RADI 5007
Statistics in the Radiological Sciences
Spring, 2020

CLASS DAYS and TIME: Mondays, Wednesdays & Fridays 09:00-11:00

CLASSROOM: Radiology Conference Room - MED 625F

COURSE FACULTY: Geoffrey Clarke

OFFICE LOCATION and HOURS: McDermott 2.426; Wed 11:00-12:00

EMAIL: clarkeg@uthscsa.edu

TELEPHONE: 210-567-8114

READ THIS DOCUMENT CAREFULLY - YOU ARE RESPONSIBLE FOR ITS CONTENTS.

COURSE DESCRIPTION AND OBJECTIVES

Students shall learn about the use of statistics in the radiological sciences following the theoretical developments and then applying the concepts to actual and simulated problems from various subfields of Radiological Science research. Students will need to bring a wifi-enabled notebook PC to take exams and work through the exercises covered in the class.

During the course students shall become familiar with the "R" programming language, a free, open-source analytical statistics environment that has been used for a myriad of applications worldwide. "R" is available for the Windows, Mac OS10 and Linux computing environments. "R" can be downloaded and installed by going to the site: http://cran.r-project.org/. After installing “R”, download (https://www.rstudio.com/) and install R Studio. For at least a few weeks, the last ½ hour of each class will be a laboratory session in which the various capabilities of “R” are demonstrated through exercises.

The ISwR library will be used for working the examples in the Dalgaard book and in class. ISwR can be downloaded from: http://cran.fyxm.net/web/packages/ISwR/index.html. (For Windows systems, this entire folder should be put in the C:\Program Files\R\R-2.9.0\library directory after the archive has been unzipped.)

Pre-requisites – none

Semester credit hours – 2 CU

By the end of this course, each student should be able to:

- apply a fundamental knowledge of statistics to analysis of scientific data.
- discuss the concepts underlying various approaches to inferential statistical testing.
- recount clinical and research applications of parametric and non-parametric statistics.

COURSE ORGANIZATION

The main teaching modalities used in this course include:

1) Auditory activities: presenting research and listening to oral presentations

2) Visual activities: reading assignments, watching videos, demonstrations, presentations (including graphs & tables)

3) Tactile/Kinesthetic: solving problems, participating in in-class demonstrations of R-based analyses
Materials – Textbook. Articles and other materials will be provided by instructors.

Computer Access – Students are required to bring wifi-enabled laptop for presentation of topics.

Demonstrations – Every class will include hands-on examples of coding for statistics in R.

ATTENDANCE

Attendance is mandatory. Students are expected to advise the instructor in advance if they will not be able to attend a class session. Missing quizzes and exams required prior approval and rescheduling.

TEXTBOOKS

Required: Introductory Statistics with R, 2nd ed. Peter Dalgaard, Heidelberg: Springer (eBook available)

GRADING POLICIES AND EXAMINATION PROCEDURES

The final grade will be based on the following weighted average: Avg. of homework = 60%, 4 Quizzes = 20% and Final Project = 20%

Grading System

A = 90-100%  B = 80-89.9%  C = 70-79.9%  F = < 70%

REQUESTS FOR ACCOMMODATIONS FOR DISABILITIES

In accordance with policy 4.2.3, Request for Accommodation Under the ADA and the ADA Amendments Act of 2008 (ADAAA), any student requesting accommodation must submit the appropriate request for accommodation under the American with Disabilities Act (ADA, form 100). to his/her appropriate Associate Dean of their School and a copy to the ADA Coordinator. Additional information may be obtained at http://uthscsa.edu/eeo/request.asp.

ACADEMIC INTEGRITY AND PROFESSIONALISM

Any student who commits an act of academic dishonesty is subject to discipline as prescribed by the UT System Rules and Regulations of the Board of Regents. Academic dishonesty includes, but is not limited to, cheating, plagiarism, collusion, the submission for credit of any work or materials that are attributable in whole or in part to another person, taking an exam for another person, signing attendance sheets for another student, and any act designed to give unfair advantage to a student or the attempt to commit such an act. Additional information may be obtained at http://catalog.uthscsa.edu/generalinformation/generalacademicpolicies/academicdishonestypolicy/

TITLE IX AT UTHSCSA

Title IX Defined:
Title of the Education Amendments of 1972 is a federal law that prohibits sex discrimination in education. It reads “no person in the United States shall, on the basis of sex, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any education program or activity receiving Federal financial assistance.”

University of Texas Health Science Center San Antonio’s Commitment:
University of Texas Health Science Center San Antonio (UTHSCSA) is committed to maintaining a learning environment that is free from discriminatory conduct based on gender. As required by Title IX, UTHSCSA does not discriminate on the basis of sex in its education programs and activities, and it encourages any student, faculty, or staff member who thinks that he or she has been subjected to sex discrimination, sexual harassment (including sexual violence) or sexual misconduct to immediately report the incident to the Title IX Director.

In an emergency, victims of sexual abuse should call 911. For non-emergencies, they may contact UPD at 210-567-2800. Additional information may be obtained at http://students.uthscsa.edu/titleix/

EMAIL POLICY
USE OF RECORDING DEVICES
Permitted for personal use only

ELECTRONIC DEVICES
Electronic devices are permitted as long as they do not become a distraction for the class.

Class Schedule is TENTATIVE and will depend upon the progress of the class.

<table>
<thead>
<tr>
<th>Date</th>
<th>Subject</th>
<th>Reference</th>
<th>Lecturer</th>
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<tbody>
<tr>
<td>1 Wednesday May 20</td>
<td>Course Overview, Measurements, Intro to R</td>
<td>Handouts</td>
<td>Clarke</td>
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<tr>
<td>2 Friday, May 22</td>
<td>Descriptive Statistics &amp; Distributions Importing Data to R &amp; Experimental Design</td>
<td>Handouts</td>
<td>Clarke</td>
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<td>Monday, May 25</td>
<td>NO CLASS – MEMORIAL DAY HOLIDAY</td>
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<td>3 Wednesday, May 27</td>
<td>The t-test Evaluating Data Normality</td>
<td>Handouts</td>
<td>Clarke</td>
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<td>4 Friday, May 29</td>
<td>Plotting Data in R, ANOVA Propagation of Errors - QUIZ #1</td>
<td>Handouts HW 1 Assigned</td>
<td>Clarke</td>
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<tr>
<td>5 Monday June 1</td>
<td>Error reduction; Statistical significance &amp; power</td>
<td>Handouts</td>
<td>Clarke</td>
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<tr>
<td>6 Wednesday June 3</td>
<td>Regression &amp; Correlation Rates &amp; proportions / Goodness of data</td>
<td>Handouts HW 1 Due HW 2 Assigned</td>
<td>Clarke</td>
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<td>7 Friday, June 5</td>
<td>QUIZ #2 Rank-Based Statistics</td>
<td>Handouts</td>
<td>Clarke</td>
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<td>8 Monday, June 8</td>
<td>Nonlinear Regression GLM: Multiple Regression Analysis</td>
<td>Handouts</td>
<td>Clarke</td>
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<td>9 Wednesday, June 10</td>
<td>The t-test Evaluating Data Normality</td>
<td>Handouts</td>
<td>Clarke</td>
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<td>Friday June 12</td>
<td>NO CLASS</td>
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<td>Monday, June 15</td>
<td>NO CLASS</td>
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<td>10 Wednesday June 17</td>
<td>GLM: Analysis of Covariance (ANCOVA)</td>
<td>Handouts</td>
<td>Clarke</td>
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<td>11 Friday June 19</td>
<td>QUIZ #3 Measuring Statistical Agreement</td>
<td>Handouts HW 2 due HW 3 assigned</td>
<td>Clarke</td>
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<td>12 Monday June 22</td>
<td>Survival Data &amp; Hazard Ratios Bayesian analysis – Pt 1</td>
<td>Handouts</td>
<td>Clarke</td>
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<td>13 Wednesday June 24</td>
<td>Bayesian analysis – Pt 2</td>
<td>Handouts</td>
<td>Clarke</td>
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<tr>
<td>14 Friday June 26</td>
<td>QUIZ #4 FINAL PROJECT PRESENTATIONS</td>
<td>HW 3 due</td>
<td>Students</td>
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