CURRICULUM 2023 (Autonomous)

Version 2.0

B.TECH
Computer Science and Engineering (CSE)

**MAR BASELIOS COLLEGE OF ENGINEERING
AND TECHNOLOGY (AUTONOMOUS)**

Mar Ivanios Vidyanagar, Nalanchira,
Thiruvananthapuram – 695 015

August 2023

CURRICULUM

FOR

B. TECH DEGREE PROGRAMME

IN

COMPUTER SCIENCE AND ENGINEERING

2023 SCHEME
(AUTONOMOUS)

MAR BASELIOS COLLEGE OF ENGINEERING AND TECHNOLOGY
(Approved by AICTE, Autonomous Institution Affiliated to APJ Abdul Kalam
Technological University)MAR IVANIOS VIDYANAGAR, NALANCHIRA,
THIRUVANANTHAPURAM – 695015, KERALA.
Phone: 0471 2545866
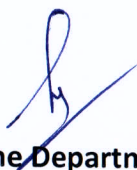Fax: 0471 2545869
Web: www.mbcet.ac.in
ail: hodcs@mbcet.ac.in

MAR BASELIOS COLLEGE OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

B.TECH DEGREE PROGRAMME

IN

COMPUTER SCIENCE AND ENGINEERING

CURRICULAM

2023 SCHEME

Items	Board of Studies (BoS)	Academic Council (AC)
	10/07/2023	09/08/2023
Date of Approval	26/03/2024	19/06/2024
	29/04/2025	28/05/2025

Head of the Department

Chairman, Board of Studies

Principal

Chairman, Academic Council

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, andto 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 andevaluate 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	24
4	Programme Core Courses, Comprehensive Course Work and Viva Voce	PCC	72
5	Programme Elective Courses	PEC	18
6	Institute Elective Courses	IEC	6
7	Project Work, Seminar, Comprehensive Viva & Internship	PWS	15
8	Mandatory Student Activities (P/F)	MSA	3
	Total Mandatory Credits		**170**
	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	19	21	23	22	21	26	21	14	**167**
	40		45		47		35		**167**
Credits for Activities	3								**3**
Total Credits									**170**
Value Added Courses (Optional) – Honours / Minor									**15**
Total Credits									**185**

			SEMESTER I				
Slot	Category Code	Course Number	Courses	L-T-P-J	SS Hours	Hours	Credit
A	BSC	23MAL10A	Linear Algebra and Calculus	3-1-0-0	5	4	4
B	BSC	23PYL10A	Engineering Physics	3-1-0-0	5	4	4
D	ESC	23ESB10E	Programming in C	2-1-2-0	4.5	5	4
E	ESC	23ESL10J/	Basics of Electrical Engineering-A	2-0-0-0	3	4	2
		23ESL10L	Basics of Electronics Engineering	2-0-0-0	3		2
G	ESC	23ESL1NA	Environmental Science	2-0-0-0	3	2	1*
S	BSC	23PYP10A	Engineering Physics Lab	0-0-2-0	1	2	1
T	ESC	23ESP10B	Electrical and Electronics Workshop	0-0-2-0	1	2	1
TOTAL					25.5	23	19

*Not to be considered for Grade/GPA/CGPA. Pass or Fail Only

			SEMESTER II				
Slot	Category Code	Course Number	Courses	L-T-P-J	SS Hours	Hours	Credit
A	BSC	23MAL10B	Vector Calculus, Differential Equations and Transforms	3-1-0-0	5	4	4
B	BSC	23CYL10A	Engineering Chemistry	3-1-0-0	5	4	4
C	ESC	23ESB10A	Engineering Graphics	2-0-2-0	4	4	3
D	ESC	23ESB10H	Programming using Python	2-0-2-0	4	4	3
E	ESC	23ESL10Q	Digital Electronics	3-0-0-0	4.5	3	3
G	HSC	23HSJ1NB	Professional Communication	2-0-0-2	5	4	1*
S	BSC	23CYP10A	Engineering Chemistry Lab	0-0-2-0	1	2	1
T	ESC	23ESB10P	Manufacturing and Construction Practices-B	1-0-2-0	2.5	3	2
TOTAL					31	28	21

*Not to be considered for Grade/GPA/CGPA. Pass or Fail Only

			SEMESTER III				
Slot	Category Code	Course Number	Courses	L-T-P-J	SS Hours	Hours	Credit
A	BSC	23MAL20B	Discrete Mathematical Structures	3-1-0-0	5	4	4
B	PCC	23CSL20A	Data Structures	3-1-0-0	5	4	4
C	PCC	23CSL20B	Computer Organization and Architecture	3-1-0-0	5	4	4
D	PCC	23CSB20C	Object Oriented Programming Concepts	3-0-2-0	5.5	5	4
E	ESC	23ESL00A	Design Engineering	2-0-0-0	3	2	2
G	HSC	23HSL2NA	Professional Ethics	2-0-0-0	3	2	1*
S	PCC	23CSP20A	Hardware Lab	0-0-3-0	1.5	3	2
T	PCC	23CSP20B	Data Structures Lab	0-0-3-0	1.5	3	2
M	VAC		Minor Course	3-0-0-0	4.5	3	3
			TOTAL		29.5/34	27/30	23/26

*Not to be considered for Grade/GPA/CGPA. Pass or Fail Only

			SEMESTER IV				
Slot	Category Code	Course Number	Courses	L-T-P-J	SS Hours	Hours	Credit
A	BSC	23MAL20D	Probability, Statistics and Numerical Methods	3-1-0-0	5	4	4
B	PCC	23CSL20D	Operating Systems	3-1-0-0	5	4	4
C	PCC	23CSL20E	Database Management Systems	3-1-0-0	5	4	4
D	PCC	23CSL20F	Formal Languages and Automata Theory	3-1-0-0	5	4	4
E	HSC	23HSL2NB	Universal Human Values-II	2-1-0-0	3.5	3	1*
G	ESC	23ESL2NC	Industrial Safety Engineering	2-1-0-0	3.5	3	1*
S	PCC	23CSP20C	Operating Systems Lab	0-0-3-0	1.5	3	2
T	PCC	23CSP20D	Database Lab	0-0-3-0	1.5	3	2
M/H	VAC		Minor/Honours Course	3-0-0-0	4.5	3	3
			TOTAL		30/34.5	28/31	22/25

*Not to be considered for Grade/GPA/CGPA. Pass or Fail Only

SEMESTER V							
Slot	Category Code	Course Number	Courses	L-T-P-J	SS Hours	Hours	Credit
A	PCC	23CSL30A	Computer Networks	3-1-0-0	5	4	4
B	PCC	23CSL30B	Microprocessors and Microcontrollers	3-1-0-0	5	4	4
C	PCC	23CSL30C	Artificial Intelligence	3-0-0-0	4.5	3	3
D	PEC	23CSL31X	Programme Elective Course 1	2-1-0-0	3.5	3	3
E	HSC	23HSL30A	Business Economics and Accountancy	3-0-0-0	4.5	3	3
S	PCC	23CSP30A	Microprocessor Lab	0-0-3-0	1.5	3	2
T	PCC	23CSP30B	Networking Lab	0-0-3-0	1.5	3	2
M/H	VAC		Minor/Honours Course	3-0-0-0	4.5	3	3
TOTAL					25.5/30	23/26	21/24

SEMESTER VI							
Slot	Category Code	Course Number	Courses	L-T-P-J	SS Hours	Hours	Credit
A	PCC	23CSL30D	Algorithm Analysis and Design	3-1-0-0	5	4	4
B	PCC	23CSL30E	Cyber Security	3-1-0-0	5	4	4
C	PCC	23CSB30F	Machine Learning	3-0-2-0	5.5	5	4
F	PCC	23CSJ30G	Software Engineering Theory and Practices	2-1-0-1	4.5	4	4
D	PEC	23CSL32X	Programme Elective Course 2	2-1-0-0	3.5	3	3
E	IEC	23IEL31X	Institute Elective 1	3-0-0-0	4.5	3	3
T	PWS	23CSS38A	Seminar	0-0-4-0	2	4	2
U	PWS	23CSJ38B	Mini Project	0-0-4-0	4	4	2
M/H	VAC		Minor/Honours Course	3-0-0-0	4.5	3	3
TOTAL					34/38.5	31/34	26/29

SEMESTER VII							
Slot	Category Code	Course Number	Courses	L-T-P-J	SS Hours	Hours	Credit
A	PCC	23CSL40A	Compiler Design	3-1-2-0	6	6	5
B	PCC	23CSB40B	Web Technology	3-0-2-0	5.5	5	4
C	PEC	23CSL43X	Programme Elective Course 3/ Industry Elective	2-1-0-0	3.5	3	3
E	IEC	23IEL42X	Institute Elective 2	3-0-0-0	4.5	3	3
T	PWS	23CSV48A	Comprehensive Course Viva	0-0-2-0	1	2	1
U	PWS	23CSJ48A	Project	0-0-10-0	10	10	5
		23CSI48A	Internship*				
M/H	VAC		Minor/Honours Course	0-0-6-0/ 3-0-0-0	3/4.5	6/3	3
TOTAL					30.5/33.5/ 35	29/35/32	21/24

SEMESTER VIII							
Slot	Category Code	Course Number	Courses	L-T-P-J	SS Hours	Hours	Credit
A	PEC	23CSL44X	Programme Elective Course 4	2-1-0-0	3.5	3	3
B	PEC	23CSL45X	Programme Elective Course 5	2-1-0-0	3.5	3	3
C	PEC	23CSL46X	Programme Elective Course 6	2-1-0-0	3.5	3	3
U	PWS	23CSJ48B	Project	0-0-10-0	10	10	5
		23CSI48B	Internship*				
M/H	VAC		Minor/Honours Course	0-0-6-0	3	6	3
TOTAL					20.5/23.5	19/25	14/17

*Students can opt for Internship either in S7 or S8. However, in S7, the internship can be permitted only if there are no pending Programme/Course requirements in the semester, that need to be completed in College in the offline mode, such as laboratory sessions.

PROGRAMME ELECTIVE I

Slot	Category Code	Course Number	Courses	L-T-P-J	Hours	Credit
D	**PEC**	23CSL31A	Parallel Computer Architecture	2-1-0-0	3	3
		23CSL31B	Introduction to Data Science	2-1-0-0	3	3
		23CSL31C	Computer Graphics and Multimedia	2-1-0-0	3	3
		23CSL31D	Fundamentals of Cryptography	2-1-0-0	3	3

PROGRAMME ELECTIVE II

Slot	Category Code	Course Number	Courses	L-T-P-J	Hours	Credit
D	**PEC**	23CSL32A	Cloud Computing	2-1-0-0	3	3
		23CSL32B	Applied Data Science Using Python	2-1-0-0	3	3
		23CSL32C	Robotics and Intelligent Systems	2-1-0-0	3	3
		23CSL32D	Virtual and Augmented Reality Systems	2-1-0-0	3	3

PROGRAMME ELECTIVE III

Slot	Category Code	Course Number	Courses	L-T-P-J	Hours	Credit
C	**PEC**	23CSL43A	Internet of Things	2-1-0-0	3	3
		23CSL43B	Computational Complexity	2-1-0-0	3	3
		23CSL43C	Deep Learning	2-1-0-0	3	3
		23CSL43D	Cloud Security	2-1-0-0	3	3
		23CSL43E	Human Computer Interaction	2-1-0-0	3	3

PROGRAMME ELECTIVE IV

Slot	Category Code	Course Number	Courses	L-T-P-J	Hours	Credit
A	PEC	23CSL44A	Virtualization	2-1-0-0	3	3
		23CSL44B	Approximation Algorithms	2-1-0-0	3	3
		23CSL44C	Natural Language Processing	2-1-0-0	3	3
		23CSL44D	Digital Forensics	2-1-0-0	3	3

PROGRAMME ELECTIVE V

Slot	Category Code	Course Number	Courses	L-T-P-J	Hours	Credit
B	PEC	23CSL45A	Algorithmic Game Theory	2-1-0-0	3	3
		23CSL45B	Large Language Models	2-1-0-0	3	3
		23CSL45C	Hardware Security	2-1-0-0	3	3
		23CSL45D	Social Media Analysis	2-1-0-0	3	3

PROGRAMME ELECTIVE VI

Slot	Category Code	Course Number	Courses	L-T-P-J	Hours	Credit
C	PEC	23CSL46A	Parallel Algorithms	2-1-0-0	3	3
		23CSL46B	Big Data Analytics	2-1-0-0	3	3
		23CSL46C	Block Chain and Crypto Currencies	2-1-0-0	3	3
		23CSL46D	Vibe Coding	2-1-0-0	3	3

INSTITUTE ELECTIVE I

Slot	Category Code	Course Number	Courses	L-T-P-J	Hours	Credit
E	IEC	23IEL31E	Data Science for Engineers	3-0-0-0	3	3
		23IEL31F	Introduction to Mobile Application	3-0-0-0	3	3
		23IEL31G	Introduction to Cyber Security and Ethical Hacking	3-0-0-0	3	3
		23IEL31H	Digital Marketing and E-commerce	3-0-0-0	3	3

INSTITUTE ELECTIVE II

Slot	Category Code	Course Number	Courses	L-T-P-J	Hours	Credit
E	IEC	23IEL42E	Responsible AI	3-0-0-0	3	3
		23IEL42F	Prompt Engineering	3-0-0-0	3	3
		23IEL42G	Business Intelligence and Analytics	3-0-0-0	3	3
		23IEL42H	Game Development	3-0-0-0	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
S3	23CSL2MA	Object Oriented Programming	3-0-0-0	3	23CSL2MC	Mathematics for Machine Learning	3-0-0-0	3	23CSL2ME	Data Communication	3-0-0-0	3
S4	23CSL2MB	Programming Methodologies	3-0-0-0	3	23CSL2MD	Concepts in Machine Learning	3-0-0-0	3	23CSL2MF	Introduction to Computer Networks	3-0-0-0	3
S5	23CSL3MA	Concepts in Software Engineering	3-0-0-0	3	23CSL3MC	Concepts in Deep Learning	3-0-0-0	3	23CSL3ME	Client Server Systems	3-0-0-0	3
S6	23CSL3MB	Introduction to Software Testing	3-0-0-0	3	23CSL3MD	Reinforcement Learning	3-0-0-0	3	23CSL3MF	Wireless Networks and IoT Applications	3-0-0-0	3
S7/ S8	23CSJ4MA	Mini Project	0-0-6-0	3	23CSJ4MC	Mini Project	0-0-6-0	3	23CSJ4ME	Mini Project	0-0-6-0	3

Semester	Basket IV Specialization: Data Science				Basket V Specialization: Network Security			
	Course Number	Course	L-T-P-J	Credit	Course Number	Course	L-T-P-J	Credit
S3	23CSL2MG	Statistics for Data Science and Time Forecasting	3-0-0-0	3	23CSL2MI	Basics of Computer Systems	3-0-0-0	3
S4	23CSL2MH	Data Visualization & ML	3-0-0-0	3	23CSL2MJ	Cyber Security	3-0-0-0	3
S5	23CSL3MG	Natural Language Processing	3-0-0-0	3	23CSL3MI	Introduction to Blockchain technologies	3-0-0-0	3
S6	23CSL3MH	Deep Learning	3-0-0-0	3	23CSL3MJ	Privacy and security in IoT	3-0-0-0	3
S7/S8	23CSJ4MG	Mini Project	0-0-6-0	3	23CSJ4MI	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	Credit
S4	23CSL2HB	Number Theory	3-0-0-0	3	23CSL2HD	Computational Fundamentals of Machine Learning	3-0-0-0	3	23CSL2HF	Principles of Program Analysis and Verification	3-0-0-0	3
S5	23CSL3HA	Cryptographic Algorithms	3-0-0-0	3	23CSL3HC	Neural Networks and Deep Learning	3-0-0-0	3	23CSL3HE	Principles of Model Checking	3-0-0-0	3
S6	23CSL3HB	Network Security	3-0-0-0	3	23CSL3HD	Advanced Topics in Machine Learning	3-0-0-0	3	23CSL3HF	Theory of Computability and Complexity	3-0-0-0	3
S7	23CSL4HA	Cyber Forensics	3-0-0-0	3	23CSL4HC	Advanced Topics in Artificial Intelligence	3-0-0-0	3	23CSL4HE	Logic for Computer Science	3-0-0-0	3
S8	23CSJ4HB	Mini Project	0-0-6-0	3	23CSJ4HD	Mini Project	0-0-6-0	3	23CSJ4HF	Mini Project	0-0-6-0	3