AMS 582 – Design of Experiments

Spring 2022; 2:00 PM – 3:20 PM; Tue & Thu

Instructor Information

Instructor	Email	Office Location & Hours
Hyunwook Koh, Ph.D.	hyunwook.koh@stonybrook.edu	B-521,9:00 AM - 11:50 AM; Mon & Wed (or by appointment)

Course Information

Course Description

This is an introductory course dealing with the design and analysis of experiments. Discussion of the accuracy of experiments, partitioning sums of squares, randomized designs, factorial experiments, Latin squares, confounding and fractional replication, response surface experiments, and incomplete block designs

Teaching Method (In-person/Online)

TBA

Textbook

"Design and Analysis of Experiments" by D.C. Montgomery, 10th edition; Wiley & Sons; ISBN: 978-1119593409 (Required)

"Mathematical Statistics and Data Analysis" by J.A. Rice, 3rd edition; Duxbury Advanced Series (Optional)

"Statistical Inference" by G. Casella and R.L. Berger, 2nd edition; Duxbury Advanced Series (Optional)

Pre-requisite

AMS 572 (Data Analysis 1)

Academic Integrity

Each student must pursue his or her academic goals honestly and be personally accountable for all submitted work. Representing another person's work as your own is always wrong. Faculty are required to report any suspected instances of academic dishonesty to the Academic Judiciary. For more comprehensive information on academic integrity, including categories of academic dishonesty, please refer to the academic judiciary website at http://www.stonybrook.edu/uaa/academicjudiciary/

School Policy on Attendance

1. If a student has over 20% unexcused absences, the student's final course grade will be an F.
2. Students should report the reason of absence to the professor in advance, or immediately after the absence.
3. When a student excuses his/her absence, the student must provide documentation of the reason for the absence to the professor.
4. The professor of the course reserves the right to excuse absences.
5. The professor may excuse the absence if the submitted documentation fulfills the following conditions: extreme emergences, severe medical reasons with doctor's note, very important events.

Critical incident Management

Stony Brook University expects students to respect the rights, privileges, and property of other people. Faculty are required to report to the Office of Judicial Affairs any disruptive behavior that interrupts their ability to teach, compromises the safety of the learning environment, or inhibits students' ability to learn.

Course Evaluations

Stony Brook University values student feedback in maintaining the high-quality education it provides and is committed to the course evaluation process, which includes a mid-semester assessment as well as an end-of-the-semester assessment, giving students a chance to provide information and feedback to an instructor which allows for development and improvement of courses. Please click the following link to access the course evaluation system: http://stonybrook.campuslabs.com/courseeval/

Grading

Final grade = *f*(Attendance[5%] + Homework[5%] + Midterm [40%] + Final [50%]); ABCDF grading; 3 credits

Total score	Final grade
94 - 100	A
90 - 93	A-
87 - 89	B+
84 - 86	B
81 - 83	B-
78 - 80	C+
75 - 77	C
72 - 74	C-
69 - 71	D+
66 - 68	D
61 - 65	D-
≤ 60	F

Learning Outcomes:

1) Extend knowledge of probability theory.
   * Central chi-square and central F-distributions.
   * Non-central chi-square and non-central F-distributions.
   * Multiple comparisons procedures including Bonferroni's inequality, Scheffe's multiple comparison procedures, and Tukey's multiple comparison procedures.
   * Decomposing chi-square sums of squares.
   * Expected value and variance of sums of squares.

2) Learn classical statistical designs.
   * One-way layout.
   * Randomized block designs.
   * Latin squares, Graeco-Latin squares, hyper Graeco-Latin squares including designs with replications.
   * Two and three way layouts.
   * Random effect models.
   * Mixed models.

3) Power and sample size computations.

4) Learn the statistical computing package of the student's choice and apply it to obtain the statistical model that generated a set of synthetic data.

Tentative Course Schedule

No.	Date	Topic	Homework
1	Feb 22	Introduction	TBA
2	Feb 24	Simple Comparative Experiments	TBA
3	Mar 1	No class (Independence Movement Day)	
4	Mar 3	Simple Comparative Experiments	TBA
5	Mar 8	Experiments with a Single Factor: The Analysis of Variance	TBA
6	Mar 10	Experiments with a Single Factor: The Analysis of Variance	TBA
7	Mar 15	Experiments with a Single Factor: The Analysis of Variance	TBA
8	Mar 17	Introduction to Factorial Designs	TBA
9	Mar 22	Introduction to Factorial Designs	TBA
10	Mar 24	Introduction to Factorial Designs	TBA
11	Mar 29	The 2^k Factorial Design	TBA
12	Mar 31	The 2^k Factorial Design	TBA
13	Apr 5	The 2^k Factorial Design	
14	Apr 7	Review	TBA
15	Apr 12	Midterm	

No.	Date	Topic	Homework
16	Apr 14	Bocking and Confounding in the 2^k Factorial Design	TBA
17	Apr 19	Bocking and Confounding in the 2^k Factorial Design	TBA
18	Apr 21	Two-Level Fractional Factorial Designs	TBA
19	Apr 26	Two-Level Fractional Factorial Designs	TBA
20	Apr 28	Two-Level Fractional Factorial Designs	TBA
21	May 3	Response Surface Methods and Designs	
22	May 5	No class (Children's Day)	
23	May 10	Response Surface Methods and Designs	TBA
24	May 12	Response Surface Methods and Designs	TBA
25	May 17	Experiments with Random Factors	TBA
26	May 19	Experiments with Random Factors	TBA
27	May 24	Nested and Split-Plot Designs	TBA
28	May 26	Nested and Split-Plot Designs	TBA
29	May 31	Nested and Split-Plot Designs	TBA
30	Jun 2	Review	TBA
31	Jun 7	No class (Reading day)	
32	Jun 14	Final (12:30 PM – 3:00 PM)	

Exam Schedule

Date	Subject
Apr 12	Midterm
Jun 14	Final