The George Washington University
Department of Statistics
STAT 6202
Fall, 2022

Course and contact information

Course: STAT 6202, Mathematical Statistics II
Meeting time: 6:10-8:40pm Tuesday
Location: TBD

Instructor

Name: Feifang Hu
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Office hours: Thursday, 3:30pm-5:00pm

Grader: **Guannan Zhai**
E.mail: **guannanzhai@gwu.edu**
Office Hours: **2:00pm-5:00pm, Tuesday**

Textbook: Casella, G., & Berger, R.L. (2001). Statistical Inference (2nd Edition). Cengage Learning. (ISBN-13: 978-0534243128)

- The textbook can be obtained through online retailers or the GW Bookstore.

- Other materials are provided in the Blackboard course.

Course description:

This is the second part of a two semester course in Mathematical Statistics. Our goal is to develop an appropriate level of mathematical and statistical literacy and competency. Full-fledged statistical theory with mathematical rigor, aimed at designing good statistical procedures will be developed. This course will cover logical and mathematical foundations of some statistical inference procedures. Topics include Sampling distributions, principles of data reduction (sufficiency, ancillarity and completeness), theory of point & interval estimation, hypothesis testing and Bayesian Inference.

Course prerequisites

The course is designed for second year MS students and PhD students who have completed STAT 6201 (Mathematical Statistics I).

Learning outcomes

By the end of this course, you will be able to:

1. Recognize and explain the interplay between probability and statistics;
2. Formulate statistical models and derive appropriate estimators and tests under a variety of statistical models;
3. Evaluate different inferential procedures to determine good & optimal estimators and tests according to statistical criteria;
4. Analyze and communicate statistical ideas and proofs of theorems rigorously.

Topics by weeks

1. Week 1: Introduction, Statistical Models, 6201 Review,
2. Week 2: Distributions based on normal samples.
3. Week 3: Order Statistics, Sufficiency
4. Week 4: Sufficiency, Minimal Sufficiency, Ancillarity
5. Week 5: Completeness, Basu's Theorem
6. Week 6: Estimation: MME, MLE etc
7. Week 7: Exam I.
8. Week 8: Estimation: Cramer-Rao Lower bound.
9. Week 9: Estimation: Rao Blackwell Theorem, UMVUE
10. Week 10: TSH: MP Test, NP Lemma,
11. Week 11: TSH: MLR Property, Karlin-Rubin Theorem
12. Week 12: TSH: Likelihood Ratio Test, Large Sample Tests
13. Week 13: Some further research and practical problems of A/B testing.
14. Week 14: Asymptotics: Convergence, CLT, Delta Method
15. Week 15: Final.

Credit hour policy:
This is a a 3-credit course. This would include 2.5 hours of direct instruction and a minimum of 8 hours of independent learning per week for a combined minimum total of 10.5 hours per week or 165.5 hours per semester. See Assignment of Credit Hour Policy for more information.

Assignments:
There will be about 10 weekly homework assignments. Each assignment will be worth 100 points. The assignments will be on: Standard homework with around 4 problems related with basic concepts and techniques of Statistical Inference, etc.

Grading

The course grade will be based on
- Homework Assignments (25%): see above information about Assignments.
- One Midterm exam I (30%): Problems related with basic concepts and techniques of Statistical Inference, etc.
- Classroom participation (10%): Discussions in class and attendance.
- Final exam (35%): Problems related with basic concepts and techniques of Statistical Inference, etc.

Class Attendance

It is important that you attend the class. Everyone should attend the class. If you cannot attend, please let me know the reason. You are responsible for any materials covered or any announcements made in class.

University policies

Academic Integrity Code: Academic integrity is an essential part of the educational process, and all members of the GW community take these matters very seriously. As the instructor of record for this course, my role is to provide clear expectations and uphold them in all assessments. Violations of academic integrity occur when students fail to cite research sources properly, engage in unauthorized collaboration, falsify data, and otherwise violate the Code of Academic Integrity. If you have any questions about whether particular academic practices or resources are permitted, you should ask me for clarification. If you are reported for an academic integrity violation, you should contact the Office of Student Rights and Responsibilities (SRR) to learn more about your rights and options in the process. Consequences can range from failure of assignment to expulsion from the university and may include a transcript notation. For more information, please refer to the SRR website (https://studentconduct.gwu.edu/academic-integrity), email rights@gwu.edu, or call 202-994-6757.

University policy on observance of religious holidays
Students must notify faculty during the first week of the semester in which they are enrolled in the course, or as early as possible, but no later than three weeks prior to the absence, of their intention to be absent from class on their day(s) of religious observance. If the holiday falls within the first three weeks of class, the student must inform faculty in the first week of the semester. For details and policy, see “Religious Holidays” at provost.gwu.edu/policies-procedures-and-guidelines.

Use of Electronic Course Materials and Class Recordings
Students are encouraged to use electronic course materials, including recorded class sessions, for private
personal use in connection with their academic program of study. Electronic course materials and recorded class sessions should not be shared or used for non-course related purposes unless express permission has been granted by the instructor. Students who impermissibly share any electronic course materials are subject to discipline under the Student Code of Conduct. Please contact the instructor if you have questions regarding what constitutes permissible or impermissible use of electronic course materials and/or recorded class sessions. Please contact Disability Support Services at disabilitysupport.gwu.edu if you have questions or need assistance in accessing electronic course materials.

Academic support

Writing Center
GW’s Writing Center cultivates confident writers in the University community by facilitating collaborative,
critical, and inclusive conversations at all stages of the writing process. Working alongside peer mentors, writers develop strategies to write independently in academic and public settings. Appointments can be booked onlinenat gwu.mywconline.com

Academic Planning and Assessment
Academic Commons
Academic Commons provides tutoring and other academic support resources to students in many courses. Students can schedule virtual one-on-one appointments or attend virtual drop-in sessions. Students may schedule an appointment, review the tutoring schedule, access other academic support resources, or obtain assistance at academiccommons.gwu.edu

Support for students outside the classroom

Disability Support Services (DSS) 202-994-8250
Any student who may need an accommodation based on the potential impact of a disability should contact Disability Support Services at disabilitysupport.gwu.edu to establish eligibility and to coordinate reasonable accommodations.

Counseling and Psychological Services 202-994-5300
GW's Colonial Health Center offers counseling and psychological services, supporting mental health and
personal development by collaborating directly with students to overcome challenges and difficulties that may interfere with academic, emotional, and personal success. healthcenter.gwu.edu/counseling-and-psychological-services.

Safety and Security
Monitor GW Alerts and Campus Advisories to Stay Informed before and during an emergency event or
Situation. In an emergency: call GWPD/EMeRG 202-994-6111 or 911. For situation-specific actions: refer to GWU's Emergency Response Handbook and Emergency Operations Plan. In the event of an armed Intruder: Run. Hide. Fight.