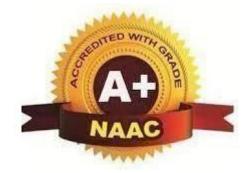


Mohgaon, Wardha Road, Nagpur - 441 108 An Autonomous Institute



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, problemsolving, 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.





Wardha Road, Nagpur-441108

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(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 tory03-Weeks Induction Program in the First Semester for s

	Mandatory03-Weeks Induction Program in the First Semester for every student Bos/ Contact Hours %Weightage ESE																	
SN	Sem	Туре	BoS/	Sub. Code		Subje	·ct		T/P	-		1		Credits				ESE Duratio
		-54-	Deptt							L	SL	Р	Hrs		CT/IA	CA	ESE	Hours
1	1	BSC	S&H	BSH31101	A1	gebra and		MESTER	(GRO T	4		0	6	4	30	10	60	3
2	1	BSC	S&H	BSH31101 BSH31104		al Process			T T	4	2 2	0	5	4			60 60	3
3	1	BSC	S&H	BSH31104 BSH31105		ul Process Il Process -Lal	in Engi	-	P	0	0	2	2	<u> </u>	30 25	- 10	25	-
4	1	ESC	CE/BT	BCE31101/BB T31101			ics /Fun	damentals	Т	3	2	0	5	3	30	10	60	3
5	1	ESC	ME	BEE31101		gineering		op	Р	0	0	2	2	1	25	-	25	-
6	1	BSC	S&H	BSH31X08	Introducti	ion to Ind Syste		owledge	Т	2	2	0	0	2	14	6	30	2
7	1	ESC	ME	BME31X01	Engineerin	ng and Co Lab		Graphics	Р	0	0	2	2	1	25	-	25	-
8	1	РСС	/CE/AE	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		Р	0	0	4	4	2	25	-	25	-		
9	1	VSEC	CS	BCS31102		Web Designing			Р	0	2	4	4	2	25	-	25	-
10	1	СС	S&H	BSH31X09	Busi	ness Com	municat	tion	Р		0	4	4	2	25	-	25	-
			1	TOTAL	FIRST SEM		L	12	10	18	34	21						
					SECOND SEMESTE		R (GR	OUF	P- A)									
1	2	BSC	S&H	BSH31201	Differential Equation and Statistics		tatistics	Т	4	2	0	6	4	30	10	60	3	
2	2	BSC	S&H	BSH31208	Quantu	um Physio	cs & Op	otics	Т	3	2	0	5	3	30	10	60	3
3	2	BSC	S&H	BSH31209	Quantum	n Physics	& Optic	s-Lab	Р	0	0	2	2	1	25	-	25	-
4	2	ESC	EE	BEE31202	Principles	of Electric	cal Engi	neering	Т	3	2	0	5	3	30	10	60	3
5	2	ESC	EE	BEE31203	Principles of	Lab	_	-	Р	0	0	2	2	1	25	-	25	-
6	2	ESC	IT	BIT31103	Sc	amming fo olving usi	ing 'C'		Т	3	2	0	5	3	30	10	60	3
7	2	ESC	IT	BIT31104		using 'C'	'-Lab		Р	0	0	2	2	1	25	-	25	-
8	2	VSEC	EE/ME /CE/AE /BT	BEE31204/B ME31201/BC E31201/ AE31201/BB T31201	Programin Lab/ Design/Env	Basics of Vironmenta Lab	ng Main f Aircra al Bioteo	itenance ft chnology	Р	0	0	4	4	2	25	-	25	-
9	2	AEC	S&H	BSH31X04	D	nication for vevelopme	nt-Lab		Р	0	1	4	5	2	25	-	25	-
10	2	CC	S&H	BSH31X05	Integrated	Personalit Course		lopment	Р	0	0	4	4	2	25	-	25	-
			TALSECC	INDSEM						13	09	18		22				
С	ourse C	Category	(Bas Course		PCC (Programme Core courses	Multidisc	ciplinary course	VSEC (Skill Course)		AEC(A	&Ma Ability	s Soc inage	IKS(I	ndian	Expo Learning	eriential Course		CC (Co Curricu Course
			1	Course.)					E	nhanc Cou	cement rse)		Know Syst	em)				
	redits S redits S			08/05 08/08	02			02			02			02				02
		ve Sum		16/13	02	-		02			02			02				02
GR	ESSIV	ETOTALC	REDITS	:21+22=43											1			
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Chairperson	Dean Academics	Vice Principal	Principal	Date of Release	Version	Onwards	

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

Category	BSC/ESC (Basic Science Course/Engine ering Science Course.)	(Flogram	PEC (Programme Elective courses)	OEC (Open Elective Course)	Multi- disciplinary courses	VSEC (Skill Course)	VEC (Value Education Courses)	Humanitie Sciene Manag AEC (Ability Enhancement Course)	ce &	Experiential Learning Courses	CC (Liberal Learning Courses)
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

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Chairperson	Dean Academics	Vice-Principal	Principal	Date of Release	Version	2023-20

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(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-IV

Sr.	Course	Course			Co	ntact	Hours		Exa	am Sche	me	ESE	Total
No.	Category	Code	Course Title	T/P	L	Р	Hrs.	Credits	CT/IA	CA	ESE	Duration (Hours)	Marks
1	PCC	BAI12401	Database Management System	Т	3	-	3	3	30	10	60	3	100
2	PCC	BAI12402	Software Engineering & Project Management		3	-	3	3	30	10	60	3	100
3	PCC	BAI12403	Operating System	Т	2	-	2	2	14	6	30	2	50
4	OEC	BXXXXXX	Open Elective- II	Т	2	-	2	2	14	6	30	2	50
5	MDM	BSH32401	Mathematics in Artificial Intelligence	Т	2	-	2	2	14	6	30	2	50
6	VAC	BSH32403	Environmental Science and Sustainability	Т	2	-	2	2	14	6	30	2	50
7	HSSM	BBA32401	Managerial Economics	Т	2	-	2	2	14	6	30	2	50
8	PCC	BAI12404	Operating System Lab	Р	-	2	-	1	-	25	25	2	50
9	PCC	BAI12405	Database Management System Lab	Р	-	2	-	1	-	25	25	2	50
10	AEC	BSH32404	Leadership and Team Dynamics	Р	-	4	-	2	-	25	25	2	50
11	VSEC	BAI12406	Data Analytics	Р	-	4	-	2	-	25	25	2	50
			Total	-	16	12	16	22	130	150	370	24	650

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

PROGRESSIVE TOTAL CREDITS: 65+22=87

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Chairperson	Dean Academics	Vice-Principal	Principal	Date of Release	Version	



(An Autonomous Institution Affiliated to RTM Nagpur University, Nagpur) 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.	Course				Cor	ntact I	Iours		Ex	am Schen	ne	ESE	Total
No.	Category	Course Code	Course Title	T/P	L	Р	Hrs.	Credits	CT/IA	CA	ESE	Duration (Hours)	Marks
1	PCC	BAI13501	Advanced Machine Learning	Т	3	I	3	3	30	10	60	3	100
2	PCC	BAI13502	Advanced Machine Learning Lab	Р	-	2	2	1	-	25	25	2	50
3	PCC	BAI13503	Computer Networks	Т	3	I	3	3	30	10	60	3	100
4	PCC	BAI13504	Computer Networks Lab	Р	-	2	2	1	-	25	25	2	50
5	PCC	BAI13505	Theory of Computation	Т	3	I	3	3	30	10	60	3	100
6	PEC	BAI13506-09	Professional Elective–I	Т	4	I	4	4	30	10	60	3	100
7	MDM	BEC33510	Microprocessor and Microcontroller	Т	4	I	4	4	30	10	60	3	100
8	OEC	BXXXXXX	Open Elective-III	Т	2	-	2	2	14	06	30	2	50
9	Project	roject BAI13510 Micro Project	Р	-	2	2	1	_	25	25	2	50	
			Total	-	19	6	25	22	164	131	405	23	700

Course Category	BSC/ESC (Basic Science Course/Engineer ing Science Course.)	PCC (Program me Core courses)	PEC (Programme Elective courses)	OEC (Open Elective Course)	Multi- disciplinary courses	VSEC (Skill Course)	VEC (Value Education Courses)	Humanities SocialScience &ManagementAECIKS(Ability(IndianEnhancKnowledgeementSystem)Course)	Experiential Learning Courses	CC (Liberal Learning Courses)	VAC (Value added Course)
Credits	-	11	4	2	4	-	-	-	1	-	-
Cumulative Sum	16/13	33	4	8	8	6	2	10	3	4	2

PROGRESSIVE TOTAL CREDITS: 87+22=109

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

Semester-VI

Sr.	Course				Cor	ntact H	Iours		Ex	am Scher	ne	ESE	Total
No.	Category	Course Code	Course Title	T/P	L	Р	Hrs.	Credits	CT/IA	CA	ESE	Duration (Hours)	Marks
1	PCC	BAI13601	Advanced Deep Learning	Т	3	I	3	3	30	10	60	3	100
2	PCC	BAI13602	Advanced Deep Learning Lab	Р	-	2	2	1	_	25	25	2	50
3	PCC	BAI13603	Visual Computing	Т	3	I	3	3	30	10	60	3	100
4	PCC	BAI13604	Visual Computing Lab	Р	-	2	2	1	-	25	25	2	50
5	VSEC	BXXXXXX	Internet of Things Lab (Mini Project)	Т	-	4	4	2	-	50	50	2	100
6	PEC	BAI13605-08	Professional Elective–II	Т	4	-	4	4	30	10	60	3	100
7	PEC	BAI13609-12	Professional Elective–III	Т	4	-	4	4	30	10	60	3	100
8	MDM	BEC33611	Internet of Things	Т	2	-	2	2	14	06	30	2	50
			Total	-	16	8	24	20	134	146	370	20	650

Course Category	BSC/ESC (Basic Science Course/Engineer ing Science Course.)	PCC (Program me Core courses)	PEC (Programme Elective courses)	OEC (Open Elective Course)	Multi- disciplinary courses	VSEC (Skill Course)	VEC (Value Education Courses)	Humanities Social Science & Management AEC (Ability IKS Enhance (Indian ment Knowledge Course) System)	Learning Courses	CC (Liberal Learning Courses)	VAC (Value added Course)
Credits	-	8	8	-	2	2	-	-	-	-	-
Cumulative Sum	16/13	41	12	8	10	8	2	10	3	4	2

PROGRESSIVE TOTAL CREDITS: 109+20=129

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(An Autonomous Institution Affiliated to RTM Nagpur University, Nagpur) 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.	Course	Course			Contact Hours				Exam Scheme			ESE	Total
No.	Category	Code	Course Title	T/P	L	Р	Hrs.	Credits	CT/IA	CA	ESE	lineotion	Marks
1	PCC	BAI14701	MOOCs Course	Т	4	-	4	4	-	25	75	3	100
2	PEC	BAI14702-05	Professional Elective-IV MOOCs	Т	4	-	4	4	-	25	75	3	100
3	Project	BAI14706	Internship/ Capstone Project	Р	-	24	24	12	-	150	150	3	300
			Total	-	8	24	32	20	-	200	300	9	500

Course Category	BSC/ESC (Basic Science Course/Engineer ing Science Course.)	PCC (Program me Core courses)	PEC (Programme Elective courses)	OEC (Open Elective Course)	Multi- disciplinary courses	VSEC (Skill Course)	VEC (Value Education Courses)	Humanities Social Science & Management AEC (Ability Enhance ment Course) System)	Experiential Learning Courses	CC (Liberal Learning Courses)	VAC (Value added Course)
Credits	-	4	4	-	-	-	-	-	12	-	-
Cumulative Sum	16/13	45	16	8	10	8	2	10	15	4	2

PROGRESSIVE TOTAL CREDITS: 129+20=149

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Chairperson	Dean Academics	Vice-Principal	Principal	Date of Release	Version	2023-20



(An Autonomous Institution Affiliated to RTM Nagpur University, Nagpur) 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.	Course				Cor	ntact H	Iours		Ex	am Scher	ne	ESE	Total
No.	Category	Course Code	Course Title	T/P	L	Р	Hrs.	Credits	CT/IA	CA	ESE	Duration (Hours)	Marks
1	PCC	BAI14801	Advanced NLP Techniques	Т	3	-	3	3	30	10	60	3	100
2	PCC	BAI14802	Advanced NLP Techniques Lab	Р	-	2	2	1	-	25	25	2	50
3	RM	BAI14803	Research Methodology	Т	4	-	4	4	30	10	60	3	100
4	Project	BAI14804	Project	Р	-	8	8	4	-	50	50	2	100
5	PEC	BAI14805-08	Professional Elective - V	Т	4	-	4	4	30	10	60	3	100
6	MDM	BEC34811	Robotics and Intelligent Systems	Т	4	-	4	4	30	10	60	3	100
			Total	-	15	10	25	20	120	115	315	16	550

Course Category	BSC/ESC (Basic Science Course/Engineer ing Science Course.)	PCC (Program me Core courses)	PEC (Programme Elective courses)	OEC (Open Elective Course)	Multi- disciplinary courses	VSEC (Skill Course)	VEC (Value Educatio n Courses)	Humanitie Science & M AEC (Ability Enhancem ent Course)		Experiential Learning Courses	CC (Liberal Learning Courses)	VAC (Value added Course)
Credits		4	4	-	4	-	-	-		8	-	-
Cumulative Sum	16/13	49	20	8	14	8	2	10	0	23	4	2

PROGRESSIVE TOTAL CREDITS: 149+20=169

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Chairperson	Dean Academics	Vice-Principal	Principal	Date of Release	Version	



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

SCHEME OF INSTRUCTIONS & SYLLABI

Program: Artificial Intelligence and Machine Learning



List of Electives offered by Artificial Intelligence and Machine Learning

Tuest Name	Course	Professional Elective- I	Course	Professional Elective- II	Course	Professional Elective- III
Track Name	Code	Semester V	Code	Semester VI	Code	Semester VI
Intelligent Systems	BAI13506	Soft Computing	BAI13605	Intelligent Decision Systems	BAI13609	Enterprise AI Solutions (Generative AI with ERP + Chat boat)
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	Professional Elective-V
Course Coue	Semester VII	Code	Semester VIII
BAI14702	Graph Neural Networks (GNNs)	BAI14805	Cognitive Intelligence
BAI14703	Cloud-Based AR/VR Applications	BAI14806	AWS Cloud Computing
BAI14704	Block chain Technology	BAI14807	Predictive Analytics
BAI14705	Blockchain Security	BAI14808	Biometric Security

List of Open Electives offered by Artificial Intelligence and Machine Learning

Course Code	Subject
BAI12307 (OE-I)	Data Visualization
BAI12407 (OE-II)	Big Data Analytics
BAI13510 (OE-III)	Fundamentals of Machine Learning

