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INSTRUCTOR

Name: Hong Li
Office: 638 Drake Centre
Phone: 204-474-9529
Email: li.hong@umanitoba.ca
Office hours: 11:30am – 12:30 pm, every Tuesday and Thursday

COURSE DESCRIPTION

This course is on actuarial aspect of life contingent insurance. In this course, students will learn to
generalize and apply the theory of life contingencies they have learned to some specific models that are
important in contemporary actuarial practice, including reserve calculation, multiple state models,
pension benefit, and profit testing.

This course is accredited under the Canadian Institute of Actuaries (CIA) University Accreditation Program
(UAP). Achievement of the minimum required grades in accredited courses may provide credit for
preliminary exams. Please note that a combination of courses may be required to achieve exam credit. At
the University of Manitoba, details of required courses and grades can be found here: https://www.cia-
ica.ca/membership/university-accreditation-program---home/accredited/manitoba

COURSE OBJECTIVES
This course, together with the antecedent course ACT 3130, covers most learning objectives of the Long-Term Actuarial Mathematics Exam (LTAM) by the Society of Actuaries (SOA).

**COURSE MATERIALS**

- This course will be taught based on
  3. The supporting study notes from the SOA (available at SOA’s website [https://www.soa.org/Education/Exam-Req/edu-exam-ltam-detail.aspx](https://www.soa.org/Education/Exam-Req/edu-exam-ltam-detail.aspx)).

- Copies of the textbook and the study manual are available in the management library on a reserve basis.

- Practice questions will be posted on D2L.

- Please respect copyright laws. Photocopying textbooks or other reading material is a violation of copyright laws and is unethical, unless permission to copy has been obtained.

**ASSESSMENT OF LEARNING**

Assessment of this course includes three in-class tests and one final exam, each 75 minutes. Below is the schedule and the weight of each component:

<table>
<thead>
<tr>
<th>Test Type</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Midterm (February 25)</td>
<td>30%</td>
</tr>
<tr>
<td>Quizzes (5 in-class quizzes)</td>
<td>20%</td>
</tr>
<tr>
<td>Final Exam</td>
<td>50%</td>
</tr>
</tbody>
</table>

The *Grading Scale* for this course is as follows.

<table>
<thead>
<tr>
<th>Marks</th>
<th>Letter Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>90 - 100</td>
<td>A+</td>
</tr>
<tr>
<td>80 – 89.9</td>
<td>A</td>
</tr>
<tr>
<td>75 – 79.9</td>
<td>B+</td>
</tr>
<tr>
<td>70 - 74.9</td>
<td>B</td>
</tr>
<tr>
<td>65 - 69.9</td>
<td>C+</td>
</tr>
<tr>
<td>60 - 64.9</td>
<td>C</td>
</tr>
<tr>
<td>50 – 59.99</td>
<td>D</td>
</tr>
<tr>
<td>Below 50</td>
<td>F</td>
</tr>
</tbody>
</table>

- All tests are cumulative, and will consist of numerical questions. The exact format of the tests will be announced sufficiently in advance.
- Quizzes: The 6 in-class quizzes will not be announced in advance.
- Success in the course and on the Society of Actuaries Exam LTAM will depend on working a large number of exercises. Each student should work as many exercises as possible. This course is hard. Do not get behind. It is very important to read ahead of each lecture.

**MISSED EXAM AND LATE SUBMISSION POLICY**

If a student fails to attend the midterm, marks will be relocated to the final exam. If a student fails to attend any quiz, they will lose the marks for this quiz.

Students who miss the final exam have to apply for a deferred exam through the Undergraduate Program Office in 268 Drake (or their home Faculty if they are not Asper students).

**ATTENDANCE POLICY**

Students are expected to attend all lectures. Attendance will be recorded starting from January 22\textsuperscript{nd}, i.e., after the Course Add Date.

**ELECTRONIC DEVICE POLICY**

Students are allowed to use laptops or tablets in class. Please obtain the permission of the instructor prior to audio/video-recording a lecture.

**OUT-OF-CLASS COMMUNICATION**

Students can access class materials via UM Learn.

**TENTATIVE CLASS SCHEDULE**

Week 1: Introduction to reserve.
Required reading:
Actuarial Mathematics for Life Contingent Risks, Chapter 7.1 – 7.3.3.

Week 2: Annual profit by source. Policies with cash flows at 1/mthly intervals. Policy values with continuous cash flows (part 1).
Required reading:
Actuarial Mathematics for Life Contingent Risks, Chapter 7.3.4, 7.3.5, 7.4, 7.5.

Week 3: Policy values with continuous cash flows (part 2). Negative policy values. Modified premium reserve.
Required reading:
Actuarial Mathematics for Life Contingent Risks, Chapter 7.5, 7.8, 7.9.

Week 4: Introduction to multiple decrement model.
Required reading:
Actuarial Mathematics for Life Contingent Risks, Chapter 8.8 – 8.10.1.

Week 5: Constructing a multiple decrement model. Transition at exact ages. Required reading:
Actuarial Mathematics for Life Contingent Risks, Chapter 8.10.2 – 8.12.
LTAM-21-18 Supplementary Note on Long Term Actuarial Mathematics, Section 3.

Week 6: Markov chain in discrete time and continuous time. Introduction to multiple-state model. Required reading:

Week 7: Premium and reserve determination in multiple-state model. Required reading:
Actuarial Mathematics for Life Contingent Risks, Chapter 8.6 – 8.7.

Week 8: Multiple life model (part 1). Required reading:
Actuarial Mathematics for Life Contingent Risks, Chapter 9.1 – 9.5.

Week 9: Multiple life model (part 2). Introduction to pension mathematics. Required reading:

Week 10: Service table. Valuing and funding pension benefits. Introduction to retirement benefits. Required reading:
Actuarial Mathematics for Life Contingent Risks, Chapter 10.5 – 10.7.
LTAM-21-18 Supplementary Note on Long Term Actuarial Mathematics, Section 6.

Week 11: Profit testing. Required reading:
Actuarial Mathematics for Life Contingent Risks, Chapter 12.

Week 12: Mortality Improvement Modeling. Required reading:
LTAM-21-18 Supplementary Note on Long Term Actuarial Mathematics, Section 4.

Week 13: Health benefits. Required reading:
LTAM-21-18 Supplementary Note on Long Term Actuarial Mathematics, Section 1, 2, 5.

**IMPORTANT DATES**

- March 18, 2020: Voluntary Withdrawal (VW) Deadline
INTENDED LEARNING OUTCOMES

AACSB Assurance of Learning Goals and Objectives
The Asper School of Business is proudly accredited by AACSB. Accreditation requires a process of continuous improvement of the School and our students. Part of “student improvement” is ensuring that students graduate with the knowledge and skills they need to succeed in their careers. To do so, the Asper School has set the learning goals and objectives listed below for the Undergraduate Program. The checked goal(s) and objective(s) will be addressed in this course and done so by means of the items listed next to the checkmark.

<table>
<thead>
<tr>
<th>Goals and Objectives in the Undergraduate Program</th>
<th>Goals and Objectives Addressed in this Course</th>
<th>Course Item(s) Relevant to these Goals and Objectives</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Quantitative Reasoning</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A. Determine which quantitative analysis technique is appropriate for solving a specific problem.</td>
<td>√</td>
<td>Entire course</td>
</tr>
<tr>
<td>B. Use the appropriate quantitative method in a technically correct way to solve a business problem.</td>
<td>√</td>
<td>Entire course</td>
</tr>
<tr>
<td>C. Analyze quantitative output and arrive at a conclusion.</td>
<td>√</td>
<td>Entire course</td>
</tr>
<tr>
<td>2 Written Communication</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A. Use correct English grammar and mechanics in their written work.</td>
<td>√</td>
<td>Tests and final exam</td>
</tr>
<tr>
<td>B. Communicate in a coherent and logical manner</td>
<td>√</td>
<td>Tests and final exam</td>
</tr>
<tr>
<td>C. Present ideas in a clear and organized fashion.</td>
<td>√</td>
<td>Tests and final exam</td>
</tr>
<tr>
<td>3 Ethical Thinking</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A. Identify ethical issues in a problem or case situation</td>
<td>√</td>
<td>Entire course</td>
</tr>
<tr>
<td>B. Identify the stakeholders in the situation.</td>
<td>√</td>
<td>Entire course</td>
</tr>
<tr>
<td>C. Analyze the consequences of alternatives from an ethical standpoint.</td>
<td>√</td>
<td>Entire course</td>
</tr>
<tr>
<td>D. Discuss the ethical implications of the decision.</td>
<td>√</td>
<td>Entire course</td>
</tr>
<tr>
<td>4 Core Business Knowledge</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>√</td>
<td>Entire course</td>
</tr>
</tbody>
</table>
ACADEMIC INTEGRITY POLICY

It is critical to the reputation of the Asper School of Business and of our degrees that everyone associated with our faculty behave with the highest academic integrity. As the faculty that helps create business and government leaders, we have a special obligation to ensure that our ethical standards are beyond reproach. Any dishonesty in our academic transactions violates this trust. The University of Manitoba General Calendar addresses the issue of academic dishonesty under the heading “Plagiarism and Cheating.” Specifically, acts of academic dishonesty include, but are not limited to:

- using the exact words of a published or unpublished author without quotation marks and without referencing the source of these words
- duplicating a table, graph or diagram, in whole or in part, without referencing the source
- paraphrasing the conceptual framework, research design, interpretation, or any other ideas of another person, whether written or verbal (e.g., personal communications, ideas from a verbal presentation) without referencing the source
- copying the answers of another student in any test, examination, or take-home assignment
- providing answers to another student in any test, examination, or take-home assignment
- taking any unauthorized materials into an examination or term test (crib notes)
- impersonating another student or allowing another person to impersonate oneself for the purpose of submitting academic work or writing any test or examination
- stealing or mutilating library materials
- accessing test prior to the time and date of the sitting
- changing name or answer(s) on a test after that test has been graded and returned
- submitting the same paper or portions thereof for more than one assignment, without discussions with the instructors involved

See following table for typical penalties for academic dishonesty in the Asper School.

*In addition to the specific university’s internal policies on conduct, including academic misconduct, candidates pursuing credits for writing professional examinations shall also be subject to the Code of Conduct and Ethics for Candidates in the CIA Education System and the associated Policy on Conduct and Ethics for Candidates in the CIA Education System. For more information, please visit Obtaining UAP Credits and the CIA FAQ.*
**Typical Penalties for Academic Dishonesty in the Asper School**

If the student is from another Faculty and the academic dishonesty is committed in an Asper course, the student’s Faculty could match or add penalties beyond the Asper School’s.

F-DISC on transcript indicates the F is for disciplinary reasons.

<table>
<thead>
<tr>
<th>ACADEMIC DISHONESTY</th>
<th>PENALTY</th>
</tr>
</thead>
</table>
| Cheating on exam (copying from or providing answers to another student) | F-DISC in course  
Suspension from taking Asper courses for 1 year  
Notation of academic dishonesty in transcript |
| Sharing exam questions electronically during exam | F-DISC in course  
Suspension from taking Asper courses for 2 years  
Notation of academic dishonesty in transcript |
| Possession of unauthorized material during exam (e.g., cheat notes) | F-DISC in course  
Suspension from taking Asper courses for 1 year  
Notation of academic dishonesty in transcript |
| Altering answer on returned exam and asking for re-grading | F-DISC in course  
Suspension from taking Asper courses for 1 year  
Notation of academic dishonesty in transcript |
| Plagiarism on assignment | F-DISC in course  
Suspension from taking Asper courses for 1 year  
Notation of academic dishonesty in transcript |
| Submitting paper bought online | F-DISC in course  
Suspension from taking Asper courses for 1 year  
Notation of academic dishonesty in transcript |
| Inappropriate Collaboration (collaborating with individuals not explicitly authorized by instructor) | F-DISC in course  
Suspension from taking Asper courses for 1 year  
Notation of academic dishonesty in transcript |
| Group member had knowledge of inappropriate collaboration or plagiarism and played along | F-DISC in course  
Notation of academic dishonesty in transcript |
| Signing Attendance Sheet for classmate | F-DISC in course  
Notation of academic dishonesty in transcript |
**STUDENT SERVICES AND SUPPORTS**

The University of Manitoba provides many different services that can enhance learning and provide support for a variety of academic and personal concerns. You are encouraged to visit the below websites to learn more about these services and supports. If you have any questions or concerns, please do not hesitate to contact your instructor or the Undergraduate Program Office.

<table>
<thead>
<tr>
<th>For Information on...</th>
<th>...follow this link</th>
</tr>
</thead>
<tbody>
<tr>
<td>Admission, Registration, Tuition Fees, Important Dates, Final Exams, Graduation, and Transcripts</td>
<td>Registrar’s Office</td>
</tr>
<tr>
<td>Academic policies &amp; procedures, regulations, Faculty-specific information, degree and major requirements</td>
<td>Academic Calendar</td>
</tr>
<tr>
<td>Help with research needs such as books, journals, sources of data, how to cite, and writing</td>
<td>Library Resources</td>
</tr>
<tr>
<td>Tutors, workshops, and resources to help you improve your learning, writing, time management, and test-taking skills</td>
<td>Writing and Learning Support</td>
</tr>
<tr>
<td>Support and advocacy for students with disabilities to help them in their academic work and progress</td>
<td>Student Accessibility Services</td>
</tr>
<tr>
<td>Copyright-related questions and resources to help you avoid plagiarism or intellectual property violations</td>
<td>Copyright Office</td>
</tr>
<tr>
<td>Student discipline bylaws, policies and procedures on academic integrity and misconduct, appeal procedures</td>
<td>Academic Integrity</td>
</tr>
<tr>
<td>Policies &amp; procedures with respect to student discipline or misconduct, including academic integrity violations</td>
<td>Student Discipline</td>
</tr>
<tr>
<td>Students’ rights &amp; responsibilities, policies &amp; procedures, and support services for academic or discipline concerns</td>
<td>Student Advocacy</td>
</tr>
<tr>
<td>Your rights and responsibilities as a student, in both academic and non-academic contexts</td>
<td>Your rights and responsibilities</td>
</tr>
<tr>
<td>Full range of medical services for any physical or mental health issues</td>
<td>University Health Service</td>
</tr>
<tr>
<td>Information on health topics, including physical/mental health, alcohol/substance use harms, and sexual assault</td>
<td>Health and Wellness</td>
</tr>
<tr>
<td>Any aspect of mental health, including anxiety, stress, depression, help with relationships or other life concerns, crisis services, and counselling.</td>
<td>Student Counselling Centre</td>
</tr>
<tr>
<td>Support services available for help regarding any aspect of student and campus life, especially safety issues</td>
<td>Student Support Case Management</td>
</tr>
<tr>
<td>Resources available on campus, for environmental, mental, physical, socio-cultural, and spiritual well-being</td>
<td>Live Well @ UofM</td>
</tr>
<tr>
<td>Help with any concerns of harassment, discrimination, or sexual assault</td>
<td>Respectful Work and Learning Environment</td>
</tr>
<tr>
<td>Concerns involving violence or threats, protocols for reporting, and how the university addresses them</td>
<td>Violent or Threatening Behaviour</td>
</tr>
</tbody>
</table>
ABOUT THE INSTRUCTOR

Dr. Hong Li, ASA, ACIA, is an Assistant Professor in the Warren Centre of Actuarial Studies and Research in the Asper School of Business. Dr. Li received his Ph.D. from the Department of Econometrics and Operations Research, Tilburg University in 2015. Dr. Li’s current research includes mortality modeling and forecasting, longevity risk management for pension plans and insurance companies, and agriculture risk management. Dr. Li has publications in leading actuarial science and demography journals such as Journal of Risk and Insurance, Demography, ASTIN Bulletin, Scandinavian Actuarial Journal, and Insurance: Mathematics and Economics.