MATH 401 – Introduction to Mathematical Statistics

Section 001 MWF 8:00am - 8:50am BIN301

Instructor: Dr. Thomas R. Boucher, PhD
Binnion 310
Email (preferred): thomas.boucher@tamuc.edu
Phone: x5947
Office Hours: MW 9-1, F 9-11, or by appointment

Note: This syllabus details the rules and procedures by which this course is to be conducted. You are responsible for reading this syllabus and knowing the contents – enrollment in this course constitutes an acknowledgement of this responsibility and implied consent to these rules and procedures.

Description: Classical probability theory; discrete and continuous random variables; distribution functions; expectation; law of large numbers; central limit other; applications; random sampling; estimation of parameters; hypothesis testing; and other topics as time allows.

Prerequisites: Math 192 or two semesters of calculus.

Student Learning Outcomes: Upon successful completion of this course a student will be able to

- Use basic probability theory to solve problems and model data-generating processes.
- Demonstrate understanding of the ideas behind random sampling, statistical inference, and estimation.
- Choose the statistical techniques appropriate for a data set.
- Use R to perform basic data munging, summary, and analysis.

Texts:

- Milton, J. S., and Arnold, J.C., "Introduction to Probability and Statistics", 4th edition, 2003, McGraw-Hill
- Verzani, J., "simpleR: Using R for Introductory Statistics". Available FREE at http://cran.r-project.org/doc/contrib/Verzani-SimpleR.pdf

Software: R, latest version is 2.15.1, though what we do should be version independent. Available on the PC's in BIN ???

If you want to work at home using your own computer:

> **R** – is a FREE and state of the art statistical computing environment. It is available for download at http://www.r-project.org/. There are R builds for Windows, Mac, and Linux/Unix operating systems. Instruction will be given for use in Windows but the builds for other OS's are very similar.

eCollege: I will get an eCollege coursesite up and running as soon as I am able. All handouts will be posted on the site.

This work is licensed under the Creative Commons Attribution-Noncommercial-No Derivative Works 3.0 United States License. You are free to copy, distribute, and transmit this work under the conditions that you attribute it to the author, do so only for noncommercial purposes, and do not alter the work in any way. To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/us/ or send a letter to Creative Commons, 171 Second Street, Suite 300, San Francisco, California, 94105, USA.

I will try where possible to post .pdf files rather than, or in addition to, Office documents. You will need the Adobe Reader (http://www.adobe.com/) which is another free download. However, Mac users may have to access Office documents occasionally. There are packages available that enable Mac users to work with Office documents (Office for Mac and OpenOffice come to mind).

Topics covered: see Class Schedule.

Grading: on a standard 100% scale:

- **HW: 30%**
- **EXAMS: 20% each**
- **FINAL: 30%**

Disputed grades will only be changed if graded assignments are produced which indicate the recorded grade is erroneous.

Exams: There are 2 exams and a cumulative final. There will be no makeup exams. With proper documentation of a valid excuse for missing an exam, the % of your grade due to that exam will be rolled over into the cumulative final; absent such documentation a missed exam counts as a zero.

Exam schedule:

- **Exam #1---**Monday, October 1st
- **Exam #2---** Monday, November 5th
- **Final ---** Monday, December 10th 8:00am – 10:00am

Homework: will be assigned in class and is due as indicated. No late homework will be accepted. You are free (encouraged, in fact) to work with others; however, each student must submit his/her own set of solutions.

Attendance/Class Participation/Academic Integrity: Students are expected to attend all lectures in a timely fashion and to participate in classroom and group discussions and activities; therefore no record of attendance is necessary.

Note: I reserve the right to give unannounced quizzes at any time. These will count as a HW grade.

ADA Statement: The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you have a disability requiring an accommodation, please contact: Office of Student Disability Resources and Services, Texas A&M University-Commerce, Gee Library, Room 132, Phone (903) 886-5150 or (903) 886-5835, Fax (903) 468-8148, email: StudentDisabilityServices@tamuc.edu

Basic Tenets of Common Decency: "All students enrolled at the University shall follow the tenets of common decency and acceptable behavior conducive to a positive learning environment." (Student's Guide Handbook, Policies and Procedures, Conduct.) This means that rude and/or disruptive behavior will not be tolerated.

Tutoring: Services up to the level of Calculus I provided by the Math Skill Center (Binnion Hall Room 328) with the following hours: M and W, 8am–8pm; T and R, 8am–6pm; and F 8am–3pm.

This work is licensed under the Creative Commons Attribution-Noncommercial-No Derivative Works 3.0 United States License. You are free to copy, distribute, and transmit this work under the conditions that you attribute it to the author, do so only for noncommercial purposes, and do not alter the work in any way. To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/us/ or send a letter to Creative Commons, 171 Second Street, Suite 300, San Francisco, California, 94105, USA.

Calculator Loan Program: we have set up a calculator loan program to support students. They can borrow a calculator for a semester with a fee ($10 for TI-83/84). Go to the Math department office.

Tentative Class Schedule:

Week/Days	Topics
8/27 MWF	Chapter 1 – Probabilities, sample spaces and events, permutations and combinations
9/3 WF	Chapter 2 - Axioms of probability, conditional probability, independence, Law of Total Probability, Bayes' Theorem
9/10 MWF	Chapter 3 – Discrete random variables, densities, cumulative distributions, expectation and variance, Geometric, Binomial, Negative Binomial, Hypergeometric, and Poisson distributions, using R
9/17 MWF	Chapter 3 – Geometric, Binomial, Negative Binomial, Hypergeometric, and Poisson distributions, using R
9/24 MWF	Chapter 4 – Continuous random variables, densities, cumulative distributions, expectation and variance, Uniform, Gamma, Exponential, and Chi-Squared distributions, using R
10/1 MWF	**Exam #1** Chapter 4 – Normal distributions, 68-95-99.7 rule, standardizing, Normal approximation to the binomial, (Weibull and reliability, transformation of variables), using R
10/8 MWF	Chapter 5 – Joint distributions, discrete and continuous, marginal distributions, independence, expectation, covariance/correlation
10/15 MWF	Chapter 6 – Random sampling, graphical and numeric summaries of data, using R
10/22 MWF	Chapter 7 - Estimation – point estimation using method of moments and maximum likelihood estimation, confidence intervals for means, Central Limit Theorem, simulation, using R
10/29 MWF	Chapter 8 – Statistical inference for one population mean, nonparametric approaches, using R
11/5 MWF	**Exam #2** Chapter 9 – Statistical inference for one and two population proportions, using R.
11/12 MWF	Chapter 10 – Statistical inference for two population means, dependent and independent samples, nonparametric approaches, using R.
11/19 MW	Chapter 11 – Scatterplots, correlation, simple linear regression, using R.
11/26 MWF	Chapter 15 – Inference for categorical data: goodness of fit, independence, homogeneity, paired data, using R.
12/3 MWF	Chapter 13 – ANOVA. Review. Using R.

Final Exam: Monday, December 10th 8:00am – 10:00am

This work is licensed under the Creative Commons Attribution-Noncommercial-No Derivative Works 3.0 United States License. You are free to copy, distribute, and transmit this work under the conditions that you attribute it to the author, do so only for noncommercial purposes, and do not alter the work in any way. To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/us/ or send a letter to Creative Commons, 171 Second Street, Suite 300, San Francisco, California, 94105, USA.