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 372: Quantitative Methods for Actuaries**
Term 191 Clssroom 59-1017; 10-11am UT Lab 5-101; 10-11am R Office Hour 11am-12:30pm U

**Instructor:** Suliman Alhomidan
**Office**: 5-427 **E-mail: homidan@kfupm.edu.sa**

**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:** **"Numerical Analysis" by Richard L. Burden, J. Douglas Faires 9th Ed, Brooks/Cole (2011)**

**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** | 5% (20 points) |
| **Project** | 10% (40 points) |
| **Lab** | 15% (60 points) |
| **Major Exam I (Materials of Week 1 through Week 5)** **Date: Sunday, October 6, 2019 Time: TBA Location: TBA.** | 20% (80 points) |
| **Major Exam II (Materials of Week 6 through Week 10)** **Date: Tuesday , November 12, 2019 Time: TBA Location: TBA.** | 20% (80 points) |
| **Final Exam (Comprehensive) Date: December 1555, 2019** **Time: 8:00—11:00 AM. Location: TBA.** | 30% (120 points) |

**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.

**Weekly Coverage of Course Material**

| Week | Section | Topic |
|---|---|---|
| 1<br>Sep 1 – 5 | 1.2 | Round-off Errors<br>Computer Arithmetic |
| 2<br>Sep 8 - 12 | 2.1<br>2.2 | The Bisection Method<br>Fixed- Point Iteration |
| 3<br>Sep 15 - 19 | 2.3<br>3.1 | Newton's and Secant Methods<br>Interpolation and the Lagrange Polynomial |
| 4<br>Sep 22 - 26 | 3.1 | Interpolation and the Lagrange Polynomial |
| 5<br>Sep 29 - Oct 3 | 3.3 | Divided Differences |
| 6<br>Oct 6 – 10 | 3.5 | Cubic Spline Interpolation |
| 7<br>Oct 13 – 17 | 4.1 | Numerical Differentiation |
| 8<br>Oct 20 – 24 | 4.3<br>4.4 | Element of Numerical Integration<br>Composite Numerical Integration |
| 9<br>Oct 27 – 31 | 5.1<br>5.2 | The Elementary Theory of I.V.P.<br>Euler' Methods |
| 10<br>Nov 3 – 7 | 5.2<br>5.3 | Euler' Methods<br>Runge-Kutta Methods |
| 11<br>Nov 10 – 14 | 6.1<br>6.2 | Linear systems of Equation<br>Pivoting Strategies |
| 12<br>Nov 17 – 21 | 8.1 | Discrete Least Squares Approximation |
| 13<br>Nov 24 – 28 | 11.3 | Finite-Difference Methods for Linera Problems |
| 14<br>Dec 1 – 5 | ** | Linear Programming<br>Simlex Method |
| 15<br>Dec 8 – 12 | ** | Duality<br>Quadratric Programming |

Thursday class will be in Lab Building 5- Room 101