هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission
اعتماد
NCAAA
2024
TP-153

Course Specification

(Bachelor)

Course Title:	**Actuarial Mathematics (1)**
Course Code:	**AFM 1343**
Program:	**Bachelor of Science in Actuarial 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:

1. Course Identification

1. Credit hours:					
3 (2 Lectures, 0 Lab, 2 Tutorial)					
2. Course type					
A.	☐University	☐College	☒ Program	☐Track	☐ Others
B.	☒ Required		☐Elective		
3. Level/year at which this course is offered: Level 5 / Year 3					
4. Course general Description:					
This course describes the applied mathematical and statistical methods to the systematic observation of natural events to assess the risk of events occurring and help formulate policies that minimize this risk and its financial impact on companies and clients.					
5. Pre-requirements for this course (if any):					
AFM 1231					
6. Co-requisites for this course (if any):					
None.					
7. Course Main Objective(s):					
The objective of actuarial contingencies is to assess and quantify the financial implications of uncertain events or contingencies that may impact an organization's future obligations or risks. Actuarial contingencies typically involve the estimation of future cash flows, liabilities, or potential losses arising from events such as accidents, natural disasters, or legal claims.					

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	Define the fundamental concepts and principles of actuarial science, particularly in the context of contingencies	K3	3 lecture hours\week	Direct: Regular Exams
1.2	Describe proficiency in probability theory and statistical techniques as applied to actuarial modeling and risk assessment.	K3	• 2 tutorial hours\week • Self-study	Direct: Short Quizzes
1.3	Recall actuarial techniques to analyze and evaluate life insurance, annuity, and general insurance products, including pricing, reserving, and risk management.	K3	Real-life problems	Direct: Assignments
2.0	**Skills**			
2.1	Analyze Skills: Actuarial contingencies courses emphasize the analysis and evaluation of complex actuarial problems.	S1	• Self-study • Real-life problems	Direct: • Participations • Short Quizzes
2.2	Examine problems related to contingencies	S2	Self-study	Direct: Participations
2.3	Show a solid foundation in risk assessment and management	S1	Real-life problems	Direct: Short Quizzes
2.4	Evaluate data/problems, including potentially conflicting or incomplete information.	S2	Self-study	Direct: Participations
3.0	**Values, autonomy, and responsibility**			
3.1	Debate with independence and in work teams.	V1, V2	Personal questions	Direct: Participation
3.2	Develop personal values and attributes such as honesty, empathy and respect for others.	V1, V2	Teamwork and class discussions.	Direct: Homework and Mini projects

C. Course Content

No	List of Topics	Contact Hours
1.	Introduction to life insurance: Brief introduction on the terminology and major types of life insurance, - life annuities and pension contracts. Traditional insurance contracts- modern insurance contracts- methods of distribution - premiums.	10
2.	Survival models: Future lifetime random variable, survival function, force of mortality, international actuarial notation (IAN), expected complete and curtate future lifetime. Mean and standard deviation of T_x	10
3.	Life Tables and Selection: Life tables, fractional age assumptions (uniform distribution of deaths and constant force of mortality), life insurance, survival models for life insurance -, select & ultimate survival models, life tables and mortality trends -some comments on heterogeneity in mortality.	10
4.	Insurance Benefits: IAN and EPV (& variance) calculations for various types of life insurance with different death benefit payout timing assumptions (the continuous and annual cases)-Gross premiums- principle of the portfolio percentile premium-age rating (constant addition and constant multiple of mortality rates. Premium Calculation: EPV (& variance) of net future loss random variable, equivalence principle for net premium calculation	10
5.	Policy values: assumptions- policies with annual cash flows (the future loss random variable- policy values for policies with annual cash flows- annual profit by source- asset shares – policy values for continuous cash flows (Thieles differential equations – numerical solution of Thieles differential equations)- policy alterations -	10
6.	Multiple stat models: some examples of multiple state models (the alive dead model-functions of select lives)	10
	Total	60

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Homework, Quizzes, Mini projects	During the term	10%
2.	First Midterm	Week 5-6	25%
3.	Second Midterm	Week 10-11	25%
4.	Final Exam	Week 16	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. 1. 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). 2. Rob Kaas, Marc Goovaerts, Jan Dhaene, Michel Denuit- Modern Actuarial Risk Theory Using R (2009), Springer 3. Computational Actuarial Science with R, First Edition,Kindle Edition by Arthur Charpentier(Editor)(2016)
Electronic Materials	**None**
Other Learning Materials	**None**

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	▪ **Each classroom 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 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**

Assessment Areas/Issues	Assessor	Assessment Methods
		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.	8/1446
DATE	05/04/1446 (08/10/2024)