Course Outline for Actuarial Sciences and Insurance (FINN 372)

Summer 2024

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Course URL (if any)	-

Course Teaching Methodology
• The teaching methodology will in person (on campus). However, the presentation slides, notes and other relevant material will be available offline. • All lectures will be live interaction basis.

Course Basics				
Credit Hours	3			
Lecture(s)	Nbr of lec(s) per week	4	Duration	1 hr 30 mins
Recitation/ Lab per week	Nbr of lec(s) per week		Duration	
Tutorial per week	Nbr of lec(s) per week		Duration	

Course Distribution	
Core	
Elective	
Open for Student Category	
Close for Student Category	

Course Description

Course Description: Actuarial Sciences and Insurance is a course designed to introduce students to the working of life insurers and the role of actuaries within them. The course is ideal for students who are curious about the actuarial profession and for students who wish to pursue non-actuarial roles in insurance organizations.

We will first cover some basic principles of insurance and discuss salient features of products and companies. We will then look at simple actuarial calculations of those products. The course will end with real world implications of actuarial work (professionalism as applicable to actuaries).

The course is not meant to prepare students completely to pass actuarial exams but to give them an idea of what actuarial work entails in the scope of a life insurance company and to introduce them to the mathematics of actuarial science.

The Course is divided into 3 sections:
Section 1: Theory of Insurance (40%)
Section 2: Theory of Basic Actuarial Mathematics (50%)
Session 3: Professionalism as applicable to actuaries (10%)

Course Pre-Requisites

1) Calculus-1
2) Principles of Finance

Course Learning Outcomes

After completion of this course, students should be able to:

1) Understand key principles governing insurance and risk management.
2) Understand the key concepts involved in life insurance business and the structure and risks associated with various life insurance products.
3) Understand the concepts & models underlying Takaful and how they differ from conventional insurance.
4) Understand the short term & long term impact of Covid 19 on different lines of insurance business.
5) Understand the basics of financial statements of insurance companies and how they are different from other financial institutions.
6) Complete basic actuarial calculations for a life contingent benefit and evaluate, for a simple case, the premium for a life insurance product.
7) Understand the role of professionalism in an actuarial context and discuss the ethical and professional implications of actuarial decisions.

UNDERGRADUATE PROGRAM LEARNING GOALS AND OBJECTIVES
General Learning Goals & Objectives **Goal 1 –Effective Written and Oral Communication** **Objective:** Students will demonstrate effective writing and oral communication skills **Goal 2 –Ethical Understanding and Reasoning** **Objective:** Students will demonstrate that they are able to identify and address ethical issues in an organizational context. **Goal 3 – Analytical Thinking and Problem Solving Skills** **Objective:** Students will demonstrate that they are able to identify key problems and generate viable solutions. **Goal 4 – Teamwork in Diverse and Multicultural Environments** **Objective**: Students will demonstrate that they are able to work effectively in diverse environments. **Goal 5 – Understanding Organizational Ecosystems** **Objective:** Students will demonstrate that they have an understanding of Economic, Political, Regulatory, Legal, Technological, and Social environment of organizations. **Major Specific Learning Goals & Objectives** **Goal 6 (a) – Program Specific Knowledge and Understanding** **Objective:** Students will demonstrate knowledge of key business disciplines and how they interact including application to real world situations. (including subject knowledge) **Goal 6 (b) – Understanding the "science" behind the decision-making process (for MGS Majors)** **Objective:** Students will demonstrate ability to analyze a business problem, design and apply appropriate decision-support tools, interpret results and make meaningful recommendations to support the decision-maker

Indicate below how the course learning objectives/outcomes specifically relate to any program learning goals and objectives.

Program Learning Goals and Objectives	**Course Learning Objectives**	**Course Assessment Item**
Goal 1 –Effective Written and Oral Communication	Students get a number of opportunities to demonstrate their ability to communicate effectively. They will also be expected to present their view point on an ethical case	CP, Project and Exam
Goal 2 –Ethical Understanding and Reasoning	This course will look at ethics from the point of view of professionalism and will be expected to debate an ethical issue among themselves within guidelines set by professional standards	CP (additional CP for these lectures)
Goal 3 – Analytical Thinking and Problem Solving Skills	**Major Goal:** This is the fundamental part of this course and a major portion of all course material is aimed at enabling students to be make basic actuarial calculations which requires development of analytical and problem solving skills.	CP (to a small extent), Quizzes and Exam

Goal 4 – Teamwork in Diverse and Multicultural Environments	Not covered specifically	Not covered specifically
Goal 5 – Understanding Organizational Ecosystems	**Major Goal:** Students will understand the organizational ecosystem of the life insurance market	CP, Quizzes and Exam
Goal 6 (a) – Program Specific Knowledge and Understanding **(Subject Knowledge)**	The first part of the course is focused on real world applications of the theory taught. In particular, students will be exposed to real life insurance products and financial information.	CP, Quizzes and Exam
Goal 6 (b) – Understanding the "science" behind the decision-making process	Students will demonstrate ability to analyze a business problem, design and apply appropriate decision-support tools, interpret results and make meaningful recommendations to support the decision-maker	Project

Grading Breakup and Policy

The course grade is based on the following criteria:

	Percentage
CP	5%
Project	15%
Quizzes	30%
Mid-Term	20%
Final	30%
Total	**100%**

Class Participation:

Class participation will be spread over the full course.

Quizzes:

There will be 4 quizzes in total which will be announced 2 lectures prior to the quiz. No makeup quizzes will be given. However, the lowest quiz will be disregarded.

Project:

There will be one course project which will focus on analysis of life insurance products and the financial statements of life insurance companies. The project is expected to run between lectures 7 and 16.

Examination:

The format and structure of the mid-term and final exams will be conveyed to students 2 weeks prior to the exam. Exams will be a blend of multiple-choice and subjective questions.

Calculator Requirement:

Students will not require a financial calculator as financial and mortality tables will be provided. However, a standard calculator will be necessary for all exams and quizzes.

Attendance Policy

The standard attendance policy of SDSB will be applicable.
Its summary is :

i. There will be 4 excused absences
ii. There will be 1 percentage point deduction from the grade/score for every absence exceeding 4 (upto 7 absences).
iii. In case of 8 or more absences, the grade will automatically drop to **D**.

Examination Details	
Mid Term Exam	Yes/No: Yes Combine/Separate: Combined Duration: 1.5 hours Preferred Date: - Exam Specifications: Calculator is required. Any required formulae and mortality tables will be provided.
Final Exam	Yes/No: Yes Combine/Separate: Combined Duration: 3 hours Preferred Date: - Exam Specifications: Calculator is required. Any required formulae and mortality tables will be provided.

Session	Session Topic	Reading Material	Session Outcome
Section 1: Introduction to Insurance			
1	Introduction to the Course and the Instructor. PLUS Fundamentals of Insurance and Risk Management	Course pack	Define the following key terms pertaining to insurance: 1) Insurance 2) Loss/Chance of Loss 3) Peril 4) Moral Hazard 5) Morale Hazard 6) Risk (Pure and Speculative) 7) Insurable Interest
2	Insurable Loss Exposures	Course pack	Explain some key concepts such as : 1) Ideally Insurable Loss Exposures 2) Risk Classification and its principles 3) Adverse Selection 4) Branches of Insurance

3	Life Insurance Products Offered Traditionally	Course pack	Define the structure of the following life insurance products and be able to identify the risks to Insurers and Policyholders for each type: 1) Whole Life Assurance 2) Term life Insurance 3) Pure Endowment 4) Endowment Assurance 5) Whole Life Level Annuity 6) Temporary Level Annuity 7) Guaranteed Level Annuity Students will also be able to identify typical exclusions in insurance contracts and reasons for these exclusions.
4	Features and Rationale of Regime of New Insurance Products (1)	Course pack	Define the structure and identify the risks to insurers for the following additional life insurance products: 1) Conventional with profits contracts 2) Unit Linked Products details & working Typical riders associated with products: CI, WOP, ADB
5	Features and Rationale of Regime of New Insurance Products (2) + Quiz 1	Course pack	Define the structure and identify the risks to insurers for the following additional life insurance products: 1) Conventional with profits contracts 2) Unit Linked Products details & working Typical riders associated with products: CI, WOP, ADB
6	Analysis of Takaful Models around the world and Takaful Products (1)	Course pack	1) Understand takaful structures across various countries 2) Understand the difference between Takaful Products and Conventional Products.

7	Analysis of Takaful Models around the world and Takaful Products (2)	Course pack	1) Understand takaful structures across various countries 2) Understand the difference between Takaful Products and Conventional Products.
8	Insurance Financial Statement Analysis (non-life companies)	Course pack	1) Understand the structure of the financial statements of non-life insurance companies and how they are different from other financial institutions 2) Understand concepts such as loss ratios expense ratios and their applicability to analysis
9	Insurance Financial Statement Analysis - Case Based Analysis + Quiz 2	Handouts will be given	Apply the ideas in the previous lecture to compare and contrast the strengths and weaknesses of 2 insurers.
Section 2: Introduction to Actuarial Mathematics			
10	Time Value of Money	Course pack	1)Understand the basic concept of time value of money and discounting cashflows. 2) Assess the present and future values of cashflows 3) Identify the following items: v, I, d, ax, an, advance versus arrears. 4) Identify correlations between various symbols and working with present value functions. In particular derive annuity functions from single PV functions.
11	Annuities & Perpetuities (1)	Course pack	1) Understand working of various types of immediate and due annuities and perpetuities 2) Derive annuity and perpetuities formulae and understand logical interpretations 3) Understand varying annuities and perpetuities

12	Annuities & Perpetuities (2)	Course pack	1) Understand working of various types of immediate and due annuities and perpetuities 2) Derive annuity and perpetuities formulae and understand logical interpretations 3) Understand varying annuities and perpetuities
13	Annuities & Perpetuities (3)	Course pack	1) Understand working of various types of immediate and due annuities and perpetuities 2) Derive annuity and perpetuities formulae and understand logical interpretations 3) Understand varying annuities and perpetuities
14	Mid Term Exam		
15	Single Decrement Models - Construction of Life Tables	Course pack	Construct a standard actuarial life table, Curtate and Normal lives
16	Single Decrement Models - Probabilities of Death and Survival	Course pack	Use a constructed Life Table to generate probabilities of death and survival. Also includes probability of deferred death and contingent survival
17	Evaluation of Insurance Contracts in the form of single decrements (1)	Course pack	Evaluate and Present Assurance Contracts in standard actuarial form

18	Evaluation of Insurance Contracts in the form of single decrements (2) + Quiz 3	Course pack	Evaluate and Present Assurance Contracts in standard actuarial form
19	Evaluation of Insurance Contracts in the form of single decrements (3)	Course pack	Evaluate and Present Annuity Contracts in standard actuarial form
20	Evaluation of Insurance Contracts in the form of single decrements (4)	Course pack	Evaluate and Present Annuity Contracts in standard actuarial form
21	Premium Evaluation - Net Premium- Assurance + Annuity	Course pack	Evaluate the Premium for a simple assurance and annuity contract without any expense loading
22	Premium Evaluation - Gross Premium- Assurance + Annuity + Quiz 4	Course pack	Evaluate the Premium for a simple assurance and annuity contract with expense loading

Section 3: Professionalism as Applicable to Actuaries			
23	Professionalism as applicable to Actuaries	Course pack	Understand the professional standards applicable to actuaries practicing in various parts of the world
24	Case Studies on an Actuarial Professionalism Issue + Revision for Final Exam	Case Studies	Able to apply the professional standards in real life situations.

Textbooks(s)/Supplementary Readings
Textbook 1: Actuarial mathematics for life contingent risks / David C. M. Dickson, Mary R. Hardy, Howard R. Waters. Dickson, D. C. M. Second Edition. 2013 **Textbook 2:** Introduction to risk management and insurance / Mark S. Dorfman. Sixth Edition. 1998. Additional Reading for Students Interested in Actuarial Science: Exam CM1 course material from the Institute and Faculty of Actuaries.