Course Specification

(Postgraduate Programs)

Course Title:	**Survival Models**
Course Code:	**AFM 6203**
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**

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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 2 / Year 1					
4. Course general Description:					
This course equip students with a strong foundation in survival analysis concepts and techniques. The course includes the essential fundamentals to apply statistical methods needed for analyzing time-to-event data. The studied survival models are related to real-world scenarios, particularly in the fields of insurance and finance. The student will use a statistical software for survival data analysis.					
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 objective of this course is to: • Equip students with a strong foundation in survival analysis concepts and techniques. • Develop students' ability to apply statistical methods to analyze time-to-event data. • Teach students how to use survival models in real-world scenarios in insurance and finance areas. • Enhance students' skills in using statistical software for survival data analysis. • Foster the ability to critically assess and choose appropriate survival analysis methods for various data types and research questions.					

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	Identify key concepts and terminology used in survival analysis.	K1	2 lecture hours\week	Direct: Regular Exams
1.2	Describe types of survival models, including non-parametric, semi-parametric, and parametric models.	K2	• 2 tutorial hours\week • Self-study	Direct: Short Quizzes
2.0	**Skills**			
2.1	Apply survival analysis techniques to real-world data, interpreting the results accurately.	S1	Self-study	Direct: • Participations • Short Quizzes
2.2	Use statistical software to perform survival analysis, including handling censored and truncated data.	S3	Real-life problems	Direct: Simulation mini-projects
2.3	Develop and assess survival models, choosing the most appropriate model based on the data.	S2	Real-life problems	Direct: Cases study
2.4	Perform a project using survival analysis, demonstrating the ability to formulate and test hypotheses.	S2	Self-study	Direct: Project
3.0	**Values, autonomy, and responsibility**			
3.1	Create connections in groups, adaptable to new circumstances, both independently and in collaboration with others.	V1	Personal questions	Direct: Participation
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 Survival Models:** Overview of Survival Analysis, Applications in Actuarial Science, Basic Concepts and Terminology.	6
2.	**Life Tables and Survival Functions:** Construction of Life Tables, Understanding Survival Functions, Key Measures: Mortality, Survival, and Hazard Rates.	9
3.	**Non-Parametric Survival Models:** Kaplan-Meier Estimator, Nelson-Aalen Estimator, Comparison of Survival Curves.	9
4.	**Parametric Survival Models:** Exponential and Weibull Models, Gompertz and Log-Normal Models, Mo6del Selection and Parameter Estimation.	9
5.	**Multivariate Survival Analysis:** Introduction to Multivariate Risks, The Cox Proportional Hazards Model, Time-Dependent Covariates.	9
6.	**Modeling Censored and Truncated Data:** Understanding Censoring and Truncation, Techniques for Handling Incomplete Data, Likelihood Construction for Censored Data.	9
7	**Applications of Survival Models in Insurance:** Pricing Life Insurance Products, Reserving for Life Insurance and Annuity Products, Survival Models in Health and Pension Actuarial Practice.	9
	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.).

. Learning Resources and Facilities

1. References and Learning Resources

Essential References	***Applied Survival Analysis: Regression Modeling of Time-to-Event Data*, David W. Hosmer, Stanley Lemeshow, and Susanne May**, 2nd Edition, 2008, John Wiley & Sons.
Supportive References	***Survival Analysis: Techniques for Censored and Truncated Data*, John P. Klein and Melvin L. Moeschberger**, 1st Edition, 1997, Springer. Dynamic Regression Models for Survival Data, Torben Martinussen and Thomas H. Scheike, 2nd edition, 2010, Springer**.**
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 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)