# Statistics in Clinical & Translational Research CTSC5103S001

#### I. INSTRUCTOR

Goutam Shahani

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## II. COURSE OVERVIEW

Learn the basic statistical procedures used to analyze data and be able to apply these techniques utilizing a standard statistical package (SAS)

Identify potential sources of bias in clinical trials, and select strategies to eliminate or control for bias

Be able to apply various biostatistical descriptors and techniques to clinical trial design and use them to interpret results

#### III. REQUIRED TEXT

Biostatistics: A Foundation for Analysis in the Health Sciences, 11th Edition (2018) by Wayne W. Daniel, Chad L. Cross

ISBN-13: 978-1119282372

Available on Wiley at: https://www.wiley.com/enus/Biostatistics%3A+A+Foundation+for+Analysis+in+the+Health+Sciences%2C+11th+Edition-p-9781119496571

Notes: The 10th edition can still be used as required textbook

## IV. REFERENCES

- Intuitive Biostatistics: A Nonmathematical Guide to Statistical Thinking Harvey Motulsky (1995, 1st Edition; 2010, 2nd Edition; 2013, 3rd Edition; 2017, 4th Edition) Oxford University Press ISBN-13: 978-0195086072 (1995); 978-0199730063 (2010); 978-0199946648 (2013); 978-0190643560 (2017)
- Principles of Biostatistics, 2nd Edition M. Pagano & K. Gauvreau (2000) Duxbury Press (2018 reprint) Chapman and Hall/CRC; ISBN-10: 0534229026; ISBN-13: 978-0534229023 (2000), 978-1138593145 (2018 reprint)

 Fundamentals of Biostatistics Bernard Rosner (2005, 6th Edition; 2010, 7th Edition, Duxbury Press) (2015, 8th Edition, Brooks Cole) ISBN-13: 978-0534418205 (2005); 978-0538733496 (2010); 978-1305268920 (2015)

## V. Homework Assignments (30%)

- a. Questions based on specific lecture topics
  - 1. Excel will be uses for analysis
  - 2. Interpretation of results
- b. There will be no late homework assignment submission.

#### VI. Midterm Exam (30%)

- a. See schedule on page 3 for the date of the mid-term
- b. There will be no early, late, or makeup midterm exam.

## VII. Final (30%)

- a. Date to be specified
- b. There will be no early, late, or makeup final exam.

## VIII. Attendance and Participation (10%)

Excused absence will be granted only for medical reason with a doctor's note. Active participation is expected.

## IX. Grading

The final grade will be according to the following. There will be no opportunity for extra credit a

	%
А	90.00 - 100.00
B+	84.00 - 89.99
В	75.00 - 83.99
C+	70.00 - 74.99
С	65.00 - 69.99
F	< 65.00

## X. COURSE SCHEDULE

The course schedule is listed below. Minor adjustments may be made during the semester.

Week	Date	<u>Topic</u>	Readings
1	19-Jan	Overview and Descriptive Statistics	Ch. 1, 2
		a. Application of statistics in biomedical research	
		b. Type of data	
		c. Graphic representation of data	
		d. Summary statistics: central tendency and dispersion	
2	26-Jan	Probability and Probability Distributions	Ch. 3, 4
		a. Probability	
		b. Conditional probability	
		c. Statistical methods in diagnostic medicine and screening test	
		d. Binomial distribution	
		e. Normal distribution	
3	2-Feb	Estimation	Ch. 5, 6
		a. Sampling distribution	
		b. Confidence interval	
		1) Population means	
		2) Population proportions	
		c. Sample size estimation based on accuracy of estimation	
4	9-Feb	Lab 1	
5	16-Feb	Hypothesis Testing	Ch. 7
		a. Type I error, Type II error	
		b. Steps of performing hypothesis testing	
		1) Hypothesis testing on population means	
		2) Hypothesis testing on population proportions	
		c. Power and sample size estimation	
6	23-Feb	Analysis of Variance	Ch. 8
		a. Comparisons between and among means	
_		b. Multiple comparisons	
/	1-Mar	Midterm Exam	
8	8-Mar		
9	15-IVIar	Spring Recess	Ch 0
10	22-iviar		Cn. 9
		a. Correlation	
11	20 Mar	D. Simple intear regression	
11	29-10181	a Chi square test	Ch 12
		a. CIII-squale test b. Polativo risk and Odde ratio	
		c. Sample size estimation based on proportions	
12	5-Anr	Multiple Lipear Regression and Logistic Regression	Ch 10 11
12	5 Арі	a Multiple linear regression	CII. 10, 11
		h. Model huilding and diagnosis	
		c Logistic regression	
13	12-Apr	Nonparametric Statistics	Ch 13
10	12 / 10	a Sign test	
		h. Wilcoxon sign rank test	
		c. Wilcoxon rank sum test	
		d. Kruskal Wallis test	
14	19-Apr	Lab 3	
15	, ,	Review for Final	
16	3-Mav	Final Exam	
Dec 22, 2023			