

## MATH 502 – Mathematical Statistics Course Syllabus

**Instructor:** Dr. Thomas R. Boucher, PhD

Binnion 310

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Office Hours: MW 3:30-5:00 TR 9:30-11:30 or by appointment

Communication Response Time: within 24 hours during the workweek.

**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:** Probability, distributions, moments, point estimation, maximum likelihood estimators, interval estimators, test of hypothesis.

**Prerequisites:** MATH 501

**Student Learning Outcomes:** Upon successful completion of this course a student will understand

- Convergence concepts in probability theory.
- Principles of data reduction.
- Point estimation.
- Interval estimation.
- Hypothesis testing.
- Asymptotic evaluations of tests, point and interval estimates.

**Texts:**

- Casella, C., and Berger, R (2002). *Statistical Inference*, 2<sup>nd</sup> Edition. Brooks/Cole Cengage Learning.
- Verzani, J., "simpleR: Using R for Introductory Statistics". Available FREE at <http://cran.r-project.org/doc/contrib/Verzani-SimpleR.pdf>
- My MATH 401 notes
- More

**Software:** R, latest version is 3.4.3 (Kite-Eating Tree), though what we do should be version independent. 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.

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**eCollege:** I will get an eCollege coursesite up and running as soon as I am able. All handouts will be posted on the site. 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:** We will cover most if not all of Chapters 6-10. For details, see Class Schedule.

**Grading:** on a standard 100% scale:

- **HW: 30%**
- **EXAMS: 3 @ 15% each**
- **FINAL EXAM: 25%**

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

**Exams:** There are 3 exams, take home. There will be no makeup exams.

- **Exam #1** --- TBA
- **Exam #2** --- TBA
- **Exam #3** --- TBA
- **Final Exam** --- TBA

**Homework:** will be assigned in class.

**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.

**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](mailto: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.

**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-\$15 for TI-83/84). Go to the Math department office.

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**Tentative Class Schedule:**

(section numbers are in Casella and Berger)

<b>Week</b>	<b>Topics</b>
1/15	5.1/5.2 - Statistics, random samples, likelihood function, data summary
1/22	7.1/7.2.1/7.2.2 – Point Estimation: methods of finding estimators: method of moments, maximum likelihood
1/29	7.2.2 – MLE multiparameter and invariance 7.3.1/7.3.2 – Evaluating estimators: UMVUE
2/5	7.3.2 – Evaluating estimators: Cramer-Rao lower bound 5.3/5.5 – Sampling Distributions: Sampling from Normal distribution, Central Limit theorem
2/12	9.1 – Confidence intervals/interval estimation <b>Exam #1</b>
2/19	9.2.2 – Finding confidence intervals: pivots 9.3.1 – Evaluating interval estimators
2/26	8.1/8.3.1/8.3.4 – Hypothesis testing
3/5	8.2.1 – Likelihood ratio tests 6.2.1 - Sufficient statistics
3/12	<b>Spring Break</b>
3/19	8.3.2 – Most powerful tests and sufficient statistics 8.3.2 – Most powerful tests and monotone likelihood ratio
3/26	<b>Exam #2</b>
4/2	7.2.3 – Bayes estimators 7.3.1/7.3.4 – Decision theory: evaluating Bayes estimators
4/9	7.3.1/7.3.4 – Decision theory: evaluating Bayes estimators 8.2.2/8.3.5 – Bayesian hypothesis testing
4/16	8.2.2/8.3.5 – Bayesian hypothesis testing 9.2.4 – Bayesian intervals
4/23	10.1.1/10.1.2 - Consistency and efficiency of point estimates 10.3 – Asymptotic distribution of likelihood ratio tests
4/30	<b>Exam #3</b>
5/7	<b>Finals</b>