

**RADI 5007**  
**Statistics in the Radiological Sciences**  
**Spring, 2018**

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**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:** MED 652E 11:00-12:00 Wednesdays

**EMAIL:** clarkeg@uthscsa.edu

**TELEPHONE:** 210-567-1361

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**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, 2<sup>nd</sup> 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 ACCOMODATIONS 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

none

## 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.

	<b>Date</b>	<b>Subject</b>	<b>Reference</b>	<b>Lecturer</b>
1	Monday May 14	Course Overview, Measurements, Intro to R	Handouts	Clarke
2	Wednesday May 16	Descriptive Statistics & Distributions Importing Data to R & Experimental Design	Handouts	Clarke
3	Friday, May 18	Bias in Design and Analysis	Handouts	Clarke
4	Monday May 21	The t-test Evaluating Data Normality	Handouts	Clarke
5	Wednesday May 23	Plotting Data in R, ANOVA Propagation of Errors - <b>QUIZ #1</b>	Handouts HW 1 Assigned	Clarke
6	Friday, May 25	Error reduction; Statistical significance & power	Handouts	Clarke
	Monday, May 28	<b>MEMORIAL DAY HOLIDAY</b>		
7	Wednesday, May 30	Regression & Correlation Rates & proportions / Goodness of data	Handouts HW 1 Due HW 2 Assigned	Clarke
8	Friday June 1	<b>QUIZ #2</b> Rank-Based Statistics	Handouts	Clarke
9	Monday, June 4	Nonlinear Regression GLM: Multiple Regression Analysis,	Handouts	Clarke
10	Wednesday June 6	GLM: Analysis of Covariance (ANCOVA)	Handouts	Clarke
11	Friday June 8	<b>QUIZ #3</b> Measuring Statistical Agreement	Handouts HW2 due HW 3 assigned	Clarke
12	Monday June 11	Survival Data & Hazard Ratios Bayesian analysis – Pt 1	Handouts	Clarke
13	Wednesday June 13	Bayesian analysis – Pt 2	Handouts	Clarke
14	Friday June 15	<b>QUIZ #4</b> <b>FINAL PROJECT PRESENTATIONS</b>	HW 3 due	Students