Course Specification

(Postgraduate Programs)

Course Title:	**Actuarial Methods**
Course Code:	**AFM 6101**
Program:	**Executive Master of Science in Actuaries and Financial Mathematics**
Department:	**Mathematics and Statistics**
College:	**Science**
Institution:	**Imam Mohammad Ibn Saud Islamic University**
Version:	**2024 – V1**
Last Revision Date:	**None**

Table of Contents

A. General information about the course: 3

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods 4

C. Course Content 5

D. Students Assessment Activities 5

E. Learning Resources and Facilities 6

F. Assessment of Course Quality 6

G. Specification Approval 7

A. General information about the course:

1. Course Identification

1. Credit hours:					
3 (2 Lectures, 0 Lab, 2 Tutorial)					
2. Course type					
A.	☐University	☐ College	☐ Department	☐Track	☒ Others
B.	☒ Required		☐ Elective		
3. Level/year at which this course is offered: Level 1 / Year 1					
4. Course general Description:					
This course introduces students to the mathematical models for valuation of life contingencies (e.g. life insurance policies). The course covers both the statistical aspects of modelling survival data, and the financial aspects of valuing uncertain future cash-flows.					
5. Pre-requirements for this course (if any):					
None.					
6. Co-requisites for this course (if any):					
None.					
7. Course Main Objective(s):					
The main objectives of this course are to: • Provide students with a comprehensive understanding of life insurance and life annuity contracts. • Introduce students to the concepts of reserves, policy values, and death profits in life contingencies. • Equip students with the skills of premium calculation, reserves, and conduct profit testing in life insurance. • Enable students to design, evaluate, and plan life insurance, annuities, and pension plans. • Develop students' proficiency in constructing survival models and applying probability theory to analyze the cost and risk of life contingencies.					

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	60	100%
2	E-learning	0	0%
3	Hybrid • Traditional classroom • E-learning	0	0%
4	Distance learning	0	0%

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	30

2.	**Laboratory/Studio**	0
3.	**Field**	0
4.	**Tutorial**	30
5.	**Others (specify)**	0
Total		**60**

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Find out fundamental concepts and principles of actuarial methods, particularly in the context of contingencies. Demonstrate proficiency in probability theory and statistical techniques as applied to actuarial and assessment. Risk.	K1	2 lecture hours\week	Direct: Regular Exams
1.2	Apply actuarial techniques to analyze and evaluate life insurance and general insurance products, including pricing, reserving, and risk management.	K2	• 2 tutorial hours\week • Self-study	Direct: Short Quizzes
2.0	**Skills**			
2.1	Make and emphasize the analysis and evaluation of complex actuarial problems.	S1	Self-study	Direct: • Participations • Short Quizzes
2.2	Identify and solve problems related to contingencies.	S2	Real-life problems	Direct: Simulation mini-projects
2.3	Develop a solid foundation in risk assessment and management.	S3	Real-life problems	Direct: Cases study
2.4	Evaluate data/problems, including potentially conflicting or incomplete information. Formulate an appropriate analysis/solution strategy.	S3	Self-study	Direct: Project
3.0	**Values, autonomy, and responsibility**			
3.1	Create connections in groups, adaptable to new circumstances, both	V1	Personal questions	Direct: Participation

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
	independently and in collaboration with others.			
3.2	Generate the highest standards of ethical conduct and professional behavior, critical, interpersonal and communication skills as well as a commitment to life-long learning	V2	Teamwork and class discussions.	Direct: Real-life project

C. Course Content

No	List of Topics	Contact Hours
1.	Introduction to life insurance: life insurance and annuity contracts. Other insurance contracts. Pension contracts. Mutual and proprietary insurers.	9
2.	Survival models: Future lifetime random variable, force of mortality, actuarial notation. Mean and deviation of random lifetime.	8
3.	Life Tables and Selection: Life tables, fractional age assumptions, Survival models for life insurance, selection of ultimate survival models.	9
4.	Insurance Benefits: Valuation of insurance benefits, Variable insurance benefits, Functions of select lives.	8
5.	Annuities.: Review of annuities-certain. Annual life annuities. Annuities payable continuously. Annuities payable m times per year. Comparison of annuities by payment frequency. Deferred annuities. Guaranteed annuities. Increasing annuities. Evaluating annuity functions. Numerical illustrations. Functions for select lives.	9
6.	Premium calculation: Preliminaries. Assumptions. The present value of future loss random variable. The equivalence principle. Gross premium calculation. Profit. The portfolio percentile premium principle. Extra risks.	9
7	Policy values: Policies with annual cash flows. Policy values for policies with cash flows at discrete intervals other than annually. Policy values with continuous cash flows. Policy alterations. Retrospective policy value. Negative policy values.	8
Total		60

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Quizzes, Mini projects, Real-life project	During the semester	30%
2.	Midterm	Week 8-9	30%
3.	Final Exam	Week 15	40%

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	**Dickson, D.C., Hardy, M., Hardy, M.R. and Waters, H.R.. Actuarial mathematics for life contingent risks. Cambridge University Press, Second edition (2020. (Main Reference)**
Supportive References	***1- Promislow, S. D. (2015) Fundamentals of actuarial mathematics. Third edition. West Sussex, England: John Wiley & Sons Ltd.*** ***2- Dickson, D.C., Hardy, M., Hardy, M.R. and Waters, H.R.. Solutions manual for actuarial mathematics for life contingent risks. Cambridge University Press, Second edition (2013).***
Electronic Materials	**None**
Other Learning Materials	**None**

2. Educational and Research Facilities and Equipment Required:

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	▪ **Each class room should be equipped with a whiteboard and a projector.** ▪ **Laboratories should be equipped with computers and an internet connection.**
Technology equipment (projector, smart board, software)	**The rooms should be equipped with data show and Smart Board.**
Other equipment (depending on the nature of the specialty)	**None**

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	**Students**	**During the semester and at the end of the course each student will complete two evaluation forms.**
Effectiveness of Students assessment	**Instructor**	**At the end of each semester the course instructor should complete the course report, including a summary of student questionnaire responses appraising progress and identifying changes that need to be made if necessary.**
Quality of learning resources	**Students**	**During the semester and at the end of the course each student**

Assessment Areas/Issues	Assessor	Assessment Methods
		will complete two evaluation forms.
The extent to which CLOs have been achieved	Instructor	At the end of each semester the course instructor should complete the course report, including a summary of student questionnaire responses appraising progress and identifying changes that need to be made if necessary.
Other	None	

Assessors (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	MATHEMATICS AND STATISTICS DEPARTMENT COUNCIL
REFERENCE NO.	20/1446
DATE	11/08/1446 (10/02/2025)