King Fahd University Of Petroleum & Minerals
Department of Mathematics and Statistics

STAT502: Statistical Inference- Term 152

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Office Hours: UTR: 12.00pm -12.50pm or by appointment

- **Course Description:**

Methods of estimation. Properties of estimators: consistency, sufficiency, completeness and uniqueness. Unbiased estimation. The method of moments. Maximum likelihood estimation. Techniques for constructing unbiased estimators and minimum variance unbiased estimators. Bayes estimators. Asymptotic property of estimators. Introduction to confidence intervals. Confidence intervals for parameters of normal distribution. Methods of finding confidence intervals. Fundamental notions of hypotheses testing. The Neyman-Pearson lemma. Most powerful test. Likelihood ratio test. Uniformly most powerful tests. Tests of hypotheses for parameters of normal distribution. Chi-square tests, t-tests, and F-tests.

- **Course Objectives:**

 To master the basics of probability theory with an aim to apply it to popular probability models and to samples for statistical inference.

- **Prerequisites**: STAT 501. Cannot be taken for credit with MATH 561 and MATH 563.

- **Textbook:** An Introduction to Probability and Statistics, Rohatgi, VK and Saleh, AK (2001) . Wiley.

- **Assessment**

Assessment for this course will be based on homework, two major exams and a comprehensive final exam, as in the following:

Activity	Weight
Homework and other class activities	22%
Exam 1 :	22%
Exam 2 :	20%
Final Exam (Comprehensive):	36%

- **Important Notes:**

  ➢ There is no quota on the number of students who can get an A+ grade.
  ➢ Attendance on time is very important. Mostly, attendance will be checked within the first five minutes of the class. Entering the class after that, is considered as late (2 lates= 1 Absence) and
  ➢ More than 10 minutes late = Absence (regardless of any excuse).

- **Grades**

Letter grade	A+	A	B+	B	C+	C	D+	D	F	DN
Cut-off	TBD	84	TBD	70	TBD	60	TBD	50%	<50%	$\geq$ 6 absences

- **General Notes:**
  ➢ Students are required to carry **pens, note-taking equipment** and a **calculator** to **EVERY lecture and exams**. It is strongly recommended to keep a **binder** for class-notes.
  ➢ Students are also expected to bring the book, take notes and organize their solved questions in a **binder** for easy retrieval to help them in study and review for class, exams, etc
  ➢ It is to the student's advantage to keep a binder for storing class notes, homework, and other graded assignments. Students who are **organized** will find it **easier** to find important materials when **studying for exams**.
  ➢ To successfully prepare for the exams, students MUST **solve problems** regularly and with discipline. The selected assigned problems are specifically designed to prepare you for major and final exams. Therefore, it is expected that you complete these problems **step-by-step** and with comprehension.
  ➢ If you happen to stumble upon a solution manual somewhere, remember 2 important points.

- o Due to publishing costs and deadlines, these solutions are brief and may have mistakes.
  - o In your career as an actuary and your exams and quizzes in this class, you are expected to know every step to a problem and to know if a solution is incorrect. Thus, the best way to solve problem is without these brief solutions.
  - ➤ ***Never round*** your intermediate results to problems when doing your calculations. This will cause you to lose calculation accuracy. Your answers may then be different from the exam keys even when you use the right procedure.
  - ➤ For every exam, so you need to bring with you ***pens***, ***pencils***, ***a sharpener***, ***an eraser***, and any scientific ***calculator*** with **statistical functions.**
- **Academic Integrity:** All KFUPM policies regarding **ethics** and **academic honesty** apply to this course.

Syllabus (Tentative)

Week	Sections	Topics
1 Jan 17-21	8.1-8.3	Introduction Problem of Point Estimation Sufficiency, Completeness, and Ancillarity
2 Jan 24-28	8.3	Sufficiency, Completeness, and Ancillarity (continue) Unbiased Estimation
3 Jan. 31 - Feb. 4	8.4-8.5	Unbiased Estimation Lower Bound For The Variance of An Estimator.
4 Feb. 7 - Feb. 11	8.5	Unbiased Estimation (Continued): Lower Bound For The Variance of An Estimator.
5 Feb. 14 - Feb. 18	8.6-8.7	Substitution Principle (Method Of Moments) Maximum Likelihood Estimators
6 Feb. 21 - Feb. 25	8.8	Bayes and Minimax Estimation
7 Feb. 28 - Mar. 3	9.1-9.2	Introduction Some Fundamental Notations of Hypotheses Testing
8 Mar. 6 - Mar. 10	9.3-9.4	Neyman-Pearson Lemma Families With Monotone Likelihood Ratio
Mar. 13 - Mar. 17 : Spring Vacation		
9 Mar. 20 - Mar. 24	9.5-9.6	Unbiased And Invariant Tests Locally Most Powerful Tests
10 Mar. 27 - Mar. 31	10.1-10.2	Introduction Generalized Likelihood Ratio Tests
11 April 3-7	10.3-10.5	Chi-Square Tests t-Tests
12 April 10-14	10.5, 11.1	F-Tests Introduction
13 April 17-21	11.2	Some Fundamental Notations Of Convenience Intervals
14 April 24-28	11.3-11.4	Methods Of Finding Confidence Intervals Shortest-Length Confidence Intervals
15 May 1-5	11.5	Unbiased Confidence Intervals