

Derivatives (Futures and Options)
(MGMT 476-001; CRN: 34067)
Spring 2015

Instructor: Dr. Hsuan-Chi Chen

Class Schedule: Tuesday and Thursday; 2:00 pm -- 3:15 pm

Classroom: ASM 1065

Office Location: ASM 2091

Office Hours: TR 1:00 pm - 2:00 pm or by appointment

E-mail Address: chenh@unm.edu

(Please indicate the course number "MGMT 476" in the subject section of your e-mail.)

Office Phone Number: (505) 277-4702

Materials:

Required

- (1) Text: Robert McDonald, *Derivatives Markets*, 3rd edition, 2013.
- (2) Calculator: Financial calculator preferred
- (3) Microsoft Excel

Recommended

The Wall Street Journal

Course Description:

This course presents models and various real-world applications for derivative pricing, derivative strategies, and risk management. Particular attention is given to the following topics: (1) Models for option pricing and hedging (risk management) and (2) various trading strategies and real-world applications. Quantitative techniques used in this course include binomial methods, Black-Scholes (BS) model, and some statistics. (3) Using Microsoft Excel to analyze pricing models and trading strategies.

To get some idea of the quantitative skills we require in the course, take a look at the following famous BS formula for pricing a call option on a stock:

$$C_o = S_o N(d_1) - Xe^{-rT} N(d_2).$$

Definitions:

$$d_1 = \frac{\ln\left(\frac{S_o}{X}\right) + \left(r + \frac{\sigma^2}{2}\right)T}{\sigma\sqrt{T}} \quad d_2 = d_1 - \sigma\sqrt{T}$$

C_o = current call option premium

S_o = current stock price

X = exercise price

σ = annual standard deviation of the stock

T = time to maturity in years

r = annualized, continuously compounded, riskless rate of return

$N(d)$ = cumulative standard normal distribution

$e \approx 2.71828$, the base of the natural logarithm

\ln = the natural logarithm

Objectives:

The specific objectives of this course are to obtain fundamental knowledge in the following topics:

1. Nature of financial derivatives
2. Speculation, arbitrage, and hedging
3. Principles of option pricing, minimum and maximum values of options
4. Put-call parity (Excel skills included)
5. Binomial models (Excel skills included)
6. Black-Scholes Model and extensions (Excel skills included)
7. Real-world applications based on the BS model (Excel skills included)
8. Option trading strategies (Excel skills included)
9. Principles of pricing forwards and futures
10. Futures hedging strategies (Excel skills included)

Grading Scale:

A+	97 – 100
A	93 – 96.99
A-	90 – 92.99
B+	87 – 89.99
B	83 – 86.99
B-	80 – 82.99
C+	77 – 79.99
C	73 – 76.99
C-	70 – 72.99
D+	67 – 69.99
D	63 – 66.99

D-	60 – 62.99
F	below 60

The components of semester grade are listed as follows:

- The first three exams: 40% (20% each for the two exams with higher scores; the exam with the lowest score will be dropped.)
- Final exam (**comprehensive and required**): 20%
- Projects: 20%
- Quizzes: 10% (equally weighted for each quiz; the quiz with the lowest score will be dropped.)
- Attendance/homework: 10% (equally weighted for each class session and homework assignment)

Exams:

There will be four exams throughout the semester. The first three exams are held during our normal class hours on the exam dates specified in the course outline below. The final exam is an exception; it follows the UNM final examination schedule. Please mark these important exam dates on your calendar.

The exams consist of short-answer questions and numerical problems. **Make-up exams will not be given.** However, I will drop the lowest grade among the first three exams (any missed exam automatically equals zero). The final exam is required for every student and is a comprehensive and integrated exam covering materials taught in the whole semester.

When taking exams, you are allowed to bring in a financial calculator. You may also bring one 8.5"x11" sheet of paper, on both sides of which you can jot down formulas or notes you would like to use during the exam. This formula sheet cannot be shared with other students during the exam.

Projects:

There will be two projects for this course related to the option data collection and analytical techniques we will cover in class. Students are encouraged to form project groups/teams of **three to four members**. Due dates and relevant information will be given when the corresponding material has been covered. For each project, each team will turn in a typed report (single-spaced; may include exhibits, tables, and references to support arguments) on the due date. No late reports will be accepted.

Also, for avoiding the free rider problem, the team coordinator should briefly state the contributions of all members and obtain their signatures for confirming the coordinator's statements **on the cover page of each project/report**. Each individual signature on the cover page of any report is counted as one attendance record (see the attendance/homework policy below) of that individual member. If the team coordinator has made reasonable efforts to obtain the signatures of team members (for example, some e-mails to the whole team can serve as evidence of notification) but still cannot get some by the due date, the responsibility is on the part of each individual member who does

NOT sign. No excuse will be accepted because the signature should be done by the due date.

If any member on a team does not make any meaningful contribution to the joint project, that member should be dismissed from the team. The team should e-mail a notice of the member's removal to both the non-contributing member and the instructor at least 24 hours before the due date.

Quizzes:

To encourage you to review class material and practice numerical problems, we have several quizzes during our normal class hours. Any missed quiz automatically equals 0. The quiz with the lowest score will be dropped. For example, suppose we have 4 quizzes and student S has scores of 75, 85, 92 and misses one quiz (a default score of 0). In this case, the average score of three top quizzes is 84 and contributes 8.4 points ($84 \cdot 10\%$) to the semester grade, since quizzes make up 10% of the semester grade.

Attendance/Homework:

This course is demanding in quantitative skills. Missing one class can present an obstacle to subsequent learning. For this reason, students are expected to attend class regularly and participate in discussions. Please come to class on time and turn off your communication devices before class.

Attendance sheets may be signed during the class and will serve as your attendance records. Homework will be assigned for practicing numerical problems and improving your quantitative skills. No late homework assignments will be accepted.

Attendance records (including the signature on homework that you turn in) and homework assignments (counted **only when you practice at least 2/3 of all sub-problems in each homework assignment**) will be equally weighted as records of your class participation and will count toward your semester grade. If you turn in homework with signature but you do NOT practice at least 2/3 of all sub-problems on the homework due date, you receive one attendance record but miss one homework (practice) record. For example, student S signed 18 out of 20 attendance sheets (including each homework signature) and missed one out of ten homework assignments. Thus, student S completed 27 out of 30 records in total. Since each record is equally weighted, the average for attendance/homework is 90 ($27/30$) and contributes 9.0 points ($90 \cdot 10\%$) to the semester grade.

Miscellaneous Questions:

Q: Should students be allowed to use Excel during exams with time-consuming calculation? The issue here is that some calculations required during exams are very time-consuming if done manually, leaving students insufficient time to complete the exams. On the other hand, it is important for students to acquire strong computational skills and not become dependent on Excel or other technical aids.

A: I will give a few quizzes in which students have to show their computation details step by step without using Excel. For instance, students may be asked to manually go through

the steps of calculating (1) the natural logarithm of (stock price/strike price); (2) the parameters d_1 and d_2 ; and (3) $N(d_1)$, $N(d_2)$, and discounting in order to obtain the BS model price. These quizzes will assure both the instructor and the students that students have acquired the basic computational skills. Later exams may allow students to use Excel so that they can avoid devoting too much time to complex calculations during the limited exam time. One benefit of using Excel will be to allow students to focus more on applications rather than on time-consuming calculations during the exams.

Academic Integrity:

Anderson School of Management faculty, staff and students commit to values of trust, honesty, integrity, and accountability. We will not tolerate academic dishonesty. By enrolling in any course at Anderson, the student accepts the Anderson Academic Honesty Code and affirms the following pledge:

I will not lie, cheat, fabricate, plagiarize or use any other dishonest means to gain unfair academic advantage.

Any violation of the code of conduct will be taken very seriously and appropriate sanctions will be applied. FOR FULL TEXT OF ANDERSON'S ACADEMIC HONESTY CODE, please visit <http://www.mgt.unm.edu/honesty>.

ADA Statement:

Reasonable accommodation will be given to any individual with a legitimate disability. Please contact the instructor privately for arrangements. If you are a qualified person with disabilities who might need appropriate academic adjustments, please communicate with me as soon as possible so that we may make appropriate arrangements to meet your needs in a timely manner. Frequently, we will need to coordinate accommodating activities with other offices on campus. Course materials can be made available in alternative formats. (Services on Campus in UNM Pathfinder)

Course Outline

Part 1: Options

- I. Introduction to Derivatives
Textbook: Chapters 1 and 2
- II. Option Trading Strategies and Risk Management
Textbook: Chapters 3 and 4

Exam #1 (February 5, Thursday)

- III. Put-Call Parity and Other Option Relationships

Textbook: Chapter 9

- IV. Binomial Option Pricing Model
Textbook: Chapters 10 and 11

Exam #2 (March 5, Thursday)

- V. The Black-Scholes Formula
Textbook: Chapter 12

(Note: *Chapters 18, 20-22* are materials recommended for students who are highly interested in advanced study and/or financial engineering.)

- VI. Applications using Black-Scholes Model (I)
Textbook: Chapter 13 and 24-1 (implied volatility)

Exam #3 (April 9, Thursday)

- VII. Applications using Black-Scholes Model (II)
Textbook: Chapters 15 and 16

Part 2: Forwards and Futures

- I. Structure of Forward and Futures Markets
Textbook: Chapters 2 and 5

II. Stock index futures

III. Bond futures and asset allocation

IV. Currency forward/futures

Textbook: Chapters 5-7

(Note: Parts II, III, and IV reorganize *Chapters 5-7* and discuss pricing, arbitrage, hedging, and target strategies using various derivatives.)

Final Exam (May 5, Tuesday, 10:00 am-12:00 pm; UNM final examination schedule)

Note: The final exam is a cumulative exam based on the requirement of finance area. Also, the exam is held in our regular meeting room.

*Course outline is tentative and may be changed.