Course Information
Course Number: MATH 689
Course Title: Special Topics in Stochastic Calculus
Section: TBA
Time: TBA
Location: TBA
Credit Hours: 3 hours

Instructor Details
Instructor: Jong Jun Lee
Office: Blocker 319
Phone: Math Department: 979-845-3261 *(There is no phone in my office, so email is a better way to reach me.)*
E-Mail: leejj82@tamu.edu
Office Hours(Online):   TBA
Course Webpage: Canvas

Course Description
This is a course in stochastic calculus. Topics include Brownian motion, Ito integrals, Ito formula, Martingale Theorem, stochastic differential equations, Random time change, Girsanov theorem, and application to mathematical finance.

Course Prerequisites
MATH 221 Several Variable Calculus or equivalent
MATH 308 Differential equations
MATH 411 Mathematical Probability

Course Learning Outcomes
We will cover much of chapters 1-4 from the textbook. This course is to provide students with introductory stochastic differential equations techniques:
- Understand Brownian motion and Ito integral
- Understand Martingale properties
- Understand construction and application of stochastic differential equations
- Understand Girsanov theorem, and application to mathematical finance

Textbook and/or Resource Materials
- Textbook:
  - ELEMENTARY STOCHASTIC CALCULUS, WITH FINANCE IN VIEW by Thomas Mikosch
- Nice supplementary readings:
  - Stochastic Differential Equations: An Introduction with Applications by Bernt Oksendal
  - Brownian Motion and Stochastic Calculus by Ioannis Karatzas and Steven Shreve
  - Diffusions, Markov Processes, and Martingales: Volume 1 and 2 by Rogers and Williams
  - Stochastic Integration and Differential Equations by Philip E. Protter
  - Stochastic Differential Equations and Diffusion Processes by Ikeda and Watanabe

Grading Policy

The course grading will be based on the tables below. At the end of the semester you will receive the grade you earned, according to the grade breakdown and grading scale given.

Grade Breakdown

Activity	Frequency	Percentage
Homework	Biweekly	30%
Midterm Exam		30%
Final Exam		40%
Total		100%

Grading Scale

Range	Grade
90 ≤ Average ≤ 100	A
80 ≤ Average < 90	B
70 ≤ Average < 80	C
60 ≤ Average < 70	D

Grading Appeal Policy – *Students have one week upon the return of assignments and exams to notify the instructor of any inaccuracies in their graded work. After 1 week, the grade will stand. Students have 1 week from the day grades are posted in the eCampus gradebook to bring any inaccuracies to the instructor's attention. Students should bring all grade disputes to the instructor in a one-on-one Zoom meeting. Due to FERPA privacy issues, grade disputes will not be discussed over email or in the classroom.*

Homework – *There will be biweekly homework based on course materials taught in class.*

Midterm Exam – *There will be one in class exam during the semester. You must bring your student ID to the exam. The tentative exam schedule is as follows:*

TBA

Final Exam – *The final exam will be comprehensive. You will need to bring your ID to your final exam. The final exam schedules are as follows:*

TBA

(The day and time of the final exam is determined by the university registrar, and may be found at http://registrar.tamu.edu/Courses,-Registration,-Scheduling/Final-Examination-Schedules*)*

Course Schedule

Week	Topic
Week1: 8/24-8/26	Chapter1. Preliminaries
Week2: 8/29-9/2	Chapter1. Preliminaries
Week3: 9/5-9/9	Chapter1. Preliminaries
Week4: 9/12-9/16	Chapter1. Preliminaries
Week5: 9/19-9/23	Chapter2. The Stochastic Integral
Week6: 9/26-9/30	Chapter2. The Stochastic Integral
Week7: 10/3-10/7	Chapter2. The Stochastic Integral
Week8: 10/10-10/14	Chapter2. The Stochastic Integral **(10/10-11 Fall break, no classes)**
Week9: 10/17-10/21	Chapter3. Stochastic Differential Equations **(Midterm Exam week)**
Week10: 10/24-10/28	Chapter3. Stochastic Differential Equations
Week11: 10/31-11/4	Chapter3. Stochastic Differential Equations
Week12: 11/7-11/11	Chapter4. Application of Stochastic Calculus in Finance
Week13: 11/14-11/18	Chapter4. Application of Stochastic Calculus in Finance
Week14: 11/21-11/25	Extra topic: Inequalities **(11/23-25 Thanksgiving Holidays)**
Week15: 11/28-12/2	Extra topic: Inequalities
Week16: 12/5-12/7	Extra topic: Inequalities, Review **(12/7 Last day of class)**
TBA	**Final Exam**

University Policies

Attendance Policy

Attendance is essential to complete this course successfully.

Excused Absences – *University student rules concerning excused and unexcused absences, as well as makeups, can be found at Student Rule 7 in its entirety for information about excused absences, including definitions, and related documentation and timelines. In particular, make-up exams or late homework will NOT be allowed unless a University approved reason is given to me in writing. Notification before the absence is required when possible. Otherwise (e.g. accident, or emergency), you must notify me within 2 working days of the missed exam or assignment to arrange a makeup. In all cases where an exam/assignment is missed due to an injury or illness, whether it be more or less than 3 days, I require a doctor's note. I will not accept the "University Explanatory Statement for Absence from Class" form. Further, an absence due to a non-acute medical service or appointment (such as a regular checkup) is not an excused absence.*

Makeup Work Policy

Students will be excused from attending class on the day of a graded activity or when attendance contributes to a student's grade, for the reasons stated in Student Rule 7, or other reason deemed appropriate by the instructor.

Please refer to Student Rule 7 in its entirety for information about makeup work, including definitions, and related documentation and timelines.

Absences related to Title IX of the Education Amendments of 1972 may necessitate a period of more than 30 days for make-up work, and the timeframe for make-up work should be agreed upon by the student and instructor" (Student Rule 7, Section 7.4.1).

"The instructor is under no obligation to provide an opportunity for the student to make up work missed because of an unexcused absence" (Student Rule 7, Section 7.4.2).

Students who request an excused absence are expected to uphold the Aggie Honor Code and Student Conduct Code. (See Student Rule 24.)

Academic Integrity Statement and Policy

"An Aggie does not lie, cheat or steal, or tolerate those who do."

"Texas A&M University students are responsible for authenticating all work submitted to an instructor. If asked, students must be able to produce proof that the item submitted is indeed the work of that student. Students must keep appropriate records at all times. The inability to authenticate one's work, should the instructor request it, may be sufficient grounds to initiate an academic misconduct case" (Section 20.1.2.3, Student Rule 20).

You can learn more about the Aggie Honor System Office Rules and Procedures, academic integrity, and your rights and responsibilities at aggiehonor.tamu.edu.

Americans with Disabilities Act (ADA) Policy

Texas A&M University is committed to providing equitable access to learning opportunities for all students. If you experience barriers to your education due to a disability or think you may have a disability, please contact Disability Resources in the Student Services Building or at (979) 845-1637 or visit disability.tamu.edu. Disabilities may include, but are not limited to attentional, learning, mental health, sensory, physical, or chronic health conditions. All students are encouraged to discuss their disability related needs with Disability Resources and their instructors as soon as possible.

Title IX and Statement on Limits to Confidentiality

Texas A&M University is committed to fostering a learning environment that is safe and productive for all. University policies and federal and state laws prohibit gender-based discrimination and sexual harassment, including sexual assault, sexual exploitation, domestic violence, dating violence, and stalking.

With the exception of some medical and mental health providers, all university employees (including full and part-time faculty, staff, paid graduate assistants, student workers, etc.) are Mandatory Reporters and must report to the Title IX Office if the employee experiences, observes, or becomes aware of an incident that meets the following conditions (see University Rule 08.01.01.M1):

- The incident is reasonably believed to be discrimination or harassment.
- The incident is alleged to have been committed by or against a person who, at the time of the incident, was (1) a student enrolled at the University or (2) an employee of the University.

Mandatory Reporters must file a report regardless of how the information comes to their attention – including but not limited to face-to-face conversations, a written class assignment or paper, class discussion, email, text, or social media post. Although Mandatory Reporters must file a report, in most instances, a person who is subjected to the alleged conduct will be able to control how the report is handled, including whether or not to pursue a formal investigation. The University's goal is to make sure you are aware of the range of options available to you and to ensure access to the resources you need.

Students wishing to discuss concerns in a confidential setting are encouraged to make an appointment with Counseling and Psychological Services (CAPS).

Students can learn more about filing a report, accessing supportive resources, and navigating the Title IX investigation and resolution process on the University's Title IX webpage.

Statement on Mental Health and Wellness

Texas A&M University recognizes that mental health and wellness are critical factors that influence a student's academic success and overall wellbeing. Students are encouraged to engage in healthy self-care by utilizing the resources and services available from Counseling & Psychological Services (CAPS). Students who need someone to talk to can call the TAMU Helpline (979-845-2700) from 4:00 p.m. to 8:00 a.m. weekdays and 24 hours on weekends. 24-hour emergency help is also available through the National Suicide Prevention Hotline (800-273-8255) or at suicidepreventionlifeline.org.

COVID Syllabus Statement

To help protect Aggieland and stop the spread of COVID-19, Texas A&M University urges students to be vaccinated and to wear masks in classrooms and all other academic facilities on campus, including labs. Doing so exemplifies the Aggie Core Values of respect, leadership, integrity, and selfless service by putting community concerns above individual preferences. COVID-19 vaccines and masking — regardless of vaccination status — have been shown to be safe and effective at reducing spread to others, infection, hospitalization, and death.