Maharashtra State Board of Technical Education, Mumbai **K-1**

TEACHING PLAN (TP)/CIS

Academic Year: 2026-2027

Date: 06/07/2026

Institute Name &Code: K. K. Wagh Polytechnic, Nashik (0078)

Program Name and Code: Artificial Intelligence and Machine Learning(AN) **Course Index:** 306

Course Name: Statistical Modelling For Machine Learning **Course Abbreviation and Code:** SML-313307

Semester: III[rd] **Scheme**: 'K' **Allocated Hrs:** 45 **Class:** SYAN **Name of Faculty:** Mrs. K.N. Deshmukh

• Teaching-Learning and Assessment Scheme:

Course Code	Course Title	Abbr	Course Category/ s	Learning Scheme					Credits	Assessment Scheme											
				Actual Contact Hrs./Week			SLH	NLH		Paper Duration	Theory				Based on LL & TL				Based on SL		Total Marks
															Practical						
				CL	TL	LL					FA-TH	SA-TH	Total		FA-PR		SA-PR		SLA		
											Max	Max	Max	Min	Max	Min	Max	Min	Max	Min	
313307	Statistical Modelling For Machine Learning	SML	DSC	3	1	4	2	10	5	3	30	70	100	40	25	10	50@	20	25	10	200

Abbreviations: CL- ClassRoom Learning , TL- Tutorial Learning, LL-Laboratory Learning, SLH-Self Learning Hours, NLH-Notional Learning Hours, FA - Formative Assessment, SA -Summative assessment, IKS - Indian Knowledge System, SLA - Self Learning Assessment

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

• Course Outcomes (COs) & Theory Learning Outcomes (TLOs):

By learning the course Statistical Modelling For Machine Learning (SML-313307) Second year AIML students will be able to:

CO No.	TLO's No.	Course Outcomes (COs) / Theory Learning Outcomes (TLO's)
CO304.1		**Solve the given problem based on Statistic Techniques using R-Programming.**
	TLO 1.1	Solve problems based on Frequency Distribution.
	TLO 1.2	Calculate Mean, Median and Mode for all types of data.
	TLO 1.3	Find Mode and Median using Graphical method.
	TLO 1.4	Find Karl Pearson's and Bowley's Co-efficient of Skewness for the given data.
	TLO 1.5	Calculate the Measures of Kurtosis based on moment for given data.
CO304.2		**Implement Statistic methods using R-Programming.**
	TLO 2.1	Fit straight line and second-degree polynomial using Least Square method.
	TLO 2.2	Calculate Coefficient of correlation using Karl-Pearson's and Spearman's Rank methods.
	TLO 2.3	Obtain the equation to the Line of Regression for the given data.
CO304.3		**Use Principles of Probability to solve given Problem.**
	TLO 3.1	Solve problems using addition and multiplication probability theorem.
	TLO 3.2	Solve problems using Conditional Probability.
	TLO 3.3	Solve problems using Bayes' theorem.
CO304.4		**Implement appropriate method based on the Interpolation.**
	TLO 4.1	Solve problems using Lagrange's interpolation formula.
	TLO 4.2	Construct forward and backward difference table.
	TLO 4.3	Solve problems using Forward, Backward, Shift, Inverse shift operators.
	TLO 4.4	Solve problems on Forward and Backward Interpolation.
	TLO 4.5	Solve problems on Extrapolation.
CO305.5		**Apply Sampling Methods to solve given problem using R-Programming.**
	TLO 5.1	Solve the given problem using Sampling distribution proportion.
	TLO 5.2	Test samples using t-Distribution.
	TLO 5.3	Test samples using chi-Square Distribution.
	TLO 5.4	Use Chi-Square test to test the Independence.

- **Teaching Plan:**

Unit No. (Allotted Hrs.)	TLOs	Title/Topic Details and Course Outcomes	Plan (From-To & No. of Lectures)	Actual Execution (From-To & No. of Lectures)	Teaching Method/ Media/ Tools	Remark
01 (10)		**Unit - I Statistical Techniques**				
	1.1	1.1 Frequency Distribution: Definition, Basic terms.	06/07/2026 To 10/07/2026 (03)		Chalk, Blackboard, LCD Projector, PPT	
	1.2	1.2 Classification of Data: Raw, Ungroup and Group data.				
	1.3	1.3 Measures of Central Tendency: Mean, Median and Mode for all types of data.				
	1.4	1.4 Concept of Quartiles, Deciles and Percentiles for all types of data.	11/07/2026 To 17/07/2026 (04)			
	1.5	1.5 Geometric mean and Harmonic mean and Combined mean for given data.				
	1.6	1.6 Graphical Representation to find Mode (Histogram) and Median (Ogive curve)				
	1.7	1.7 Measures of Dispersion: Range, Mean Deviation, Standard Deviation, Variance.	18/07/2026 To 24/07/2026 (03)			
	1.8	1.8 Skewness: Types of skewness, Test of skewness, Co-efficient of skewness-Karl Pearson's and Bowley's coefficient.				
	1.9	1.9 Types of skewness in terms of Mean and Mode.				
	1.10	1.10 Measures of Kurtosis using central moment.				
02 (10)		**Unit - II Statistical Methods**				
	2.1	2.1 Fitting of Straight Line $y = a + bx$ using method of least square.	25/07/2026 (01)		Chalk, Blackboard, LCD Projector, PPT	
	2.2	2.2 Fitting of second degree polynomial $y = a + bx + cx^2$ using method of least square.	28/07/2026 (02)			
	2.3	2.3 Covariance of the data.	31/07/2026 To 04/08/2026 (03)			
	2.4	2.4 Correlations, Types of Correlations.	07/08/2026 To 10/08/2026 (02)			
	2.5	2.5 Scatter Or Dot-Diagram				
	2.6	2.6 Karl-Pearson's and Spearman's Rank Coefficient of Correlation.	11/08/2026 (01)			
	2.7	2.7 Regression Equation of line in two variables.	13/08/2026 (01)			
03 (07)		**Unit - III Probability of Random Variable**				

	3.1	3.1 Probability : Definition, Terminologies.	14/08/2026 To 18/08/2026 (03)		Chalk, Blackboard, LCD Projector, PPT	
	3.2	3.2 Theorem of Probability: Addition, Multiplication.				
	3.3	3.3 Conditional probability.	19/08/2026 To 28/08/2026 (04)			
	3.4	3.4 Bayes' theorem.				
04 (10)		**Unit - IV Interpolation**				
	4.1	4.1 Introduction.	29/08/2026 (01)		Chalk, Blackboard, LCD Projector, PPT	
	4.2	4.2 Lagrange's Interpolation formula.	01/09/2026 (01)			
	4.3	4.3 Finite Differences: Forward difference, Backward difference, Shift operator, Inverse shift operator.	04/09/2026 To 08/09/2026 (04)			
	4.4	4.4 Relation between forward, backward, shift and inverse shift operator.	09/09/2026 To 11/09/2026 (02)			
	4.5	4.5 Newton's Gregory forward and backward difference Interpolation Formula.	12/09/2026 To 15/09/2026 (02)			
	4.6	4.6 Concept of Extrapolation.				
05 (08)		**Unit - V Sampling Methods**				
	5.1	5.1 Population, Sampling, Aim of Sampling, Parameters and Statistic, Types of Sampling, Standard Error.	18/09/2026 (01)		Chalk, Blackboard, LCD Projector, PPT	
	5.2	5.2 Hypothesis: Null Hypothesis and Alternating Hypothesis.	19/09/2026 (01)			
	5.3	5.3 Level of Significance, Test of Significance and Confidence Limits.	22/09/2026 (02)			
	5.4	5.4 Test of Significance of Large Samples (N >30).				
	5.5	5.5 Sample Distribution of the proportion.	25/09/2026 To 16/09/2026 (02)			
	5.6	5.6 Comparison of Large Samples.				
	5.7	5.7 The t-Distribution (For Small Samples).				
	5.8	5.8 Chi-Square Distribution, Condition for Chi Square test.	29/09/2026 (01)			
	5.9	5.9 Degree of freedom.				
	5.10	5.10 Chi-Square Test of Goodness of fit and Chi-Square test as a test of Independence.	30/09/2026 (01)			

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

Course Outcomes (COs)	**Programme Outcomes (POs)**							**Programme 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**	**PO-6 Project Management**	**PO-7 Life Long Learning**	**PSO- 1**	**PSO- 2**

					Environment				
CO1	3	1	1	-	-	-	1	1	-
CO2	3	2	1	1	1	-	1	1	-
CO3	3	2	2	1	-	1	2	2	-
CO4	3	2	2	1	-	1	1	-	2
CO5	3	2	2	1	1	1	2	-	3

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.

- **Direct Assessment Criteria:**

Formative assessment (Assessment for Learning)

- ✔ Laboratory Performance, Unit Tests , Midterm Exam, Self-learning, Term Work, Seminar/Presentations.
- ✔ Continuous assessment based on process and product related performance indicators.
- ✔ Each Practical will be assessed considering 60% weightage to the process, 40% weightage to the product.

Summative Assessment (Assessment of Learning)

- ✔ End Semester Exam, Practical exam, viva voce

- **References:**

1. Books:

Sr. No.	Title of Book	Author	Publication
01	Higher Engineering Mathematics	H.K.Dass, Er.Rajnish Verma	S. Chand Technical ISBN: 9788121938907,9788121938907
02	Engineering Mathematics	A.C. Srivastava, P.K. Srivastava	O'Reilly Media, Inc. ISBN: 9781492031086
03	Higher Engineering Mathematics	Grewal B. S.	Khanna Publication New Delhi, 2013 ISBN: 8174091955
04	Higher Engineering Mathematics	B. V. Ramana	Tata Mcgraw Hill Education private limited, New Delhi. ISBN: 9780070634190, 9780070634190
05	Calculus and Its Applications	Marvin L. Bittinger David J. Ellenbogen Scott A. Surgent	Addison-Wesley 10th Edition ISBN-13: 978-0-321-69433-1
06	R For Dummies	Andrie de Vries and Joris Meys	Wiley Publisher ISBN-13: 978-8126562183
07	Beginner's Guide for Data Analysis using R Programming	Jeeva Jose	Khanna Book Publishing, First Edition ISBN-13: 978-9386173454

2. Learning Websites & Portals :

Sr.No	Link / Portal	Description
1	http://nptel.ac.in/courses/106102064/1	Online Learning Initiatives by IITs and IISc
2	https://ocw.mit.edu/	MIT Open courseware
3	https://www.khanacademy.org/math	Concept of Mathematics through video lectures and notes
4	www.mathworks.com/	Applications of concepts of Mathematics to coding.
5	https://amser.org/b920509/science--mathematics	AMSER (Interpolation. Extrapolation
6	https://www.coursera.org/learn/r-programming	R Programming: Free online Course
7	https://libguides.furman.edu/oer/subject/mathematics	Open Education Resources (OER) in Mathematics. (Interpolation. Extrapolation
8	https://www.wolframalpha.com/	Solving Mathematical Problems, performing calculations, visualizing mathematical concepts.
9	https://brilliant.org/	Interactive Learning in Mathematics
10	https://www.w3resource.com/r-programming-exercises/basic/	R Programming Basic, Exercises, Practice, Solution
11	www.datamentor.io/r-programming/examples/	R Programming Examples
12	https://www.tutorialspoint.com/r_programming_language/index.asp	R-Programming Online Course
13	https://www.freecodecamp.org/news/all-the-math-you	Mathematics in AI

	-need-in-artificial- intelligence/	
14	https://byjus.com/maths/least-square-method/	Least Square Method
15	https://www.w3resource.com/r-programming-exercises/basic/r-programming-basic-exercise-3.php	R-Programming: Basic Exercises with Solution
Note : Teachers are requested to check the creative common license status/financial implications of the suggested online educational resources before use by the students		

Mrs. K.N.Deshmukh
Name & Signature of the Faculty

Prof. R.Y.Thombare
(H.O.D - AN)

Cc: 1. Course File- SML(313307)