MATH 484/564   Regression

This course introduces the basic statistical regression models. Topics include simple linear regression, multiple linear regression, least square estimates of parameters; hypothesis testing and confidence intervals in linear regression, testing of models, data analysis and appropriateness of models, generalized linear models. Students are expected to use software packages (R, Python, etc.) to analyze real data. Credit may not be granted for both MATH 484 and MATH 564. (3-0-3)

Required for B.S. in Statistics; Elective for B.S. in Applied Math, M.S. in Applied Math, Ph.D. in Applied Math, and all the professional master programs of the AMATH.

S. Chatterjee and A.S. Hadi, "Regression Analysis by Example", 5th edition, Wiley.

MATH 474 or MATH 476 or MATH 563, min grade of C.

1. Students will learn about the regression models and their applications in various fields of science and engineering.
2. Students will be able to formulate real life problems using regression models.
3. Students will be able to use statistical software to estimate the models from real data, and draw conclusions and develop solutions from the estimated models.
4. Students will learn to use visual and numerical diagnostic statistical models to analyze larger and

more complex data.

Homework	20-30%
Midterm Exam	30-20%
Project	20%
Final Exam	30%

Two 75-minute lectures per week

Part I: Linear Regression (18 hours)

      1. Simple Linear Regression

      2. Multiple Linear Regression

      3. Regression Models with Qualitative Predictors

Part II: Diagnostics and Remedial Measures (20 hours)

      4. Diagnostics

      5. Variable Transformation

      6. Weighted Least Square

      7. Autocorrelation

      8. Collinearity

      9. Variable Selection and Model Validation

Part III: Nonlinear Regression (4 hours)

      10. Logistic Regression

      11. Generalized Linear Models

      12. Robust Regression

Syllabus by: Maggie X. Cheng and Lulu Kang, 03/09/2022