Dr. D. Y. Patil Educational Federation's
Dr. D. Y. Patil College of Engineering and Innovation
APPROVED BY AICTE, RECOGNIZED BY GOVT. OF MAHARASHTRA,
AUTONOMOUS INSTITUTE AFFILIATED TO SAVITRIBAI PHULE PUNE UNIVERSITY
Accredited by NAAC with "A" Grade

ACADEMIC COURSE STRUCTURE

SY, TY, B. Tech.

Artificial Intelligence and Data Science (AI-DS)

B. Tech. 4 YEAR UG COURSE

(Applicable for the batches admitted from AY 2025-2026 at FY)

Dr. D. Y. Patil College of Engineering & Innovation

Survey No. 27/A/1/2C, Varale Campus,
Near Talegaon Railway Station,
Tal. Maval, Dist. Pune 410 507,
Ph: 020 48522561, 565,566
Web Site: https://www.dypcoei.edu.in,
Email: principal.dypcoei@dypatilef.com

Vision and Mission of the Institute

Vision of DYPCOEI

To achieve excellence in quality education through value based rapidly changing technologies and create technical Human-Resource with proficiencies of accepting new challenges.

Mission of DYPCOEI

M1: Continuously strive to impart value-based education to elevate the satisfaction level of all stakeholders.

M2: Take dedicated efforts to create competent professionals by effective teaching learning process with passion of lifelong learning attitude.

M3: Our endeavour is to promote and support innovative research, entrepreneurship and development activities through Industry Interaction.

Vision and Mission of the Department

Vision of Department:

To prepare globally acceptable professionals in the field of Artificial Intelligence and Data Science having a desire to learn latest technologies, innovate and ethically progress.

Mission of Department:

M1: Impart Value-base education by effective Teaching-Learning process to enhance the concepts Artificial Intelligence and Data Science.

M2: Prepare AI and DS professionals to put their efforts in determining solutions for complex engineering problems of the society.

M3: Inspire faculty and students to develop innovatively through continuous research activities.

Program Educational Objectives (PEOs)

PEO1: Prepare graduates who will be able to apply the concepts of Machine Learning and Data Science while deriving solutions for real-life problems.

PEO2: Inculcate ability of communication, soft skills, ethics and work in a team while demonstrating the professionalism in the corporate world.

PEO3: Impart life-long learning among faculty and students to adapt new trends and technologies in the field of Artificial Intelligence and Data Science.

PEO4: Inculcate research ability among faculty & students while understanding, analysing the problems and designing solutions innovatively.

Program Outcomes (POs)

PO1: Engineering knowledge: Apply the knowledge of mathematics, science, Engineering fundamentals, and an Engineering specialization to the solution of complex Engineering problems.

PO2: 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.

PO3: 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.

PO4: 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.

PO5: 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.

PO6: 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.

PO7: 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.

PO8: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of Engineering practice.

PO9: Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in Multidisciplinary settings.

PO10: Communication Skills: 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.

PO11: Project Management and Finance: Demonstrate knowledge and understanding of 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.

PO12: 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.

Program Specific Outcomes (PSOs)

PSO1: Enhance understanding of fundamental theory and concepts of Machine Learning, Data Science and Deep Learning.

PSO2: Rigorous hand-on training to enhance the skills in emerging trends and technologies.

PSO3: Inculcate understanding of responsibility in team work while contributing in the development of prototype, product or application as part of student's projects.

Program – B. Tech. (Artificial Intelligence and Data Science)

(Autonomous Curriculum Structure for students admitted from AY 2025-26 at FY)

A. Definition of Credit:

1 Hr. Lecture (L) per week	1 credit
1 Hr. Tutorial (T) per week	1 credit
2 Hours Practical (Lab) per week	1 credit

B. Range of Credits:

Student will become eligible to get Under Graduate (UG) **BTech degree in Artificial Intelligence and Data Science** after earning **160 credits.** A student will be eligible to get Under **Graduate degree with Honors** or additional **Minor Engineering**, if he/she completes an additional **20 credits from SEM-V to SEM-VIII.**

C. Credit for BTech Degree in Artificial Intelligence and Data Science

Sr. No.	Year	Semester	Credits
1	First Year	I	22
2		II	22
3	Second Year	III	20
4		IV	22
5	Third Year	V	20
6		VI	18
7	Final Year	VII	18
8		VII	18
Total Credits			**160**

D. Structure of BTech program

Abbreviation	Course Type	Credit
BSC	Basic Science Courses	18
ESC	Engineering Science Courses	12
PCC	Program Core Courses	44
PEC	Program Elective Courses	20
CEP	Community Engagement Project	02
VAC	Value Added Courses	04
IAP	Internship and Project	14
MDM	Multidisciplinary Minor	14
OEC	Open Elective Courses	08
VSE	Vocational and Skill Enhancement Course	06
REM	Research Methodology	04
EMC	Entrepreneurship and Management Courses	04
AEC	Ability Enhancement Course	04
CCC	Co-curricular Courses	04
IKS	Indian Knowledge System	02
	Total	**160**

E. Minor Structure: B. Tech (Artificial Intelligence and Machine Learning)

Sr. No.	Courses Name	SEM	Credits
1	Deep Learning	V	3
2	Deep Learning Laboratory		2
3	Design and Analysis of Algorithm	VI	3
4	Design and Analysis of Algorithm Laboratory		2
5	Generative AI	VII	3
6	Generative AI Laboratory		2
7	Artificial Neural Networks	VIII	3
8	Artificial Neural Networks Laboratory		2
		Total	**20**

F. Honors Courses: Cyber Security

Sr. No.	Courses Name	SEM	Credits
1	Network Security and Cryptography	V	5
2	Ethical Hacking	VI	5
3	Secure Software Development	VII	5
4	Cyber risk management and Compliance	VIII	5
		Total	**20**

Honors Courses: Internet of Things

Sr. No.	Courses Name	SEM	Credits
1	Introduction to Internet of Things	V	5
2	Embedded IoT	VI	5
3	Cloud Integrated IoT Systems	VII	5
4	Security in Industrial IoT	VIII	5
		Total	**20**

Honors Courses: Generative AI

Sr. No.	Courses Name	SEM	Credits
1	Generative Ai Introduction and Applications	V	5
2	Prompt Engineering basics	VI	5
3	Explainable AI	VII	5
4	Natural Language Processing	VIII	5
		Total	**20**

Credit Distribution of Various Courses across Eight Semesters:

SEM	Total Marks	No. of Credits for Course Category															Total Credit
		BSC	ESC	PCC	PEC	MDM	OEC	VSE	AEC	EMC	IKS	VAC	REM	CEP	IAP	CCC	
I	700	9	6	4				1	2								**22**
II	700	9	6	3				1			2					1	**22**
III	700			8		2	4			2		2		2			**20**
IV	700			7		2	2	2	2	2		2			2	1	**22**
V	700			6	8	4	2										**20**
VI	700			4	4	2		2							4	2	**18**
VII	700			6	2	2							4		4		**18**
VIII	700			6	6	2									4		**18**
Total	**5600**	**18**	**12**	**44**	**20**	**14**	**8**	**6**	**4**	**4**	**2**	**4**	**4**	**2**	**14**	**4**	**160**

S. Y. BTech (AI-DS)

Artificial Intelligence and Data Science - Second Year (Semester –III)												
Sr. No.	Code	Course Title	Hours/week			Credits	Examination scheme					
			L	T	P		CCE	SEE	TW	PR	OR	Total
1	ADPCC301	Operating Systems	2		--	2	50	50	--	--	--	100
2	ADPCC302	Data Structures	2	--	--	2	50	50	--	--	--	100
3	ADPCC303	Data Structures Laboratory	--	--	2	1	--	--	25	25	--	50
4	ADPCC304	Artificial Intelligence	2	--	--	2	50	50	--	--	--	100
5	ADPCC305	Artificial Intelligence Laboratory	--	--	2	1	--	--	--	25	--	25
6	ADMDM306	MDM-I	2	--	--	2	50	50	--	--	--	100
7	ADOEC307	Open Elective Courses I	2	--	--	2	--	50	25	--	--	75
8	ADOEC308	Open Elective Courses II	--	--	4	2	--	--	50	--	--	50
9	ADEMC309	Entrepreneurship and Startup Ecosystem	2	--	--	2	--	--	25	--	--	25
10	ADVAC310	VAC-1 Social Well-Being	1	--	2	2	--	--	25	--	--	25
11	ADCEP311	Community Engagement/Field Project	--	--	4	2	--	--	25	--	25	50
Total			**13**	**--**	**14**	**20**	**200***	**250#**	**175$**	**50$**	**25$**	**700**

Open Elective -I (ADOEC307)		Open Elective -II (ADOEC308)	
ADOEC307A	Engineering Economics	ADOEC308A	MOOC- I
ADOEC307B	AI in Finance Management	ADOEC308B	Foreign Language- I
ADOEC307C	Digital Finance	ADOEC308C	UHV

#	**Semester End Examination (SEE)** based on subjective questions.
$	**LAB /Practical or Hands-on/ Activity based Evaluation.**
*	**Comprehensive Continuous Evaluation (CCE)** based on Unit Tests, Home Assignment/Comprehensive, Presentation/Group Discussion/Laboratory Work/Course Project/Viva Voce/Blog Writing/Case Study/Survey/Multiple-Choice Question (MCQ) examination.
@	**For MOOCs:** Assignments marks will be converted on the scale of 50 marks.
%	**For MOOCs:** Score of examination conducted by the respective authority of MOOC or Score of SEE Conducted by Institute will be converted on the scale of 50 marks.

Artificial Intelligence and Data Science - Second Year (Semester –IV)												
Sr. No.	Code	Course Title	Hours/week			Credits	Examination scheme					
			L	T	P		CCE	SEE	TW	PR	OR	Total
1	ADPCC401	Discrete Mathematics and Statistics	2	--	--	2	50	50	--	--	--	100
2	ADPCC402	Database Management Systems	2	--	--	2	50	50	--	--	--	100
3	ADPCC403	Data Structures and Algorithms	2	--	--	2	50	50	--	--	--	100
4	ADPCC404	Data Structures and Algorithms Laboratory	--	--	2	1	--	--	--	25	--	25
5	ADMDM405	MDM-II	2	--	--	2	50	50	--	--	--	100
6	ADOEC406	Open Elective Courses III	2	--	--	2	--	50	25	--	--	75
7	ADVSE407	DevOps in Machine Learning Laboratory	--	--	4	2	--		25	25	--	50
8	ADAEC408	Reasoning and Aptitude Development	2	--	--	2	--	--	25	--	--	25
9	ADEMC409	Technology Commercialization & Startup Development	2	--	--	2	--	--	25	--	--	25
10	ADVAC410	VAC-2 Campus to Corporate	1	--	2	2	--	--	25	--	--	25
11	ADIAP411	Problem Based Learning	--	--	4	2	--	--	50	--	--	50
12	ADCCC412	Professional Self Initiatives and Social Activities	1	--	--	1	--	--	25	--	--	25
Total			**16**	**--**	**12**	**22**	**200***	**250#**	**200$**	**50$**	--	**700**

Open Elective -III (ADOEC407)	
ADOEC407A	Digital Marketing
ADOEC407B	Critical Thinking and Problem Solving
ADOEC407C	Ethics in Artificial Intelligence

T. Y. BTech (AI-DS)

Artificial Intelligence and Data Science - Third Year (Semester –V)												
Sr. No.	Code	Course Title	Hours/week			Credits	Examination scheme					
			L	T	P		CCE	SEE	TW	PR	OR	Total
1	ADPCC501	Web Engineering	2	--	--	2	50	50	--	--	--	100
2	ADPCC502	Data Science for Engineers	3	--	--	3	50	50	--	--	--	100
3	ADPCC503	Data Science for Engineers Laboratory	--	--	2	1	--	-	25	25	--	50
4	ADPEC504	Program Elective Courses I	3	--	--	3	50	50	--	--	--	100
5	ADPEC505	Program Elective Courses II	3	--	--	3	50	50	--	--	--	100
6	ADPEC506	Elective-I & II Laboratory	--	--	4	2	--	--	25	25	--	50
7	ADMDM507	MDM-III	2	--	--	2	50	50	--	--	--	100
8	ADMDM508	Mini Project & Seminar	--	--	4	2	--	--	25	--	25	50
9	ADOEC509	Open Elective Courses IV	--	--	4	2	--	--	50	--	--	50
Total			**13**	**--**	**14**	**20**	**250***	**250#**	**125$**	**50$**	**25$**	**700**

Program Elective-I (ADPEC504)		Program Elective-II (ADPEC505)	
ADPEC504 (A)	Data Warehousing and Data Mining	ADPEC505 (A)	Applied Statistics for Data Science
ADPEC504 (B)	Python for Data Science	ADPEC505 (B)	Web Development - Frontend
ADPEC504 (C)	Networks and Security	ADPEC505 (C)	AI In Cybersecurity
ADPEC504 (D)	Machine Learning	ADPEC505 (D)	Artificial Neural Networks

Open Elective -IV (ADOEC509)	
ADOEC509A	Intellectual Property Rights
ADOEC509B	MOOC- 2
ADOEC509C	Foreign Language-2

#	**Semester End Examination (SEE)** based on subjective questions.
$	**LAB /Practical or Hands-on/ Activity based Evaluation.**
*	**Comprehensive Continuous Evaluation (CCE)** based on Unit Tests, Home Assignment/Comprehensive, Presentation/Group Discussion/Laboratory Work/Course Project/Viva Voce/Blog Writing/Case Study/Survey/Multiple-Choice Question (MCQ) examination.
@	**For MOOCs:** Assignments marks will be converted on the scale of 50 marks.
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Artificial Intelligence and Data Science - Third Year (Semester –VI)												
Sr. No.	Code	Course Title	Hours/week			Credits	Examination scheme					
			L	T	P		CCE	SEE	TW	PR	OR	Total
1	ADPCC601	Big Data Analytics	2	--	--	2	50	50	--	--	--	100
2	ADPCC602	Big Data Analytics Laboratory	--	--	4	2	--	--	50	50	--	100
3	ADPEC603	Program Elective Courses III	2	--	--	2	50	50	--	--	--	100
4	ADPEC604	Program Elective Courses III Laboratory	--	--	4	2	--	--	50	50	--	100
5	ADMDM605	MDM-IV	2	--	--	2	50	50	--	--	--	100
6	ADVSE606	R programming for AI	2	--	--	2	--	50	25	--	--	75
7	ADIAP607	Industrial Internship and Project	--	--	8	4	--	--	50	--	50	100
8	ADCCC608	Leadership & Management of Club/Activity	2	--	--	2	--	--	25	--	--	25
Total			**10**	**--**	**16**	**18**	**150***	**200#**	**200$**	**100$**	**50$**	**700**

Program Elective-III (ADPEC603)	
ADPEC603 (A)	Data Preparation and Analysis
ADPEC603 (B)	Web Development - Backend
ADPEC603 (C)	Data Privacy and Ethics
ADPEC603 (D)	Natural Language Processing (NLP)

B.Tech (AI-DS)

Artificial Intelligence and Data Science – B. Tech (Semester –VII)												
Sr. No.	Code	Course Title	Hours/week			Credits	Examination scheme					
			L	T	P		CCE	SEE	TW	PR	OR	Total
1	ADPCC701	Responsible AI Practices with AWS	2	--	--	2	50	50	--	--	--	100
2	ADPCC702	Responsible AI Practices Laboratory	--	--	2	1	--	--	25	25	--	50
3	ADPCC703	Computational Intelligence	2	--	--	2	50	50	--	--	--	100
4	ADPCC704	Computational Intelligence Lab	--	--	2	1	--	--	25	25	--	50
5	ADPEC705	Program Elective Courses IV	2	--	--	2	50	50	--	--	--	100
6	ADMDM706	MDM-V	2	--	--	2	50	50	--	--	--	100
7	ADREM707	Research Methodology	4	--	--	4	50	50	--	--	--	100
8	ADIAP708	Project Stage I	--	--	8	4	--	--	50	--	50	100
Total			**12**	**--**	**12**	**18**	**250***	**250#**	**100$**	**50$**	**50$**	**700**

Program Elective-IV (ADPEC705)	
ADPEC705 (A)	Data Classification and Evaluation
ADPEC705 (B)	API Development and Testing
ADPEC705 (C)	Blockchain Technology
ADPEC705 (D)	Deep Learning

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@	**For MOOCs:** Assignments marks will be converted on the scale of 50 marks.
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Artificial Intelligence and Data Science – B. Tech (Semester –VIII)												
Sr. No.	Code	Course Title	Hours/week			Credits	Examination scheme					
			L	T	P		CCE	SEE	TW	PR	OR	Total
1	ADPCC801	Quantum Artificial Intelligence	2	--	--	2	50	50	--	--	--	100
2	ADPCC802	Quantum Artificial Intelligence Laboratory	--	--	2	1	--	--	--	25	--	25
3	ADPCC803	Data Modelling and Visualization	2	--	--	2	50	50	--	--	--	100
4	ADPCC804	Data Modelling and Visualization Laboratory	--	--	2	1	--	--	25	25	--	50
5	ADPEC805	Program Elective Courses V	3	--	--	3	50	50	--	--	--	100
6	ADPEC806	Program Elective Courses VI	3	--	--	3	50	50	--	--	--	100
7	ADMDM807	MDM-VI	2	--	--	2	--	50	25	--	--	75
8	ADIAP808	Project Stage II	--	--	8	4	--	--	100	--	50	150
Total			**12**	**--**	**12**	**18**	**200***	**250#**	**150$**	**50$**	**50$**	**700**

Program Elective-V (ADPEC805)		Program Elective-VI (ADPEC806)	
ADPEC805 (A)	Information Retrieval and Virtual Reality	ADPEC806 (A)	Predictive Modelling and Analytics
ADPEC805 (B)	DevOps and Agile Software Development	ADPEC806 (B)	AWS: Cloud Computing Services
ADPEC805 (C)	Secure AI Systems	ADPEC806 (C)	AI for Cyber Threat Intelligence
ADPEC805 (D)	Reinforcement Learning	ADPEC806 (D)	Emotional Intelligence