B.Tech 2022 Curriculum | B.Tech 2021 Curriculum | B.Tech 2020 Curriculum | B.Tech 2019 Curriculum

B.Tech Curriculum (from 2022 batch onwards)

Semester 1		**Credits**
MA1110	Calculus-I	1
MA1220	Calculus-II	1
CY1017	Environmental Chemistry	2
EP1108	Modern Physics	2
ID1063	Intro to Programming	3
SSxxxx	English Comm	2
CS1010	Discrete Math	3
AI1001	Intro to AI	1
	Total	**15**

Semester 2		**Credits**
EE1203	Vector Calculus	1
MA1150	Differential Equations	1
MA1230	Series of Functions	1
AI1100	Artificial Intelligence	1
AI1103	Probability and Random Variables	3
ID1054	Digital Fabrication	2
BM1030	Bioengineering	2
AI1104	Programming for AI	1
LA/CAxxxx	LA/CA Elective	3
	Total	**15**

Semester 3		**Credits**
ID2230	Data Structures	3
MAxxxx	Introduction to Metric Spaces	1
AI2000	Foundations of Machine Learning	3
EE2100	Matrix Theory	3
CS3550	DBMS - I	1
EE3900	Linear Systems and Signal processing	3
LA/CA	LA/CA Elective	1
SSxxxx	Personality Development	1
	Total	**16**

Semester 4		**Credits**
AI2101	Convex Optimization	3
CS2443	Algorithms	3
AI2100	Deep Learning	3
MA4240	Applied Statistics	3
CS3320	Compilers - I	1
CS3563	DBMS - II	3
SSxxxx	Intro to Entrepreneurship	1
	Total	**17**

Semester 5		Credits
MA5060	Numerical Analysis	3
CS2323	Computer Architecture	2
AI3000	Reinforcement Learning	3
AI3020	Intro to Computer Networks	1
CS3510	OS - I	1
AI3001	Advanced Topics in ML	2
EE2102	Control Systems	3
LA/CAxxxx	LA/CA Elective	1
	Total	**16**

Semester 6		Credits
XXxxxx	Free Electives	7
	AI Electives (6 credits can be converted to internship)	9
IDxxxx	Engineering Electives	1
	Total	**17**

Semester 7		Credits
	AI Electives (baskets below)	9
LA/CAxxxx	LA/CA Elective	1
AI4000	Robotics	3
AI4013	AI for Humanity	3
	Total	**16**

Semester 8		Credits
	AI Electives (baskets below)	9
XXxxxx	Free Electives	6
LAxxxx	Ethics and Values	1
	Total	**16**

Category Wise Split

Category Wise Split	Credits	Percentage
Free Electives	13	10.16%
Basic Sciences	16	12.50%
Basic Engineering Skills	16	12.50%
Soft Skills	4	3.13%
Department Core	72	56.25%
LA/CA	7	5.47%
Total	**128**	**100.00%**

Elective Baskets

“Core AI and ML” **(At least 3 credits from the following)**	
Course Name	**Credits**
Intro to Statistical Learning theory	1
Kernel Methods	1
Sequence Models	
Optimization Methods in Machine Learning/Convex Optimization-II	3
Bayesian Data Analysis	2
Nonlinear Control Techniques	3
Information Theory and Coding	3
Introduction to Submodular Functions	1
Game Theory and Mechanism Design	3

“Language Technologies” **(At least 3 credits from the following)**	
Course Name	**Credits**
Natural Language Processing	3
Information Retrieval	3
Text Processing	3

“Speech and Vision” **(At least 3 credits from the following)**	
Course Name	**Credits**
Computer Vision	3
Speech Systems	3
Image and Video Processing	3
Surveillance Video Analytics	3

“Data Analytics” **(At least 3 credits from following)**	
Course Name	**Credits**
Predictive Analysis	3
Data Mining	3
Time Series Analysis	1
Graph Analytics for Big Data	3
Distributed Systems	3
Cloud Computing	3
Big Data: Tools and Techniques	1

“AI, Neuroscience and Natural Intelligence” **(At least 3 credits from the following)**	
Course Name	**Credits**

“AI, Neuroscience and Natural Intelligence” (At least 3 credits from the following)	
Computational Neuroscience Lab	2
Brain Machine Interfaces	3
Movement Sciences Lab	2
Movement Science and Disorders	3
Theoretical & Computational Neuroscience	2
Applications of AI in Healthcare	1

- Out of 30 department electives, 17 must be from the baskets (as specified above). The remaining 13 credits can be any of the remaining basket courses or any CS/EE/MA courses.
- At least TWO of these department elective courses must be 3-credit courses.
- Six credits of Department Electives in the sixth semester can optionally be converted to a semester long internship in the sixth semester. The onus is on the student to distribute/complete the remaining 11 credits in the sixth semesters in other semesters.
- Maximum 4 credit of CA courses, and 6 credits of LA courses can be taken
- For most AI courses, the lab component is built into the courses themselves.
- Electives not in the lists below can be considered in a given basket with approval of faculty advisor (e.g. a new AI elective offered by a new faculty).

B.Tech Curriculum (from 2021 batch onwards)

Semester 1		**Credits**
MA1110	Calculus-I	1
MA1220	Calculus-II	1
CY1017	Environmental Chemistry	2
EP1108	Modern Physics	2
ID1063	Intro to Programming	3
SSxxxx	English Comm	2
CS1010	Discrete Math	3
AI1001	Intro to AI	1
	Total	**15**

Semester 2		**Credits**
EE1203	Vector Calculus	1
MA1150	Differential Equations	1
MA1230	Series of Functions	1
AI1100	Artificial Intelligence	2
AI1103	Probability and Random Variables	3
ID1054	Digital Fabrication	2
BM1030	Bioengineering	2
AI1104	Programming for AI	1
LA/CAxxxx	LA/CA Elective	3
	Total	**16**

Semester 3		**Credits**
ID2230	Data Structures	3

Semester 4		**Credits**
AI2101	Convex Optimization	3

Semester 3		Credits
MAxxxx	Introduction to Metric Spaces	1
AI2000	Foundations of Machine Learning	3
EE2100	Matrix Theory	3
CS3550	DBMS - I	1
EE3900	Linear Systems and Signal processing	3
LA/CA	LA/CA Elective	1
SSxxxx	Personality Development	1
	Total	**16**

Semester 4		Credits
CS2443	Algorithms	3
AI2100	Deep Learning	3
MA4240	Applied Statistics	3
CS3320	Compilers - I	1
CS3563	DBMS - II	3
SSxxxx	Intro to Entrepreneurship	1
	Total	**17**

Semester 5		Credits
MA5060	Numerical Analysis	3
CS2323	Computer Architecture	2
AI3000	Reinforcement Learning	3
AI3020	Intro to Computer Networks	1
CS3510	OS - I	1
AI3001	Advanced Topics in ML	2
EE2102	Control Systems	3
LA/CAxxxx	LA/CA Elective	1
	Total	**16**

Semester 6		Credits
XXxxxx	Free Electives	6
	AI Electives (6 credits can be converted to internship)	9
IDxxxx	Engineering Electives	1
	Total	**16**

Semester 7		Credits
	AI Electives (baskets below)	9
LA/CAxxxx	LA/CA Elective	1
AI4000	Robotics	3
AI4013	AI for Humanity	3
	Total	**16**

Semester 8		Credits
	AI Electives (baskets below)	9
XXxxxx	Free Electives	6
LAxxxx	Ethics and Values	1
	Total	**16**

Category Wise Split

Category Wise Split	Credits	Percentage
Free Electives	12	9.38%
Basic Sciences	16	12.50%
Basic Engineering Skills	16	12.50%
Soft Skills	4	3.13%
Department Core	73	57.03%
LA/CA	7	5.47%
Total	**128**	**100.00%**

Elective Baskets

“Core AI and ML” **(At least 3 credits from the following)**	
Course Name	**Credits**
Intro to Statistical Learning theory	1
Kernel Methods	1
Sequence Models	
Optimization Methods in Machine Learning/Convex Optimization-II	3
Bayesian Data Analysis	2
Nonlinear Control Techniques	3
Information Theory and Coding	3
Introduction to Submodular Functions	1
Game Theory and Mechanism Design	3

“Language Technologies” **(At least 3 credits from the following)**	
Course Name	**Credits**
Natural Language Processing	3
Information Retrieval	3
Text Processing	3

“Speech and Vision” **(At least 3 credits from the following)**	
Course Name	**Credits**

“Data Analytics” **(At least 3 credits from following)**	
Course Name	**Credits**

“Speech and Vision” **(At least 3 credits from the following)**	
Computer Vision	3
Speech Systems	3
Image and Video Processing	3
Surveillance Video Analytics	3

“Data Analytics” **(At least 3 credits from following)**	
Predictive Analysis	3
Data Mining	3
Time Series Analysis	1
Graph Analytics for Big Data	3
Distributed Systems	3
Cloud Computing	3
Big Data: Tools and Techniques	1

“AI, Neuroscience and Natural Intelligence” **(At least 3 credits from the following)**	
Course Name	**Credits**
Computational Neuroscience Lab	2
Brain Machine Interfaces	3
Movement Sciences Lab	2
Movement Science and Disorders	3
Theoretical & Computational Neuroscience	2
Applications of AI in Healthcare	1

- Out of 30 department electives, 17 must be from the baskets (as specified above). The remaining 13 credits can be any of the remaining basket courses or any CS/EE/MA courses.
- At least TWO of these department elective courses must be 3-credit courses.
- Six credits of Department Electives in the sixth semester can optionally be converted to a semester long internship in the sixth semester. The onus is on the student to distribute/complete the remaining 11 credits in the sixth semesters in other semesters.
- Maximum 4 credit of CA courses, and 6 credits of LA courses can be taken
- For most AI courses, the lab component is built into the courses themselves.
- Electives not in the lists below can be considered in a given basket with approval of faculty advisor (e.g. a new AI elective offered by a new faculty).

B.Tech Curriculum (from 2020 batch onwards)

Semester 1		**Credits**
MA1110	Calculus-I	1
MA1220	Calculus-II	1
CY1017	Environmental Chemistry	2
EP1108	Modern Physics	2

Semester 2		**Credits**
EE1203	Vector Calculus	1
MA1150	Differential Equations	1
MA1230	Series of Functions	1
AI1100	Artificial Intelligence	2

Semester 1		Credits
ID1063	Intro to Programming	3
SSxxxx	English Comm	2
CS1010	Discrete Math	3
AI1001	Intro to AI	1
	Total	**15**

Semester 2		Credits
AI1103	Probability and Random Variables	2
ID1054	Digital Fabrication	2
BM1030	Bioengineering	2
IDxxxx	Engineering Electives	1
AI1104	Programming for AI	1
LA/CAxxxx	LA/CA Elective	3
	Total	**16**

Semester 3		Credits
ID2230	Data Structures	3
MAxxxx	Introduction to Metric Spaces	1
AI2000	Foundations of Machine Learning	3
EE2100	Matrix Theory	3
CS3550	DBMS - I	1
EE3900	Linear Systems and Signal processing	3
LA1500	AI and Humanity	1
SSxxxx	Personality Development	1
	Total	**16**

Semester 4		Credits
AI2101	Convex Optimization	3
CS2443	Algorithms	3
AI2100	Deep Learning	3
MAxxxx	Applied Statistics	3
CS3320	Compilers - I	1
CS3563	DBMS - II	3
SSxxxx	Intro to Entrepreneurship	1
	Total	**17**

Semester 5		Credits
MA5060	Numerical Analysis	3
CS2323	Computer Architecture	2
AI3000	Reinforcement Learning	3
AI3020	Intro to Computer Networks	1
CS3510	OS - I	1
AI3001	Advanced Topics in ML	2
EE2102	Control Systems	3

Semester 6		Credits
XXxxxx	Free Electives	6
	AI Electives (6 credits can be converted to internship)	9
IDxxxx	Engineering Electives	1
	Total	**16**

Semester 5		Credits
LA/CAxxxx	LA/CA Elective	1
	Total	**16**

Semester 7		Credits
	AI Electives (baskets below)	12
LA/CAxxxx	LA/CA Elective	1
AI4000	Robotics	3
	Total	**16**

Semester 8		Credits
	AI Electives (baskets below)	9
XXxxxx	Free Electives	6
LAxxxx	Ethics and Values	1
	Total	**16**

Category Wise Split

Category Wise Split	Credits	Percentage
Free Electives	12	9.38%
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Department Core	73	57.03%
LA/CA	7	5.47%
Total	**128**	**100.00%**

Elective Baskets

“Core AI and ML” **(At least 3 credits from the following)**	
Course Name	**Credits**
Intro to Statistical Learning theory	1
Kernel Methods	1

“Language Technologies” **(At least 3 credits from the following)**	
Course Name	**Credits**
Natural Language Processing	3
Information Retrieval	3

“Core AI and ML” **(At least 3 credits from the following)**	
Sequence Models	
Optimization Methods in Machine Learning/Convex Optimization-II	3
Bayesian Data Analysis	2
Nonlinear Control Techniques	3
Information Theory and Coding	3
Introduction to Submodular Functions	1
Game Theory and Mechanism Design	3

“Language Technologies” **(At least 3 credits from the following)**	
Text Processing	3

“Speech and Vision” **(At least 3 credits from the following)**	
Course Name	**Credits**
Computer Vision	3
Speech Systems	3
Image and Video Processing	3
Surveillance Video Analytics	3

“Data Analytics” **(At least 3 credits from following)**	
Course Name	**Credits**
Predictive Analysis	3
Data Mining	3
Time Series Analysis	1
Graph Analytics for Big Data	3
Distributed Systems	3
Cloud Computing	3
Big Data: Tools and Techniques	1

“AI, Neuroscience and Natural Intelligence” **(At least 3 credits from the following)**	
Course Name	**Credits**
Computational Neuroscience Lab	2
Brain Machine Interfaces	3
Movement Sciences Lab	2
Movement Science and Disorders	3
Theoretical & Computational Neuroscience	2
Applications of AI in Healthcare	1

- Out of 30 department electives, 17 must be from the baskets (as specified above). The remaining 13 credits can be any of the remaining basket courses or any CS/EE/MA courses.
- At least TWO of these department elective courses must be 3-credit courses.
- Six credits of Department Electives in the sixth semester can optionally be converted to a semester long internship in the sixth semester. The onus is on the student to distribute/complete the remaining 11 credits in the sixth semesters in other semesters.
- Maximum 4 credit of CA courses, and 6 credits of LA courses can be taken
- For most AI courses, the lab component is built into the courses themselves.
- Electives not in the lists below can be considered in a given basket with approval of faculty advisor (e.g. a new AI elective offered by a new faculty).
- Some AI Btech (2020) students have taken the 4 credit CS3530 course with permission from the instructor. Since it will be wasteful for them to repeat the 1cr (intro) version AI3020, we propose (only for Btech(2020) batch) that CS3530 may be considered towards completion of AI 3020. The extra 3 credits may be considered towards completion of departmental electives.

B.Tech modified curriculum (2019 Batch)

Semester 1		**Credits**
MA1110	Calculus - I	1
MA1220	Calculus - II	2
AI1001	Introduction to Modern AI	1
AI1002	Introduction to Drones	1
CS1310	Discrete Structures - I	2
ID1054	Digital Fabrication	2
ID1035	Independent Project	1
ID1303	Introduction to Programming	2
PH/CYxxxx	Science Elective	2
LA/CAxxxx	Electives	1
	Total	**15**

Semester 2		**Credits**
MA1130	Vector Calculus	1
AI1101	Linear Algebra	3
AI1102	Probability and Random Variables	2
MA1150	Differential Equations	1
CS1340	Discrete Structures-II	2
CS1353	Introduction to Data Structures	3
ID1370	Digital Signal Processing	1
MA2140	Statistics	1
EE1210	Basic Control Theory	1
AI1150	IDP	1
	Total	**16**

Semester 3		**Credits**
MA2120	Transforms	1
AI2000	Foundations of Machine Learning	3
MA3140	Statistical Inference	3
CS2400	Principles of Programming Languages-I	1
CS3510	OS - I	1
CS2323	Computer Architecture	2
AI2003	Stochastic Processes	1

Semester 4		**Credits**
CS2443	Algorithms	3
CS2420	Intro to Complexity Theory	1
CS3523	OS - II	3
AI2100	Deep Learning	3
AI2150	IDP	1
AI2101	Convex Optimization	3
AI1100	Artificial Intelligence	2

Semester 3		Credits
AI3002	Introduction to Brain and Neuroscience	1
LA1500	What is AI and Humanity?	1
AI2050	IDP	1
	Total	**15**

Semester 4		Credits
	Total	**16**

Semester 5		Credits
AI4000	Robotics	3
CS3550	DBMS - I	1
AIxxxx	AI Electives (baskets below)	6
CS3530	Computer Networks - I	1
AI3000	Reinforcement Learning	3
LA/CAxxxx	LA/CA Elective	1
PH/CYxxxx	Science Elective	1
AI3050	IDP	1
	Total	**17**

Semester 6		Credits
AI3102	Sequence Models	1
	AI Electives (baskets below)	3
CS3563	DBMS - II	3
CS3543	Computer Networks-II	3
XXxxxx	Free Electives	6
	Total	**16**

Semester 7		Credits
	AI Electives (baskets below)	9
PH/CYxxxx	Science Elective	1
XXxxxx	Free Elective	2
LA/CAxxxx	LA/CA Electives	3
	Total	**15**

Semester 8		Credits
	AI Electives (baskets below)	8
PH/CYxxxx	Science Electives	1
LA/CAxxxx	LA/CA Electives	3
AI3150	IDP	1
XXxxxx	Free Electives	2
	Total	**15**

- Six credits of Free electives in the sixth semester can optionally be converted to a semester long internship in the sixth semester. The onus is on the student to distribute/complete the remaining 11 credits in the sixth semesters in the other semesters.
- Electives not in the given basket lists can be considered in a given basket with approval of faculty advisor (e.g. a new AI elective offered by a new faculty).

	Semester								Total
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	
AI Core	4	4	10	6	5	3	0	0	**32**
AI Elec	0	0	0	0	4	6	8	8	**26**
CS	2	5	5	10	1	3	0	0	**26**
EE	0	1	0	1	0	0	0	0	**2**
LA/CA Elec	1	0	0	0	2	1	3	3	**10**
Free Elec	0	0	0	0	2	2	3	3	**10**
Sci/MA	5	3	3	0	1	0	1	1	**14**
ID	5	1	0	0	0	0	0	0	**6**
Total	**16**	**15**	**17**	**17**	**16**	**15**	**15**	**15**	**126**

Elective Baskets

“Core AI and ML” **(At least 6 credits from the following)**
Statistical Learning Theory
Kernel Methods for Machine Learning
Optimization Methods in Machine Learning
Bayesian Data Analysis
Numerical Linear Algebra
Information Theory and Coding
Representation Learning
Introduction to Submodular Functions

“Speech and Vision” **(At least 6 credits from the following)**
Computer Vision
Speech Systems
Image and Video Processing

“Language Technologies” **(At least 5 credits from the following)**
Natural Language Processing
Information Retrieval
Text Processing

“Data Analytics” **(At least 3 credits from following)**
Predictive Analysis
Data Mining
Time Series Analysis
Graph Analytics for Big Data
Distributed Systems
Cloud Computing
Big Data: Tools and Techniques

"Emerging Technologies" **(At least 2 credita from the following)**
Principles of Cyber Security
Computer Forensics
Bitcoins and Cryptocurrencies
Cryptography
Randomized Algorithms
Quantom Computing

“AI, Health and Humans” **(At least 2 credits from the following)**
Bioformatics
Gene Editing
Applications of AI in Healthcare
Theoretical & Computational Neuroscience
Neromechanics
Natural Intelligence

"Smart Industry" **(At least 2 credits from the following)**
Computer Integrated Manufacturing
Machine Diagnostics and Condition Monitoring
Mathematical Elements of Geometrical Modeling