

CHE 379/384T – Fall 2018

From Data to Decisions: Measurement, Uncertainty, Analysis, and Modeling

CHE 379: unique # 14800, CHE 384T: unique # 14839
Room: CPE 2.222, TTh 3:30 – 5:00 pm

Instructor: Chris Mack, chris@lithoguru.com

Office Hours: by appointment

Class Website: <http://www.lithoguru.com/scientist/statistics/>

Course Objective: Standard undergraduate treatments of data analysis and modeling include important basic ideas of regression and goodness of fit. However, several significant real-world issues are rarely addressed adequately in these introductory courses. This course will discuss many of the problems scientists and engineers routinely encounter when dealing with data and will provide rigorous methods for handling them: measurement uncertainty analysis, data flyer removal, impact of sampling on model quality, dealing with correlated inputs, and residual analysis. In the end, students should have the tools necessary to answer one of the foundational problems in science: given two competing scientific models (theories), does the data contain sufficient information to choose one over the other?

Optional Textbook: Introduction to Linear Regression Analysis, 5th Edition, by Montgomery, Peck, and Vining

Course Outline:

- I. Prework: Review of Statistics, Regression and Goodness of Fit
- II. Introduction and Motivation, Regression Review
- III. Testing for Normality, Outliers, Leverage and Influence, and Heteroscedasticity
- IV. Weighted Linear Regression, Total Regression, Model Error
- V. Multiple Regression
- VI. Independence of Residuals, Autocorrelation in Time Series
- VII. Multicollinearity
- VIII. Building Models
- IX. Robust Regression, Bayesian Regression
- X. Design of Experiments, Response Surface Modeling
- XI. Measurement and Propagation Uncertainty

Prerequisites: Graduate standing in chemical engineering, or graduate standing and consent of instructor.

Grading for CHE 379:	Homework/Quizzes	15%
	Exam #1	25%
	Exam #2	25%
	Final	35%

Grading for CHE 384T:	Homework/Quizzes	15%
	Project/Paper	15%
	Exam #1	20%
	Exam #2	20%
	Final	30%

This class will use +/- grades. Attendance will not count towards the grade in this class, though all students are responsible for all material discussed during the lectures and assigned as reading and practice homework.

Students with disabilities may request appropriate academic accommodations from the Division of Diversity and Community Engagement, Services for Students with Disabilities, 471-6259, <http://www.utexas.edu/diversity/ddce/ssd/>.

By UT Austin policy, you must notify me of your pending absence at least fourteen days prior to the date of observance of a religious holy day. If you must miss a class, an examination, a work assignment, or a project in order to observe a religious holy day, you will be given an opportunity to complete the missed work within a reasonable time after the absence.

I take the UT Honor Code very seriously:

The core values of the University of Texas at Austin are learning, discovery, freedom, leadership, individual opportunity, and responsibility. Each member of the University is expected to uphold these values through integrity, honesty, trust, fairness, and respect toward peers and community.

Guns in the classroom: Despite recent legislative actions, I think it is a very bad idea to allow guns in the classroom at UT. While properly permitted students have a legal right to carry a concealed handgun in class, I will not teach if I suspect a gun is present.