BOB JONES UNIVERSITY
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Ma 418 ~ Actuarial Mathematics I
Fall Semester 2021 – 2022

Instructor:	Dr. Melissa Gardenghi
Office:	Alumni 38
Office Hours:	Daily by appointment (see below to schedule)
Preferred Method of Communication:	MS Teams; personal correspondence by personal chat and general course/content related questions in the course general channel
Email:	mgardeng@bju.edu
Course Webpage:	https://math.bju.edu/ma418/

Course Description:

Actuarial modeling, including life states, survival models, and relevant random variable calculations; premium and reserves calculations; pension and retirement calculations. First semester, odd-numbered calendar years, Corequisite: Ma 404

Textbook/Calculator:

Actuarial Mathematics for Life Contingent Risks, 3rd edition, by Dickson, Hardy, & Waters (ISBN# 9781108478083). Please note that this text is not a statistics book. You may find it useful to have access to a mathematical statistics book for referencing information on various distributions. *Solutions Manual for Actuarial Mathematics for Life Contingent Risks* is optional but not required.

Students may ONLY use the TI BA II Plus, TI-30Xa, TI-30X II, and TI-30X MultiView (adapted from SOA Exam guidelines, exceptions for non-actuarial students are made on a case by case basis).

Course Context: This course supports the following objectives of the actuarial program:

ASM1: Progress logically from premises to valid conclusions in a variety of mathematical and applied contexts including analysis, statistics (both theoretical and applied), probability and finance.

ASM2: Apply mathematics to actuarial problems (such as financial math and probability modeling) in exercising the biblical mandate to have dominion over the earth.

ASM3: Use technology as a tool for understanding as well as a labor-saving or problem-solving tool.

ASM4: Build the communication skills necessary to effective communicate technical information to a quasi-technical audience and provide the information necessary for data-based decisions.

ASM5: Construct a biblically consistent philosophy of topics encountered in actuarial science.

Course Goals:

CG1: Review foundational and necessary statistical techniques. ASM1, ASM3

CG2: Introduce the student to actuarial models. ASM1, ASM3

CG3: Develop the student's ability to communicate information about technical aspects of actuarial science as well as a general understanding of what the discipline entails. ASM2, ASM3

CG4: Encourage the appropriate use of technological tools to efficiently develop actuarial models. ASM1, ASM4

CG5: Prepare the student, with the foundational material that will allow them to start preparing for the Modeling Life Contingencies Exam (Exam MLC). ASM2, ASM3

CG6: Encourage the student to place the professional ethic code within the context of Scripture. ASM5

Course Objectives: The student will be able to[*]

1. Describe the basic components/uses of actuarial science. CG 3
2. Address ethical considerations pertinent to actuaries from a biblical perspective. CG 6
3. Use statistical tools appropriate for modeling risk. CG1, CG4, CG5
4. Calculate and interpret standard probability functions including survival and mortality probabilities, force of mortality, and complete and curtate expectation of life. CG2, CG5
5. Calculate and interpret basic reserve types and methods. CG2, CG5
6. Calculate and interpret probabilities, means, percentiles and higher moments in the context of survival models, present value RVs, premiums, and reserves. CG1, CG4, CG5
7. Calculate and interpret the effect of changes in underlying assumptions in the context of present value RVs, premiums, and reserves. CG 2, CG5
8. Apply appropriate approximation methods such as uniform distribution of deaths and constant force in the context of survival models, present value RVs, premiums, and reserves. CG2, CG5
9. Recognize and answer those questions on Exam LTAM that are covered in chapters $1 - 7$ of the textbook. CG5

[*] Objectives 4-8 are based on the Learning Objectives stated in the syllabus for Exam LTAM (see https://www.soa.org/globalassets/assets/files/edu/2021/fall/syllabi/ltam.pdf, retrieved July 14, 2021).

These objectives are subject to the completion of relevant content. There may not be time to complete all of chapters 1-7 during one semester.

Course Requirements and Evaluation: The course grade will consist of

1. Two unit tests as announced in class. Worth 250 and 300 points each.[**]
   Tentative Test Schedule: Sept 21 Ch 2-3; Nov 9 Ch 4- 6
2. Weekly homework quiz[***], due by 11:50 on Saturday each week, and will be worth 8 points each.
3. Academic Goal quizzes, approximately 16, worth 5 points each
4. Homework handouts, approximately 8, worth 5 points each
5. Actuarial roles defined 45 points. Due date: Sept 7
6. Evaluation of ethical concerns 90 points. Due date: Sept 28
7. Semester project: 6 project updates, worth 5 points each, life tables, worth 125 points due Oct 21; policy valuation worth 170 points due Dec 7
8. A cumulative final exam will be worth 400 points.

[**] Point assignments are subject to change.
[***] Recommended homework assignments and project instructions can be found on the course webpage.

Grading Scale: Standard 10 point scale with approximately 1650 points in the class.

Office Hour Appointments:

Office hour appointments can be made using the Calendly site.

Instructions for using the site: https://math.bju.edu/media/bju-math-division/bju-math-department/melissa-gardenghi/Office-Hours-Procedure.pdf.

A direct link to Calendly for making appointments with Dr. Gardenghi: https://calendly.com/mgardeng/20min

General Policies:

1. Compliance with student handbook policies is expected during class. The classroom is to be a professional environment. That means your attention is expected to be on course related material, and you are expected to positively contribute to the class. I reserve the right to ask you to leave class should your attention be elsewhere (sleeping, surfing the internet, working on assignments for another class, etc.).

2. Late Policy:

   - Weekly HW/progress reports are penalized at 25% per calendar day late (automatically in Canvas).

- Written assignments/projects are penalized at 15% off if turned in with 3 calendar days of the due date and are a 0 after that. Oral presentations are a 0 if not presented on the day assigned.

- In-class tests must be taken by the date given in class unless there is incapacitating illness (see attendance policy below).

- Work may always be completed early (contact your professor if you wish to take a test early).

Exceptions may be granted by your professor in emergencies. Contact your professor asap by Teams to notify them of the emergency.

3. BJU attendance policy is in effect (see https://home.bju.edu/bju-policies/ for details).

Scheduled tests/quizzes should be taken before your *planned absence*; please contact your professor to make arrangements for doing so. You are personally responsible to get notes from your classmates and discuss the missed material with them. You should not expect your professor to privately re-teach you the material you missed. If an unannounced quiz/assessment is taken during the class that you miss, you will NOT be allowed to make it up, and you WILL receive a zero on the assignment.

Missing an in-class test because you feel you are not prepared to take it is **not** acceptable. Work missed for this reason will not be made up and you will receive a zero on the assignment.

For *absences due to incapacitating illness or emergency*, you should contact the instructor as soon as you realize you will not be in class to make arrangements for making up any missed work. In-class tests will be made up without penalty for the first occurrence. Each subsequent time a test is missed because of incapacitating illness or emergency, an additional 10 percent grade penalty for that test will be incurred.

4. University academic integrity policy is in effect (see https://home.bju.edu/bju-policies/ for details).

Cheating is defined as any use of unauthorized helps, and plagiarism is defined as taking someone else's words and/or ideas and claiming them as your own.

Doing your own work brings glory to God. The claiming of someone else's work as your own is cheating and is a sin. All work done for this class needs to be your own. If information is taken from other sources (which is at times appropriate), it always needs to be referenced and credit given where it is due. Use standard referencing techniques as taught in En 102. Solutions found on the internet are not to be copied.

Projects: You are encouraged to discuss the general ideas as discussed in this course with your classmates, but are **not** permitted to "work together" on your project. Your projects must represent your own ideas and your own work.

Papers: You may discuss the general ideas included in your papers, but you must craft your own positions and the writing should represent your own work.

In-Class Tests: In today's age of technology, cheating includes getting unapproved help from a source on the internet and/or using your calculator to provide you with additional information during a test. The presence of any unauthorized material on your desk while taking a test, will be construed as cheating and will be dealt with as such. Cheating on a test will result in a zero on the test plus any penalties imposed by the Academic Integrity Committee. See detailed Testing Guidelines on the course website.

Take-Home Tests: Take-home tests are also expected to represent your own work. All guidelines for in-class tests also apply to take-home tests unless explicitly stated otherwise in the directions. No collaboration, discussion, consultation, etc. with any person is permitted. Cheating on a test will result in a zero on the test plus any penalties imposed by the Academic Integrity Committee.

If you have a question about any source you are considering using, please gain your professor's approval before using it. You are always permitted to ask your professor for help. Any help they choose to provide is acceptable.