Syllabus

Course Web Page: https://edoras.sdsu.edu/~babailey/stat672
and `canvas.sdsu.edu`

Meeting Time: Lectures: MW 2:00 - 3:15 p.m.

Instructor: Professor Barbara Bailey
GMCS 513
email: bbailey@sdsu.edu
Office Hours: M 11:00 - 12:00 p.m.via a Zoom Meeting; by appointment via a Zoom Meeting

Reference: The textbook for the course is

Cunningham, R., Herzog, T., and London, R. (2008) *Models for Quantifying Risk*, 3rd Edition. AC-TEX Publications, Inc. (Later editions are available and can be substituted.)

Objectives: This course will provide you with the basic theory of actuarial models and applications of probability to insurance and other financial risks. The course will analyze the time-to-failure random variable for a single life, and its implications for evaluations of insurance and annuity functions. The theory and application of Markov Chain models are also included.

The Society of Actuaries states that "An actuary is a business professional who analyzes the financial consequences of risk. Actuaries use mathematics, statistics and financial theory to study uncertain future events, especially those of concern to insurance and pension programs. They evaluate the likelihood of those events, design creative ways to reduce the likelihood and decrease the impact of adverse events that actually do occur." This course is intended to help prepare students for the Exam LTAM-Long-Term Actuarial Mathematics. This is a very new Exam and is the revised and replacement for the Exam MLC-Models for Life Contingencies. Details regarding the exam format and exam syllabus can be found off the Society of Actuaries webpage (SOA.org), where it states that the syllabus for Exam LTAM develops the candidate's knowledge of the theoretical basis of contingent payment models and the application of those models to insurance and other financial risks.

Learning Outcomes:

- Produce and interpret graphs for parametric and tabular survival models.
- Calculate and interpret standard probability functions including survival and mortality probabilities, force of mortality, and complete expectation of life.
- Apply to calculations involving tabular or parametric survival models, and appropriate approximation methods.
- Calculate and interpret probabilities, means, percentiles and higher moments on the present value random variables associated with benefits and expenses for different insurance models.
- Calculate and interpret the effect of changes in underlying assumptions such as mortality and interest for different insurance models.
- Use statistical methods to simulate random variables from various distributions and perform Monte Carlo integration with present value random variables.

Homework: Homework assignments will be regularly available on the course web page as announced in class. The homework will contain a series of practice problems of which *selected problems* **will** be graded or multiple choice questions will be graded. The homework serves as a tool to review and practice the material covered in class. All material covered on the assignments can be questioned on the exams. Some problems may require computing with R and must include concise computer output with a clearly presented version of your plots and code. No previous experience with R is required.

You are encouraged to work with one another to solve homework problems, but you should write solutions individually. Do not allow someone else to copy your work. If you suspect a student of cheating please inform me. The Mathematics and Statistics Department expects academic honesty from our students, as laid out in the University Policies. Violations will be reported to the Center for Student Rights and Responsibilities.

Late homework will not be accepted. You may drop your lowest percentage score.

Exams: There will be three exams during class time on Wednesday February 16, March 23, April 20. All exams are closed book. A hand calculator is necessary for all in exams.

Each exam will be worth 100 points. **No makeup exams are given - no exceptions**.

The final exam will be given Monday, May 9 from 1:00 p.m. to 3:00 p.m. The final will be cumulative and comprehensive.

Grading: The grade for the class is based on a score composed of the following.

Homework	20 %
Three Exams	60 %
Final Exam	20 %

Prerequisites: STAT 550 or 551A

Topics to be covered: basic outline; topics may be added and/or dropped as the semester proceeds.

1. Review of Probability
    a. Random Variables and Their Distributions
    b. Survey of Discrete and Continuous Distributions
    c. Multivariate Probability
    d. Sums of Independent Random Variables
2. Survival Models
    a. Age-at-Failure Random Variables
    b. Parametric Survival Models
    c. Time-to-Failure Random Variables
3. The Life Table
    a. Traditional Form of the Life Table
    b. Derived Form of the Life Table
4. Life Insurance Models
    a. Discrete Stochastic Models
    b. Continuous Stochastic Models
5. Life Annuity Models
6. Markov Chains
7. Predictive Analytics

Code of Academic Conduct on Examinations and Assignments: "At San Diego State University, students are invited to be active members of the educational community. As with any community, its members serve a vital role in determining acceptable standards of conduct, which includes academic conduct that reflects the highest level of honesty and integrity." The "Statement of Student Rights and Responsibilities clarifies for students their role as members of the campus community, setting forth what is expected of them in terms of behavior and contributions to the success of our university." "Inappropriate conduct by Students . . . is subject to discipline on all San Diego State University Campuses. The Center for Student Rights and Responsibilities coordinates the discipline process and establishes standards and procedures in accordance with regulations contained in Sections 41301-41304 of Title 5 of The California Code of Regulations, and procedures contained in Executive Order 628, Student Disciplinary Procedures for The California State University." See http://www.sa.sdsu.edu/srr/judicial for more information.

Students with Disabilities: If you are a student with a disability and believe you will need accommodations for this class, it is your responsibility to contact Student Disability Services at (619)594-6473. To avoid any delay in the receipt of your accommodations, you should contact Student Disability Services as soon as possible. Please note that accommodations are not retroactive, and that accommodations based upon disability cannot be provided until you have presented your instructor with an accommodation letter from Student Disability Services. Your cooperation is appreciated.

Other information: See course web page: edoras.sdsu.edu/∼babailey/stat575

See next page for SDSU University Policies

UNIVERSITY POLICIES

Accommodations: If you are a student with a disability and are in need of accommodations for this class, please contact Student Ability Success Center at (619) 594-6473 as soon as possible. Please know accommodations are not retroactive, and I cannot provide accommodations based upon disability until I have received an accommodation letter from Student Ability Success Center.

Student Privacy and Intellectual Property: The Family Educational Rights and Privacy Act (FERPA) mandates the protection of student information, including contact information, grades, and graded assignments. I will not post grades or leave graded assignments in public places. Students will be notified at the time of an assignment if copies of student work will be retained beyond the end of the semester or used as examples for future students or the wider public. Students maintain intellectual property rights to work products they create as part of this course unless they are formally notified otherwise.

Religious observances: According to the University Policy File, students should notify the instructors of affected courses of planned absences for religious observances by the end of the second week of classes.

Medical-related absences: Students are instructed to contact their professor/instructor/coach in the event they need to miss class, etc. due to an illness, injury or emergency. All decisions about the impact of an absence, as well as any arrangements for making up work, rest with the instructors. Student Health Services (SHS) does not provide medical excuses for short-term absences due to illness or injury. When a medical-related absence persists beyond five days, SHS will work with students to provide appropriate documentation. When a student is hospitalized or has a serious, ongoing illness or injury, SHS will, at the student's request and with the student's consent, communicate with the student's instructors via the Vice President for Student Affairs and may communicate with the student's Assistant Dean and/or the Student Ability Success Center.

SDSU Economic Crisis Response Team: If you or a friend are experiencing food or housing insecurity, or any unforeseen financial crisis, visit sdsu.edu/ecrt, email ecrt@sdsu.edu, or walk-in to Well-being & Health Promotion on the 3rd floor of Calpulli Center.

Resources for students: A complete list of all academic support services--including the Writing Center and Math Learning Center--is available on the Student Affairs' Academic Success website. Counseling and Psychological Services (619-594-5220) offers confidential counseling services by licensed therapists; you can Live Chat with a counselor at http://go.sdsu.edu/student_affairs/cps/therapist-consultation.aspx between 4:00pm and 10:00pm, or call San Diego Access and Crisis 24-hour Hotline at (888) 724-7240.

Academic Honesty: The University adheres to a strict policy prohibiting cheating and plagiarism. Examples of academic dishonesty include but are not limited to:

- copying, in part or in whole, from another's test or other examination;
- obtaining copies of a test, an examination, or other course material without the permission of the instructor;
- collaborating with another or others in work to be presented without the permission of the instructor;
- falsifying records, laboratory work, or other course data;
- submitting work previously presented in another course, if contrary to the rules of the course;
- altering or interfering with grading procedures;
- assisting another student in any of the above;
- using sources verbatim or paraphrasing without giving proper attribution (this can include phrases, sentences, paragraphs and/or pages of work);
- copying and pasting work from an online or offline source directly and calling it your own;
- using information you find from an online or offline source without giving the author credit;
- replacing words or phrases from another source and inserting your own words or phrases.

The California State University system requires instructors to report all instances of academic misconduct to the Center for Student Rights and Responsibilities. Academic dishonesty will result in disciplinary review by the University and may lead to probation, suspension, or expulsion. Instructors may also, at their discretion, penalize student grades on any assignment or assessment discovered to have been produced in an academically dishonest manner.

Classroom Conduct Standards: SDSU students are expected to abide by the terms of the Student Conduct Code in classrooms and other instructional settings. Prohibited conduct includes:
- Willful, material and substantial disruption or obstruction of a University-related activity, or any on-campus activity.
- Participating in an activity that substantially and materially disrupts the normal operations of the University, or infringes on the rights of members of the University community.
- Unauthorized recording, dissemination, or publication (including on websites or social media) of lectures or other course materials.
- Conduct that threatens or endangers the health or safety of any person within or related to the University community, including
    1. physical abuse, threats, intimidation, or harassment.
    2. sexual misconduct.

Violation of these standards will result in referral to appropriate campus authorities.