University of St Thomas  
Mathematics Department  

MATH 2330\ Introduction to Statistics for Nursing \ FALL 2015  
3 credit hours  

Instructor: Dr. Ron Hartberger  
Office Hours: See spreadsheet posted on the UST Blackboard System for this course.  
Phone: off: 713.525.3865  res: 713.784.9286  
Office: Mathematics/Computer Science/Cooperative Engineering #206  
Email: hartber@stthom.edu  
Class days and time: Mon – Wed – Fri, 8:10 a.m. – 9:00 a.m.  
Class Location: Strake 207  

Course Description  

Provides students with the methods and logic to perform elementary statistical analysis commonly used in clinical research including descriptive measures, probability, sampling, normal distribution, Student t and Chi squared distributions, estimation and hypothesis testing, analysis of variance, regression and correlation.  

Course Prerequisites: None  

Nursing Program Requirement: Attaining a grade of B or higher in all math and science courses.  

Goals & Objectives of the Course  

Students will achieve the following learning outcomes:  

- Develop a basic working knowledge of commonly used concepts in statistical theory as a key to sound analysis of nursing research literature:  
  - Probability theory  
  - Hypothesis testing  
  - Correlation and regression  
- Develop an understanding of measures of central tendency: mean, median, mode, variance and standard deviation.  
- Develop an understanding of relative and cumulative probabilities through manual calculation of selected examples.  
- Use contingency tables to develop discrete probabilities.
• Discuss the uses for measures of dispersion – range, variance and standard deviation – when analyzing clinical data.
• Understand the use of various probability distributions, along with their limitations in practice.
• Differentiate one-tailed and two-tailed tests of significance in a clinical context.
• Compare and contrast Type I and Type II errors and their implications for clinical conclusions.
• Determine p values for continuous random variables and their significance in determining the validity of clinical conclusions.
• Using examples from nursing research literature, gain insight into the process of inferring from a sample to a population
• Discuss the purpose, calculation and interpretation of chi-square analysis, t-test, analysis of variance, Pearson correlation and regression analysis.

Course Materials and Supplies

This text is required:

Head First Statistics by Dawn Griffiths, published by OreillyBooks.

There will be occasional (sometimes daily) reading assignments from this text, as well as assigned problems.

I have written and will distribute certain supplemental materials at appropriate points during the semester.

Obtain an appropriate calculator (see section on Calculators, below), and bring this calculator with you to class AFTER exam # 1.

Also use a 3-ring binder (such as the one you were issued containing notes from the math boot camp) rather than a bound copybook or spiral notebook, for course materials: homework, in-class exercises, handouts (some of which may be distributed electronically on Blackboard for you to print) and your manually recorded class notes.

Course Content

I. Overview of Statistical Theory and Analysis
   Quick review of the algebraic concepts and notations which will be used in this course
   a. Purpose and application of statistical methods
   b. Probability Theory
   c. Inference and Generalization in Nursing Research Literature

II. Descriptive Statistics
   a. Sample Vs Population
   b. Frequency Distribution
   c. Measures of Central Tendency
d. Measures of Dispersion

III. Hypothesis Testing and Level of Significance
   a. Inference and Probability of Reaching Reasonable Generalizations
   b. Creation of a Single Test Statistic from a set of Clinical Data.
   c. Selection from among Normal, Student t and Chi-squared distributions according to Logic of a Particular Clinical Study
   d. Chi-Square Test of Theory vs Observations
   e. Tests of Independence of Variables

IV. Margin of Error
   a. Minimal Sample Size to Limit Error Within Specific Range

V. Using Statistics to Examine Relationships
   a. Pearson Product-Moment Correlation

VI. Using Statistics as a Predictive Tool
   a. Regression Analysis
   b. Limitations of Predictions for Clinical Conclusions

VII. Statistical Analysis of Causality
   a. t-tests to find limits on Range of Validity of Regression Results

VIII. As time permits: Analysis of Variance

IX. Case Studies from Nursing Research Literature
   a. Application and Appraisal of Statistical Analysis using Case Examples

The timing of individual sections from this outline will depend on my continued observations of the students’ preparedness for and progress in this class.

Each individual student is responsible for acquiring any extra help in refreshing the necessary mathematical skills for this course.

Take advantage of my office hours and the tutorial services offered by UST.

**Instructional Methods**

This course will consist of both lectures and discussions. Supplemental resources will be posted on the UST Blackboard system, and remain there during the semester.

Also, each student is assigned a UST e-address. The student can make individual arrangements to have this e-mail automatically forwarded to a personal account. The complete list of assignments, in reverse chronological order, will remain posted on the UST Blackboard system. All the assignments to date for the course will be included in each posting; usually only the first one or two page(s) will need to be printed to get the current assignment.

I will provide spreadsheets, as well as examples utilizing other software packages, to illustrate certain concepts presented in the lectures. These should go into your 3-ring binder. These spreadsheets are designed to allow you to participate in the logic of providing answers. Using these spreadsheets only to allow you to record a final answer will be a total waste of your time.
The purpose of any examples provided by software in this course will be primarily to enhance your understanding of concepts, and only secondarily to provide answers. If you have used the software or the Internet just to get answers this will be immediately apparent on the exams and quizzes.

Relevant questions from students are encouraged during the lectures, but side conversations are not permitted. I will occasionally call for volunteers to present solutions on the board, or, to illustrate where they have had difficulty and need help.

Professional demeanor is expected at all times, so no one should be intimidated because of the possibility of making an incorrect statement at the board. (This includes the instructor.)

I have posted my office hours in a spreadsheet posted on Blackboard. Avail yourself of the opportunity to seek assistance either individually or in groups – the department conference room is usually available. Also, I accept calls at my residence during certain hours – please see details on the spreadsheet for office hours and contact numbers.

One of the things that sets the University of St Thomas apart from other universities is the size of the classes and the office hours instructors are required to set. Do not remain confused by any concepts. Understanding of most concepts will be required to approach the material which follows.

No appointment is necessary and there is no charge for this help.

Free tutoring by upper level math students will also be available shortly after the start of the semester. These tutoring sessions will be held in the department conference room, second floor of the Mathematics, Computer Science and Cooperative Engineering house on Yoakum, between Strake and the Library. I will announce specific times later. You can either get help directly from me during office hours or from one of these tutors, whichever works for you. I have no ego invested in where you get extra help. Just avail yourself of the various opportunities.

Tutoring in mathematics is also available at certain specific hours in the Tutoring Center (second floor, Croocker). The schedule will be announced later.

Calculators

Certain homework and exams will be done without the use of any type of electronic calculator. All testing on course concepts will be done without the aid of any computer system, (neither laptop nor tablet nor smartphone, etc.) allowing, at designated times, only a STAND-ALONE calculator (NOT part of a cell phone, iPad, iPhone, tablet, etc.) which does the basic arithmetic operations:
addition, subtraction, multiplication, division, squares and square roots.  
It is also recommended that your calculator:  
have left and right parentheses  
allow temporary storage of interim results  

A graphing calculator will add little or nothing to your understanding in this course. Insisting that you draw freehand sketches will enhance your understanding of the course materials. I will provide EXCEL spreadsheets which produce more easily editable graphs. No prior knowledge of EXCEL will be assumed.

There are calculators which incorporate statistical procedures, but to get credit for any problems worked on an exam or quiz, the intermediate steps must be shown, using only the appropriate formulas and the basic arithmetic operations. Pushing a button to avoid detailed understanding is not part of this course. A special purpose statistical calculator can impede your progress in this course.

You will also be coached on estimating, specifically, trying to break you away from unquestioning dependence on a calculator.

Bring your own free-standing calculator with you for exams in which I do allow calculators. I will not provide calculators for you. This is also true for quizzes and exams – bring your own calculators. It would be wise to bring a spare battery. A malfunctioning calculator is no excuse for doing poorly on an exam.

Grading Procedures

Grades are awarded based on the following scale (prescribed by the UST School of Nursing):

- A  95 -100
- A- 90 -94
- B+ 87 -89
- B  84 -86
- B- 81 -83
- C+ 78 -80
- C  75 -77
- C- 72 -74
- D+ 69 -71
- D  65 -68
- F <65

The primary grading mechanism in this course will be through exams and/or short quizzes. In most cases there will be a one week notice before a major exam. Short quizzes may be
given on a single prior class period notice. Whether or not you decide to do your homework in groups, all testing will be on an individual basis.

Grading will be on the basis of:

<table>
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<tr>
<th>Component</th>
<th>Percentage</th>
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<tr>
<td>Quizzes and/or exams</td>
<td>70%</td>
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<tr>
<td>COMPREHENSIVE Final exam</td>
<td>25%</td>
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<tr>
<td>Attendance, Participation and demonstrated capabilities with problems from assigned Homework</td>
<td>5%</td>
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In an age of instant access to materials on the Internet there is no point in having students delude themselves into thinking they are producing anything of value for themselves by transcribing answers from an electronic source.

As time permits, I will invite you to discuss certain assigned problems in class. I have posted my contact information and schedule of office hours to give you the opportunity for further discussion, either individually or as a group.

**Course Requirements**

**Attendance:**
Because the course content is cumulative in nature it is very difficult to make up the material which has been presented in any classes the student has missed.

Develop a buddy system among your classmates so that you can get the notes on classroom discussions and examples if you need to be out.

Attendance will be taken in almost every class session.

**Cell phones and beepers:** During class sessions, please keep cell phones and beepers on vibrate or silent mode. Do NOT text, either inbound or outbound, during class, or talk on your cell phone or any other device. This is unprofessionally disruptive to the class and you will be asked to leave the classroom if you cannot follow this rule.

If you have an emergency communication, please exit and discuss this outside of the classroom. Students may have special situations requiring them to be immediately contactable. I assume you will use your professional discretion and will take any truly urgent calls outside the classroom.

**Computer Use Policy:** You will quickly find that it is impossible to take notes of a mathematical nature on a laptop or tablet. The use of laptops and tablets will not be permitted in this class.

**Audio or visual recording of class materials by electronic means will NOT be permitted.** Specifically, there is to be no digital photography of materials
on the board whether placed there by the instructor or other students. There is tremendous value in having you learn to take and then organize handwritten notes.

However special accommodations may be made for those students who have special documented needs, as certified by the University.

**Student Accommodations**

In accordance with Section 504 of the Federal Rehabilitation Act of 1973 and the Americans with Disabilities Act of 1990, the instructor will make all possible and reasonable adjustments in policies, practices, services, and facilities to ensure equal and optimal educational programs and activities. Whenever a special accommodation is necessary to ensure access to full participation by a student with disabilities, that student must personally inform the instructor of any disability or needed accommodations.

The University Office for ADA Compliance may ask to see proof of disability and specify accommodations as requested by students. Students with special needs should inform the instructor immediately. Students must also contact the Office of Counseling and Disability Services (2nd floor of Crooker Center) by calling Dr. Rose Signorello at 713-525-3162 or Ms. Debbie Jones at 713-525-6953.

The accommodations will become available only when the instructor receives official, written notification from the officer in charge of ADA compliance. Students should contact the instructor immediately if new needs arise. Students can see the instructor before or after class or request another time to discuss any matters. All information and discussions will be kept confidential.

**As an instructor, I am neither qualified nor allowed by the University to authenticate a claim of a disability requiring special accommodations. Please seek accommodations for a disability within a few days of the start of class. The material in this course is highly cumulative, so the longer you wait the more difficult it will be to obtain effective assistance.**

Again, if you have questions or concerns regarding the accommodation process, please call Debby Jones or Rose Signorello at ext. 6953 or 3162 at Counseling and Disability Services.

**Academic integrity**

UST Students should demonstrate integrity in all of their activities, both personal and professional. Any unprofessional behavior or failure to adhere to the honor system is a serious violation of integrity and may result in failure of the course.
**Plagiarism** involves taking credit for another person’s work. Students must cite sources in APA style any time source material (e.g., books, journal articles, internet material, etc.) has been used, paraphrased, or quoted. Quoted material must be placed in quotation marks and referenced appropriately. Please note that copying information directly from a source without giving credit, using friends’ work, buying papers online, re-using one’s own work from previous classes, etc., all constitute plagiarism.

Any instance of plagiarism will result in a failing grade in the course and may result in dismissal from UST. Ignorance is no excuse; if a student remains uncertain about the guidelines for using and citing source material after these issues are addressed in class, the student should seek input from the instructor.

Please note that Turn It In software and other software may be used to help address insufficient documentation; this software can detect plagiarism.