CURRICULUM 2023 (Autonomous)

Draft
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B.TECH
Computer Science and Engineering (AI)

MAR BASELIOS COLLEGE OF ENGINEERING AND TECHNOLOGY
Mar Ivanios Vidyanagar, Nalanchira, Thiruvananthapuram – 695 015

August 2023

CURRICULUM

FOR

B. TECH DEGREE PROGRAMME

IN

COMPUTER SCIENCE AND ENGINEERING

(Artificial Intelligence)

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
mail: 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 (Artificial Intelligence)

CURRICULAM

2023 SCHEME

Items	Board of Studies (BoS)	Academic Council (AC)
Date of Approval	10/07/2023	09/08/2023
	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 researchfor 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)

PEO1: Graduates will be successful professionals in Industries of core or interdisciplinary nature or entrepreneurs, demonstrating effective leadership and excellent team work.

PEO2: Graduates will expand the horizon of knowledge through higher education or research,leading to self-directed professional development

PEO3: Graduates will demonstrate competency in AI & ML, professional attitude and ethics whileproviding 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 engineeringproblems 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 healthand 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 independentand life-long learning in the broadest context of technological change.

PROGRAMME SPECIFIC OUTCOMES (PSOs)

PSO1: To apply Algorithmic Principles, Programming Skills and Software Engineering Principles to design, develop and evaluate Software Systems of varying complexities.

PSO2: To apply knowledge of System Integration to design and implement computer-based systems

PSO3: To solve real world and socially relevant problems using AI

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

B.TECH COMPUTER SCIENCE AND ENGINEERING (Artificial Intelligence)

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 and Seminar	PWS	15
8	Professional Development Courses	PDC	--
9	Mandatory Student Activities (P/F)	MSA	3
	Total Mandatory Credits		**170**
	Value Added Courses (Optional) – Honours/Minor		15

ii) Semester-wise Credit Distribution

Semester	I	II	III	IV	V	VI	VII	VIII	*Total Credits*
Credits for Courses	19	21	23	22	25	23	20	14	**167**
	40		45		48		34		**167**
Credits of Activities	3								**3**
Total Credits									**170**
Value Added Courses (Optional) – Honours/Minor									**15**
Total Credits									**185**

SEMESTER I										
Slot	**Cate-gory**	**Course Code**	**Courses**	**Credit Structure**				**SS**	**Hours**	**Credit**
				L	**T**	**P**	**J**			
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**

SEMESTER II										
Slot	**Cate-gory**	**Course Code**	**Courses**	**Credit Structure**				**SS**	**Hours**	**Credit**
				L	**T**	**P**	**J**			
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**	**Course Code**	**Courses**	**Credit Structure**				**SS**	**Hours**	**Credit**
				L	**T**	**P**	**J**			
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
H	VAC		Minor	3	0	0	0	4.5	3	3
TOTAL								**29.5/34**	**27/30**	**23/26**

SEMESTER IV										
Slot	**Category**	**Course Code**	**Courses**	**Credit Structure**				**SS**	**Hours**	**Credit**
				L	**T**	**P**	**J**			
A	BSC	23MAL20E	Mathematics of Artificial Intelligence	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
H	VAC		Minor/Honours	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**	**Course Code**	**Courses**	**Credit Structure**				**SS**	**Hours**	**Credit**
				L	**T**	**P**	**J**			
A	PCC	23CSL30A	Computer Networks	3	1	0	0	5	4	4
B	PCC	23CTL30A	Introduction to Artificial Intelligence	3	1	0	0	5	4	4
C	PCC	23CTL30B	Data Science	2	1	0	0	3.5	3	3
F	PCC	23CTB30C	Introduction to Machine Learning	3	0	2	0	5.5	5	4
D	PEC	23CTL31X	Programme Elective I-Course1	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	23CTP30A	Artificial Intelligence 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	3	0	0	0	4.5	3	3
TOTAL								**29.5/34**	**28/31**	**25/28**

SEMESTER VI										
Slot	**Category**	**Course Code**	**Courses**	**Credit Structure**				**SS**	**Hours**	**Credit**
				L	**T**	**P**	**J**			
A	PCC	23CSL30D	Algorithm Analysis and Design	3	1	0	0	5	4	4
C	PCC	23CTB30D	Deep Learning	3	0	2	0	5	5	4
B	PCC	23CTL30E	Robotics and Intelligent systems	3	1	0	0	5	4	4
E	IEC	23IEL31X	Institute Elective 1	3	0	0	0	4.5	3	3
D	PEC	23CTL32X	Programme Elective II-Course2	2	1	0	0	3.5	3	3
S	PCC	23CTP30B	Robotics Lab	0	0	2	0	1	2	1
T	PWS	23CTS38A	Seminar	0	0	4	0	2	4	2
U	PWS	23CTJ38B	Miniproject	0	0	4	0	4	4	2
M/H	VAC		Minor/Honours	3	0	0	0	4.5	3	3
TOTAL								**30/34.5**	**29/32**	**23/26**

SEMESTER VII										
Slot	**Category**	**Course Code**	**Courses**	**Credit Structure**				**SS**	**Hours**	**Credit**
				L	**T**	**P**	**J**			
A	PCC	23CTL40A	Generative AI	3	1	0	0	5	4	4
B	PCC	23CTB40B	Software Engineering	3	0	2	0	5.5	4	4
D	PEC	23CTL43X	Programme Elective III/Industry Elective1- Course3	2	1	0	0	3.5	3	3
E	IEC	23IEL42X	Institute Elective 2	3	0	0	0	4.5	3	3
T	PWS	23CTV48A	Comprehensive Course Viva	0	0	2	0	1	2	1
U	PWS	23CTJ48A	Project	0	0	10	0	10	10	5
		23CTI48A	Internship							
M/H	VAC		Minor/Honours	0	0	6	0	3	6	3
				3	0	0	0	4.5	3	3
TOTAL								**29.5/37**	**26,33/36**	**20/23**

SEMESTER VIII										
Slot	**Category**	**Course Code**	**Courses**	**Credit Structure**				**SS**	**Hours**	**Credit**
				L	**T**	**P**	**J**			
A	PEC	23CTL44X	Programme Elective IV- Course4	2	1	0	0	3.5	3	3
B	PEC	23CTL45X	Programme Elective V- Course5	2	1	0	0	3.5	3	3
C	PEC	23CTL46X	Programme Elective VI- Course6	2	1	0	0	3.5	3	3
U	PWS	23CTJ48B	Project	0	0	10	0	10	10	5
		23CTI48A	Internship*							
M/H	VAC		Minor/Honours	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
E	PEC	23CSL31A	Parallel Computer Architecture	2-1-0-0	3	3
		23CSL31C	Computer Graphics and Multimedia	2-1-0-0	3	3
		23CTL31A	Web Technology	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
		23CSL32D	Virtual and Augmented Reality Systems	2-1-0-0	3	3
		23CTL32A	Natural Language Processing	2-1-0-0	3	3
		23CTL32B	Foundations of Security in Computing	2-1-0-0	3	3
		23CTL32C	Data Analytics	2-1-0-0	3	3

PROGRAMME ELECTIVE III

Slot	Category Code	Course Number	Course	L-T-P-J	Hours	Credit
C	PEC	23CSL43A	Internet of Things	2-1-0-0	3	3
		23CSL43E	Human Computer Interaction	2-1-0-0	3	3
		23CTL43A	Computer Vision	2-1-0-0	3	3
		23CTL43B	Data Engineering	2-1-0-0	3	3
		23CTL43C	AI For Cyber Security	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
		23CTL44A	Reinforcement Learning	2-1-0-0	3	3
		23CTL44B	Time Series Analysis & Forecasting	2-1-0-0	3	3
		23CTL44C	Cybercrime Forensics and Digital Forensics	2-1-0-0	3	3
		23CTL44D	Social Network Analytics	2-1-0-0	3	3

PROGRAMME ELECTIVE V

Slot	Category Code	Course Number	Courses	L-T-P-J	Hours	Credit
B	PEC	23CTL45A	Agentic AI and Multi agent Systems	2-1-0-0	3	3
		23CTL45B	Privacy and security in IoT	2-1-0-0	3	3
		23CTL45C	Big Data and Scalable AI Systems	2-1-0-0	3	3

PROGRAMME ELECTIVE VI

Slot	Category Code	Course Number	Courses	L-T-P-J	Hours	Credit
C	PEC	23CSL46D	Vibe Coding	2-1-0-0	3	3
		23CTL46A	AI for Healthcare	2-0-0-0	3	3
		23CSL46C	Block chain and Crypto Currencies	2-1-0-0	3	3

INSTITUTE ELECTIVE 1

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	23CSJ4MA	Mini Project	0-0-6-0	3	23CSJ4MC	Mini Project	0-0-6-0	3	23CSJ4ME	Mini Project	0-0-6-0	3
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	3-0-0-0-0	3	23CSL3MI	Introduction to Block-chain 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	23CSJ4MG	Mini Project	0-0-6-0	3	23CSJ4MI	Mini Project	0-0-6-0	3
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: COMPUTATIONAL BIOLOGY				Basket III Specialization: COMPUTER VISION			
	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	23CTL2HB	Computational Fundamentals for Bioinformatics	3-0-0-0	3	23CTL2HD	Advanced Topics in Computer Graphics	3-0-0-0	3
S5	23CSL3HA	Cryptographic Algorithms	3-0-0-0	3	23CTL3HA	ComputationalBiology	3-0-0-0	3	23CTL3HC	Advanced Concepts In Computer Vision	3-0-0-0	3
S6	23CSL3HB	Network Security	3-0-0-0	3	23CTL3HB	Machine Learning in Computational Biology	3-0-0-0	3	23CTL3HD	Image And Video Processing	3-0-0-0	3
S7	23CSL4HA	Cyber Forensics	3-0-0-0	3	23CTL4HA	Computational Health Informatics	3-0-0-0	3	23CTL4HC	Surveillance Video Analytics	3-0-0-0	3
S8	23CSJ4HB	Mini Project	0-0-6-0	3	23CTJ4HB	Mini Project	0-0-6-0	3	23CTJ4HD	Mini Project	0-0-6-0	3