

MA 506 Probability and Statistical Inference

Instructor: Prashant Shekhar, PhD

Tentative Schedule for Fall 2023

<i>SNo: Week of (class days)</i>	<i>Topic</i>	<i>Homework</i>	<i>Learning Outcome</i>
Unit I: Course Basics			
1: 28 th Aug (Tu,Th)	Course introduction Python basics		1 1,2
2: 4 th Sept (Tu,Th)	Probability Statistical inference		1,2,15 1,2,15
Unit II: Regression			
3: 11 th Sept (Tu,Th)	Regression introduction Regression continued	HW1 released	4,5,6,7 4,5,6,7
4: 18 th Sept (Tu,Th)	Linear Regression from scratch Regression diagnostics		1,2,7 7
5: 25 th Sept (Tu,Th)	Confidence Intervals Confidence Intervals II	HW1 due	4,5,7 4,5,7
6: 2 nd Oct (Tu,Th)	Ridge and Lasso Regression Regression model comparison	HW2 released	4,5,6,12,14 7, 13
7: 9 th Oct (Tu,Th)	No Lecture t-statistic, p-value, F-statistic and R^2	Project details due	3,7, 13
8: 16 th Oct (Tu,Th)	CV, GCV, K-fold CV No Lecture	HW2 due HW3 released	7, 11,12,13
9: 23 th Oct (Tu,Th)	Test:1 Review Test:1		
Unit III: Classification			
10: 30 st Oct (Tu,Th)	Classification introduction Logistic regression	HW3 due	8,9 8,9
11: 6 th Nov (Tu,Th)	Logistic regression Regularized classification	HW4 released	8,9 12,13
12: 13 th Nov (Tu,Th)	Multiclass classification Classifier evaluation and selection		10,11,12 3, 10
13: 20 th Nov (Tu, Th)	Test 2 review No Lecture	HW4 due	
Course Conclusion			
14: 27 th Nov (Tu,Th)	Test 2 Project presentation I		15
15: 4 th Dec (Tu,Th)	Project presentation II Project presentation III	Project due	15 15

Learning outcome: After successful completion of this course, you will acquire knowledge to:

1. Understand the basics of statistical learning and its relation to machine learning.
2. Understand the basics of python and using it as a tool to solve problems in statistical learning.
3. Assess the quality of various statistical learning approaches based on various available metrics
4. Understand different problems in supervised learning.
5. Delve deeper into various aspects of linear regression.
6. Understand and implement multiple linear regression
7. Better understand various issues one might face while using linear regression as a tool to understand different properties of data.
8. Understand basics of classification and its relation to regression.
9. Use logistic regression as a tool to solve classification problems.
10. Compare different classification models for your own problem.
11. Use various resampling approaches to make an intelligent choice of a model for your own data science related problem.
12. Use regularization as a way to produce better models.
13. Understand various ways of controlling the complexity of your statistical learning model.
14. Interpret data and models in higher dimensions.
15. Apply the concepts learnt in class to problems of practical importance.