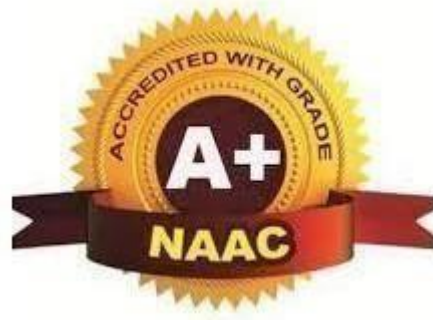




TULSIRAMJI GAIKWAD-PATIL
College of Engineering & Technology

Mohgaon, Wardha Road, Nagpur - 441 108

An Autonomous Institute



Department
of
Artificial Intelligence and Machine Learning

**B.Tech. Artificial Intelligence and
Machine Learning**

Teaching Scheme

Considering

**National Education
Policy 2020**

From
Academic Year 2025-26

Vision of Institute

To emerge as a learning Center of Excellence in the National Ethos in domains of Science, Technology and Management.

Mission of Institute

1. To strive for rearing standard and stature of the students by practicing high standards of professional ethics, transparency and accountability.
2. To provide facilities and services to meet the challenges of Industry and Society.
3. To facilitate socially responsive research, innovation and entrepreneurship.
4. To ascertain holistic development of the students and staff members by inculcating knowledge and profession as work practices.

Vision of the Department

“To emerge as a learning Center of Excellence in the National Ethos in the domains of Artificial Intelligence & Machine Learning.”

Mission of the Department

- To provide quality technical education that equips students with practical skills and knowledge aligned with current industry standards and emerging technologies.
- To address societal and industrial challenges by fostering collaboration between academia, industry, and communities for inclusive development.
- To nurture innovation and entrepreneurial thinking by encouraging creativity, problem-solving, and the development of impactful solutions.
- To promote a culture of research, critical thinking, and continuous learning to empowers, stakeholders to adapt and thrive in a dynamic global landscape.

Program Education Objectives (PEO)

- PEO 1: Develop strong analytical, predictive, and decision-making skills to formulate and solve complex problems in intelligent computing and interdisciplinary domains
- PEO 2: Pursue advanced studies, engage in research, and drive innovation in Machine Learning and related fields, contributing to technological and scientific progress.
- PEO 3: Apply technical knowledge with a commitment to ethical standards and professional integrity, ensuring stakeholder satisfaction and making a positive societal impact.
- PEO 4: Embrace lifelong learning while upholding values of professional ethics, social responsibility, and environmental sustainability.

Program Outcomes (PO)

PO1: Engineering Knowledge: Apply knowledge of mathematics, natural science, computing, engineering fundamentals and an engineering specialization as specified in WK1 to WK4 respectively to develop to the solution of complex engineering problems.

PO2: Problem Analysis: Identify, formulate, review research literature and analyze complex engineering problems reaching substantiated conclusions with consideration for sustainable development. (WK1 to WK4)

PO3: Design/Development of Solutions: Design creative solutions for complex engineering problems and design/develop systems/ components/ processes to meet identified needs with consideration for the public health and safety, whole-life cost, net zero carbon, culture, society and environment as required. (WK5)

PO4: Conduct Investigations of Complex Problems: Conduct investigations of complex engineering problems using research-based knowledge including design of experiments, modelling, analysis & interpretation of data to provide valid conclusions. (WK8).

PO5: Engineering Tool Usage: Create, select and apply appropriate techniques, resources and modern engineering & IT tools, including prediction and modelling recognizing their limitations to solve complex engineering problems. (WK2 and WK6)

PO6: The Engineer and The World: Analyze and evaluate societal and environmental aspects while solving complex engineering problems for its impact on sustainability with reference to economy, health, safety, legal framework, culture and environment. (WK1, WK5, and WK7).

PO7: Ethics: Apply ethical principles and commit to professional ethics, human values, diversity and inclusion; adhere to national & international laws. (WK9)

PO8: Individual and Collaborative Team work: Function effectively as an individual, and as a member or leader in diverse/multi-disciplinary teams.

PO9: Communication: Communicate effectively and inclusively within the engineering community and society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations considering cultural, language, and learning differences

PO10: Project Management and Finance: Apply knowledge and understanding of engineering management principles and economic decision-making and apply these to one's own work, as a member and leader in a team, and to manage projects and in multidisciplinary environments.

PO11: Life-Long Learning: Recognize the need for, and have the preparation and ability for i) independent and life-long learning ii) adaptability to new and emerging technologies and iii) critical thinking in the broadest context of technological change. (WK8)

Program Specific Outcomes (PSO)

PSO 1: Develop and apply AI/ML competencies using domains such as Computer Vision, Deep Learning, and MLOps to address real-world challenges across various sectors.

PSO 2: Design and implement intelligent solutions by leveraging Natural Language Processing, Reinforcement Learning, and Robotics.

PSO 3: Adopt engineering best practices and industry exposure to develop practical software systems and engage in impactful research activities.



Tulsiramji Gaikwad-Patil College of Engineering and Technology

Wardha Road, Nagpur-441108

Accredited with NAAC A+ Grade Approved by AICTE, New Delhi, Govt. of Maharashtra

(An Autonomous Institution Affiliated to RTM Nagpur University)

Scheme of Instruction for First Year of B.Tech. (UG)

Programme **Group-A Semester-I CSE/IT/DS/ECE/AIML**

Mandatory 03-Weeks Induction Program in the First Semester for every student

SN	Sem	Type	BoS/ Dep'tt	Sub. Code	Subject	T/P	Contact Hours				Credits	%Weightage			ESE Duration Hours
							L	SL	P	Hrs		CT/IA	CA	ESE	
FIRST SEMESTER (GROUP-A)															
1	1	BSC	S&H	BSH31101	Algebra and Calculus	T	4	2	0	6	4	30	10	60	3
2	1	BSC	S&H	BSH31104	Chemical Process in Engineering	T	3	2	0	5	3	30	10	60	3
3	1	BSC	S&H	BSH31105	Chemical Process in Engineering -Lab	P	0	0	2	2	1	25	-	25	-
4	1	ESC	CE/BT	BCE31101/BB T31101	Engineering Mechanics /Fundamentals of Biotechnology	T	3	2	0	5	3	30	10	60	3
5	1	ESC	ME	BEE31101	Engineering Workshop	P	0	0	2	2	1	25	-	25	-
6	1	BSC	S&H	BSH31X08	Introduction to Indian Knowledge System	T	2	2	0	0	2	14	6	30	2
7	1	ESC	ME	BME31X01	Engineering and Computer Graphics Lab	P	0	0	2	2	1	25	-	25	-
8	1	PCC	EE/ME /CE/AE /BT	BEE31101/B ME31102/BC E31102/BAE 31101/BBT31 102	Electrical Wiring and Installations / Computer Aided Design/ CAD for Civil Engineers/ CAD for Aircraft Component/ Biotechnological Skill Lab	P	0	0	4	4	2	25	-	25	-
9	1	VSEC	CS	BCS31102	Web Designing	P	0	2	4	4	2	25	-	25	-
10	1	CC	S&H	BSH31X09	Business Communication	P		0	4	4	2	25	-	25	-
TOTAL FIRST SEM							12	10	18	34	21				
SECOND SEMESTER (GROUP-A)															
1	2	BSC	S&H	BSH31201	Differential Equation and Statistics	T	4	2	0	6	4	30	10	60	3
2	2	BSC	S&H	BSH31208	Quantum Physics & Optics	T	3	2	0	5	3	30	10	60	3
3	2	BSC	S&H	BSH31209	Quantum Physics & Optics-Lab	P	0	0	2	2	1	25	-	25	-
4	2	ESC	EE	BEE31202	Principles of Electrical Engineering	T	3	2	0	5	3	30	10	60	3
5	2	ESC	EE	BEE31203	Principles of Electrical Engineering- Lab	P	0	0	2	2	1	25	-	25	-
6	2	ESC	IT	BIT31103	Programming for Problem Solving using 'C'	T	3	2	0	5	3	30	10	60	3
7	2	ESC	IT	BIT31104	Programming for Problem Solving using 'C'-Lab	P	0	0	2	2	1	25	-	25	-
8	2	VSEC	EE/ME /CE/AE /BT	BEE31204/B ME31201/BC E31201/ AE31201/BB T31201	Power SIM / CNC Machine and Programing / Building Maintenance Lab/ Basics of Aircraft Design/Environmental Biotechnology Lab	P	0	0	4	4	2	25	-	25	-
9	2	AEC	S&H	BSH31X04	Communication for Personality Development-Lab	P	0	1	4	5	2	25	-	25	-
10	2	CC	S&H	BSH31X05	Integrated Personality Development Course-I	P	0	0	4	4	2	25	-	25	-
TOTALSECONDSEM								13	09	18	40	22			
Course Category		BSC/ESC (Basic Science Course/Engineeri ng Science Course.)		PCC (Programme Core courses		Multidisciplinary course		VSEC (Skill Course)		Humanities Social Science &Management		Experiential Learning Courses		CC (Co Curricul r Courses	
Credits SEM-I		08/05		02		--		02		--		02		02	
Credits SEM-II		08/08		--		--		02		02		--		02	
Cumulative Sum		16/13		02		--		04		02		02		04	

PROGRESSIVE TOTAL CREDITS: 21+22=43

				Aug, 2023	1.00	Applicable for AY 2023-24 Onwards
Chairperson	Dean Academics	Vice Principal	Principal	Date of Release	Version	



Tulsiramji Gaikwad-Patil College of Engineering & Technology, Nagpur

(An Autonomous Institution Affiliated to RTM Nagpur University, Nagpur)

SCHEME OF INSTRUCTIONS & SYLLABI

Programme: Artificial Intelligence and Machine Learning

Scheme of Instructions: Second Year B.Tech. in Artificial Intelligence and Machine Learning

Semester--III



Sr. No.	Course Category	Course Code	Course Title	T/P	Contact Hours			Credits	Exam Scheme			ESE Duration (Hours)	Total Marks
					L	P	Hrs.		CT/IA	CA	ESE		
1	PCC	BAI12301	Artificial Intelligence	T	3	-	3	3	30	10	60	3	100
2	PCC	BAI12302	Advanced Python Programming	T	3	-	3	3	30	10	60	3	100
3	PCC	BAI12303	Data Structures & Algorithms	T	2	-	2	2	14	6	30	2	50
4	OEC	BAI12307	Open Elective- I (Data Visualization)	T	4	-	4	4	30	10	60	3	100
5	VEC	BSH32308	Ethics in Artificial Intelligence	T	2	-	2	2	14	6	30	2	50
6	MDM	BSH32303	Numerical Methods & Statistical Analysis	T	2	-	2	2	14	6	30	2	50
7	HSSM	BBA32302	Entrepreneurship and Skill Development	T	2	-	2	2	14	6	30	2	50
8	PCC	BAI12304	Advanced Python Programming Lab	P	-	2	2	1	-	25	25	2	50
9	PCC	BAI12305	Data Structures & Algorithms	P	-	2	2	1	-	25	25	2	50
10	CEP	BAI12306	Community Project	P	-	4	4	2	-	50	-	2	50
Total				-	18	8	26	22	146	154	350	23	650

Course Category	BSC/ESC (Basic Science Course/Engineering Science Course.)	PCC (Programme Core courses)	PEC (Programme Elective courses)	OEC (Open Elective Course)	Multi-disciplinary courses	VSEC (Skill Course)	VEC (Value Education Courses)	Humanities Social Science & Management		Experiential Learning Courses	CC (Liberal Learning Courses)
								AEC (Ability Enhancement Course)	IKS (Indian Knowledge System)		
Credits	-	10	-	4	2	-	2	2		2	-
Cumulative Sum	16/13	12	-	4	2	4	2	6		2	4

PROGRESSIVE TOTAL CREDITS: 43+22=65

				June, 2025	1.00	Applicable for AY 2025-26
Chairperson	Vice-Principal/ Director Academics	Director Administration	Principal	Date of Release	Version	



Tulsiramji Gaikwad-Patil College of Engineering & Technology, Nagpur

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SCHEME OF INSTRUCTIONS & SYLLABI



Programme: Artificial Intelligence and Machine Learning

Scheme of Instructions: Second Year B.Tech. in Artificial Intelligence and Machine Learning

Semester-IV

Sr. No.	Course Category	Course Code	Course Title	T/P	Contact Hours			Credits	Exam Scheme			ESE Duration (Hours)	Total Marks
					L	P	Hrs.		CT/IA	CA	ESE		
1	PCC	BAI12401	Database Management System	T	3	-	3	3	30	10	60	3	100
2	PCC	BAI12402	Software Engineering & Project Management.	T	3	-	3	3	30	10	60	3	100
3	PCC	BAI12403	Data visualization & automation Lab	P	-	2	2	1	-	25	25	2	50
4	PCC	BAI12404	Operating System Lab.	P	-	4	4	2	-	50	50	2	100
5	PCC	BAI12405	Database Management System Lab.	P	-	2	2	1	-	25	25	2	50
6	OEC	BAI12407	Introduction to Machine Learning (Open Elective- II.)	T	2	-	2	2	14	6	30	2	50
7	MDM	BSH32402	Sampling Method & Estimation Theory	T	2	-	2	2	14	6	30	2	50
8	VEC	BSH32403	Environmental Science and Sustainability.	T	2	-	2	2	14	6	30	2	50
9	HSSM	BBA32X02	Managerial Economics	T	2	-	2	2	14	6	30	2	50
10	AEC	BSH32404	Leadership and Team Dynamics.	P	-	4	4	2	-	50	50	2	100
11	VSEC	BAI12406	Data Analytics.	P	-	4	4	2	-	50	50	2	100
Total				-	14	16	30	22	116	244	440	24	800

Course Category	BSC/ESC (Basic Science Course/Engineering Science Course.)	PCC (Programme Core courses)	PEC (Programme Elective courses)	OEC (Open Elective Course)	Multi-disciplinary courses	VSEC (Skill Course)	VEC (Value Education Courses)	Humanities Social Science & Management		Experiential Learning Courses	CC (Liberal Learning Courses)	VAC (Value added Course)
								AEC (Ability Enhancement Course)	IKS (Indian Knowledge System)			
Credits		10	-	2	2	2	2	4		-	-	-
Cumulative Sum	16/13	22	-	6	4	6	4	10		2	4	-

PROGRESSIVE TOTAL CREDITS: 65+22=87

				June, 2025	1.00	Applicable for AY 2025-26
Chairperson	Vice-Principal/ Director Academics	Director Administration	Principal	Date of Release	Version	



Tulsiramji Gaikwad-Patil College of Engineering & Technology, Nagpur

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SCHEME OF INSTRUCTIONS & SYLLABI



Programme: Artificial Intelligence and Machine Learning

Scheme of Instructions: Third Year B.Tech. in Artificial Intelligence and Machine Learning

Semester-V

Sr. No.	Course Category	Course Code	Course Title	T/P	Contact Hours			Credits	Exam Scheme			ESE Duration (Hours)	Total Marks
					L	P	Hrs.		CT/IA	CA	ESE		
1	PCC	BAI13501	Machine Learning.	T	3	-	3	3	30	10	60	3	100
2	PCC	BAI13502	Machine Learning Lab.	P	-	2	2	1	-	25	25	2	50
3	PCC	BAI13503	Computer Networks.	T	3	-	3	3	30	10	60	3	100
4	PCC	BAI13504	Computer Networks Lab.	P	-	2	2	1	-	25	25	2	50
5	PCC	BAI13505	Design Analysis and Algorithm	T	3	-	3	3	30	10	60	3	100
6	PCC	BAI13510	AI System Design and Integration Lab.	P	-	2	2	1	-	25	25	2	50
7	PEC	BAI13506-09	Professional Elective-I	T	4	-	4	4	30	10	60	3	100
8	MDM	BEC33518	Embedded System	T	4	-	4	4	30	10	60	3	100
9	OEC	BAI13511	Open Elective-III (Advance Machine Learning)	T	2	-	2	2	14	06	30	2	50
Total				-	19	6	25	22	164	131	405	23	700

Course Category	BSC/ESC (Basic Science Course/Engineering Science Course.)	PCC (Programme Core courses)	PEC (Programme Elective courses)	OEC (Open Elective Course)	Multi-disciplinary courses	VSEC (Skill Course)	VEC (Value Education Courses)	Humanities Social Science & Management		Experiential Learning Courses	CC (Liberal Learning Courses)	VAC (Value added Course)
								AEC (Ability Enhancement Course)	IKS (Indian Knowledge System)			
Credits	-	12	4	2	4	-	-	-	-	-	-	-
Cumulative Sum	16/13	34	4	8	8	6	4	10	2	4	-	-

PROGRESSIVE TOTAL CREDITS: 87+22=109

				June, 2025	1.00	Applicable for AY 2025-26
Chairperson	Vice-Principal/ Director Academics	Director Administration	Principal	Date of Release	Version	



Tulsiramji Gaikwad-Patil College of Engineering & Technology, Nagpur

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SCHEME OF INSTRUCTIONS & SYLLABI

Programme: Artificial Intelligence and Machine Learning

Scheme of Instructions: Third Year B.Tech. in Artificial Intelligence and Machine Learning

Semester–VI



Sr. No.	Course Category	Course Code	Course Title	T/P	Contact Hours			Credits	Exam Scheme			ESE Duration (Hours)	Total Marks
					L	P	Hrs.		CT/IA	CA	ESE		
1	PCC	BAI13601	Deep Learning & NLP	T	3	-	3	3	30	10	60	3	100
2	PCC	BAI13602	Deep Learning & NLP Lab	P	-	2	2	1	-	25	25	2	50
3	PCC	BAI13603	Visual Computing	T	3	-	3	3	30	10	60	3	100
4	PCC	BAI13604	Visual Computing Lab	P	-	2	2	1	-	25	25	2	50
5	VSEC	BAI3613	AI Process Lab	T	-	4	4	2	-	50	50	2	100
6	PEC	BAI13605-08	Professional Elective–II	T	4	-	4	4	30	10	60	3	100
7	PEC	BAI13609-12	Professional Elective–III	T	4	-	4	4	30	10	60	3	100
8	MDM	BEC33603	Internet of Things	T	2	-	2	2	14	06	30	2	50
9	Project	BAI13614	Mini Project	P	-	2	2	1	-	25	25	2	50
			Total	-	16	8	26	21	134	171	395	20	650

Course Category	BSC/ESC (Basic Science Course/Engineering Science Course.)	PCC (Programme Core courses)	PEC (Programme Elective courses)	OEC (Open Elective Course)	Multi-disciplinary courses	VSEC (Skill Course)	VEC (Value Education Courses)	Humanities Social Science & Management		Experiential Learning Courses	CC (Liberal Learning Courses)	VAC (Value added Course)
								AEC (Ability Enhancement Course)	IKS (Indian Knowledge System)			
Credits	-	8	8	-	2	2	-	-		1	-	-
Cumulative Sum	16/13	42	12	8	10	8	4	10		3	4	2

PROGRESSIVE TOTAL CREDITS: 109+20=129

				June, 2025	1.00	Applicable for AY 2025-26
Chairperson	Vice-Principal/ Director Academics	Director Administration	Principal	Date of Release	Version	



Tulsiramji Gaikwad-Patil College of Engineering & Technology, Nagpur

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SCHEME OF INSTRUCTIONS & SYLLABI

Programme: Artificial Intelligence and Machine Learning

Scheme of Instructions: Final Year B.Tech. in Artificial Intelligence and Machine Learning

Semester–VII



Sr. No.	Course Category	Course Code	Course Title	T/P	Contact Hours			Credits	Exam Scheme			ESE Duration (Hours)	Total Marks
					L	P	Hrs.		CT/IA	CA	ESE		
1	PCC	BAI14701	Generative AI	T	4	-	3	3	30	10	60	3	100
	PCC	BAI14710	Reinforcement Learning	T	2	-	2	2	14	6	30	2	50
2	PEC	BAI14702-05	Professional Elective - IV	T	4	-	4	4	30	10	60	3	100
3	PEC	BAI14706-09	Professional Elective - V	T	4	-	4	4	30	10	60	3	100
4	MDM	BEC14701	Robotics and Intelligent Systems	T	3	-	3	3	30	10	60	3	100
5	MDM	BEC14702	Robotics and Intelligent Systems Lab	P	-	2	2	1	-	25	25	2	50
6	Project	BAI14711	Project	P	-	8	8	3	-	100	100	2	200
			Total	-	16	12	28	20	120	190	390	18	700

Course Category	BSC/ESC (Basic Science Course/Engineering Science Course.)	PCC (Programme Core courses)	PEC (Programme Elective courses)	OEC (Open Elective Course)	Multi-disciplinary courses	VSEC (Skill Course)	VEC (Value Education Courses)	Humanities Social Science & Management		Experiential Learning Courses	CC (Liberal Learning Courses)	VAC (Value added Course)
								AEC (Ability Enhancement Course)	IKS (Indian Knowledge System)			
Credits	-	5	8	-	4	-	-	-	-	3	-	-
Cumulative Sum	16/13	47	20	8	14	8	4	10	6	4	2	

PROGRESSIVE TOTAL CREDITS: 129+21=150

				June, 2025	1.00	Applicable for AY 2025-26
Chairperson	Vice-Principal/ Director Academics	Director Administration	Principal	Date of Release	Version	



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SCHEME OF INSTRUCTIONS & SYLLABI

Programme: Artificial Intelligence and Machine Learning

Scheme of Instructions: Final Year B.Tech. in Artificial Intelligence and Machine Learning

Semester–VIII



Sr. No.	Course Category	Course Code	Course Title	T/P	Contact Hours			Credits	Exam Scheme			ESE Duration (Hours)	Total Marks
					L	P	Hrs.		CT/IA	CA	ESE		
1	RM	BAI14801	Research Methodology	T	4	-	4	4	30	10	60	3	100
3	Internship/ Industry Project	BAI14802	Internship/Industry Project	P	-	24	24	12	0	75	75	0	150
			Total	-	4	24	28	16	30	85	135	3	300

Course Category	BSC/ESC (Basic Science Course/Engineering Science Course.)	PCC (Programme Core courses)	PEC (Programme Elective courses)	OEC (Open Elective Course)	Multi-disciplinary courses	VSEC (Skill Course)	VEC (Value Education Courses)	Humanities Social Science & Management		Experiential Learning Courses	CC (Liberal Learning Courses)	VAC (Value added Course)
								AEC (Ability Enhancement Course)	IKS (Indian Knowledge System)			
Credits		-	-	-	-	-	-	-	-	16	-	-
Cumulative Sum	16/13	47	20	8	14	8	4	10	22	4	2	

PROGRESSIVE TOTAL CREDITS: 150+16=166

				June, 2025	1.00	Applicable for AY 2025-26
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SCHEME OF INSTRUCTIONS & SYLLABI

Program: Artificial Intelligence and Machine Learning

List of Electives offered by
Artificial Intelligence and Machine Learning



Track Name	Course Code	Professional Elective- I	Course Code	Professional Elective- II	Course Code	Professional Elective- III
		Semester V		Semester VI		Semester VI
Intelligent Systems	BAI13506	Soft Computing	BAI13605	Intelligent Decision Systems	BAI13609	Enterprise AI Solutions (Generative AI with ERP + Chat bot)
Interactive and Immersive Technologies with Cloud Integration	BAI13507	Computer Graphics	BAI13606	Human-Computer Interaction (HCI)	BAI13610	Fundamentals of augmented realities
Data Engineering	BAI13508	Next generation databases	BAI13607	No SQL using MongoDB	BAI13611	Big data Analytics
Information Security	BAI13509	Information Security Fundamentals	BAI13608	Cryptography and Network Security	BAI13612	Web Application Security

Course Code	Professional Elective- IV	Course Code	Professional Elective-V
	Semester VII		Semester VII
BAI14702	Graph Neural Networks (GNNs)	BAI14706	Cognitive Intelligence
BAI14703	Cloud-Based AR/VR Applications	BAI14707	AWS Cloud Computing
BAI14704	Block chain Technology	BAI14708	Predictive Analytics
BAI14705	Blockchain Security	BAI14709	Biometric Security

List of Open Electives offered by Artificial Intelligence and Machine Learning

Course Code	Subject
BAI12307 (OE-I)	Data Visualization
BAI12407 (OE-II)	Introduction to Machine Learning
BAI13511 (OE-III)	Advance Machine Learning

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