

Term Information

Effective Term Autumn 2020

General Information

Course Bulletin Listing/Subject Area Statistics
Fiscal Unit/Academic Org Statistics - D0694
College/Academic Group Arts and Sciences
Level/Career Undergraduate
Course Number/Catalog 4301
Course Title Advanced Statistical Inference
Transcript Abbreviation Adv Stat Inf
Course Description Advanced probability models and fundamentals of inferential procedures; distribution functions, moment generating functions, transformations, order statistics, large-sample theory, classical hypothesis testing, distribution-free hypothesis tests.
Semester Credit Hours/Units Fixed: 3

Offering Information

Length Of Course 14 Week
Flexibly Scheduled Course Never
Does any section of this course have a distance education component? No
Grading Basis Letter Grade
Repeatable No
Course Components Lecture
Grade Roster Component Lecture
Credit Available by Exam No
Admission Condition Course No
Off Campus Never
Campus of Offering Columbus

Prerequisites and Exclusions

Prerequisites/Corequisites Prereq: 3201 and 3202; or 4201 and 4202; or permission of the instructor.
Exclusions
Electronically Enforced Yes

Cross-Listings

Cross-Listings

Subject/CIP Code

Subject/CIP Code 27.0502
Subsidy Level Baccalaureate Course
Intended Rank Junior, Senior

Requirement/Elective Designation

Required for this unit's degrees, majors, and/or minors

Course Details

Course goals or learning objectives/outcomes

- Quantify the probability of events using mathematical description of probability.
- Learn the properties of probability mass/density and cumulative distribution functions.
- Quantify probability models through their moments and moment generating functions.
- Derive the probability distribution of transformed random variables.
- Derive the probability distribution of order statistics.
- Formulate, construct and interpret confidence intervals of the parameters in a statistical model.
- Formulate statistical hypotheses about the parameters in a statistical model, construct appropriate hypothesis tests, understand the properties of such tests, and interpret the results in both a statistical and practical context.
- Conduct distribution-free hypotheses testing procedures.

Content Topic List

- Conditional and marginal probability distributions
- Functions of random variables
- Order statistics
- Moments and moment generating functions
- Large sample theory
- Principles of point and interval estimation
- Hypothesis testing
- Nonparametric statistics

Sought Concurrence

No

Attachments

- STAT4301.pdf
(Syllabus. Owner: Lee, Yoonkyung)

Comments

- This course proposal is to be considered concurrently with the program proposal for the undergraduate Statistics major. *(by Lee, Yoonkyung on 08/28/2017 05:15 PM)*

COURSE REQUEST
4301 - Status: PENDING

Last Updated: Haddad,Deborah Moore
09/05/2017

Workflow Information

Status	User(s)	Date/Time	Step
Submitted	Lee, Yoonkyung	09/04/2017 09:19 PM	Submitted for Approval
Approved	Lee, Yoonkyung	09/04/2017 09:28 PM	Unit Approval
Approved	Haddad, Deborah Moore	09/05/2017 10:56 AM	College Approval
Pending Approval	Nolen, Dawn Vankeerbergen, Bernadette Chantal Oldroyd, Shelby Quinn Hanlin, Deborah Kay Jenkins, Mary Ellen Bigler	09/05/2017 10:56 AM	ASCCAO Approval

Statistics 4301

Advanced Statistical Inference

3-semester-hour course

Prerequisite: Stat 3201 and Stat 3202; or Stat 4201 and Stat 4202; or permission of the instructor.

Class distribution: Three 55-minute lectures per week

Course Description and Learning Outcomes: The course will cover advanced probability models and fundamentals of inferential procedures.

Upon successful completion of the course, students will be able to

1. Quantify the probability of events using mathematical description of probability
2. Learn the properties of probability mass/density and cumulative distribution functions.
3. Quantify probability models through their moments and moment generating functions
4. Derive the probability distribution of transformed random variables
5. Derive the probability distribution of order statistics
6. Formulate, construct and interpret confidence intervals of the parameters in a statistical model
7. Formulate statistical hypotheses about the parameters in a statistical model, construct appropriate hypothesis tests, understand the properties of such tests, and interpret the results in both a statistical and practical context
8. Conduct distribution-free hypotheses testing procedures

Required Text and Other Course Material

The required text book for the course is Probability and Statistics, 4th edition, by Morris H. DeGroot and Mark H. Schervish (Pearson, ISBN: 978-0321500465)

Assignments

Homework will be assigned (approximately) weekly, will be due on the dates announced in class, and will be graded. Assignments will consist of problems from the textbooks or from other sources to reinforce learning the material covered in the lectures.

Exams

There will be two in-class midterm exams that cover the material from lectures, the assigned readings and homework. A final examination will be given during the university's examination period.

Grading Information

The final grade will be assigned based on homework assignments, two in-class midterm exams and a comprehensive final examination. The weights of each component of the grade are

Homework	Midterm 1	Midterm 2	Final Exam
20%	25%	25%	30%

Outline of Topics

- 1) Review of probability
- 2) Review of basic statistical distributions
- 3) Conditional probability
 - a. Conditional and marginal distributions
 - b. Bayes Theorem
- 4) Functions of random variables
 - a. Order statistics
 - b. Function of random variables: distribution function technique
 - c. Transformation technique: one variable
 - d. Transformation technique: two variables
 - e. Moment generating function technique
- 5) Review of expected values, moments
 - a. Conditional expectation
 - b. Moment generating functions
 - c. Product moments
 - d. Moments of linear combination of random variable
- 6) Large sample theory
 - a. Convergence in probability
 - b. Law of large numbers
 - c. Central limit theorem
 - d. Issues in sampling from finite populations
- 7) Estimation
 - a. Maximum likelihood
 - b. Sufficiency
 - c. Bayesian estimation
- 8) Hypothesis testing
 - a. Testing simple hypotheses, Neyman-Pearson Lemma
 - b. Likelihood ratio tests
 - c. Uniformly most powerful tests
 - d. Bayesian testing
- 9) Nonparametric Statistics
 - a. Signed rank test
 - b. Rank-sum test

Statement on Academic Misconduct

It is the responsibility of the Committee on Academic Misconduct to investigate or establish procedures for the investigation of all reported cases of student academic misconduct. The term “academic misconduct” includes all forms of student academic misconduct wherever committed; illustrated by, but not limited to, cases of plagiarism and dishonest practices in connection with examinations. Instructors shall report all instances of alleged academic misconduct to the committee (Faculty Rule 3335-5-487). For additional information, see the Code of Student Conduct <http://studentlife.osu.edu/csc/>.

Special Accommodations

Students with disabilities (including mental health, chronic or temporary medical conditions) that have been certified by the Office of Student Life Disability Services will be appropriately accommodated and should inform the instructor as soon as possible of their needs. The Office of Student Life Disability Services is located in 098 Baker Hall, 113 W. 12th Avenue; telephone 614- 292-3307, slds@osu.edu; slds.osu.edu.