

I. Proposed curriculum for AI BTech - 2020 batch onward

	Semester 1	Credits
MA 1110	Calculus - I	1
MA 1220	Calculus - II	1
CY 1017	Environmental Chemistry	2
EP 1108	Modern Physics	2
ID 1063	Intro to Programming	3
SS xxxx	English Comm	2
CS 1010	Discrete Math	3
AI 1001	Intro to AI	1
	Total	15

	Semester 2	Credits
EE 1203	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	1
ID xxxx	Engineering Electives	1
AI 1104	Programming for AI	1
LA xxxx	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 - 1	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
CS3530	Computer Networks - I	1
CS3510	OS-1	1
AI3001	Advanced Topics in ML	2
EE2102	Control Systems	3
LA xxxx	LA/CA Elective	1
	Total	16

	Semester 6	Credits
XX xxxx	Free Electives	6
	AI Electives (6 credits can be converted to internship)	9
ID xxxx	Engineering Electives	1
	Total	16

	Semester 7	Credits
	AI Electives (see baskets)	12
LA xxxx	LA/CA Elective	1

AI4000	Robotics	3
	Total	16

	Semester 8	Credits
	AI Electives (see baskets)	9
XX xxxx	Free Electives	6
LAxxxx	Ethics and Values	1
		16

1. Out of 30 department electives, 17 must be from the baskets (as specified below). The remaining 13 credits can be any of the remaining basket courses or any CS/EE/MA courses.
2. At least TWO of these department elective courses must be 3-credit courses.
3. 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.
4. Maximum 4 credit of CA courses, and 6 credits of LA courses can be taken
5. For most AI courses, the lab component is built into the courses themselves.
6. 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).

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%

Semester-wise split of 3 credit courses

Semester wise distribution						
Semester	#Credits	#core credits	#3c core	#2c core	#1c core	credit % of 3c courses
Sem 1	15	15	2	3	1	40.00%
Sem 2	16	12	1	2	4	25.00%
						-%
Sem 3	16	16	4	0	4	75.00%
Sem 4	17	17	5	0	2	88.24%
Sem 5	16	15	3	2	2	60.00%
Sem 6	16	-	-	-	-	-%
Sem 7	16	3	1	-	-	100.00%
						-%
Sem 8	16	0	-	-	-	-%
Total	128	78	16	7	13	61.54%

Elective basket "Core AI and ML" (At least 5 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

Elective basket "Language Technologies" (At least 3 credits from the following)	
Course name	Credits

Natural Language Processing	3
Information Retrieval	3
Text Processing	3

Graph Analytics for Big Data	3
Distributed Systems	3
Cloud Computing	3
Big Data: Tools and Techniques	1

Elective basket “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

Elective basket “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

Elective basket “Data Analytics” (At least 3 credits from following)	
Course name	Credits
Predictive Analysis	3
Data Mining	3
Time Series Analysis	1

II. Modifications to AI curriculum (2019 Batch)

The revision of the curriculum for the AI19 batch is proposed for the following reasons:

- Compatibility with changes in other departments' curricula (number of credits and offered semester) and consistency with AI'20 batch curriculum
- Convert certain fractal courses into 3 credit courses
- Avoiding teaching multiple similar courses in the same semester, and avoid teaching the same course back-to-back
- Enable internship opportunity in semester 6.

Changes are indicated in red

Semester I		
C. No.	Course Name	Credits
MA 1110	Calculus I	1
MA 1220	Calculus II	2

AI 1001	Introduction to Modern AI	1
AI 1002	Introduction to Drones	1
CS 1310	Discrete Structures I	2

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ID 1054	Digital Fabrication	2
ID 1035	Independent Project	1
ID 1303	Introduction to Programming	2
PH /CY	Science Elective	2
LA/CA	Electives	1
	Total	15

Semester II		
MA1130	Vector Calculus	1
AI 1101	Linear Algebra	3
AI 1102	Probability and Random Variables	2
MA1150	Differential Equations	1
CS 1340	Discrete Structures II	2
CS1353	Introduction to Data Structures	3
ID 1370	Digital Signal Processing	1
MA2140	Statistics	1
EE1210	Basic Control Theory	1
AI 1150	IDP	1
	Total	16

Semester III		Credits	Remarks
MA 2120	Transforms	1	
AI 2000	Foundations of Machine Learning	3	
MA3140	Statistical Inference	3	Replacement for 2 credit version

CS 2400	Principles of Programming Languages I	1	
CS 3510	OS-I	1	
CS 2323	Computer Architecture	2	
AI 2003	Stochastic Processes	1	
AI 3002	Introduction to Brain and Neuroscience	1	Moved from sem 5
LA 1500	AI and Humanity	1	Moved from sem 5
AI 2050	IDP	1	
	Total	15	

Semester IV		Credits	Remarks
CS 2443	Algorithms	3	
CS 2420	Intro to Complexity Theory	1	
CS 3523	OS - II	3	
AI 2101	Deep Learning	3	
AI 2150	IDP	1	
AI 2101	Convex Optimization	3	Moved from sem 3
AI 1100	Artificial Intelligence	2	Moved from sem 3
	Total	16	

Semester V		New credits	Remarks
AI 4000	Robotics	3	Credits changed to 3
CS3550	DBMS-I	1	Moved from sem 3
AI ****	AI Electives (baskets below)	6	Readjusted

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CS 3530	Computer Networks-I	1	
AI3000	Reinforcement learning	3	Moved from sem 4
LA/CA	LA/CA Electives	1	
PH / CY	Science Elective	1	
AI 3050	IDP	1	
	Total	17	

3150			sem 6
FE	Free Electives	2	Readjusted
	Total	15	

1. Total breakup (number of core, AI elective, free elective, etc) remains the same as in 34th senate minutes.
2. The elective baskets are proposed to be the same as in the 34th senate minutes
3. 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.
4. 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 VI		Credits	Remarks
AI 3102	Sequence Models	1	
AI ****	AI Electives (baskets below)	3	Readjusted
CS 3563	DBMS-II	3	Moved from sem 4
CS 3543	Computer Networks - II	3	
FE	Free Electives	6	Can be converted to internship
	Total	16	

Semester VII		Credits	Remarks
AI ****	AI Electives (baskets below)	9	Readjusted
PH/CY	Science Elective	1	
FE ****	Free Elective	2	
LA/CA	LA/CA Electives	2	
	Total	15	

Semester VIII		Credits	Remarks
AI ****	AI Electives (baskets below)	8	
PH/CY	Science Elective	1	
LA/CA	LA/CA Electives	3	
AI	IDP	1	Moved from

III. Modifications to Minor in AI curriculum (12 credits)

The revision of the Minor in AI curriculum is proposed for the following reasons:

- Compatibility with changes in course numbers impacted by the new curriculum

Changes are indicated in red.

Student has to finish a total of 12 credits, with at least one course from each of the categories (rows) below. If a student has already completed some of these categories as part of the regular B.Tech Program, the student should take an equivalent number of elective credits to compensate.

Courses	Category
AI1103 (or) AI5002	Probability
EE2100 or EE 5609	Matrix Theory
AI2000 (or) AI5000	Foundations of Machine Learning
AI2100 (or) AI5100	Deep Learning
List below	Electives

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).

Electives list

AI and ML: Theory
Probabilistic graphical models

Statistical Learning Theory
Kernel Methods
Optimization Methods in Machine Learning
Convex optimization
Reinforcement Learning
Artificial Intelligence
Bayesian Data Analysis
Representation Learning

Applied AI and ML
Computer Vision
Natural Language Processing
Speech Systems
Image and Video Processing
Data Analytics/Big Data
Applications of AI in Healthcare
Hardware Architectures for Machine Learning
Data Mining
Information Retrieval