

- **Teaching-Learning and Assessment Scheme:**

Course Code	Course Title	Abbr	Course Category/	Learning Scheme			Credit s	Paper Duration	Assessment Scheme										Total Marks			
				Actual Contact Hrs./Week		SLH			Theory			Based on LL & TL				Based on SL						
				CL	TL	LL	FA		SA-TH	Total	FA-PR	SA-PR	SLA									
316320	ADVANCED ALGORITHM IN AI & ML ALGORITHM	AAM	DSE	3	-	2	1	6	3	3	30	70	100	40	25	10	25#	10	25	10	175	

**Abbreviations:** CL- Class Room Learning , LL-Laboratory Learning, SLH-Self Learning Hours, NLH-Notional Learning Hours, FA - Formative Assessment, SA -Summative assessment, SLA - Self Learning Assessment

**Legends:** @ Internal Assessment, # External Assessment, \*# on Line Examination, @\\$ Internal Online Examination

- **Course Outcomes (COs) & Theory Learning Outcome(TLOs):** By learning course Advanced Algorithm In AI & ML (AAM-316320), Third Year of AJML students will be able to:

CO No.	TLO No.	Course Outcomes (COs) / Theory Learning Outcomes (TLOs)
CO607.1		Apply suitable Machine learning model for dataset feature extraction.
CO607.2	TLO 1.1	Select a suitable model for the given data with justification.
	TLO 1.2	Explain the process of supervised learning on the given data.
	TLO 1.3	Explain the process of Feature extraction and Engineering.
	TLO 1.4	Compare Feature Engineering for the given type of data.
	TLO 1.5	Differentiate between Feature scaling & Feature selection.
CO607.2		Implement Machine learning algorithms on given problem.
CO607.3	TLO 2.1	Explain the working of Support Vector Machines.
	TLO 2.2	Explain the method of performance analysis of clustering for the given problem.
	TLO 2.3	Illustrate the process of Dimensionality Reduction.
	TLO 2.4	Explain Association Rule Learning.
	TLO 2.5	Differentiate between various Generative models.
CO607.3		Implement Artificial Neural Networks analyzing associated parameters of Deep Learning.
CO607.4	TLO 3.1	Describe the concepts of ANN.
	TLO 3.2	Explain the functioning of Perceptron Learning Algorithm with example.
	TLO 3.3	Explain Gradient Descent rule.
	TLO 3.4	Calculate the output of the network for the given input pattern & given activation function.
CO607.4		Build a Convolutional Neural Network for given context.

	TLO 4.1	Illustrate use of CNN in real-life applications.
	TLO 4.2	Explain the functions of different Layers in a CNN.
	TLO 4.3	Describe the characteristics of different types of Pooling.
	TLO 4.4	Analyse different open source CNN architectures.
<b>CO607.5</b>		<b>Classify Sequential and Image Data using Deep Learning.</b>
	TLO 5.1	Describe the process of implementing Deep Learning for Sequential Data.
	TLO 5.2	Illustrate the process of implementing Deep Learning for Image Data.
	TLO 5.3	Explain working of GPT.

## ● Teaching Plan:

Unit No. (Allotted Hrs.) Marks	Theory Learning Outcomes (TLO)	Title/Topic Details and Course Outcome [CO]	Plan (From -To & No. of Lectures)	Actual Execution (From-To & No. of Lectures)	Pedagogy used (Teaching Method/ Media)	Remark
01 (06) Hrs. 12M		<b>Unit - I ML Models and Features Engineering [607.1]</b>				
	1.1	1.1 Introduction of ML models	15/12/2025 (01)		Chalk Board, PPT	
	1.2	1.2 Training a model for Supervised learning	16/12/2025 (01)		Chalk Board, PPT	
	1.3	1.3 Features : Understanding data, Feature extraction and Engineering	17/12/2025 (01)		Chalk Board, PPT	
	1.4	1.4 Feature engineering on : Numerical data, Categorical data & Text data	22/12/2025 (01)		Chalk Board, PPT	
	1.5	1.5 Feature scaling & Feature selection	23/12/2025 To 24/12/2025 (02)		Chalk Board, PPT MKCL ERA	
02 (07) Hrs. 12M		<b>Unit – II Supervised and Unsupervised Learning Algorithms [CO607.2]</b>				
	2.1	2.1 Supervised Learning : Support Vector Machines- Working, Types and Implementation of SVM	29/12/2025 To 31/12/2025 (03)		Chalk Board, PPT	
	2.2	2.2 Unsupervised Learning : K-Mediod Algorithm- working and implementation	05/01/2026 (01)		Chalk Board, PPT+LCD MKCL ERA	

	2.3	2.3 Dimensionality Reduction: Introduction, Subset Selection, Principal Component Analysis	06/01/2026 (01)		Chalk Board, PPT+LCD	
	2.4	Association Rule Learning— Apriori Algorithm, Éclat Algorithm	07/01/2026 (01)		Chalk Board, PPT+ LCD	
	2.5	Generative Models - Generative Adversarial Networks (GANs), Variation Auto encoders (VAEs)	12/01/2026 (01)		Board, PPT+LCD MKCL ERA	
03 (06) Hrs. 12M		<b>Unit - III Artificial Neural Networks [CO607.3]</b>				
	3.1	3.1 Introduction of Artificial Neural Networks(ANN)	13/01/2026 To 19/01/2026 (03)		Chalk Board, PPT+LCD, MKCL ERA	
	3.2	3.2 Perceptron : Basic Components, working, Types ,Training Rule	20/01/2026 (01)		Chalk Board, PPT+LCD,	
	3.3	3.3 Gradient Descent Rule, Gradient, Types of Gradient Descent	21/01/2026 (01)		Chalk Board, PPT+LCD,	
	3.4	3.4 Activation Functions: Sigmoid, ReLU, Hyperbolic tangent, Softmax etc.	27/01/2026 (01)		Chalk Board, PPT+LCD,	
		<b>Unit - IV Convolutional Neural Networks [CO607.4]</b>				
04 (06) Hrs. 10M	4.1	4.1 Convolutional Neural Networks : Introduction, Architecture and Applications	28/01/2026 To 02/02/2026 (02)		Chalk Board, PPT+LCD, MKCL ERA	
	4.2	4.2 Padding, Strided convolution, Convolution over volume, Pooling	03/02/2026 To 04/02/2026 (02)		Chalk Board, PPT+ LCD	
	4.3	4.3 Case studies: LeNet, AlexNet, VGGNet, ResNet, GoogleNet etc.	09/02/2026 To 10/02/2026 (02)		Chalk Board, PPT	
		<b>Unit - V Deep Learning for Sequential data and Image data [CO607.5]</b>				
05 (12) Hrs. 14M	5.1	5.1 Sequential Data: Recurrent Neural Networks (RNNs), Long Short-Term Memory (LSTM) networks, Gated Recurrent Units (GRUs)	11/02/2026 To 23/02/2026 (04)		Chalk Board, PPT+LCD,	

	5.2	5.2 Image Data : Pre-trained Neural Networks, Transfer Learning, Fine Tuning	24/02/2026 To 03/03/2026 (04)		Chalk Board, PPT+LCD,	
	5.3	5.3 Introduction to Transformers, Generative Pre-training Transformer(GPT)	04/03/2026 To 23/03/2026 (04)		Chalk Board, PPT+LCD	
<b>45Hrs</b>		<b>Total</b>	<b>45 Hrs.</b>			

- **COs - POs & PSOs Matrix:**

Course Outcomes (COs)	Program Outcomes (POs)							Program Specific Outcomes* (PSOs)	
	PO-1 Basic and Discipline Specific Knowledge	PO-2 Problem Analysis	PO-3 Design/Development of Solutions	PO-4 Engineering Tools	PO-5 Engineering Practices for Society, Sustainability and Environment	PO-6 Project Management	PO-7 Life Long Learning	PSO- 1	PSO- 2
CO1	3	-	-	1	-	-	-	1	-
CO2	2	2	2	1	-	-	1	1	-
CO3	-	2	2	1	-	-	1	2	1
CO4	2	2	2	1	1	2	1	2	-
CO5	2	2	2	1	1	2	1	2	2
CO6	2	2	2	1	-	2	1	2	2

Legends :- High:03, Medium:02,Low:01, No Mapping: -

**PSO1:** Apply fundamental concepts of Computer Engineering and Artificial Intelligence and machine Learning to solve technical problems.

**PSO2:** Implement the domain knowledge to achieve a successful career as an engineering professional.

- **Self-Learning Assessment :**

1. Self-learning assessment includes micro-project or assignment.
2. SLA Marks Shall be awarded as per the continuous assessment record
3. SLA will be of 25 Marks.
4. Complete the course on Infosys Springboard such as Variety of ML algorithms / Support vector algorithm in ML / Advanced setting in ML model etc.
5. Following are some SLA Assignment topic or similar self-learning topic could be added by SLA:
  - I. Train a GAN for Image Generation.
  - II. Implement and Tune a Convolutional Neural Network (CNN) for Transfer Learning.
  - III. Implement and Train a Transformer Model for Text Generation.

#### IV. Implement a Neural Network with Backpropagation and Vanishing Gradient Problem.

- **Formative Assessment (Assessment for Learning) :**

- Two offline class tests of 30 marks each will be conducted. Average of two class tests marks will be consider as Formative Assessment for Theory marks out of 30.

- **Summative Assessment (Assessment of Learning)**

- End semester assessment of 70 marks through paper based examination by MSBTE
- Total theory marks (100) will be calculated as marks of Formative Assessment (30) + marks of Summative Assessment (70)

- **References:**

**A. Books:**

Sr. No	Author	Title	Publisher with ISBN Number
1	Andreas C. Müller & Sarah Guido	Introduction to Machine Learning with Python	O'Reilly Media, Inc ISBN-13: 978-9352134571
2	Tom M Mitchell	Machine Learning	McGraw Hill Education; First Edition ISBN-13: 978-1259096952
3	Rudolph Russell	Machine Learning Step-by-Step Guide To Implement Machine Learning Algorithms with Python	CreateSpace Independent ISBN-13: 978-1719528405
4	Dipanjan Sarkar, Raghav Bali, Tushar Sharma	Practical Machine Learning with Python A Problem-Solver's Guide to Building Real-World Intelligent Systems	Apress ISBN-13:978-1484232064
5.	François Chollet	Deep Learning with Python	Manning Publications ISBN-13:978-1617294433

**B. Learning Web Sites:**

Sr. No	Link / Portal	Description
1	<a href="https://www.python.org/downloads/">https://www.python.org/downloads/</a>	Python IDE download
2	<a href="https://www.pdfdrive.com/machine-learning-step-by-step-guide-to-implement-machine-learning-algorithms-with-python-d158324853.html">https://www.pdfdrive.com/machine-learning-step-by-step-guide-to-implement-machine-learning-algorithms-with-python-d158324853.html</a>	AI and ML E-Books
3	<a href="https://www.geeksforgeeks.org/how-to-install-python-pycharm-on-windows/">https://www.geeksforgeeks.org/how-to-install-python-pycharm-on-windows/</a>	Guidelines for Installation of python
4	<a href="https://www.pythongcentral.io/how-to-install-pytorch-using-pip-a-step-by-step-guide/">https://www.pythongcentral.io/how-to-install-pytorch-using-pip-a-step-by-step-guide/</a>	Installation of PyTorch on windows
5	<a href="https://www.geeksforgeeks.org/what-is-feature-engineering/">https://www.geeksforgeeks.org/what-is-feature-engineering/</a>	Feature Engineering

**C. Learning URLs of referenced YouTube Videos:**

<b>Sr. No</b>	<b>URLs of YouTube Videos</b>	<b>Topic</b>
<b>1</b>	<a href="https://www.youtube.com/watch?v=7uwa9aPbBRU">https://www.youtube.com/watch?v=7uwa9aPbBRU</a>	Introduction of ML models
<b>2</b>	<a href="https://www.youtube.com/watch?v=lzWcVVCXMfo">https://www.youtube.com/watch?v=lzWcVVCXMfo</a>	Features : Understanding data, Feature extraction and Engineering
<b>3</b>	<a href="https://www.youtube.com/watch?v=85je4aCdYcE">https://www.youtube.com/watch?v=85je4aCdYcE</a>	Feature scaling & Feature selection
<b>4</b>	<a href="https://www.youtube.com/watch?v=BpcDcvARbUQ">https://www.youtube.com/watch?v=BpcDcvARbUQ</a>	Supervised Learning : Support Vector Machines- Working, Types and Implementation of SVM
<b>5</b>	<a href="https://www.youtube.com/watch?v=7zLkQt2qnaU">https://www.youtube.com/watch?v=7zLkQt2qnaU</a>	Generative Models - Generative Adversarial Networks (GANs), Variation Auto encoders (VAEs)
<b>6</b>	<a href="https://www.youtube.com/watch?v=quCEmM2JBbk">https://www.youtube.com/watch?v=quCEmM2JBbk</a>	Introduction of Artificial Neural Networks(ANN)
<b>7</b>	<a href="https://www.youtube.com/watch?v=IJ4_tvwIVg8">https://www.youtube.com/watch?v=IJ4_tvwIVg8</a>	Activation Functions: Sigmoid, ReLU, Hyperbolic tangent, Softmax etc.
<b>8</b>	<a href="https://www.youtube.com/watch?v=zfiSAzpy9NM">https://www.youtube.com/watch?v=zfiSAzpy9NM</a>	Convolutional Neural Networks : Introduction, Architecture and Applications
<b>9</b>	<a href="https://www.youtube.com/watch?v=WGP6QBI_mVo">https://www.youtube.com/watch?v=WGP6QBI_mVo</a>	Deep Learning for Sequential data and Image data
<b>10</b>	<a href="https://www.youtube.com/watch?v=SUW0Bhp7WwY">https://www.youtube.com/watch?v=SUW0Bhp7WwY</a>	Generative Pre-training Transformer(GPT)

**D. Tools:**

1. Google Classroom to share subject material to students.
2. Quizzes using MKCL ERA LMS login
3. python setup, PyTorch, Google colab.

Ms. D. N. More  
**(Name & signature of Staff)**  
Cc: Course File – AAM (31320)

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