sound and socially committed professionals, by providing a vibrant learning ambience for the welfare of humanity.

## **DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING**

### **Vision and Mission of the Department**

**Vision:**

To be a Centre of Excellence in Computer Science and Engineering providing quality education and research for the betterment of the society.

**Mission:**

To impart sound knowledge in theoretical and applied foundations of Computer Science and Engineering, and to train the students to solve real life issues to effectively define and shape life.

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

1. Graduates will be successful professionals in Industries of core or interdisciplinary nature or entrepreneurs, demonstrating effective leadership and excellent team work.
2. Graduates will expand the horizon of knowledge through higher education or research, leading to self-directed professional development.
3. Graduates will demonstrate professional attitude and ethics while providing solutions in societal and environmental contexts.



## PROGRAMME OUTCOMES (POs)

Engineering graduates will be able to:

1. **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. **Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. **Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4. **Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5. **Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
6. **The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7. **Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8. **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. **Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11. **Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12. **Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

## PROGRAMME SPECIFIC OUTCOMES (PSOs)

Engineering Graduates will have the ability to:

1. Apply Algorithmic Principles, Programming Skills and Software Engineering Principles to design, develop and evaluate Software Systems of varying complexities.
2. Apply knowledge of System Integration to design and implement computer-based systems.
3. Solve real world and socially relevant problems with the knowledge in recent and advanced Computing Technologies.



## DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

For the students admitted from 2023

### Scheduling of Courses

#### i) Knowledge Segments and Credits

Every course of B. Tech Programme is placed in one of the nine categories as listed in the following table.

No semester shall have more than six lecture-based courses and two laboratory courses, and/or drawing/seminar/project courses in the curriculum.

Sl. No.	Category	Category Code	2023
1	Humanities and Social Sciences including Management Courses	HSC	6
2	Basic Science Courses	BSC	26
3	Engineering Science Courses	ESC	22
4	Programme Core Courses, Comprehensive Course Work and Viva Voce	PCC	69
5	Programme Elective Courses	PEC	18
6	Institute Elective Courses	IEC	6
7	Project Work and Seminar	PWS	13
8	Mandatory Non-credit Courses (P/F) with Grade	MNC	--
9	Mandatory Student Activities (P/F)	MSA	3
<b>Total Mandatory Credits</b>			<b>163</b>
	Value Added Courses (Optional) – Honours/Minor	VAC	15

#### ii) Semester-wise Credit Distribution

Semester	I	II	III	IV	V	VI	VII	VIII	Total Credits
Credits for Courses	18	20	22	23	22	22	18	15	160
	38		45		44		33		160
Credits for Activities	3								3
Total Credits									163
Value Added Courses (Optional) – Honours / Minor									15
<b>Total Credits</b>									<b>178</b>



<b>SEMESTER I</b>						
<b>Slot</b>	<b>Category Code</b>	<b>Course Number</b>	<b>Courses</b>	<b>L-T-P-J</b>	<b>Hours</b>	<b>Credit</b>
A	BSC	23MAL10A	Linear Algebra and Calculus	3-1-0-0	4	4
B	BSC	23PYL10A	Engineering Physics	3-1-0-0	4	4
D	ESC	23ESB10E	Programming in C	2-1-2-0	5	4
E	ESC	23ESL10J/ 23ESL10L	Basics of Electrical Engineering-A Basics of Electronics Engineering	2-0-0-0 2-0-0-0	4	2 2
G	MNC	23NCL10A	Environmental Science	2-0-0-0	2	--
S	BSC	23PYP10A	Engineering Physics Lab	0-0-2-0	2	1
T	ESC	23ESP10B	Electrical and Electronics Workshop	0-0-2-0	2	1
<b>TOTAL</b>					<b>23</b>	<b>18</b>

<b>SEMESTER II</b>						
<b>Slot</b>	<b>Category Code</b>	<b>Course Number</b>	<b>Courses</b>	<b>L-T-P-J</b>	<b>Hours</b>	<b>Credit</b>
A	BSC	23MAL10B	Vector Calculus, Differential Equations and Transforms	3-1-0-0	4	4
B	BSC	23CYL10A	Engineering Chemistry	3-1-0-0	4	4
C	ESC	23ESB10A	Engineering Graphics	2-0-2-0	4	3
D	ESC	23ESB10H	Programming using Python	2-0-2-0	4	3
E	ESC	23ESL10Q	Digital Electronics	3-0-0-0	3	3
G	MNC	23NCJ10B	Professional Communication	2-0-0-2	4	--
S	BSC	23CYP10A	Engineering Chemistry Lab	0-0-2-0	2	1
T	ESC	23ESB10P	Manufacturing and Construction Practices-B	1-0-2-0	3	2
<b>TOTAL</b>					<b>28</b>	<b>20</b>



SEMESTER III						
Slot	Category Code	Course Number	Courses	L-T-P-J	Hours	Credit
A	BSC	23MAL20B	Discrete Mathematical Structures	3-1-0-0	4	4
B	PCC	23CSL20A	Data Structures	3-1-0-0	4	4
C	PCC	23CSL20B	Computer Organization and Architecture	3-1-0-0	4	4
D	PCC	23CSB20C	Object Oriented Programming Concepts	3-0-2-0	5	4
E	ESC	23ESL00A	Design Engineering	2-0-0-0	2	2
G	MNC	23NCL20A	Professional Ethics	2-0-0-0	2	--
S	PCC	23CSP20A	Hardware Lab	0-0-3-0	3	2
T	PCC	23CSP20B	Data Structures Lab	0-0-3-0	3	2
R/M	VAC		Remedial/Minor Course	3-0-0-0	3	3
<b>TOTAL</b>					<b>27/30</b>	<b>22/25</b>

SEMESTER IV						
Slot	Category Code	Course Number	Courses	L-T-P-J	Hours	Credit
A	BSC	23MAL20D	Probability, Statistics and Numerical Methods	3-1-0-0	4	4
B	PCC	23CSL20D	Operating Systems	3-1-0-0	4	4
C	PCC	23CSL20E	Database Management Systems	3-1-0-0	4	4
D	PCC	23CSL20F	Formal Languages and Automata Theory	3-1-0-0	4	4
E	HSC	23HSL20A	Universal Human Values-II	3-0-0-0	3	3
G	MNC	23NCL20B	Industrial Safety Engineering	2-1-0-0	3	--
S	PCC	23CSP20C	Operating Systems Lab	0-0-3-0	3	2
T	PCC	23CSP20D	Database Lab	0-0-3-0	3	2
R/M/H	VAC		Remedial/Minor/Honours Course	3-0-0-0	3	3
<b>TOTAL</b>					<b>28/31</b>	<b>23/26</b>





<b>SEMESTER V</b>						
<b>Slot</b>	<b>Category Code</b>	<b>Course Number</b>	<b>Courses</b>	<b>L-T-P-J</b>	<b>Hours</b>	<b>Credit</b>
A	PCC	23CSL30A	Computer Networks	3-1-0-0	4	4
B	PCC	23CSL30B	Microprocessors and Microcontrollers	3-1-0-0	4	4
C	PCC	23CSJ30C	Web Technology	2-0-2-1	5	4
D	PEC	23CSL31X	Programme Elective Course 1	2-1-0-0	3	3
E	HSC	23HSL30A	Business Economics and Accountancy	3-0-0-0	3	3
S	PCC	23CSP30A	Microprocessor Lab	0-0-3-0	3	2
T	PCC	23CSP30B	Network Lab	0-0-3-0	3	2
R/M/H	VAC		Remedial/Minor/Honours Course	3-0-0-0	3	3
<b>TOTAL</b>					<b>25/28</b>	<b>22/25</b>

<b>SEMESTER VI</b>						
<b>Slot</b>	<b>Category Code</b>	<b>Course Number</b>	<b>Courses</b>	<b>L-T-P-J</b>	<b>Hours</b>	<b>Credit</b>
A	PCC	23CSL30D	Algorithm Analysis and Design	3-1-0-0	4	4
B	PCC	23CSL30E	Artificial Intelligence	3-1-0-0	4	4
C	PCC	23CSB30F	Software Engineering Theory and Practices	3-0-2-0	5	4
D	PEC	23CSL32X	Programme Elective Course 2	2-1-0-0	3	3
E	IEC	23IEL31X	Institute Elective 1	3-0-0-0	3	3
T	PWS	23CSS38A	Seminar	0-0-4-0	4	2
U	PWS	23CSJ38B	Miniproject	0-0-4-0	4	2
R/M/H	VAC		Remedial/Minor/Honours Course	3-0-0-0	3	3
<b>TOTAL</b>					<b>27/30</b>	<b>22/25</b>



<b>SEMESTER VII</b>						
<b>Slot</b>	<b>Category Code</b>	<b>Course Number</b>	<b>Courses</b>	<b>L-T-P-J</b>	<b>Hours</b>	<b>Credit</b>
A	PCC	23CSB40A	Cyber Security	3-1-2-0	6	5
B	PCC	23CSB40B	Machine Learning	2-1-2-0	5	4
C	PEC	23CSL43X	Programme Elective Course 3/ Industry Elective	2-1-0-0	3	3
E	IEC	23IEL42X	Institute Elective 2	2-1-0-0	3	3
T	PWS	23CSV48A	Comprehensive Course Viva	0-0-2-0	2	1
U	PWS	23CSJ48B	Project Phase I	0-0-4-0	4	2
R/M/H	VAC		Remedial/Minor/Honours Course	0-0-6-0/ 3-0-0-0	6/3	3
<b>TOTAL</b>					<b>23/ (29/26)</b>	<b>18/21</b>

<b>SEMESTER VIII</b>						
<b>Slot</b>	<b>Category Code</b>	<b>Course Number</b>	<b>Courses</b>	<b>L-T-P-J</b>	<b>Hours</b>	<b>Credit</b>
A	PEC	23CSL44X	Programme Elective Course 4	2-1-0-0	3	3
B	PEC	23CSL45X	Programme Elective Course 5	2-1-0-0	3	3
C	PEC	23CSL46X	Programme Elective Course 6	2-1-0-0	3	3
U	PWS	23CSJ48C	Project Phase II	0-0-12-0	12	6
R/M/H	VAC		Remedial/Minor/Honours Course	0-0-6-0	6	3
<b>TOTAL</b>					<b>21/27</b>	<b>15/18</b>

**PROGRAMME ELECTIVE I**

Slot	Category Code	Course Number	Courses	L-T-P	Hours	Credit
<b>D</b>	<b>PEC</b>	23CSL31A	Data Science	2-1-0	3	3
		23CSL31B	Soft Computing	2-1-0	3	3
		23CSL31C	Real Time Operating Systems	2-1-0	3	3
		23CSL31D	Parallel Computer Architecture	2-1-0	3	3
		23CSL31E	Principles of Programming Languages	2-1-0	3	3
		23CSL31F	Artificial Neural Networks	2-1-0	3	3
		23CSL31G	Automated Verification	2-1-0	3	3

**PROGRAMME ELECTIVE II**

Slot	Category Code	Course Number	Courses	L-T-P	Hours	Credit
<b>D</b>	<b>PEC</b>	23CSL32A	Data Mining Techniques	2-1-0	3	3
		23CSL32B	Fuzzy Set Theory	2-1-0	3	3
		23CSL32C	Foundations of Security in Computing	2-1-0	3	3
		23CSL32D	High Performance Computing	2-1-0	3	3
		23CSL32E	Cloud Computing	2-1-0	3	3
		23CSL32F	Computational Linguistics	2-1-0	3	3
		23CSL32G	Model Based Software Development	2-1-0	3	3

**PROGRAMME ELECTIVE III**

Slot	Category Code	Course Number	Courses	L-T-P	Hours	Credit
<b>C</b>	<b>PEC</b>	23CSL43A	Big Data Analytics	2-1-0	3	3
		23CSL43B	Computational Complexity	2-1-0	3	3
		23CSL43C	Sustainable Computing	2-1-0	3	3
		23CSL43D	Domain Specific Accelerators	2-1-0	3	3
		23CSL43E	Mobile Computing	2-1-0	3	3
		23CSL43F	Natural Language Processing	2-1-0	3	3
		23CSL43G	Data Compression Techniques	2-1-0	3	3

**PROGRAMME ELECTIVE IV**

Slot	Category Code	Course Number	Courses	L-T-P	Hours	Credit
A	PEC	23CSL44A	Human Computer Interaction	2-1-0	3	3
		23CSL44B	Approximation Algorithms	2-1-0	3	3
		23CSL44C	Artificial Intelligence for Robotics	2-1-0	3	3
		23CSL44D	Hardware Security	2-1-0	3	3
		23CSL44E	Internet of Things	2-1-0	3	3
		23CSL44F	Pattern Recognition	2-1-0	3	3
		23CSL44G	Logic for CS	2-1-0	3	3

**PROGRAMME ELECTIVE V**

Slot	Category Code	Course Number	Courses	L-T-P	Hours	Credit
B	PEC	23CSL45A	Deep Learning	2-1-0	3	3
		23CSL45B	Algorithmic Game Theory	2-1-0	3	3
		23CSL45C	Knowledge Engineering and Expert Systems	2-1-0	3	3
		23CSL45D	Parallel Algorithms	2-1-0	3	3
		23CSL45E	Block Chain Technologies	2-1-0	3	3
		23CSL45F	Bioinformatics	2-1-0	3	3
		23CSL45G	Virtual and Augmented Reality Systems	2-1-0	3	3

**PROGRAMME ELECTIVE VI**

Slot	Category Code	Course Number	Courses	L-T-P	Hours	Credit
C	PEC	23CSL46A	Bio Inspired Optimization Techniques	2-1-0	3	3
		23CSL46B	Cognitive Modeling	2-1-0	3	3
		23CSL46C	Social Network Analysis	2-1-0	3	3
		23CSL46D	Image Processing Techniques	2-1-0	3	3
		23CSL46E	Wireless Sensor Networks	2-1-0	3	3
		23CSL46F	Quantum Computing	2-1-0	3	3
		23CSL45G	Secure Model and IoT Systems	2-1-0	3	3

**INSTITUTE ELECTIVE**

Slot	Category Code	Course Number	Courses	L-T-P	Hours	Credit
<b>E</b>	<b>IEC</b>	23IEL46A	Introduction to Mobile Computing	2-1-0	3	3
		23IEL46B	Introduction to Deep Learning	2-1-0	3	3
		23IEL46C	Computer Graphics and Image Processing	2-1-0	3	3
		23IEL46D	Python for Engineers	2-1-0	3	3
		23IEL46E	Object Oriented Concepts	2-1-0	3	3
		23IEL46F	Introduction to AI and ML	2-1-0	3	3



**MINOR**

Semester	BASKET I Specialization: SOFTWARE ENGINEERING				BASKET II Specialization: MACHINE LEARNING				BASKET III Specialization: NETWORKING			
	Course Number	Course	L-T-P-J	Credit	Course Number	Course	L-T-P-J	Credit	Course Number	Course	L-T-P-J	Credit
<b>S3</b>	23CSL2MA	Object Oriented Programming	3-0-0-0	3	23CSL2MB	Mathematics for Machine Learning	3-1-0-0	3	23CSL2MC	Data Communication	3-1-0-0	3
<b>S4</b>	23CSL2MD	Programming Methodologies	3-0-0-0	3	23CSL2ME	Concepts in Machine Learning	3-0-0-0	3	23CSL2MF	Introduction to Computer Networks	3-0-0-0	3
<b>S5</b>	23CSL3MA	Concepts in Software Engineering	3-0-0-0	3	23CSL3MB	Concepts in Deep Learning	3-0-0-0	3	23CSL3MC	Client Server Systems	3-0-0-0	3
<b>S6</b>	23CSL3MD	Introduction to Software Testing	3-0-0-0	3	23CSL3ME	Reinforcement Learning	3-0-0-0	3	23CSL3MF	Wireless Networks and IoT Applications	3-0-0-0	3
<b>S7</b>	23CSJ4MA	Mini Project	0-0-6-0	3	23CSJ4MA	Mini Project	0-0-6-0	3	23CSJ4MA	Mini Project	0-0-6-0	3
<b>S8</b>	23CSJ4MB	Mini Project	0-0-6-0	3	23CSJ4MB	Mini Project	0-0-6-0	3	23CSJ4MB	Mini Project	0-0-6-0	3



### HONOURS

Semester	BASKET I Specialization: SECURITY IN COMPUTING				BASKET II Specialization: MACHINE LEARNING				BASKET III Specialization: FORMAL METHODS		
	Course Number	Course	L-T-P-J	Credit	Course Number	Course	L-T-P-J	Credit	Course Number	Course	L-T-P-J
S4	23C SL2 HA	Number Theory	3-0-0-0	3	23C SL 2HB	Computational Fundamentals of Machine Learning	3-0-0-0	3	23C SL 2HC	Principles of Program Analysis and Verification	3-0-0-0
S5	23C SL3 HA	Cryptographic Algorithms	3-0-0-0	3	23C SL3 HB	Neural Networks and Deep Learning	3-0-0-0	3	23C SL3 HC	Principles of Model Checking	3-0-0-0
S6	23C SL3 HD	Network Security	3-0-0-0	3	23C SL3 HE	Advanced Topics in Machine Learning	3-0-0-0	3	23C SL3 HF	Theory of Computability and Complexity	3-0-0-0
S7	23C SL4 HA	Cyber Forensics	3-0-0-0	3	23C SL4 HB	Advanced Topics in Artificial Intelligence	3-0-0-0	3	23C SL4 HC	Logic for Computer Science	3-0-0-0
S8	23C SJ4H A	Mini Project	0-0-6-0	3	23C SJ4H A	Mini Project	0-0-6-0	3	23C SJ4H A	Mini Project	0-0-6-0