



جامعة الملك فهد للبترول والمعادن
King Fahd University of Petroleum & Minerals

KING FAHD UNIVERSITY OF PETROLEUM & MINERALS

DEPARTMENT OF MATHEMATICS & STATISTICS

Dhahran, 31261, Kingdom of Saudi Arabia

MATH 322: Quantitative Methods for Actuaries

Term 61

Instructor: Yaqoub Shehadeh

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Course Descriptions:

Algorithms; simplex and dual method; linear and quadratic programming; Solution of non-linear equations; finite differences; cubic splines; individual risk models; life tables. Floating-point arithmetic and error analysis. Interpolation. Polynomial interpolation. Numerical integration and differentiation. Data fitting. Solution of linear algebraic systems. Initial and boundary value problems of ordinary differential equations.

Credit: (3 – 0 – 3).

Note: Not to be taken for credit with Math 321 or CISE 301.

Prerequisite: MATH201 and either ICS 102 or ICS 103.

Textbook:

Ward Cheney and David Kincaid, *Numerical Mathematics and Computing* (7th Edition), Cengage Learning, 2013.

Reference:

Bowers et. Al, *Actuarial Mathematics*, SOA, 1997.

Grading Policy:

Assessment for this course is based on **class activities (attendance, homework and quizzes), project, two major (written) exams** and a **comprehensive final (written) exam**, as described in the following table:

Activity	Weight
Class Activities	15% (60 points)
Project	15% (60 points)
Major Exam I (Materials of Week 1 through Week 5) Date: Wednesday, October 26, 2016 Time: <u>5:45 PM.</u> Location: TBA.	20% (80 points)
Major Exam II (Materials of Week 6 through Week 10) Date: Wednesday, December 7, 2016 Time: <u>5:45 PM.</u> Location: TBA.	20% (80 points)
Final Exam (Comprehensive) Date: January 12, 2017. Time: <u>8:00—11:00 AM.</u> Location: TBA.	30% (120 points)

Grading Scales:

Letter Grade	A+	A	B+	B	C+	C	D+	D	F
Range (in points)								>=220	

There is no quote on the number of students who can obtain "A+"!

Exam Questions:

- ❖ The questions of the common exams are based on the examples and the exercises of the textbook.

Attendance:

- ✓ **Attendance** on time is *very* important. Mostly, attendance will be checked within the *first five minutes* of the class. Entering the class after that, is considered as one late, and *every two times late* equals to one absence. In accordance with the University rules, "***a grade of DN in a course is given if the student's unexcused absences are more than 20% of the lecture and laboratories sessions scheduled for the course***". Therefore, students who accumulate **9**, or more, unexcused absences will receive the DN grade.

Academic Integrity: All KFUPM policies regarding **ethics** and **academic honesty** apply to this course.

Course Schedule

Week # (Dates)	Sections	Topics
Week 1 (Sep. 18 – 21)	1.1 1.2	Introduction Mathematical Preliminaries
Week 2 (Sep. 25 – 29)	1.3 1.4	Floating-Point Representation Loss of significance
Week 3 (Oct 02 – 06)	2.1	Naïve Gaussian Elimination
Week 4 (Oct 9 – 13)	3.1	Bisection Method
Week 5 (Oct 16 – 20)	3.2 3.3	Newton’s Method Secant Method
Week 6 (Oct 23 – 27)	4.1 4.3	Polynomial Interpolation Estimating Derivatives
Week 7 (Oct 30 – Nov 3)	5.1 5.3	Trapezoid Method Simpson’s Rules and Newton-Cotes Rules
Week 8 (Nov 6 – 10)	5.4	Gaussian Quadrature Formulas
(March 13 – 17) Midterm Vacation		
Week 9 (Nov 20 – 24)	6.1 6.2	First Degree and Second Degree Splines Natural Cubic Splines
Week 10 (Nov 27 – Dec 1)	7.1 7.2	Taylor Series Method Runge - Kutta Methods
Week 11 (Dec 4 – 8)	11.1 11.2	Shooting Method A Discretization Method
Week 12 (Dec 11 – 15)	Guest assigned reading	Utility functions Life Tables
Week 13 (Dec 18 – 22)		Individual Risk Models Collective Risk Models
Week 14 (Dec 25 – 29)	9.1	Method of Least Squares
Week 15 (Jan 1 – 5) Jan 8	14.1 14.2	Standard Forms and Duality Simplex Method <u>Normal Thursday Classes</u>
Final Exam (Comprehensive): as posted on the registrar website		