STAT/CSE 4340/EMIS 3340
Statistics for Engineers and Applied Scientists
January 2016

Instructor:
Dr. Cornelis Potgieter
Department of Statistical Science, 107 Heroy Building
214-768-1863
cpotgieter@smu.edu

Class meets January 4th through January 13th

Overview
By the end of the term, you should have a solid foundation and understanding of basic statistical
concepts as they pertain to various areas of engineering and computer science. Various techniques to
analyze statistical data will be introduced and discussed in detail. The necessary statistical theory to
establish these techniques will also be presented, as this will lead to further understanding of the topics
covered. These skills should aid you in becoming an informed and critical consumer of scientific
literature, as well as help in your development in your own scientific endeavors.

Grading (subject to change)
Your semester grade will be determined as follows:

<table>
<thead>
<tr>
<th></th>
<th>%</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Homework</td>
<td>40</td>
<td>Assigned each day</td>
</tr>
<tr>
<td>Quizzes</td>
<td>40</td>
<td>During class time</td>
</tr>
<tr>
<td>Final Exam</td>
<td>20</td>
<td>--</td>
</tr>
<tr>
<td>TOTAL</td>
<td>100</td>
<td>--</td>
</tr>
</tbody>
</table>

- Disability Accommodations: Students needing academic accommodations for a disability must first be registered with Disability Accommodations & Success Strategies (DASS) to verify the disability and to establish eligibility for accommodations. Students may call 214-768-1470 or visit http://www.smu.edu/alce/dass.asp to begin the process. Once registered, students should then schedule an appointment with the professor to make appropriate arrangements. (See University Policy No. 2.4; an attachment describes the DASS procedures and relocated office.)

- Religious Observance: Religiously observant students wishing to be absent on holidays that require missing class should notify their professors in writing at the beginning of the semester and should discuss with them, in advance, acceptable ways of making up any work missed because of the absence. (See University Policy No. 1.9.)

- Excused Absences for University Extracurricular Activities: Students participating in an officially sanctioned, scheduled University extracurricular activity should be given the opportunity to make up class assignments or other graded assignments missed as a result of their participation. It is the responsibility of the student to make arrangements with the instructor prior to any missed scheduled examination or other missed assignment for making up the work. (University Undergraduate Catalogue.)
Learning objectives
After successful completion of the course, students should be able to
1. Calculate and interpret descriptive statistics from various populations.
2. Define and determine sample spaces, and calculate probabilities of various events.
3. Understand statistical independence and conditional probabilities.
4. Recognize several well-known discrete and continuous probability models and calculate corresponding probabilities.
5. Extend concepts to joint probability distributions and calculate correlation and covariance.
6. Understand the distribution of the sample mean and how this relates to the Central Limit Theorem.
7. Learn methodology of point estimation.
8. Calculate and interpret confidence intervals.
9. Conduct hypothesis tests and interpret results.

Learning outcomes
Students will be able to understand and apply the following: simple probability rules including conditional probability and Bayes theorem, main families of distributions such as normal, exponential, binomial, Poisson, basic statistical inference such as point estimation, confidence intervals and hypothesis tests.

Detailed (but tentative) outline of activities:

- Working with data. Summarizing data: measures of center and spread. Graphical display of data.
- Introduction to probability. Sample spaces, probability rules, independence, conditional probability, Bayes Theorem. Random variables and probability distributions.
- Discrete distributions, continuous distributions, joint distributions. basic rules of independence, conditional distributions etc. Expectation and variance, effect of independence, covariance, correlation.
- Discrete random variables, binomial, geometric, multinomial, Poisson.
- Continuous random variables, uniform, exponential, normal, gamma, chi-square.
- Transformations of random variables.
- Sampling distributions, especially \( t \) distribution, CLT, repeated sampling principle.
- Point estimation. Method of moments, incl. normal, exponential, binomial, Poisson.
- One and two sample confidence intervals, for means, proportions, CLT.
- One and two sample hypothesis tests.

Readings:
In addition to the required text, a “cheat sheet” with all relevant and important formulas relevant to the material being covered on a particular day will be handed out at the start of class. This should be your most valued resource when completing assignments. Notes prepared in class will be uploaded to Blackboard for your reference.

Texts:
Devore, J. L. Probability and Statistics for Engineers and the Sciences, Eighth Edition