



STA 322 – Regression Course Syllabus

Course description: Regression and model building, measure of model adequacy, transformations, prediction.

Credit hours: 3

Course Prerequisites and Corequisites: MTH 144 or MTH 233, and STA 320

Course outline:

	<u>Approximate time spent</u>
<ul style="list-style-type: none">• Simple Linear Regression	20%
<ul style="list-style-type: none">○ Scatterplots○ Ordinary Least Squares Estimation<ul style="list-style-type: none">▪ Normal Equations▪ Properties of Least Squares Estimators○ Variance Estimation○ Model Assessment<ul style="list-style-type: none">▪ F-test▪ Coefficient of Determination○ Transformations○ Confidence Intervals and Hypothesis Tests for<ul style="list-style-type: none">▪ Slope▪ Intercept▪ Mean Response given X○ Prediction and Prediction Intervals	
<ul style="list-style-type: none">• Multiple Linear Regression	30%
<ul style="list-style-type: none">○ Matrix Representation○ Ordinary Least Squares Estimation<ul style="list-style-type: none">▪ Normal Equations▪ Properties of Least Squares Estimators○ Variance Estimation○ Model Assessment<ul style="list-style-type: none">▪ F-test▪ Coefficient of Multiple Determination○ Transformations○ Confidence Intervals and Hypothesis Tests for<ul style="list-style-type: none">▪ Partial Slopes▪ Intercept▪ Mean Response given X○ Prediction and Prediction Intervals	
<ul style="list-style-type: none">• Regression Diagnostics	30%
<ul style="list-style-type: none">○ Residual Analysis<ul style="list-style-type: none">▪ Normality▪ Constant Variance▪ Independence○ Outliers and Influential Points<ul style="list-style-type: none">▪ Outlier Tests▪ Cook's Distance	

STA 322 – Statistical Modeling
Syllabus Continuation

	<u>Approximate time spent</u>
• Variable Selection	20%
○ Multi-collinearity	
○ Stepwise Regression Methods	
• Introduction to Special Topics in Regression	10%
○ Polynomial Regression	
○ Logistic Regression	
○ Poisson Regression	
○ Non-Linear Regression	

Student Learning Outcomes (SLO): At the end of STA 322, a student who has studied and learned the material should be able to:

1. Build a simple linear regression model. [EEO: 1, 4]
2. Assess the strength and appropriateness of a simple linear regression model. [EEO: 4, 6]
3. Interpret the following of a simple linear regression model: slope, intercept, point predictions, prediction intervals, and confidence intervals. [EEO: 1, 4]
4. Perform the first three bullets in the context of a multiple regression model. [EEO: 1, 4, 6]
5. Demonstrate an understanding of the least squares estimators. [EEO: 1]
6. Demonstrate the matrix representation of a Simple or Multiple Regression Model. [EEO: 1, 5]
7. Use residuals to check model assumptions. [EEO: 4, 6]
8. Identify outliers and influential points. [EEO: 4]
9. Use transformations to successfully (if possible) meet model assumptions. [EEO: 1, 6]
10. Use a statistical computer package in order to complete the analysis described in the above bullets. [EEO: 4]

There are no specific program learning outcomes for this major addressed in this course. It is a general education core curriculum course and/or a service course.

Exemplary Educational Objectives (EEO):

1. To apply arithmetic, algebraic, geometric, higher-order thinking, and statistical methods to modeling and solving real-world situations.
4. To use appropriate technology to enhance mathematical thinking and understanding and to solve mathematical problems and judge the reasonableness of the results.
5. To interpret mathematical models such as formulas, graphs, tables and schematics, and draw inferences from them.
6. To recognize the limitations of mathematical and statistical models.