

# DERIVATIVES VALUATIONS AND APPLICATION

## BUSFIN 7232

### SPRING 2018 (SESSION I)

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**INSTRUCTOR:** Prof. Pirim  
**OFFICE:** 242 Fisher Hall  
**E-MAIL:** [pirim.1@osu.edu](mailto:pirim.1@osu.edu) (Please allow 24 hours to respond)  
**WEB PAGE:** Carmen

**CLASS TIMES AND ROOMS:** Mon/Wed 10:15 am – 11:45 am, Gerlach Hall 265

**OFFICE HOURS:** Mondays 1:00 pm – 2:00 pm OR  
by appointment, please email with a subject “BUSFIN 7232”

**TEXTBOOK:** McDonald., R., “Derivatives Markets”, 3rd Edition, Prentice Hall, Pearson.  
**ISBN-13:** 978-0321543080 (Hardcover)

#### Course Description

In recent years there has been considerable growth in markets for futures and options; and there has been phenomenal growth especially on futures and options contracts on financial assets. These contracts are used for *compensation, speculation, yield enhancements* of investments, and, most importantly, for *risk management*. Since every company is exposed to some risk, there is virtually no company that does not deal with derivatives in some way. While some of you may end up in the derivatives industry, it is more likely that most of you will work for a more traditional corporation, perhaps a small business, a governmental agency, or a non-profit organization. However, these entities are all exposed to risk, so this subject is important to you all.

In this course, we will first start in valuation of derivatives products. There is a large number of literatures on option valuation. While the theory might at first glance appear advanced and difficult, it is in fact quite accessible. The purpose of this course is to give you an overview of pricing methods on option contracts. During the course we will examine different types of option contracts and how they are priced. Most of the pricing will be done in the context of the binomial option-pricing model. This is a simple but powerful approach to valuing a wide variety of derivative. We will also cover famous Black and Scholes formula and applications to various derivatives products. And then we will cover Option Greeks and delta-gamma hedging. Last, we will end this course with Exotic Options.

## Course Objectives

By the end of this course, students should successfully be able to:

- (1) understand the pricing of option contracts;
- (2) learn skills used in derivative contract analysis and valuation,
- (3) evaluate trading and speculation opportunities available in the current financial markets, and
- (4) assess the influence of economic events upon pricing.

## Course Materials

### Required Textbook

Title: "Derivatives Markets", 3<sup>rd</sup> Edition, and Prentice Hall-Pearson

Author: Robert L. McDonald

ISBN-13: 978-0321543080 (Hardcover)

### Lecture Materials

There will be lecture materials for each week. Each week, copies of these lecture materials will be available on course web site. Lecture and any other reading materials will be posted in the form of MS Word, Power Point and/or Adobe Acrobat files. It is your responsibility to print them out before/after the class. You are responsible for all material covered in class. Lecture may go beyond the scope of the textbook for certain topics. Therefore, it is important for you to attend class. You are responsible for all announcements made in class. Class lectures will sometimes involve working through problems. Thus, **you are required to bring a calculator** to every class so that you may work on problems and participate in class discussions.

### Suggested End-of-Chapter Problems (Optional)

The course textbook has a set of problems at the end of each chapter. These questions are designed to help students assess their understanding of chapter topics. Some of these problems/questions will be selected from each chapter and will be posted on Carmen. Students should try to answer these problems after they finish reading a chapter to check their understanding of the topics covered.

### Suggested Readings (Optional)

Wall Street Journal: [www.wsj.com](http://www.wsj.com)

Financial Times: <http://www.ft.com/home/us>

Bloomberg: [www.bloomberg.com](http://www.bloomberg.com)

Yahoo! Finance: <http://finance.yahoo.com/>

Freakonomics: <http://freakonomics.blogs.nytimes.com/>

Real Time Economics (WSJ): <http://blogs.wsj.com/economics/>

Calculated Risk: <http://www.calculatedriskblog.com/>

Economy and Economics of Everyday Life: <http://economix.blogs.nytimes.com>

When Genius Failed, Roger Lowenstein

The New Market Wizards, Jack D. Schwager

Too Big to Fail, Andrew Ross Sorkin

The Big Short, Michael Lewis

Young Money, Kevin Roose

Alpha Masters, Maneet Ahuja

## Course Website

The course website is located on Carmen. A student must be registered for the course to access the course web site.

Important Resources on the Course Website:

- Course syllabus
- Supplemental course material used (or mentioned) in class
- Lecture notes (PowerPoint slides)
- Course announcements
- Problem sets and solutions
- Detailed solutions for suggested end-of-chapter problems in the course text
- Posted exam scores (privately for each student)
- Exam formulas
- **Logging in Carmen:** Be sure you are logging in to the course in Carmen each week, including weeks with holidays or weeks with minimal online course activity. (During most weeks you will probably log in many times.) If you have a situation that might cause you to miss an entire week of class, discuss it with me *as soon as possible*.

## Course Technology:

Baseline technical skills necessary for this course

- Basic computer and web-browsing skills
- Navigating Carmen

### Technology Support for Carmen

As instructor, my responsibility is the course content and evaluating performance. Please contact me about any concerns in these areas. However, I am generally not able to assist in matters relating to technology, connectivity or Carmen access. Such issues may be addressed directly to either Carmen Technical support or Help desk.

Hence sources of help are available from [helpdesk@osu.edu](mailto:helpdesk@osu.edu) (or by phone at 292-8976) and [carmen@osu.edu](mailto:carmen@osu.edu) or 614-688-HELP at any time.

## Course Requirements and Policies:

### Exams:

There will be **one comprehensive final exam**. Final Exam will be similar to the examples and problem sets used in class, and I reserve the right to make any changes appropriate for the administration and evaluation of the class. Final Exam is closed-book and closed-notes however a formula sheet will be provided during the exam. A copy of the formula sheet will be posted on the course website before the exam. A copy also will be handed out at the exam.

### Make-up Exams:

**As a general rule, make-up exams are NOT given in this course.** However, a student may be allowed to take a make-up exam, if in the opinion of the instructor, there are special or extenuating circumstances. Without permission to take a make-up exam, failure to take an exam will result in grade of zero on the exam in

question. Every effort should be made (e.g. email, voicemail, message with the Finance Department Office) to notify the instructor at least 24 hours in advance. The date/time of the make-up exam will be scheduled according to the instructor's schedule by the instructor.

Under no circumstances will a student be excused from an exam

### **Petition for Exam Re-Grading:**

If a student believes his or her exam was not graded correctly and wants a question re-graded, the students must submit a request to Prof. Pirim in writing (must be submitted as an attached document in an email). The request must be received no later than ten (10) days from the date of the exam in question. The request should be carefully explain why the student wants his or her exam re-graded.

### **Problem Sets:**

There will be total 5 problem sets. The problem sets will be posted on Carmen no later than 5:00 pm on the day indicated below in Table 1 and will be due at the beginning of class on the due day given in the Table 1. Solutions will be posted on the due dates, and no late problem sets will be accepted. If you submit a print-out from a spreadsheet, please make sure to label it carefully. You must submit a paper copy of your solution. I **will NOT** accept electronic copies. You can work in a group **no more than three people** and submit **one copy per group**. Also, please remember that **late assignments will not be accepted**.

### **Project:**

Since the mid-1980s there have been some spectacular losses in derivatives market. Below, you have list of the companies, which had big losses due to their positions in derivatives products. For this project you will need to obtain information about the whole event on the firm your group draw and write a full report and last present your findings about this event to all of us.

The project will be completed in a group of up to 6 people. This project counts 20 % of your overall grade. The breakdown is as follows.

\* Written Report - 10 %

\* Presentation - 5 %

\* Peer Evaluation - 5%

### **Big Losses by Financial Institutions and Non-Financial Corporations (Following list is the order of the presentation)**

1. Barings (\$1 billion)
2. Kidder Peabody (\$350 million)
3. Long-Term Capital Management (LTCM) (\$4 billion)
4. Metallgesellschaft (\$1.8 billion)
5. Societe Generale (\$7.2 Billion)
6. UBS (\$2 Billion)

## Directions:

In this project, you will write a comprehensive final report between 15 to 20 typed pages, double-spaced, Times News Roman, #12 font size. The project is due on **February 14<sup>th</sup>** (Wednesday), 2018. You should submit hard and electronic copies of the report and presentation in order to get full credit. Your group leader must send an email with attached report and power point slides for presentation to me no later than **midnight on the February 14<sup>th</sup>, 2018** Hard copy must be submitted **in class on February 14<sup>th</sup>, 2018**.

### Written Report must contain the following:

- 1. Title page:** Your name(s) and group # (underline the group leader's name), course #, term and date, and instructor's name.
- 2. Introduction:** Briefly describe your project and what you learn from this project.
- 3. Overview of the firm:** Explain the industry of the firm and the important key elements of the firm.
- 4. Summary of the whole event:** **Chorological order of the whole event** that led this firm to have big losses. When did it start? Who was responsible for this loss? When did the firm first know about the losses?
- 5. Analysis:** Discuss in detail and analyze the whole event. What went wrong? What was the strategy of the firm? Who was the key person(s) for the whole event? What did the upper management do? What happened at the end? Did the firm go bankrupt? What happened to the key players and the firm?
- 6. Conclusion:** Lessons to be learned from this specific event.
- 7. Appendices:** [In order for group leader to receive full credit for peer evaluation, confirmed weekly E-mail records should be included (the group leader responsibility) ].
- 8. References**

### Presentations:

For the final presentation of the project, please discuss what was discovered. What have you learned and what lessons can we take away from this event. Presentation must be professionally prepared in PowerPoint and well organized. Each group will have 30 minutes to present their project. Hard copies of the report as well as PowerPoint document must precede the presentation, hence due date for all groups is **February 14<sup>th</sup>, 2018**. Besides submitting the project in class, also send me copies of the report and power point presentation via e-mail by midnight on the **February 14<sup>th</sup>, 2018**.

**Peer Evaluation:** You will be asked to complete a peer evaluation form at the end of the semester, **February 21<sup>st</sup>, 2018**, is the due date. So that I can recognize the individual contributions of group members to the overall group project. Each group member can earn a maximum of 100 points and it will be 5% of your overall grade. In order for me to determine your grade and assign these points, you have to provide me with information that evaluates the performance of your study group members. Keep in mind that the information you provide through peer evaluation form is confidential and I shall not share this information with your group members. I will post the peer evaluation form on Carmen in advance and it is due last day of class, **February 21<sup>st</sup>, 2018**. I will NOT accept electronic copies and please submit it in class.

### Assignment for Bonus 5 Points:

You can use Think or Swim platform on TD Ameritrade U to tie lecture with hands on practice. Please create your account on tdameritradeu.com by the second week of this semester. The information about how to create an account at TD Ameritrade U will be posted on Carmen first week. You will be making investment decision with paper cash of \$1,000,000 to invest in stock, options and futures contracts based on your research through Bloomberg, Capital IQ, Thomson One and Morningstar or through internet with Yahoo or Google finance. You should document reasons why you made the trade.

### Attendance and Participation:

You are strongly encouraged to participate in this class. I encourage you to ask questions and participate in discussions. This makes lecture more interesting. I also encourage you to give me any suggestions that you have about improving the course. Attendance will be checked occasionally. You are responsible for all information covered in class. If you miss class, obtain the information missed. To enhance your understanding, **you should read the assigned material beforehand**. If you do not miss more than one class then you will be eligible for a bonus 1 point towards your overall grade. As a matter of professional courtesy, I expect an email or phone message, if you are unable to attend class.

*I also wanted to remind you all that The University and College expectation is that students spend two hours outside of class for every hour spent in class. Since this course meets almost 3 hours per week, you should expect to spend around 6 hours per week outside of class on course-related work.*

### Email Policy:

Any inquiries regarding the explanation of course subjects, solution to a problem, information already included in syllabus such as curve and grading policies, exam date/time & materials, any grading policy, technical problems such as calculator & Carmen **will NOT be answered via email**. However, you may schedule an appointment with me, in addition to the office hours, and/or use the discussion board on course Carmen site for these kinds of inquiries that could also be answered by your classmates.

### Faculty feedback and response time:

I am providing the following guidelines to give you an idea of my intended support throughout the course. Grading and feedback:

- Problem set grades will be posted on Carmen within 7 days after the due date.
- Exam scores should be posted on Carmen within 7 days after the test date.

E-mail:

I will generally reply e-mails within 48 hours on school days and on many weekends.

## Course Grading Policy:

Your final course grade will be determined by the following:

Assignment or category	Points	Percentage of total grade
Problem Sets (Best 4 at 25 points each)	100 points	20 %
Project Report	100 points	10 %
Project Presentation	100 points	5 %
Peer Evaluations	100 points	5 %
Final Examination	100 points	60 %
Total	500 points	100%

*See course schedule, below, for due dates*

**Total Course Grade = 0.60 x (Final Exam Grade) + 0.10 x (Project Report Grade) + 0.10 x (Project Presentation Grade) + 0.05 x (Peer Evaluation) + 0.20 x ( 4 Best Problem Sets Grade)**

Note that only 4 out of 5 problem set grades will count toward the total problem sets grade. The lowest of the 5 problems set grade will not be in above calculation.

After the total course grade has been calculated for all students, the average for the class is calculated. If the course class average is below 75%, a curve adjustment is applied. The curve adjustment equals 75% minus the course class average. If the course class average is equal or above 75%, a curve adjustment is not applied (that is curve adjustment is zero). **There will be NO extra credit work available in this course.**

The course grade will be converted to a letter grade for the course using the following grading scale:

### Grading scale:

A	93 – 100	B+	87–89.9	C+	77–79.9	D+	67 –69.9	E	Below 60
A-	90 – 92.9	B	83–86.9	C	73–76.9	D	60 –66.9		
		B-	80–82.9	C-	70 –72.9				

I reserve the right to correct grades recorded on the course website, should she determine such entries were posted incompletely or incorrectly.

## Academic Integrity Policy:

The Ohio State University's *Code of Student Conduct* (Section 3335-23-04) defines academic misconduct as: "Any activity that tends to compromise the academic integrity of the University, or subvert the educational process." Examples of academic misconduct include (but are not limited to) plagiarism, collusion (unauthorized collaboration), copying the work of another student, and possession of unauthorized materials during an examination. Ignorance of the University's *Code of Student Conduct* is never considered an "excuse" for academic misconduct, so I recommend that you review the *Code of Student Conduct* and, specifically, the sections dealing with academic misconduct.

**If I suspect that a student has committed academic misconduct in this course, I am obligated by University Rules to report my suspicions to the Committee on Academic Misconduct.** If COAM determines that you have violated the University's *Code of Student Conduct* (i.e., committed academic misconduct), the sanctions for the misconduct could include a failing grade in this course and suspension or dismissal from the University.

If you have any questions about the above policy or what constitutes academic misconduct in this course, please contact me.

## Accommodations for Accessibility:

### Requesting accommodations

If you would like to request academic accommodations based on the impact of a disability qualified under the Americans with Disabilities Act and Section 504 of the Rehabilitation Act of 1973, contact your instructor privately as soon as possible to discuss your specific needs. Discussions are confidential. In addition to contacting the instructor, please contact the Office for Disability Services at 614-292-3307 or [ods@osu.edu](mailto:ods@osu.edu) to register for services and/or to coordinate any accommodations you might need in your courses at The Ohio State University. Go to <http://ods.osu.edu> for more information.

## Assessment Timetable:

The following table shows the due dates for all the problem sets in this class. The problem sets will be posted on Carmen no later than 5:00 pm on the day indicated below in Table 1 and will be due at the **beginning of class** on the due day given in the Table 1. **Solutions will be posted on the due dates, and no late problem sets will be accepted.**

Please remember that I **will NOT** accept electronic copies. You can work in a group no more than **three people** and submit one copy per group. **Also, please remember that late assignments will not be accepted**



**Table 1: Assessment Timetable**

<i>Problem Set</i>	<i>Date Issued (Posted on Carmen)</i>	<i>Due Date (Beginning of class)</i>
Problem Set 1	January 17 <sup>th</sup> , Wednesday	January 24 <sup>th</sup> , Wednesday
Problem Set 2	January 24 <sup>th</sup> , Wednesday	January 31 <sup>st</sup> , Wednesday
Problem Set 3	February 31 <sup>st</sup> , Wednesday	February 7 <sup>th</sup> , Wednesday
Problem Set 4	February 7 <sup>th</sup> , Wednesday	February 14 <sup>th</sup> , Wednesday
Optional Problem Set 5	February 14 <sup>th</sup> , Wednesday	February 21 <sup>st</sup> , Wednesday

**Course Schedule:**

The following describes the tentative class schedule. The topics covered on each proposed week may change as the session progresses, but the general order will not vary. You are strongly urged to read the appropriate chapters **BEFORE** the lecture so as to learn more during the lectures. To do well, you **must keep up with the reading and stay focused during class. It is easy to get behind** in the study of derivatives. **You should read through the chapters prior to class.** This will help your understanding of the concepts as they are discussed. Reread the material after class. If you have any questions, please feel free to come and see me. The following outline is the order of study (I reserve the right to change this outline when necessary).

**Table 2: Tentative Lecture Timetable**

<i>Class Date</i>	<i>Topics, Assignments, Deadlines</i>	<i>Reading</i>
<p><b>Week 1</b></p> <p>Jan 8<sup>th</sup> &amp; Jan 10<sup>th</sup></p>	<p><b>Week 1: Course Introduction and Review Syllabus</b></p> <p><b>Chapter 10: Binomial Option Pricing: Basic Concepts</b></p> <p><b>Assignment for this week:</b></p> <ol style="list-style-type: none"> <li>1. Read chapter 10</li> <li>2. Download slides for chapter 10</li> <li>3. Review chapter 10 slides before class</li> </ol>	<p><b>Syllabus</b></p> <p><b>McDonald Ch. 10</b></p>
<p><b>Week 2</b></p> <p>Jan 15<sup>th</sup> (No Class) Martin Luther King Day</p> <p>Jan 17<sup>th</sup></p>	<p><b>Week 2: Chapter 10 &amp; 11, Binomial Option Pricing: Basic Concepts and Selected Topics</b></p> <p><b>Assignment for this week:</b></p> <ol style="list-style-type: none"> <li>1. Read chapter 10 &amp; 11</li> <li>2. Download slides for chapter 10 &amp; 11</li> <li>3. Review chapter 10 &amp; 11 slides before class</li> </ol>	<p><b>McDonald Ch. 10 &amp; 11</b></p>
<p><b>Week 3</b></p> <p>Jan 22<sup>nd</sup> &amp; Jan 24<sup>th</sup></p>	<p><b>Week 3: Chapter 12: The Black-Scholes Formula and Option Greeks</b></p> <p><b>Assignment for this week:</b></p> <ol style="list-style-type: none"> <li>1. Read chapter 12</li> <li>2. Download slides for chapter 12</li> <li>3. Review chapter 12 slides before class</li> <li>4. Problem Set #1 due (Jan 24<sup>th</sup>, Wednesday)</li> </ol>	<p><b>McDonald Ch.12</b></p>
<p><b>Week 4</b></p> <p>Jan 29<sup>th</sup> &amp; Jan 31<sup>st</sup></p>	<p><b>Week 4:</b></p> <p><b>Chapter 13: Market-Making and Delta- Hedging</b></p> <p><b>Assignment for this week:</b></p> <ol style="list-style-type: none"> <li>1. Read chapter 13</li> <li>2. Download slides for chapter 13</li> <li>3. Review chapter 13 slides before class</li> <li>4. Problem Set #2 due (Feb 31<sup>st</sup>, Wednesday)</li> </ol>	<p><b>McDonald Ch. 13</b></p>

<p><b>Week 5</b></p> <p><b>Feb 5<sup>th</sup> &amp; Feb 7<sup>th</sup></b></p>	<p><b>Week 5:</b>  <b>Chapter 13 Cont'd and Chapter 14: Exotic Options</b></p> <p><b>Assignment for this week:</b></p> <ol style="list-style-type: none"> <li>1. Read chapter 14</li> <li>2. Download slides for chapter 14</li> <li>3. Review chapter 14 slides before class.</li> <li>4. Problem Set #3 due (Feb 7<sup>th</sup>, Wednesday)</li> </ol>	<p><b>McDonald Ch.14</b></p>
<p><b>Week 6</b></p> <p><b>Feb 12<sup>th</sup> &amp; Feb 14<sup>h</sup></b></p>	<p><b>Week 6:</b>  <b>Cont'd Chapter 14: Exotic Options</b></p> <p><b>Assignment for this week:</b></p> <ol style="list-style-type: none"> <li>1. Read chapter 14</li> <li>2. Download slides for chapter 14</li> <li>3. Review chapter 14 slides before class</li> <li>4. Problem Set #4 due (Feb 14<sup>th</sup>, Wednesday)</li> </ol>	<p><b>McDonald Ch.14</b></p>
<p><b>Week 7</b></p> <p><b>Feb 19<sup>th</sup> &amp; Feb 21<sup>th</sup> Last day of Class</b></p>	<p><b>Week 7:</b></p> <p><b>Assignment for this week:</b></p> <ol style="list-style-type: none"> <li>1. Optional Problem Set #5 due (Feb 21<sup>st</sup>, Wednesday)</li> </ol> <p><b>PRESENTATIONS : First three groups; Feb 19<sup>th</sup> Barings, Kidder Peabody, and LTCM</b></p> <p><b>PRESENTATIONS: Last Three Groups; Feb 21<sup>st</sup> MG, Societe Generale, and UBS</b></p> <p>Review for Final Examination</p>	

**FINAL EXAM SCHEDULE**

**Feb 26<sup>th</sup>, 2017, Monday**

**From 10:15 am to 12:15 pm at GE 265**

**McDonald Chapters: 10, 11, 12, 13, and 14**

**GOOD LUCK!**