Hong Kong Baptist University
Faculty of Science
Department of Mathematics

Title (Units): ORBS7140 Actuarial Statistics (3,3,0)

Course Aims: This course introduces the mathematics of risk and insurance, life contingencies as applied to models including expenses, non-forfeiture benefits, dividends, and valuation theory for pension plans. This course aim at equip students with basic contents of actuararial science and help them understand the real-world economic development.

Prerequisite: No

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Remark: This course is delivered by staff of HKBU.

Course Intended Learning Outcomes (CILOs):

Upon successful completion of this course, students should be able to:

No.	Course Intended Learning Outcomes (CILOs)
1	Explain the fundamental principles of actuarial statistics
2	Valuate various insurance and annuity plans
3	Apply life tables to estimate survival and mortality statistics

Teaching & Learning Activities (TLAs):

CILO	TLAs will include the following:
1,2,3	Lectures with rigorous mathematical discussions and concrete examples. Lecturer will constantly ask questions in class to make sure that the majority of students are following the teaching materials.
1,2,3	Assignments to monitor both students' learning and mastering of the taught materials. In addition, common mistakes will also be addressed and analyzed.

Assessment:

No.	Assessment Methods	Weighting	CILO Addressed	Remarks
1	Assignments	40%	all	Assignments are designed to measure students' understanding of the theory, techniques, and applications of actuarial statistics. Test may be conducted to monitor the students' understanding of the theory, techniques and skills taught in the class. This may involve, but not limited to, in-class discussions of rigorous technical problems and their solutions.
2	Final Examination	60%	1,3	Final Examination is designed to see how far students have achieved their intended learning outcomes especially in the knowledge domain. Students should have a thorough understanding of the knowledge and apply them correctly in different context to do well in the exam.

Course Intended Learning Outcomes and Weighting:

Content	CILO No.	Teaching (in hours)
1. Introduction	1	3
2. Probability Models	1	9
3. The Life Table	1,3	3
4. Life Annuities	1,2,3	9
5. Life Insurance	1,2,3	9
6. Stochastic Models	1,2,3	6

References:

1. S. David Promislow, *Fundamentals of Actuarial Mathematics*, 2006.
2. N.L. Bowers, H.U. Gerber, J.C. Hickman, D.A. Jones and C.J. Nesbitt, *Actuarial Mathematics*, The Society of Actuaries, 1997.
3. F.E. Vylder, *Life Insurance Theory: Actuarial Perspectives*, Kluwer Academic Publishers, 1997.
4. R.W. Batten, *Life Contingencies: a Guide for the Actuarial Student*, ACTEX Publications, 1998.
5. M.M. Parmenter, *Theory of Interest and Life Contingencies With applications: a Problem-solving Approach*, ACTEX Publication, Winsted CT, 1999.

Course Content in Outline:

Topic	Hours
I. Introduction	3
A. Risk and insurance	
B. Deterministic versus stochastic models	
C. Finance and investments	
D. Adequacy and equity	
E. Reassessment	
II. Probability Models	9
A. Stochastic processes	
B. Markov process	
C. Martingales	
III. The Life Table	3
A. Basic definitions	
B. Probabilities	
C. Constructing the life table from the values of q_x	
D. Life expectancy	
IV. Life Annuities	9
A. Calculating annuity premiums	
B. The interest and survivorship discount function	
C. Guaranteed payments	
D. Deferred annuities with annual premiums	
V. Life Insurance	9
A. Calculating life insurance premiums	
B. Types of life insurance	
C. Combined insurance-annuity benefits	
D. Insurance viewed as annuities	
VI. Stochastic Models	6
A. The stochastic approach to insurance and annuities	
B. Constant benefit contracts	
C. Ruin models	
D. Aggregate loss	

(Approved by the Science Faculty Board Meeting by circulation in August 2024)
(Approved by the Department Management Committee on 7 August 2024)

(Approved by the Science Faculty Board Meeting 31 October 2023)
(Approved by the Department Management Committee on 5 September 2023)