

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

**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**  
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**MAR BASELIOS COLLEGE OF ENGINEERING AND TECHNOLOGY**

**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING**

**B.TECH DEGREE PROGRAMME**

**IN**

**COMPUTER SCIENCE AND ENGINEERING (Artificial Intelligence)**

**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**



## **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)**

- 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 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)**

**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
<b>Total Mandatory Credits</b>			<b>170</b>
Value Added Courses (Optional) – Honours/Minor			15

**ii) Semester-wise Credit Distribution**

Semester	I	II	III	IV	V	VI	VII	VIII	Total Credits
<i>Credits for Courses</i>	19	21	23	22	25	23	20	14	<b>167</b>
	40		45		48		34		<b>167</b>



B.Tech in Computer Science and Engineering(Artificial Intelligence) 2023-2024

<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	ESC	23ESL1NA	Environmental Science	2-0-0-0	2	1
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>19</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	HSC	23HSJ1NB	Professional Communication	2-0-0-2	4	1
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>21</b>





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<b>SEMESTER III</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	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	HSC	23HSL2NA	Professional Ethics	2-0-0-0	2	1
S	PCC	23CSP20A	Hardware Lab	0-0-3-0	3	2
T	PCC	23CSP20B	Data Structures Lab	0-0-3-0	3	2
M	VAC		Minor	3-0-0-0	3	3
<b>TOTAL</b>					<b>27/30</b>	<b>23/26</b>

<b>SEMESTER IV</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	23MAL20E	Mathematics of Artificial Intelligence	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	23HSL2NB	Universal Human Values- II	3-0-0-0	3	1
G	ESC	23ESL2NC	Industrial Safety Engineering	2-1-0-0	3	1
S	PCC	23CSP20C	Operating Systems Lab	0-0-3-0	3	2
T	PCC	23CSP20D	Database Lab	0-0-3-0	3	2
M/H	VAC		Minor/Honours	3-0-0-0	3	3
<b>TOTAL</b>					<b>28/31</b>	<b>22/25</b>



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<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	23CTL30A	Introduction to Artificial Intelligence	3-1-0-0	4	4
C	PCC	23CSJ30C	Web Technology	2-0-2-1	5	4
F	PCC	23CTL30B	Data Analytics	2-1-0-0	3	3
D	PEC	23CTL31X	Programme Elective I- Course1	2-1-0-0	3	3
E	HSC	23HSL30A	Business Economics and Accountancy	3-0-0-0	3	3
S	PCC	23CTP30A	Artificial Intelligence Lab	0-0-3-0	3	2
T	PCC	23CSP30B	Networking Lab	0-0-3-0	3	2
M/H	VAC		Minor/Honours	3-0-0-0	3	3
<b>TOTAL</b>					<b>28/31</b>	<b>25/28</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	23CTJ30C	Machine Learning	2-0-2-1	5	4
C	PCC	23CTL30D	Robotics and Intelligent systems	3-1-0-0	4	4
E	IEC	23IEL31X	Institute Elective 1	3-0-0-0	3	3
F	PEC	23CTL32X	Programme Elective II- Course2	2-1-0-0	3	3
S	PCC	23CTP40A	Robotics Lab	0-0-2-0	2	1
T	PWS	23CTS38A	Seminar	0-0-4-0	4	2
U	PWS	23CTJ38B	Miniproject	0-0-4-0	4	2
M/H	VAC		Minor/Honours	3-0-0-0	3	3
<b>TOTAL</b>					<b>29/32</b>	<b>23/26</b>



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<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	23CTB40A	Software Engineering Theory and Practices	3-0-2-0	5	4
B	PCC	23CTL40B	Deep Learning	3-1-0-0	4	4
D	PEC	23CTL43X	Programme Elective III /Industry Elective1- Course3	2-1-0-0	3	3
E	IEC	23IEL42X	Institute Elective 2	2-1-0-0	3	3
T	PWS	23CTV48A	Comprehensive Course Viva	0-0-2-0	2	1
U	PWS	23CTJ48B	Project Phase I	0-0-10-0	10	5
M/H	VAC		Minor/Honours	0-0-6-0/ 3-0-0-0	6/3	3
<b>TOTAL</b>					<b>27 33/36</b>	<b>20/23</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	23CTL44X	Programme Elective IV- Course4	2-1-0-0	3	3
B	PEC	23CTL45X	Programme Elective V- Course5	2-1-0-0	3	3
C	PEC	23CTL46X	Programme Elective VI- Course6	2-1-0-0	3	3
U	PWS	23CTJ48C	Project Phase II	0-0-10-0	10	5
M/H	VAC		Minor/Honours	0-0-6-0	6	3
<b>TOTAL</b>					<b>19/25</b>	<b>14/17</b>



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**PROGRAMME ELECTIVE I**

Slot	Category Code	Course Number	Courses	L-T-P-J	Hours	Credit
E	PEC	23CSL31D	Parallel Computer Architecture	2-1-0-0	3	3
		23CTL31B	Concepts in Computer graphics and image processing	2-1-0-0	3	3
		23CTL31C	Intelligent Model Design and Thinking	2-1-0-0	3	3
		23CTL31D	Social Network Analysis	2-1-0-0	3	3
		23CTL31E	Data Mining	2-1-0-0	3	3
		23CSL31F	Programming in R	2-1-0-0	3	3
		23CTL31F	Full stack Development	2-1-0-0	3	3

**PROGRAMME ELECTIVE II**

Slot	Category Code	Course Number	Courses	L-T-P-J	Hours	Credit
D	PEC	23CSL32F	Computational Linguistics	2-1-0-0	3	3
		23CTL32A	Image and Video Analytics	2-1-0-0	3	3
		23CTL32C	AI Ethics and Responsible AI	2-1-0-0	3	3
		23CSL32D	High Performance Computing	2-1-0-0	3	3
		23CTL32D	Web Intelligence and Big Data	2-1-0-0	3	3
		23CTL32E	Intrusion Detection and Prevention Systems	2-1-0-0	3	3
		23CSL32C	Foundations of Security in Computing	2-1-0-0	3	3
		23CSL32E	Cloud Computing	2-1-0-0	3	3

**PROGRAMME ELECTIVE III**

Slot	Category Code	Course Number	Course	L-T-P-J	Hours	Credit
C	PEC	23CSL43F	Natural Language Processing	2-1-0-0	3	3
		23CTL43B	Computer Vision	2-1-0-0	3	3
		23CTL43C	Artificial Neural Networks	2-1-0-0	3	3
		23CSL43D	Domain Specific Accelerators	2-1-0-0	3	3
		23CTL43D	IoT for AI	2-1-0-0	3	3
		23CTL43E	AI For Cyber Security	2-1-0-0	3	3
		23CTL43F	Human Computer Interaction	2-1-0-0	3	3
		23CTL43G	DataScience	2-1-0-0	3	3



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**PROGRAMME ELECTIVE IV**

Slot	Category Code	Course Number	Courses	L-T-P-J	Hours	Credit
A	PEC	23CTL44A	Deep Learning for Signal & Image Processing	2-1-0-0	3	3
		23CTL44B	Data and Visual analytics in AI	2-1-0-0	3	3
		23CTL44C	Knowledge Engineering and Expert Systems	2-1-0-0	3	3
		23CTL44D	Cybercrime Forensics and 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	23CTL45A	AI for Health Care	2-1-0-0	3	3
		23CTL45B	Big Data and Database Management	2-1-0-0	3	3
		23CSL45A	Cognitive Modelling	2-1-0-0	3	3
		23CTL45C	Time Series Analysis & Forecasting	2-1-0-0	3	3

**PROGRAMME ELECTIVE VI**

Slot	Category Code	Course Number	Courses	L-T-P-J	Hours	Credit
C	PEC	23CTL46A	Data Compression Techniques	2-1-0-0	3	3
		23CTL46B	Game Theory in Artificial Intelligence	2-0-0-0	3	3
		23CTL46C	Machine Learning models and Storage Management	2-1-0-0	3	3
		23CTL46D	Applied Cryptography	2-1-0-0	3	3
		23CSL46A	Bio-Inspired Optimization Techniques	2-1-0-0	3	3
		23CSL46F	Quantum Computing	2-1-0-0	3	3

**INSTITUTE ELECTIVE**

Slot	Category Code	Course Number	Courses	L-T-P-J	Hours	Credit
C	IEC	23IEL31X	Big Data Analytics	2-1-0-0	3	3
		23IEL31X	Introduction to AI and ML	2-1-0-0	3	3
		23IEL31X	Web Technology	2-1-0-0	3	3
		23IEL31X	Data Science	2-1-0-0	3	3
		23IEL31X	Natural Language Processing	2-1-0-0	3	3



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**MINOR**

<b>BASKET I Specialization: SOFTWARE ENGINEERING</b>				<b>BASKET II Specialization: MACHINE LEARNING</b>				<b>BASKET III Specialization: NETWORKING</b>			
<b>Course Number</b>	<b>Course</b>	<b>L-T-P-J</b>	<b>Credit</b>	<b>Course Number</b>	<b>Course</b>	<b>L-T-P-J</b>	<b>Credit</b>	<b>Course Number</b>	<b>Course</b>	<b>L-T-P-J</b>	<b>Credit</b>
23CSL2 MA	Object Oriented Programming	3-0-0-0	3	23CSL2 MC	Mathematics for Machine Learning	3-0-0-0	3	23CSL2 ME	Data Communication	3-0-0-0	3
23CSL2 MB	Programming Methodologies	3-0-0-0	3	23CSL2 MD	Concepts in Machine Learning	3-0-0-0	3	23CSL2 MF	Introduction to Computer Networks	3-0-0-0	3
23CSL3 MA	Concepts in Software Engineering	3-0-0-0	3	23CSL3 MC	Concepts in Deep Learning	3-0-0-0	3	23CSL3 ME	Client Server Systems	3-0-0-0	3
23CSL3 MB	Introduction to Software Testing	3-0-0-0	3	23CSL3 MD	Reinforcement Learning	3-0-0-0	3	23CSL3 MF	Wireless Networks and IoT Applications	3-0-0-0	3
23CSJ4 MA	Mini Project	0-0-6-0	3	23CSJ4 MA	Mini Project	0-0-6-0	3	23CSJ4 MA	Mini Project	0-0-6-0	3



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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	23CTL3MJ	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	23CSJ4MH	Mini Project	0-0-6-0	3	23CSJ4MJ	Mini Project	0-0-6-0	3



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**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	23CSL2HA	Number Theory	3-0-0-0	3	23CTL2HA	Computational Fundamentals for Bioinformatics	3-0-0-0	3	23CTL2HB	Advanced Topics in Computer Graphics	3-0-0-0	3
S5	23CSL3HA	Cryptographic Algorithms	3-0-0-0	3	23CTL3HA	Computational Biology	3-0-0-0	3	23CTL3HB	Advanced Concepts In Computer Vision	3-0-0-0	3
S6	23CSL3HD	Network Security	3-0-0-0	3	23CTL3HC	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	23CTL4HB	Surveillance Video Analytics	3-0-0-0	3
S8	23CTJ4HA	Mini Project	0-0-6-0	3	23CTJ4HA	Mini Project	0-0-6-0	3	23CTJ4HA	Mini Project	0-0-6-0	3