UNIVERSITI TEKNOLOGI MARA
ASC486: STOCHASTIC MODELING FOR ACTUARIAL APPLICATION

Course Name (English)	STOCHASTIC MODELING FOR ACTUARIAL APPLICATION APPROVED
Course Code	ASC486

MQF Credit	4

Course Description	This course introduces the students with the stochastic processes and their application. This course follows the syllabus of Core Statistics 2 from Institute and Faculty of Actuaries (IFOA).

Transferable Skills	Demonstrate professional skills, knowledge and competencies.

Teaching Methodologies	Lectures, Tutorial

CLO	CLO1	Describe the general principles of stochastic processes and their classification.
	CLO2	Define and apply Markov chain.
	CLO3	Define and apply Markov process.
	CLO4	Demonstrate lifelong learning skills in assignments related to stochastic models.

Pre-Requisite Courses	No course recommendations

Topics
1. Stochastic Processes 1.1) Define stochastic models 1.2) Deterministic and stochastic modelling 1.3) Discrete and continuous stochastic process 1.4) Mixed type
2. Random Walks 2.1) Define Random walks 2.2) Random walks and its relation to Markov chain
3. Markov Chains 3.1) Features of Markov chain model 3.2) Chapman-Kolmogorov equations – Time homogeneous and in-homogeneous Markov chain 3.3) Transition probabilities of Markov chain 3.4) Long Term Behaviour of a Markov chain 3.5) System of frequency based experience rating in terms of a Markov chain
4. Markov Process Models 4.1) Essential features of a Markov process model 4.2) Two State Model-Simple dead and alive model 4.3) Multiple State Markov Models
5. Time-Homogeneous Markov Jump Process 5.1) Poisson Process 5.2) Distribution of holding times and occupancy probabilities 5.3) Features of time-homogeneous Markov Jump process 5.4) Chapman-Kolmogorov equations and transition intensities
6. Time-Inhomogeneous Markov Jump Process 6.1) Distribution of holding times and occupancy probabilities 6.2) Features of time-inhomogeneous Markov Jump process 6.3) Chapman-Kolmogorov equations and transition intensities
7. Estimation and Simulation of Stochastic Models 7.1) Simulating Markov chains 7.2) Simulation process for time-homogeneous and inhomogeneous Markov Jump

Assessment Breakdown	%
Continuous Assessment	30.00%
Final Assessment	70.00%

Details of Continuous Assessment	Assessment Type	Assessment Description	% of Total Mark	CLO
	Assignment	Asignment CLO4-5%	5%	CLO4
	Quiz	Quiz 2 CLO3-2%	2%	CLO3
	Quiz	Quiz 1 CLO2-3%	3%	CLO2
	Test	Test 1 CLO2-10%	10%	CLO2
	Test	Test 2 CLO3-10%	10%	CLO3

Reading List	Recommended Text	• James R. Kirkwood 2015, *Markov Processes (Advances in Applied Mathematics)*, 1st Ed., CRC Press [ISBN: 13 978-148224]
		• Sheldon M. Ross 2014, *Introduction to Probability Models*, 11th Ed., Academic Press [ISBN: 13 9780124079]
	Reference Book Resources	• Karlin S. and H. M. Taylor 1998, *An Introduction to Stochastic Modelling*, 3rd Ed., Academic Press [ISBN: 978-0-12-6848]
		• Brzezniak Zdzislaw; Zastawwniak, Tomasz 1998, *Basic Stochastic Processes: A Course Through Exercises*, Springer [ISBN: ISBN 3 540 76]
		• Institute and Faculty of Actuaries (IFOA) 2019, *Actuarial Statistics- CS2 Core Reading*, Institute and Faculty of Actuaries
Article/Paper List	Reference Article/Paper Resources	• James C. Hickman 1997, Introduction to Actuarial Modelling, *Journal of North American Actuarial*, 1
Other References	This Course does not have any other resources	