STAT 6202
Mathematical Statistics II
Syllabus

Spring 2022

Instructor: Dr. Subrata Kundu
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Phone: 202-994-6355

Meeting Time: R 6:10p - 8:40p
Location: MPA 309
Virtual Office Hours: T 6p - 7p (on zoom)
In person Office hours: T 4p - 5p (Rome 750)

Note: This syllabus is subject to change based on the needs of the class.

Instructor Response Time

I will respond to emails by the end of the next business day. I will return assignments within ten days.

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 Objectives

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.

Prerequisites

Academic

STAT 6201: Mathematical Statistics I

Technological

As a learner in this course you need to ensure you have the required technology and skills to fully participate. Please consult the [GW Online website](#) for further information.

You should be able to:

- Use a personal computer and its peripherals.

- Download and install any software needed for the course.

- Use email and other communication tools with attachments.

- Access your GW email for university-related communications (see [Office of the Registrar website](#)).

- Use word processing and other productivity software to submit assignments.

- Use web conferencing tools to collaborate with other course participants.

- Use your computer to upload documents, recordings, and images.

- Seek technology help by contacting [GW Information Technology](#) (202-994-4948) or [ithelp@gwu.edu.](#)

Textbooks & Materials

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.

Credit Hour Policy

Over these 15 weeks, you will spend 2.5 hours per week classroom lectures (37.5 hours for the semester), and 0.5 hour per week participating in the weekly discussion exercises, Homework and other independent work (e.g. readings,homework, exams, project) is estimated at around 4.5 hours per week (75 hours for the semester) and includes a 2-hour final exam

STAT 6202: Mathematical Statistics II

Methods of Instruction and Assessment

This course uses the following methods of instruction and assessment. Their overarching purpose is to provide opportunities for active learning and skills development, which will support you in achieving course objectives.

Methods of Instruction

- **Lectures**: Weekly lecture (150 minutes) on Thursdays. These lectures are designed to introduce key ideas, themes, and concerns. You are strongly encouraged to take notes while listening to lectures

- **Readings**: Each week you will be responsible for various reading assignments. The readings work in tandem with course lectures to help you understand course concepts, be able to participate in discussions with peers, and also complete assignments.

Methods of Assessment

The following assessments are indicators of your progress in the course and are intended to help you achieve course objectives.

- **Participation:** Throughout the course, you will interact with peers and me in class and via discussion boards. One set of discussions focuses on specific topics relevant to the course; the other set is for posting and responding to class Q&A that is module-specific. You are expected to post original ideas and questions and respond substantively to peers to support learning and to build class community.

- **Homework Assignments:** Regular homework assignments help you practice mathematical statistics skills, receive feedback, and gauge your improvement. Homework assignments are opportunities to sharpen skills and prepare for other course assessments.

- **Research Paper and Virtual Poster Session (Optional):** You will develop research and writing skills during this course using credible resources to write a research paper. Your work on the research paper can help you demonstrate your ability to clearly articulate what you are learning. You will present your findings to peers in a virtual poster session in our course. A grading rubric will be provided.

- **Midterm Exam:** In this course, you will demonstrate your knowledge and skills in various assessments, including a midterm exam. The feedback you receive on the midterm can help you prepare for additional homework assignments and the final exam. Participation in student study discussion boards is strongly recommended.

- **Final Exam:** You will demonstrate proficiency with course content by completing a final exam at the end of the course.

Academic Integrity

This course will comply with the University's Code of Student Conduct. The Code of Academic Integrity defines academic dishonesty as "cheating of any kind, including misrepresenting one's work, taking credit for work of others without crediting them and without appropriate authorization, and the fabrication of information." Common examples of academic dishonesty include cheating, fabrication, plagiarism, falsification, forgery of University academic documents, and facilitating academic dishonesty by others. Consult GW's Academic Dishonesty Prevention resource for further information and support.

Grading

This course uses the following grading schema.

Assignment Type	Point Value Per Assignment	Number of Assignments	Total Percent of Final Grade
Participation	varies[1]	14	5%
Homework	varies[2]	Up to 10	20%
Research Paper (optional)	100	1	10% (or 0%)
Midterm Exams	100	2	30%
Final Exam	100	1	20% (or 30%)

[1]Point values differ depending on discussion type   Total: 100%
[2]Point values will vary depending on content covered

The grading scale below determines your final letter grade.

- 93 - 100 = A
- 90 - 92 = A-
- 87 - 89 = B+
- 83 - 86 = B
- 80 - 82 = B-
- 77 - 79 = C+
- 73 - 76 = C
- 70 - 72 = C-
- 67 - 69 = D+
- 63 - 66 = D
- 60 - 62 = D-
- Less than 60 = F

Lecture Recordings:

This is not a remote learning course. Students are expected to be present in class. Every effort will be made to record the lectures and share the course material on Blackboard. By taking this course

- you agree not to share the recordings with anyone and
- give consent to the class recordings.

Weekly Schedule

- Week 1 - Introduction, Statistical Models, 6201 Review,
- Week 2 - Order Statistics, Sufficiency
- Week 3 - Sufficiency, Minimal Sufficiency,
- Week 4 - Completeness, Basu's Theorem
- Week 5 - Ancillarity, Completeness, Basu's Theorem
- Week 6 - Estimation: MME, MLE etc.
- Week 7 - Midterm
- Week 8 - Estimation: Comparing Estimators, Cramer-Rao Lower bound
- Week 9 - Estimation: Rao Blackwell Theorem, UMVUE
- Week 10 - Testing Statistical Hypotheses
- Week 11 - TSH: MP Test, NP Lemma,
- Week 12 - TSH: MLR Property, Karlin-Rubin Theorem
- Week 13 - TSH: Likelihood Ratio Test, Large Sample Tests
- Week 14 - Asymptotics: Convergence, CLT, Delta Method
- Week 15 - Final

Late Work

Late submission of coursework will not be accepted. Under extenuating circumstances you can obtain prior approval for extension. If coursework is missed, you will receive zero credit for that part of the grade. No make-up exams will be given. In exceptional circumstances (e.g. well-documented medical problems), a missed exam will not be counted when computing your course grade.

Incomplete Grades

Undergraduate students

Incomplete grades may be given to undergraduate students only if for reasons beyond the student's control (such as medical or family emergency) s/he is unable to complete the final work of the course. Faculty should not assign an Incomplete grade if not asked by the student.

A contract must be signed by the instructor and the student and filed in the department office. A copy should be submitted to the Academic Advising office in Phillips 107. A student has up to a calendar year to finish the coursework for the class, and when completed a grade change form must be submitted to the Academic Advising office to update the grade.

For further policy and contract information for undergraduate students, please consult with your advisor and also visit the website for Columbian College of Arts and Sciences Academic Advising.

Graduate students

Incomplete grades may be given to undergraduate students only if for reasons beyond the student's control (such as medical or family emergency) s/he is unable to complete the final work of the course. Faculty should not assign an Incomplete grade if not asked by the student.

Please consult with your advisor and complete a CCAS graduate student incomplete grade form.

Netiquette

Please observe the following rules of netiquette for communicating online:

- Remain professional, respectful, and courteous at all times.Remember that a real human being wrote each post and will read what you write in response. It is easy to misinterpret discussion posts. Let's give the benefit of the doubt.

- If you have a strong opinion on a topic, it is acceptable to express it as long as it is not phrased as an attack. Please be gracious with differing opinions. When upset, wait a day or two prior to posting. Messages posted (or emailed) in anger are often regretted later.

- Proofread and use the spell check tool when you type a post. It makes the post easier to read and helps your readers understand what you are saying.

I reserve the right to delete any post that is deemed inappropriate for the discussion forum, blog, or wiki without prior notification to the student.

Policies

The following are university- and course-related policies that all course participants should read and understand. Please contact me if you have any questions.

Differences in Time Zone: All the times in this Blackboard course correspond to the U.S. Eastern Time zone

Inclement Weather: Please note that we may hold the class online when the University is closed for inclement weather.

Disability Support Services and Accessibility

Any student who may need an accommodation based on the impact of a disability should contact the Office of Disability Support Services (DSS) to inquire about the documentation necessary to establish eligibility, and to coordinate a plan of reasonable and appropriate accommodations. DSS is located in Rome Hall, Suite 102. For additional information, please call DSS at 202-994-8250, or consult https://disabilitysupport.gwu.edu.

For information about how the course technology is accessible to all learners, see the following resources:

- Blackboard accessibility policy

- Kaltura (video platform) accessibility policy

- Microsoft Office accessibility policy

- Adobe accessibility policy

- YouTube accessibility policy - please consult the accessibility information site for the Google Suite of products.

Religious Observances

In accordance with University policy, students should notify faculty during the first week of the semester of their intention to be absent from class on the day(s) of religious observance. Please consult the university policy on religious holiday observance for further information.

Acceptable Use Policy for Computing Systems and Services

All members of the George Washington University must read and comply with the Acceptable Use Policy when accessing and using computing systems and services, including email and Blackboard. Please read the Acceptable Use Policy to familiarize yourself with how GW systems are to be used ethically.

Sharing of Course Content

Unauthorized downloading, distributing, or sharing of any part of a recorded lecture or course materials, as well as using provided information for purposes other than the student's own learning may be deemed a violation of GW's Student Conduct Code.

Use of Student Work (FERPA)

Personal Information
GW complies with FERPA. As such, student personal information from this course will not be disclosed. For more information on FERPA, please consult the GW Office of the Registrar.

Live Session Recordings
Course lectures **may be** audio/video recorded. Recordings will be made available to students.

Copyright Policy Statement

Copyright Restriction: Materials used in connection with this course may be subject to copyright protection under Title 17 of the United States Code. Under certain Fair Use circumstances specified by law, copies may be made for private study, scholarship, or research. Electronic copies should not be shared with unauthorized users. If a user fails to comply with Fair Use restrictions, he/she may be liable for copyright infringement. For more information, see the GW Copyright Policy and Fair Use guidelines.

Emergency Preparedness and Response

The University has asked all faculty to inform students of these procedures, prepared by the GW Office of Public Safety and Emergency Management in collaboration with the Office of the Executive Vice President for Academic Affairs.

To Report an Emergency or Suspicious Activity
Call the University Police Department at 202-994-6111 (Foggy Bottom) or 202-242-6111 (MV).

Shelter in Place - General Guidance
Although it is unlikely that we will ever need to shelter in place, it is helpful to know what to do just in case. No matter where you are, the basic steps of shelter in place will generally remain the same.

- If you are inside, stay where you are unless the building you are in is affected. If it is affected, you should evacuate. If you are outdoors, proceed into the closest building or follow instructions from emergency personnel on the scene.

- Locate an interior room to shelter inside. If possible, it should be above ground level and have the fewest number of windows. If sheltering in a room with windows, move away from the windows. If there is a large group of people inside a particular building, several rooms may be necessary.

- Shut and lock all windows (for a tighter seal) and close exterior doors.

- Turn off air conditioners, heaters, and fans. Close vents to ventilation systems as you are able. (University staff will turn off ventilation systems as quickly as possible).

- Make a list of the people with you and ask someone to call the list in to UPD so they know where you are sheltering and who is with you. If only students are present, one of the students should call in the list.

- Await further instructions. If possible, visit GW Campus Advisories for incident updates or call the GW Information Line 202-994-5050.

- Make yourself comfortable and look after one other. You will get word as soon as it is safe to come out.

Evacuation

An evacuation will be considered if the building we are in is affected or we must move to a location of greater safety. We will always evacuate if the fire alarm sounds. In the event of an evacuation, please gather your personal belongings quickly (purse, keys, GWorld card, etc.) and proceed to the nearest exit. Every classroom has a map at the door designating both the shortest egress and an alternate egress. Anyone who is physically unable to walk down the stairs should wait in the stairwell, behind the closed doors. Firemen will check the stairwells upon entering the building.

Once you have evacuated the building, proceed to our primary rendezvous location: the courtyard area between the GW Hospital and Ross Hall. In the event that this location is unavailable, we will meet on the ground level of the Visitors Parking Garage (I Street entrance, at 22nd Street). From our rendezvous location, we will await instructions to re-enter the School.

Alert DC

Alert DC provides free notification by e-mail or text message during an emergency. Visit GW Campus Advisories for a link and instructions on how to sign up for alerts pertaining to GW. If you receive an Alert DC notification during class, you are encouraged to share the information immediately.

GW Alert

GW Alert provides popup notification to desktop and laptop computers during an emergency. In the event that we receive an alert to the computer in our classroom, we will follow the instructions given. You are also encouraged to download this application to your personal computer. Visit GW Campus Advisories to learn how.

Additional Information

Additional information about emergency preparedness and response at GW or the University's operating status can be found on GW Campus Advisories or by calling the GW Information Line at 202-994-5050.