



## University of Kerala

Discipline	Mathematics				
Course Code	UK3VACMAT200				
Course Title	Introduction to Actuarial Mathematics				
Type of Course	VAC				
Semester	III				
Academic Level	200-299				
Course Details	Credit	Lecture per week	Tutorial per week	Practical	Total Hours per week
	3	3			3
Pre-requisites	<p>1. Basics of Probability Theory, including basic concepts like probabilities, events, random variables, expected values, and variance.</p> <p>2. Fundamentals of algebra, especially for solving equations and manipulating mathematical expressions.</p>				
Course Summary	<p>This course provides a comprehensive overview of key concepts in actuarial mathematics, including probability theory, financial mathematics and insurance principles. Through exploration of topics such as probabilities, interest calculations, life insurance premiums, and annuities, students develop the analytical skills necessary for careers in insurance, finance, and risk management.</p>				

### Detailed Syllabus

Module	Unit	Contents	Hrs
<b>I</b>	<b>Probability</b>		<b>10</b>
	1	Probabilities and events	
	2	Conditional probability $\Delta$ and $E$	



Module	Unit	Contents	Hrs
	3	Random variables	
	4	Expected values	
	5	Variance	
	Chapter 1 of Text [3]		
<b>II</b>	<b>The Theory of Interest</b>		<b>8</b>
	6	Simple Interest interest	
	7	Compound interest	
	8	Continuously Compounded interest	
	9	Present value	
	Chapter 1 of Text [1]		
<b>III</b>	<b>Annuity</b>		<b>9</b>
	10	Introduction to annuity	
	11	Types of Annuities	
	12	Amortization	
	Chapter 9 of Text [4]		
<b>IV</b>	<b>Insurance</b>		<b>9</b>
	13	Life insurance	
	14	Calculating life insurance premiums	
	15	Types of life insurance	
	16	Combined insurance–annuity benefits	
	17	Insurances viewed as annuities	
	Chapter 5 of Text [2]		
<b>V</b>	<b>Suggestions for teacher designed module</b>		<b>9</b>
	For internal assessment examinations only.		
	18	Time Varying Interest Rates, Rate of Return, Continuous Income Streams, Sinking Fund, General insurance–annuity identity	
	These topics can be found in Chapter 1 of Text [1], Chapter 9 of Text [4], Chapter 5 of Text [2]		

## Text Books

**Text 1** Buchanan, J. R., An undergraduate introduction to financial mathematics, 2012.

**Text 2** Promislow, S. D. . Fundamentals of actuarial mathematics. John Wiley Sons, 2014.

**Text 3** Ross, S. M., An elementary introduction to mathematical finance. Cambridge University Press, 2011.

**Text 4** Trivedi, K., Business mathematics. Pearson Education India, 2011.

## References

**Ref. 1** Bowers et al., Actuarial Mathematics, Society of Actuaries, 1997.



Ref. 2 Samuel A. Broverman, Mathematics of Investment and Credit, Actex Learning, 2017.

## Course Outcomes

CO No.	Upon completion of the course the graduate will be able to	PO/PSO	Cognitive Level	Knowledge Category	Lecture(L) Tutorial (T)	Practical (P)
CO 1	Examine interest calculations, including simple, compound, and continuously compounded interests, and rate of return evaluations	PSO1, 2	R, U, Ap	F, C		
CO 2	Compare various annuities and apply amortization and sinking funds principles.	PSO-5, 6	R, U, An	P		
CO 3	Develop methods for calculating life insurance premiums and distinguishing between different insurance types.	PSO-1,3	U, An	M		
CO 4	Solve practical problems using statistical and mathematical methods in actuarial contexts	PSO-3,4	C, E	C, P		
CO 5	Apply knowledge to analyze insurance-annuity benefits and explore insurance-annuity identities.	PSO-6	C, Ap, An	P		

(R-Remember, U-Understand, Ap-Apply, An-Analyse, E-Evaluate, C-Create)  
(F-Factual, C-Conceptual, P-Procedural, M-Metacognitive)



## Mapping of CO with PSOs and POs

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	2	3	-	-	-	-	1	3	3	-	-	-	-	-
CO2	-	-	-	-	3	3	-	-	-	-	-	-	-	-
CO3	2	3	-	-	-	-	-	-	3	-	-	-	-	-
CO4	-	-	3	3	-	-	-	-	-	-	-	-	-	-
CO5	-	-	-	-	-	3	-	-	-	-	-	-	-	-

( - -Nil, 1-Slightly/Low, 2-Moderate/Medium, 3-Substantial/High)

## Assessment Rubrics

- Quiz/Assignment/Discussion/Seminar
- Midterm Exam
- Programming Assignments
- Final Exam

## Mapping of COs to Assessment Rubrics

	Internal Examination	Assignment	Project Evaluation	End Semester Exam
CO1	✓			✓
CO2	✓	✓		✓
CO3	✓			✓
CO4	✓	✓		✓

