American University-Central Asia

SYLLABUS

Actuarial Mathematics, Level 1

BUS/MAT-367 , ID 3964

Fall – 2020

Course Title:	Actuarial Mathematics, Level 1
Course Code:	3964
Course Coordinator:	Taalaibek Imanaliev, Doctor of Science, Professor
Course Duration:	15 weeks
No. of Credit Units:	6
Class meeting:	L: Tu 14:10-15:25; S: Th 14:10-15:25.
Mode:	On-line
Contact:	Imanaliev_t@auca.kg, room 415, phone: 915000 +ext. 426
Appointments/Hours	Fr: 13:00-15:00

1. **Lecturers**:

Taalaibek Imanaliev, Doctor of Science in Physics and Mathematics, Professor, imanaliev_t@auca.kg

2. **Class meetings:** 2 classes per week, total **6** credits, 15 working weeks.
3. **Consultations:**according to the individual schedules of the instructor.
4. **Short course description:**

This course will introduce to the basics of Actuarial Mathematics. The first level course consist of the following topics: basic theory of interest (we develop formulae needed in the rest of actuarial science), equation of value, concept of annuities, amortization, sinking funds, bonds, life tables, life annuities, life insurance, multi-life insurance, evaluation of pension plans.

III. Course Policies

- **Attendance Requirements** It is important to attend classes to master the materials in the course. Attendance affects grades: students lose 1 point for any unexcused absence. Missing 10 or more classes for any reasons will result in a grade of "F" in the course.
- **Academic Honesty** The Applied Mathematics and Informatics Department has zero tolerance policy for cheating. Students who have questions or concerns about academic honesty should ask their professors or refer to the University Catalog for more information.
- **Calculators and smartphones** For quizzes and exams, you can use a simple or an engineering calculator. In the case of online quiz or exam, the smartphone can be used only for photographing (scanning) the work and for sending the work to the instructor. All other devices and resources are prohibited.
- **Syllabus change** Instructors reserve the right to change or modify this syllabus as needed; any changes will be announced in class.

- **In the case of online classes.**
  - Students should not turn off their video or audio during the online class without the instructor's permission.
  - **Hardware requirements:** Computer with internet connection, webcam, headset and microphone, smartphone with camera.
  - **Quizzes and exams and homework assignments rules:**
  - The instructor defines the rules for receiving assignments and sending students' work; written works should be submitted in PDF format.
  - Written work should be performed on a white sheet of paper with a well writing blue or black ink pen, the work should contain a minimum number of blots (for dirt and multiple deletions, points may be reduced).
  - The submitted written works must be clearly visible and legible; in case of poor visibility, the work will not be checked.
  - During the exam or quiz, the camera and microphone must be turned on, the student's workspace and the student himself must be clearly visible.
  - Technical problems arising during an exam (quiz) should be eliminated as quickly as possible; in this case, the instructor decides to postpone the exam(quiz), to accept or reject the work.

IV. Assessment

a. Grading will be based on following components:

Grades will be based on a total of 100 points, coming from**:**

Quizzes	The lecturer sets day and time	20 points
Midterm Exam	October, xx, 2020 (The lecturer sets day and time)	30 points
Final Exam	December, xx, 2020 (The lecturer sets day and time)	40 points
Home works/ Activity	Every class	10 points

b. Grading scale:

The total grade of the student is as follows:

0 ≤ F ≤ 40 < D ≤ 45 < C- ≤ 50 < C ≤60 < C+ ≤65< B- ≤70 < B ≤ 80 < B+ ≤ 85< A- ≤ 90 < A≤100

Make-up Exams and Quizzes

- If the reason for missing the midterm exam is valid, the student’s final exam will be worth up to 60 points.
- If the reason for missing a quiz is valid, the quiz can be taken at another time and will be worth half points.
- If the reason for missing the Final Exam is valid, the student can apply for the grade of “I”.
- If a student misses both exams or two quizzes and an exam, he/she will not be attested for the course.
- If the reason for missing any exam or quiz is not valid, then the grade 0 will be given for the missing exam or quiz.

Prerequisites: MAT -131/132, MAT-227/233, MAT-234, MAT-306/307 .

5. **Textbooks:**
   1. Promislow S. David, *Fundamentals of Actuarial Mathematics*, J. Wiley, third edition, 2015, pp.527. (Available in AUCA Library)
   2. Stephen Garrett, *Introduction to Actuarial and Financial Mathematical Methods*, Elsevier, 2015, pp. 609. (Available in AUCA Library)
   3. Bowers et al. *Actuarial Mathematics*, The Society of Actuaries, 1997, pp. 753 (Available in AUCA Library)
   4. Parmenter Michael, Theory of Interest and Life Contingencies with Pension Applications. Problem Solving Approach, 1999, pp. 301 (google books).
6. **Objectives:**
   - Solving real life time value of money problems
   - Mathematical formulation of indeterministic problems
   - Application of basic theory to real economic concepts (bonds, mortgages, pension plans, life insurance)
   - Preparation to certified actuarial exams

7. **Expected outcomes.**

After completing BUS/MAT-367 the student will be able to

- Learn and intuitively apply the concepts of Accumulation function, Simple Interest, Compound Interest, Present Value and Discount, Nominal Rate of Interest, Effective Rate of Interest, Force of Interest
- Derive equation of interest, equation with unknown rate of interest, time weighted Rate of Return
- Understand the concept of annuities, annuities with unknown time and unknown rate of Interest, continuous annuities, varying annuities
- Understand the comcept of Amortization, Amortization schedules, Sinking funds, Yield Rates
- Understand the concept of bonds, price of bonds, Book Value, Bond Amortization Schedules
- Understand the concept of Life Contingencies, Probability and Expectation, Contingent payments, Life Tables and Population problems, Stationary Population, Expectation of Life
- Evaluate Life Annuities, Commutation Functions, annuities payable monthly, Varying Life Annuities, Annual Premiums and Reserves

Academic Honesty

Our Programs have zero tolerance policy for cheating. Students who have questions or concerns about academic honesty should ask their professor or refer to the University Catalog for more information.

Workbooks

Each student must maintain a math workbook with a clear record of completed homework. Workbooks will be assessed from time to time. Students should bring their workbooks to all classes, as they are necessary for their class work. Workbooks must be submitted for assessment immediately upon request of the instructor or full credit for homework may not be earned. The workbook must contain

calculations completed by the student. Photocopies of answers will not be accepted nor will answers that have been copied from the back of the textbook or transcribed from the solution manual. We highly recommend working jointly with your fellow students on homework problems.

Calculators
Students must have calculators and computers in each class and exams.

Cell phones
We ask students to turn off their cell phones during classes. Use of cell phones is entirely prohibited during the exams.

Syllabus change
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8. **Tentative Academic Calendar:**

1-4 weeks
Accumulation Function, Principal Value, Accumulated Value, Amount function, Interest, Effective rate of interest, Simple Interest, Ordinary Simple Interest, Banker's Rule, Compound Interest, Present Value and Discout d, Effective Rate of Discount dn, Nominal Rate of Interest, Force of Interest
5-7 weeks
Equation of Value, Unknown rate of Interest, Time-wighted rate of return, Annuities,

Week 8. Preparation for the Midterm test.

9-11 weeks
Amortization. Amortization Graph, Sinking Fund, Yield rate,
Bond, Bond price, Bond current value, Bond amortization graph

12-15 weeks
Life insurance, Probability and Expectation value, Unknown payments, Death Table, Population Growth, Stationary population, Expected duration of life, multiple decrements

Preparation for the final exam.

Out-of class assignments:

- Insurance annuity
- Pension Plans.