ATTACHMENT 2 (e)

Course Specifications

Kingdom of Saudi Arabia

The National Commission for Academic Accreditation & Assessment

Course Specifications
(CS)

ACTU 477

Pension Mathematics

Course Specifications

Institution	Date of Report /
College/Department : Department of mathematics	

A. Course Identification and General Information

1. Course title and code: **Pension Mathematics** (ACTU 477)		
2. Credit hours (3)		
3. Program(s) in which the course is offered. Actuarial Science (If general elective available in many programs indicate this rather than list programs)		
4. Name of faculty member responsible for the course Faculty of Science		
5. Level/year at which this course is offered 5		
6. Pre-requisites for this course (if any) ACTU472		
7. Co-requisites for this course (if any)		
8. Location if not on main campus		
9. Mode of Instruction (mark all that apply)		
a. Traditional classroom	✓ What percentage?	80%
b. Blended (traditional and online)	What percentage?	
c. e-learning	✓ What percentage?	10%
d. Correspondence	✓ What percentage?	10%
f. Other	What percentage?	

Comments:

B Objectives

1. What is the main purpose for this course? Pension plans, Salary scale function, Valuation of benefits, Funding plans, Actuarial Cost Methods, Individual Level Premium, Aggregation, Pensioners, Contributory Plans, Ancillary Benefits, Assets: Group Annuity Contracts, Individual Life-Insurance Policies, Interest, Inflation, and Salary Increases, Valuation methods; gains and losses; dynamic control, Cost Methods in Current Actuarial Practice.
2. Briefly describe any plans for developing and improving the course that are being implemented. (e.g. increased use of IT or web based reference material, changes in content as a result of new research in the field). 1- introduce more applications and use life data 2- extended with using Finance packages in lecture or practical 3- concentrate the relations with others courses like Fin 200

C. Course Description (Note: General description in the form to be used for the Bulletin or handbook should be attached)

1. Topics to be Covered

List of Topics	No. of Weeks	Contact Hours
Topic 1:Models for single and multiple lives	1	3
The Candidate will understand key concepts concerning tabular or parametric survival models and single or multiple-life states.	2	6
Topic 2: Present Value Random Variables	1	3
The Candidate will be able to perform calculations on the present value random variables associated with benefits and expenses for any of the models mentioned in the Learning Outcomes of Learning Objective 1.	2	6
Topic 3: Premium Calculation .	1	3
The Candidate will be able to both calculate with and explain premium-calculation methodologies such as the equivalence principle, the portfolio-premium principle, and premiums determined by specified profit objectives, Non-interest-sensitive insurances; ○ Annuities; ○ Universal life insurances; and ○ Participating insurances.	2	6

Topic 4 : Reserves In this chapter they will understand reserves for insurances and annuities for models mentioned in the Learning Outcomes of Learning Objectives 1 and 3.	2	6
Topic 5: Pension Plans and Retirement Benefits	1	3
In this chapter they will understand how the models from previous Learning Objectives apply to pension plans and retirement benefits.	2	6

2. Course components (total contact hours and credits per semester):

	Lecture	Tutorial	Laboratory	Practical	Other:	Total
Contact Hours	30	30				60
Credit	2	1				3

3. Additional private study/learning hours expected for students per week. ☐

4. Course Learning Outcomes in NQF Domains of Learning and Alignment with Assessment Methods and Teaching Strategy

Course Learning Outcomes, Assessment Methods, and Teaching Strategy work together and are aligned. They are joined together as one, coherent, unity that collectively articulate a consistent agreement between student learning, assessment, and teaching.

The ***National Qualification Framework*** provides five learning domains. Course learning outcomes are required. Normally a course has should not exceed eight learning outcomes which align with one or more of the five learning domains. Some courses have one or more program learning outcomes integrated into the course learning outcomes to demonstrate program learning outcome alignment. The program learning outcome matrix map identifies which program learning outcomes are incorporated into specific courses.

On the table below are the five NQF Learning Domains, numbered in the left column.

First, insert the suitable and measurable course learning outcomes required in the appropriate learning domains (see suggestions below the table). **Second**, insert supporting teaching strategies that fit and align with the assessment methods and intended learning outcomes. **Third**, insert appropriate assessment methods that accurately measure and evaluate the learning outcome. Each course learning outcomes, assessment method, and teaching strategy ought to reasonably fit and flow together as an integrated learning and teaching process. **Fourth**, if any program learning outcomes are included in the course learning outcomes, place the @ symbol next to it.

Every course is not required to include learning outcomes from each domain.

	NQF Learning Domains And Course Learning Outcomes	Course Teaching Strategies	Course Assessment Methods
1.0	**Knowledge**		
1.1	Explain and interpret the effects of transitioning between states, the survival models and their interactions. Calculate and interpret standard probability functions including survival and mortality probabilities, force of mortality, and complete and curtate expectation of life.		
1.2	For models dealing with multiple lives and/or multiple states, explain the random variables associated with the model; calculate and interpret marginal and conditional probabilities, and moments.		
2.0	**Cognitive Skills**		
2.1	Using the factors mentioned in Learning Outcomes 1a and 1b, construct and interpret survival models for cohorts consisting of non-homogeneous populations, for example, smokers and non-smokers or ultimate-and-select groups.		
2.2	Describe the behavior of continuous-time and discrete-time Markov chain models, identify possible transitions between states, and calculate and interpret the probability of being in a particular state and transitioning between states.		
3.0	a) Calculate and interpret probabilities, means, percentiles and higher moments. b) Calculate and interpret the effect of changes in underlying assumptions such as mortality and interest. c) Apply to calculations involving these random variables appropriate approximation methods such as uniform distribution of deaths, constant force, Woolhouse, and Euler.		
3.1	Team work and leadership		
3.2	Apply to calculations involving these premiums appropriate approximation methods such as uniform distribution of deaths, constant force, Woolhouse, and Euler		
4.0	**Communication, Information Technology, Numerical**		
4.1	Calculate and interpret any of (i) several reserve types including benefits reserves, gross premium reserves, expense reserves or any of (ii) several reserve methods such as Full Preliminary Term (FPT) or modified reserves		
4.2	Using IT for learning and simulation Describe and compare defined contribution and defined benefit pension plans including final salary and career		

	average earning plans. b) Identify and interpret the common states and decrements for pension plans, and the parametric and tabular models, including Markov chain models, associated with these decrements.		
5.0	**Psychomotor (not applicable)**		
5.1			
5.2			

Suggested Guidelines for Learning Outcome Verb, Assessment, and Teaching

NQF Learning Domains	Suggested Verbs
Knowledge	Define the terms: **Models for single and multiple lives ,** **Present Value Random Variables ,** **Premium Calculation,** **Reserves,** **Pension Plans and Retirement Benefits** .
Cognitive Skills	*Calculate* Measures of financial performance: balance sheet; income statement; statement of cash flows by using some graph and finance programme
Interpersonal Skills & Responsibility	graph the data explain the features of model, , interpret the output, evaluate
Communication, Information Technology, Numerical	Writing reports for the study in an integrated manner using the finance softwares and optimal packages
Psychomotor	Not applicable

Suggested ***verbs not to use*** when writing measurable and assessable learning outcomes are as follows:

Consider Maximize Continue Review Ensure Enlarge Understand
Maintain Reflect Examine Strengthen Explore Encourage Deepen

Some of these verbs can be used if tied to specific actions or quantification.

Suggested assessment methods and teaching strategies are:

According to research and best practices, multiple and continuous assessment methods are required to verify student learning. Current trends incorporate a wide range of rubric assessment tools; including web-based student performance systems that apply rubrics, benchmarks, KPIs, and analysis. Rubrics are especially helpful for qualitative evaluation. Differentiated assessment strategies include: exams, portfolios, long and short essays, log books, analytical reports, individual and group presentations, posters, journals, case studies, lab manuals, video analysis, group reports, lab reports, debates, speeches, learning logs, peer evaluations, self-evaluations, videos, graphs, dramatic performances, tables, demonstrations, graphic organizers, discussion forums, interviews, learning contracts, antidotal notes, artwork, KWL charts, and concept mapping.

Differentiated teaching strategies should be selected to align with the curriculum taught, the needs of students, and the intended learning outcomes. Teaching methods include: lecture, debate, small group work, whole group and small group discussion, research activities, lab demonstrations, projects, debates, role playing, case studies, guest speakers, memorization, humor, individual presentation, brainstorming, and a wide variety of hands-on student learning activities.

5. Schedule of Assessment Tasks for Students During the Semester

	Assessment task (e.g. essay, test, group project, examination, speech, oral presentation, etc.)	Week Due	Proportion of Total Assessment
1	First Mid-Term Exam	8	25%
2	Second Mid-Term Exam	2	25%
3	Homework and reports		10%
4	Final Exam	17 or later	40%

D. Student Academic Counseling and Support

1. Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice. (include amount of time teaching staff are expected to be available each week)
Office Hours, Main Library and Network

E. Learning Resources

1. List Required Textbooks
ACTEX, 15th Edition, Fourth Printing Abraham Weishaus, Ph.D., F.S.A., CFA, M.A.A.A.

https://www.actexmadriver.com/trials/ASM_3MLC-ASM-17FSMP-E%20FT%20sample.pdf

2. List Essential References Materials (Journals, Reports, etc.)

3. List Recommended Textbooks and Reference Material (Journals, Reports, etc)

4. List Electronic Materials (eg. Web Sites, Social Media, Blackboard, etc.)

5. Other learning material such as computer-based programs/CD, professional standards or regulations and

software.

F. Facilities Required

Indicate requirements for the course including size of classrooms and laboratories (i.e. number of seats in classrooms and laboratories, extent of computer access etc.)
1. Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)

2. Computing resources (AV, data show, Smart Board, software, etc.)
3. Other resources (specify, e.g. if specific laboratory equipment is required, list requirements or attach list)

G Course Evaluation and Improvement Processes

1 Strategies for Obtaining Student Feedback on Effectiveness of Teaching
2 Other Strategies for Evaluation of Teaching by the Program/Department Instructor
3 Processes for Improvement of Teaching
4. Processes for Verifying Standards of Student Achievement (e.g. check marking by an independent member teaching staff of a sample of student work, periodic exchange and remarking of tests or a sample of assignments with staff at another institution).
5 Describe the planning arrangements for periodically reviewing course effectiveness and planning for improvement.

Faculty or Teaching Staff:

Signature: _____ Date Report Completed:
Received by: _____ Dean/Department Head

Signature: _____ Date: _____