**IE 3314 – Engineering Research Methods**

Fall 2013 / Tues & Thu 2:00-3:30 p.m.

**Instructor:** Sheik N. Imrhan, PhD, PE, MIEHF

**Office Number:** 420Q, Woolf Hall

**Office Telephone Number:** 817-272-3167

**Email Address:** imrhan@uta.edu

**Faculty Profile:** https://www.uta.edu/mentis/public/#profile/profile/view/id/249/

**Office Hours:** T/Th: 11:00 a.m.-2:00 p.m. I am also available any time I am in my office. I do not turn away students just because they come to my office during unassigned office hours.

**Section Information:** IE 5326-001/002/003

**Time and Place of Class Meetings: 404 Woolf Hall**

**Description of Course Content:** A continuation of IE 3301. Simple and multiple linear regression analysis, design of experiments, analysis of variance, and quality control statistics. Emphasis on the application of these methods to engineering data, with computerized data analysis.

**Student Learning Outcomes:** At the end of this course students should be able to:

•Understand the salient concepts related to regression analysis and analysis of variance in experimental designs

•Design statistical experiments

•Analyze engineering and related data using mainly regression analysis and analysis of variance techniques

•Use the SAS software for analyses

**Required Background:** IE 3301 or equivalent. Students must have a sound knowledge of the Normal Distribution, Hypothesis Testing, and Confidence Intervals by the first class day, since this course is a continuation of IE 3301. Other important areas include Descriptive Statistics and Chi-Square, Student-t and F-distributions, and the introduction to Regression Analysis taught in IE 3301.

**Required Textbooks and Other Course Materials:** : Probability and Statistics for Engineers and Scientists; 9th edition; by Walpole, Myers, Myers and Ye; Published by Prentice Hall. A student solutions manual for this book is also available in the bookstore - optional for this course. Check the OIT page for any (free) short course in using SAS and attend it.

**Descriptions of major assignments and examinations:**

Exams

(1) Exam 1 – short exam - ½ hr: Sept 12 (40 points)

(2) Exam 2 - 1¼ hr; Oct 17 (100 points)

Exam 3 – 1 ½ (final exam; 120 points; see UTA final exam schedule)

(3) One semester team project (50 points) – first submission on Nov 14; final submission on Nov 26

(4) Home work (selected problems) – 20 points.

(4) Class attendance and participation (10 points)

Semester Project

There is one large semester project, in multiple linear regression (MLR). It consists of gathering a large data set and analyzing it with a statistical software package (Statistical Analysis System, SAS). to develop a linear regression predictive model. The latest version of PC SAS will be used. It may be accessed from the IMSE PC lab or any of UTA's PC labs. The report will be submitted in two parts – Part 1 on Oct 31, and the whole (final) report on November 26. You are required to complete your computer lab work for this project by Nov 12. Detailed information will be given to the class by mid- October. If the IMSE computer lab is not available at any time, you are required to use another campus lab.

This project will be based on the work covered in class. Help will be given, but only in class, so that all students can benefit from my discussions and comments. This will ge a graded project, so you will not be given help simply because you failed to keep up with your work, or you failed to learn simple concepts taught in class (e.g. you do not know how to interpret the slope of a regression line). To get help, ask your questions (on the difficulties encountered in your analyses) at the beginning of a class lecture. I am always available in my office for other matters.

**Attendance:** Regular and punctual attendance are required.

**Other Requirements**: There are no other class meetings or requirements, other than those described above.

**Grading**: Semester grade will be based on

1. One ½ hr exam on Sept 12 (40 points)
2. Two 1¼ hr exams (100 points each)

Exam 1:

1. One semester project (50 points)
2. Class attendance and participation (10 points)

Letter grading scale from %: 90+ - 100 = A; 80+ - 90=B; 70+-80=C; 60+ - 70=D; <60 = F

**Expectations for Out-of-Class Study**: For every hour of lecture (or credit hour earned), you should spend about 3 hours per week working outside of class-- in course-related activities, including reading required materials, completing assignments, preparing for exams, etc. In other words, about 9 hours per week out-of-classroom work.

**Make-up Exams**: There will be no make-up exams unless you can provide proof of an emergency (family emergency, illness, etc.) that cause you to miss the exam.

**Grade Grievances**: Any appeal of a grade in this course must follow the procedures and deadlines for grade-related grievances as published in the current graduate catalog (see http://grad.pci.uta.edu/about/catalog/current/general/regulations/#gradegrievances.]

**Drop Policy:** Students may drop or swap (adding and dropping a class concurrently) classes through self-service in MyMav from the beginning of the registration period through the late registration period. IMSE students must get their program advisor’s permission to drop or swap. After the late registration period, students must see their academic advisor to drop a class or withdraw. Undeclared students must see an advisor in the University Advising Center. Drops can continue through a point two-thirds of the way through the term or session. It is the student's responsibility to officially withdraw if they do not plan to attend after registering. **Students will not be automatically dropped for non-attendance**.Repayment of certain types of financial aid administered through the University may be required as the result of dropping classes or withdrawing. For more information, contact the Office of Financial Aid and Scholarships (<http://wweb.uta.edu/aao/fao/>).

**Americans with Disabilities Act:** The University of Texas at Arlington is on record as being committed to both the spirit and letter of all federal equal opportunity legislation, including the *Americans with Disabilities Act (ADA)*. All instructors at UT Arlington are required by law to provide "reasonable accommodations" to students with disabilities, so as not to discriminate on the basis of that disability. Any student requiring an accommodation for this course must provide the instructor with official documentation in the form of a letter certified by the staff in the Office for Students with Disabilities, University Hall 102. Only those students who have officially documented a need for an accommodation will have their request honored. Information regarding diagnostic criteria and policies for obtaining disability-based academic accommodations can be found at [www.uta.edu/disability](http://www.uta.edu/disability) or by calling the Office for Students with Disabilities at (817) 272-3364.

**Academic Integrity:** Students enrolled in this course are expected to adhere to the UT Arlington Honor Code:

*I pledge, on my honor, to uphold UT Arlington’s tradition of academic integrity, a tradition that values hard work and honest effort in the pursuit of academic excellence.*

*I promise that I will submit only work that I personally create or contribute to group collaborations, and I will appropriately reference any work from other sources. I will follow the highest standards of integrity and uphold the spirit of the Honor Code.*

UT Arlington faculty members may employ the Honor Code as they see fit in their courses, including (but not limited to) having students acknowledge the honor code as part of an examination or requiring students to incorporate the honor code into any work submitted. Per UT System *Regents’ Rule* 50101, §2.2, suspected violations of university’s standards for academic integrity (including the Honor Code) will be referred to the Office of Student Conduct. Violators will be disciplined in accordance with University policy, which may result in the student’s suspension or expulsion from the University.

**Student Support Services**:UT Arlington provides a variety of resources and programs designed to help students develop academic skills, deal with personal situations, and better understand concepts and information related to their courses. Resources include tutoring, major-based learning centers, developmental education, advising and mentoring, personal counseling, and federally funded programs. For individualized referrals, students may visit the reception desk at University College (Ransom Hall), call the Maverick Resource Hotline at 817-272-6107, send a message to [resources@uta.edu](mailto:resources@uta.edu), or view the information at [www.uta.edu/resources](http://www.uta.edu/resources).

**Lab Safety Training:**  **Students registered for this course must complete all required lab safety training prior to entering the lab and undertaking any activities.** Once completed, Lab Safety Training is valid for the remainder of the same academic year (i.e., through the following August) and must be completed anew in subsequent years. There are no exceptions to this University policy. Failure to complete the required training will preclude participation in any lab activities, including those for which a grade is assigned.

**Electronic Communication:** UT Arlington has adopted MavMail as its official means to communicate with students about important deadlines and events, as well as to transact university-related business regarding financial aid, tuition, grades, graduation, etc. All students are assigned a MavMail account and are responsible for checking the inbox regularly. There is no additional charge to students for using this account, which remains active even after graduation. Information about activating and using MavMail is available at <http://www.uta.edu/oit/cs/email/mavmail.php>.

**Student Feedback Survey:** At the end of each term, students enrolled in classes categorized as “lecture,” “seminar,” or “laboratory” shall be directed to complete an online Student Feedback Survey (SFS). Instructions on how to access the SFS for this course will be sent directly to each student through MavMail approximately 10 days before the end of the term. Each student’s feedback enters the SFS database anonymously and is aggregated with that of other students enrolled in the course. UT Arlington’s effort to solicit, gather, tabulate, and publish student feedback is required by state law; students are strongly urged to participate. For more information, visit <http://www.uta.edu/sfs>.

**Final Review Week:** Five class days prior to the first day of final examinations in Fall (same as in Spring) is designated as Final Review Week. This is to allow students sufficient time to prepare for final examinations. During this week, there shall be no scheduled activities such as required field trips or performances; and there will be no assigned themes, research problems or exercises of similar scope that have a completion date during or following this week ***unless specified in the class syllabus***. During Final Review Week, there will be no examinations constituting 10% or more of the final grade, except makeup tests (approved by me) and laboratory examinations. You will not get any portion of the final examination during Final Review Week. Scheduled classes during this week will be held, as normal. In addition, I may not limit content to topics that have been previously covered; I may introduce new concepts as appropriate.

**Emergency Exit Procedures:** Should we experience an emergency event that requires us to vacate the building, you should exit the room and move toward the nearest exit. When exiting the building during an emergency, one should never take an elevator but should use the stairwells. Faculty members and instructional staff will assist students in selecting the safest route for evacuation and will make arrangements to assist handicapped individuals.

**Librarian to Contact:** Industrial & Manufacturing Systems Engineering Sylvia George-Williams 817-272-7519 sylvia@uta.edu

**Course Schedule.**

(Number of class lectures are given in parentheses)

1. Review of hypothesis testing and C.I. estimation from IE 3301 (1)
2. Simple linear regression (5)

Using SAS for data analysis (1)

1. Multiple linear regression (8)
2. Analysis of variance concepts (1)
3. Analysis of variance and experimental designs (10)

***As the instructor for this course, I reserve the right to adjust this schedule in any way that serves the educational needs of the students enrolled in this course. Sheik N. Imrhan***