



### ST305 Statistical Inference (Online)

<b>Instructor Information</b>	Shen Fan Home Institution: China University of Petroleum Email: fans@cup.edu.cn		
<b>Term</b>	December 13, 2021 - January 7, 2022	<b>Credits</b>	4 units
<b>Course Delivery</b>	The class will be delivered in the format of online. Other than recorded lecture videos, the instructor will arrange 4 hours' real-time interactions with students per week (via Tencent Meeting and WeChat group). The workload students are expected to complete to properly pass this course is about 10-15 hours per week.		
<b>Required Texts (with ISBN)</b>	Statistical Inference. George Casella, Roger L. Berger. Duxbury Press ISBN: 9780534243128		
<b>Prerequisite</b>	N/A		



## Course Overview

Welcome to the Statistical Inference Course. This course will introduce the key ideas behind working with data in a scientific way and the tools for solving real-world data problems in laboratory sessions. By the end of the course, students will be equipped with the ability to choose the best statistical analysis to use in many situations, and execute data analytic strategy with interactive graphics. To achieve our teaching goals, plenty of hands-on practice will be given, to help learners using statistics to draw inferences about populations.

## Course Goals

By the end of the course, students who have completed this course successfully should be able to: deduce the (limiting) distribution of sums of random variables; derive the distribution of random variables; classify many common distributions; formulate and solve various inferential problems in a decision theory framework; derive and apply optimal procedures in various problems, including Bayes rules, minimax rules, minimum variance unbiased estimators and most powerful tests.

## Exams

**Midterm Exam (30%):** 2 hours' Written Test

**Final Exam (45%):** 2 hours' Written Test

## Grading Policy

Type	Description	Weight
Homework	Short answer questions	25%
Midterm Examination	Written Test; On-line Submission	30%
Final Exam	Written Test; On-line Submission	45%

## Grading Scale

Number grade	Letter grade	GPA
90-100	A	4.0
85-89	A-	3.7
80-84	B+	3.3
75-79	B	3.0
70-74	B-	2.7
67-69	C+	2.3
65-66	C	2.0
62-64	C-	1.7
60-61	D	1.0
≤59	F (Failure)	0



### Class Schedule

Date	Lecture	Readings	Online Teaching Arrangement
Day 1	Probability Theory, Practical R Exercises	Chapter 1	approximately 80 minutes pre-recorded video lectures
Day 2	Practical R Exercises	Chapter 1	approximately 80 minutes pre-recorded video lectures
Day 3	Transformation and Expectations	Chapter 2	approximately 80 minutes pre-recorded video lectures
Day 4	Variability	Chapter 2	approximately 80 minutes pre-recorded video lectures plus 120 minutes online interaction via Tencent Meeting and WeChat group
Day 5	Distributions	Chapter 3	approximately 80 minutes pre-recorded video lectures
Day 6	Practical R Exercises	Chapter 2,3	approximately 80 minutes pre-recorded video lectures plus 120 minutes online interaction via Tencent Meeting and WeChat group
Day 7	Hypothesis testing	Chapter 8	approximately 80 minutes pre-recorded video lectures
Day 8	P-values	Chapter 8	approximately 80 minutes pre-recorded video lectures
Day 9	Power	Chapter 8	Approximately 80 minutes pre-recorded video lectures
Day 10	Midterm review		approximately 80 minutes pre-recorded video lectures plus 120 minutes online interaction via Tencent Meeting and WeChat group
Day 11	Midterm Exam		online Midterm Exam
Day 12	Confidence intervals (I)	Chapter 9	approximately 80 minutes pre-recorded video lectures
Day 13	Confidence intervals (II)	Chapter 9	approximately 80 minutes pre-recorded video lectures
Day 14	Practical R Exercises	Chapter 8,9	approximately 80 minutes pre-recorded video lectures plus 120 minutes online interaction via Tencent Meeting and WeChat group
Day 15	Point Estimation	Chapter 7,10	approximately 80 minutes pre-recorded video lectures
Day 16	Asymptotic (I)	Chapter 10	approximately 80 minutes pre-recorded video lectures



Day 17	Asymptotic (II)	Chapter 10	approximately 80 minutes pre-recorded video lectures
Day 18	Practical R Exercises	Chapter10	approximately 80 minutes pre-recorded video lectures plus 120 minutes online interaction via Tencent Meeting and WeChat group
Day 19	Final Review		approximately 80 minutes pre-recorded video lectures plus 120 minutes online interaction via Tencent Meeting and WeChat group
Day 20	Final Exam		On-line Submission