

22S:180
Mathematics of Finance I
Fall 2009

Prerequisite: two semesters of calculus

Instructor: J. Broffitt, 231 SH, 335-0820, james-broffitt@uiowa.edu

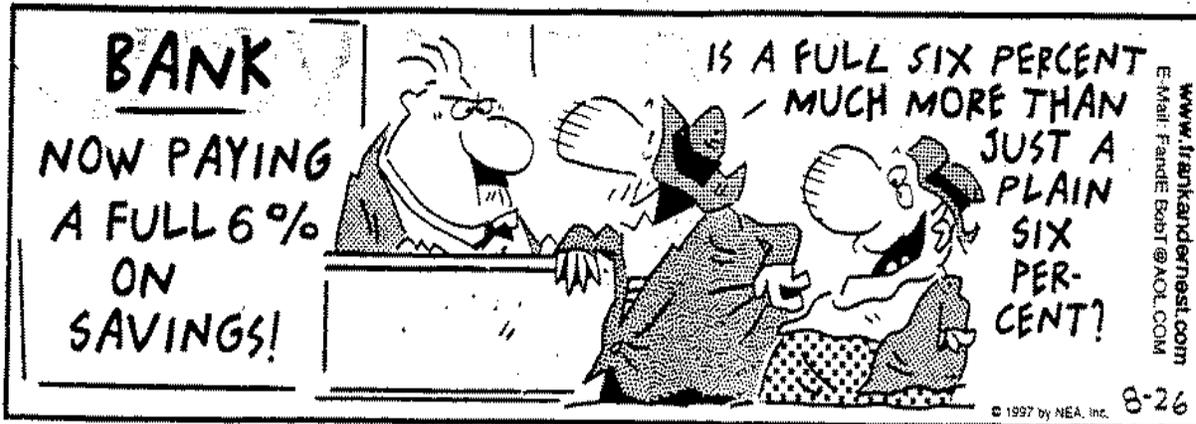
Office Hours: 2:30 - 3:20 MW & 10:00 - 11:00 TR, or by appointment.

Department: Statistics & Actuarial Science, 241 SH, 335-0712.
Department Chair - L. Tierney, luke-tierney@uiowa.edu, 5-0712.

Classes: 8:30 to 9:20 Monday, Tuesday, Wednesday, Thursday, and Friday; except there will be no class on the following Tuesday's: September 22 & 29, October 13 & 27, and November 3.
The last class will be on Friday, November 20. Classes meet in room - 14 SH.

Frank and Ernest

By Bob Thaves



Objectives:

This course is intended to provide a good understanding of the mathematics of compound interest, and to provide an introduction to financial derivatives. This is of fundamental importance in actuarial work. Students returning from internships and former students coming back for a visit often comment that compound interest is one of the most useful topics they studied. In addition, this course prepares students for CAS Exam 2/SOA Exam FM, and provides a background for the study of life contingencies. One of the prerequisites for 22S:181, Life Contingencies I, is a grade of C or higher in 22S:180.

In the early part of the course we consider the basic mathematics, terminology and notation needed to deal with interest problems. Students are sometimes overwhelmed at first. However, with practice it all begins to make sense. Thus, it is important to work through applicable textbook problems in addition to the homework problems assigned. The latter part of the course deals more with applications of the theory. This will help to reinforce many of the ideas. Finally, the last few weeks will be devoted to financial derivatives.

Fall 2009 Exam Dates for CAS Exam 2/SOA Exam FM: December 1 - 8.

This is a computer-based exam.

Applications to take this exam must be received in the SOA office by October 22.

Email:

Any emails relating to this course will be sent to you via your email address registered with the University (no exceptions). Please check your email at least once per day.

ICON:

This course will make use of ICON (Iowa Courses ON line). Grades will be posted on ICON as well as homework assignments and other information that you should access and print out. In particular, compound interest questions from seven past CAS 2/SOA FM exams are on this website. Since we will work several of these questions in class, **print a copy and bring it to class**. There are also some past exams that I have given in 225:180. **I recommend bring these to class as well**. The web address for ICON is <http://icon.uiowa.edu/>. You will need to log in using your Hawk ID and password.

Texts:

There are two parts to the course: interest theory and financial derivatives.

1. Interest Theory. No official text has been assigned for this part. Two I have used in the past are *Financial Mathematics - A Practical Guide for Actuaries and other Business Professionals (Second Edition)*, by C. Ruckman and J. Francis, and *Theory of Interest (third edition)* by Kellison. Copies of both are on reserve in the Mathematics Library, 125 MLH. You can order one online if you like.

The CAS Exam 2/SOA Exam FM syllabus is as follows for these books:

Financial Mathematics A Practical Guide for Actuaries and other Business Professionals: Chapters 1, 2, Chapter 3 (3.1-3.9), Chapter 4 (4.1-4.5), Chapter 5, Chapter 6 (6.1-6.3, excluding 6.1.6-6.1.7), Chapter 7 (7.1-7.9), Chapter 8 (8.1-8.3).

Theory of Interest: Chapter 1 (1.2-1.10), Chapter 2 (2.3-2.6), Chapter 3 (3.2-3.8), Chapter 4 (4.2-4.9), Chapter 5 (5.2-5.6), Chapter 6 (6.2-6.7, 6.10), Chapter 7 (7.2-7.7), Chapter 9 (9.4), Chapter 10 (10.2-10.5), Chapter 11 (11.2-11.8).

2. Financial Derivatives: The assigned text is *Derivatives Markets (Second Edition)*, 2006 by McDonald, R. The Exam 2/Exam FM syllabus consists of the following sections: Chapter 1 (1.1-1.4); Chapter 2 (2.1-2.6, Appendix 2.A); Chapter 3 (3.1-3.5), Chapter 4 (4.1-4.4), Chapter 5 (5.1-5.4, Appendix 5.B), Chapter 8 (8.1-8.2).

Copies of his book are also on reserve in the Math Library. Although we will only use it for about three weeks, it is part of the exam syllabus for other professional exams, so I recommend getting a copy.

Note: Other textbooks may be used to study for the professional exam. For these and other information about CAS exam 2/SOA exam FM, go to <http://www.soa.org/files/pdf/edu-2008-fall-exam-fm.pdf>.

Optional Study Material:

Various types of study materials are available from different sources. Here are some web sites you can check:

<http://www.actexamdriver.com> -- this seems to be the most popular with students.

<http://www.bpp.com>

<http://www.afshapiro.com/students.html>

Calculators:

You will need either the Texas Instruments BA II Plus or the BA II Plus Professional. These calculators are the only ones allowed on SOA/CAS exams that do interest calculations. The II Plus costs about \$30, and the II Plus Professional costs about \$50. You will need to get one and get used to it prior to our first exam. On exams you will need one of these calculators. In addition you may use any other calculator(s) approved for the SOA exams: TI-30Xa (about \$10) and the TI-30X II (S - solar, B - battery) (about \$13). I will provide some instructions for using the financial calculator. An alternate calculator guide is available on the SOA website.

Attendance:

Attendance is mandatory. I expect students to be on time and attend all classes. Being sick is a legitimate reason to miss class, but just feeling a little under the weather is not. **Excessive absences may result in a lowering of your grade or a failing grade.**

Homework:

Unless otherwise stated, homework assignments will be collected on Fridays and returned on Mondays. Submit homework on 8.5x11 paper. **If there is more than one page, staple them together.** Homework is due at the beginning of the class period. I do not mind if you work with others on homework problems, and I encourage you to come to me for hints if you are stuck. However, you should first attempt to do the problems on your own, and you are to write the solutions on your own rather than copying the work of others. Do not merely write down answers, but clearly show how you got your results. Homework may be submitted one class period late, but there will be a 25% penalty. Late homework creates additional burdens on the grader. The penalty is to encourage you to be on time with your homework, and thus make life a bit easier for the grader.

Friendly Advice:

Main rule -- do not fall behind! The material is cumulative. Most of you will need a minimum of two to three hours of study after each class (not including class time) to successfully learn the course material. Some of you will need more. If you do not put in the time, you will not learn. Your goal should be to understand rather than to just memorize facts and formulas.

Come to office hours to get your problems sorted out promptly. Study the text carefully and keep up with the lectures. Don't read it like a novel. Do the problems and if you get stuck, look for similar worked examples. Work problems by yourself or in small groups -- both assigned homework problems and others from the text and former SOA exam problems. Working exercises is *the* major way to assess your understanding and to solidify concepts. You cannot learn how to solve problems by merely watching your teacher do them -- you must solve problems on your own. When you do not understand, ask questions. Be a participant and not just a spectator.

Exams:

Exams will be closed book. Do not wear caps or hats during the exams. There will be two exams plus a final. Exam dates and times are as follows:

| | | | |
|--------------------|-----------------------------|------------------------|-----------------|
| Exam 1 : | Friday, September 25 | 8:30 to 9:20 AM | room TBD |
| Exam 2: | Friday, October 30, | 8:30 to 9:20 AM | room TBD |
| Final Exam: | Monday, December 14, | 7:30 to 9:30 AM | room TBD |

Grades:

Grades will be based on the percent of points earned on exams and homework; however, **attendance may also affect your grade.** Each exam will count 22%, the final will count 44%, and homework will count 12%. If E_i is the percent of points earned on exam i , F is the percent of points earned on the final, and H is the percent of points earned on homework, your course composite will be calculated by the following weighted average: $0.22[E_1 + E_2] + 0.44F + 0.12H$. Your grade for this course will be assigned according to the following **approximate** scale:

| Undergraduate Students | Graduate Students | Grade |
|-------------------------------|--------------------------|--------------|
| 90 to 100 | 90 to 100 | A |
| 75 to 89 | 80 to 89 | B |
| 60 to 74 | 70 to 79 | C |
| 50 to 59 | 60 to 69 | D |
| 0 to 49 | 0 to 59 | F |

This is not an absolute scale. The cutoff points may vary depending on the difficulty of the exams. Also, borderline cases may receive a + or -, **and grades may be lowered due to attendance.**

Off-Cycle Course:

This is an off-cycle course since it ends prior to the end of the regular semester. Our last class is on November 20. Consequently, deadlines published in the University calendar do not apply. You can find the last drop date and other similar dates and information at the webpage <http://www.registrar.uiowa.edu/more/coursedeadlines.aspx>

College of Liberal Arts and Sciences: Policies and Procedures

Administrative Home

The College of Liberal Arts and Sciences is the administrative home of this course and governs matters such as the add/drop deadlines, the second-grade-only option, and other related issues. Different colleges may have different policies. Questions may be addressed to 120 Schaeffer Hall, or see the CLAS [Student Academic Handbook](#).

Electronic Communication

University policy specifies that students are responsible for all official correspondences sent to their University of Iowa e-mail address (@uiowa.edu). Faculty and students should use this account for correspondences. (*Operations Manual*, [III.15.2](#). Scroll down to k.11.)

Accommodations for Disabilities

A student seeking academic accommodations should first register with Student Disability Services and then meet privately with the course instructor to make particular arrangements. See www.uiowa.edu/~sds/ for more information.

Academic Fraud

Plagiarism and any other activities when students present work that is not their own are academic fraud. Academic fraud is a serious matter and is reported to the departmental DEO and to the Associate Dean for Undergraduate Programs and Curriculum. Instructors and DEOs decide on appropriate consequences at the departmental level while the Associate Dean enforces additional consequences at the collegiate level. See the CLAS Academic Fraud section of the [Student Academic Handbook](#).

CLAS Final Examination Policies

Final exams may be offered only during finals week. No exams of any kind are allowed during the last week of classes. Students should not ask their instructor to reschedule a final exam since the College does not permit rescheduling of a final exam once the semester has begun. Questions should be addressed to the Associate Dean for Undergraduate Programs and Curriculum.

Making a Suggestion or a Complaint

Students with a suggestion or complaint should first visit the instructor, then the course supervisor, and then the departmental DEO. Complaints must be made within six months of the incident. See the CLAS [Student Academic Handbook](#).

Understanding Sexual Harassment

Sexual harassment subverts the mission of the University and threatens the well-being of students, faculty, and staff. All members of the UI community have a responsibility to uphold this mission and to contribute to a safe environment that enhances learning. Incidents of sexual harassment should be reported immediately. See the UI [Comprehensive Guide on Sexual Harassment](#) for assistance, definitions, and the full University policy.

Reacting Safely to Severe Weather

In severe weather, class members should seek appropriate shelter immediately, leaving the classroom if necessary. The class will continue if possible when the event is over. For more information on Hawk Alert and the siren warning system, visit the Public Safety [web site](#).

*These CLAS policy and procedural statements have been summarized from the web pages of the [College of Liberal Arts and Sciences](#) and The University of Iowa [Operations Manual](#).