COURSE PORTFOLIO

FACULTY OF SCIENCE

MATHEMATICS DEPARTMENT

COURSE NAME:	**Numerical Analysis**
COURSE NUMBER:	**M A T H 4 2 1**
SEMESTER/YEAR:	Second semester 1435/1436
DATE:	**5/4/1436 – 17/8/1436h.**

Instructor Information

Name of the instructor: Dr. Farida Mosally
Office location: Room: C008 Building: 7
Office hours:

	Sun	Mon	Tue	Wed	
Time		11 - 1		11 - 1	

Contact number(s): **6400000 Extension 63622**
E-mail address(s): fmusaly@kau.edu.sa
Course website address: http://www.kaau.edu.sa/fmusaly

Course Information

Course meeting place & times:

Section	Place	Sun	Mon	Tue	Wed	
XAR	L08/C		9:30-11		8 - 9 9:30-11	

Objectives of the course

- To provide the numerical methods of solving the non-linear equations, interpolation, differentiation, and integration.
- To improve the student's skills in numerical methods by using the numerical analysis software and computer facilities.

Course description

- Numerical solutions of non-linear equations: bisection method, Newton-Raphson method, secant method, convergence.
- Interpolation: Lagrange, Newton divided difference formulas.
- Numerical differentiation: first derivative, higher derivatives.
- Numerical integration: Trapezoidal rule, Simpson's rule, Gaussian integration.
- Algorithms and programs.

Main text book

- R. Burden, and J. D. Faires, Numerical Analysis, PWS-Kent Publishers, 8th.edition.

Subsidiary Books

- V. A. Patel, Numerical Analysis, Harcourt Brace, College Publishers, (1994).
- W. Cheney and D. Kincaid, Numerical Mathematics and Computing, Brooks/Cole Publishing Company, (2003).

- محمد سعيد حمودة: التحليل العددي، جده – دار زهران (1995).

Course prerequisites and requirements:

Course name	Course number
Mathematical Software and Programming	Math 331
Differential Equations I	Math204
Linear Algebra	Math 241

Course Grading:

	Quiz 1	First Exam	Quiz 2	Second Exam	Final Exam	Home work
Date	W:29/4/1436h	W:20/5/1436h	W:26/6/1436h	W: 10/7/1436h	M: 22/7/1436h	
Mark	7	20	7	20	40	6

Expectations from students:

1- Keeping on the prudish uniform.
2- Don't open mobile during the lecture.
3- The student whose absent more than 5-times not allowed to enter the final exam.
4- The student whose absent in one periodic examination with acceptable excuse add its mark to the final exam.
5- Decreasing one mark to 2 absent without reason.
6- The incomplete exam is for the student if she enters all the periodic examinations and with report medicinal massages from the governmental direction.

السياسات ومتطلبات المادة

1. مسئولية الطالبة **اللبس المحتشم و عدم استخدام الجوال أثناء الحاضرة.**
2. الطالبة التي تتجاوز نسبة غيابها عن 20% (5 **محاضرات**) بدون عذر مقبول لا يحق لها دخول الاختبار النهائي.
3. حضور الاختبارات وتقديم الواجبات في الأوقات المتفق عليها.
4. لا تعاد الاختبارات بتاتا الطالبة التي تتغيب عن اختبار ما بعذر تقبله أستاذة المادة تضاف درجة الاختبار إلى الاختبار النهائي.
5. تخصم درجة عن كل مرتين غياب بدون عذر.
6. يشترط لحصول الطالبة على درجة غير مكتمل تقديم عذرا مقبول من الشؤون التعليمية وحضور جميع الاختبارات. لا تتجاوز نسبة غيابها عن 20%.
7. عقوبة الغش في الاختبارات الدورية والنصفية الرسوب في المادة وعقوبة الغش في الاختبار النهائي الرسوب في الفصل **الدراسي التالي.**

Course Schedule

Week	Date	Topic	What is Due?
1	11/11/1435h	**Introduction to the course and review to MATLAB**	
2-4		**Chapter 1** • **Review of calculus**	
		Numerical Solution of equation in one variable • Bisection method • Fixed point method • Newton-Raphson method • Secant method	**Ex. Set 2.1** 1,5,7,9,12, 13,15 **Ex. Set 2.2** 1,2,3,5,8,9,11 **Ex. Set 2.3** 2,3,5(a,b), 6(a,b,e,f), 7(a,b,e,f), 14,21, 25
Quiz 1			
5-7		**Iterative Techniques in Matrix Algebra** • Norms of Vectors and Matrices • Iterative Techniques for Solving Linear Systems **Numerical Solutions of Nonlinear Systems of Equations** • Fixed Points • Newton's Method	**Ex. Set 7.1** 1,2,3,4 **Ex. Set 7.3** 1(a,b), 2,3,4. **Ex. set 10.1** 5, 7(b), 8(c), 10(c) **Ex. set 10.2** 7(a, b)
First Exam			
8-9		**Interpolation and polynomial approximation** • Interpolation and Lagrange polynomial Neville's Method • Divided difference • Equally Spaced Points	**Ex. Set 3.1** 1, 3, 5(a,b), 7(a), 9(a,b), 17, 19(c), 20, 21. **Ex. Set 3.2** 3(b), 5(b), 7, 12, 17, 19
Quiz 2			
10-11		**Numerical Differentiation** • First derivative, three Point Formula • Higher derivatives	**Ex. Set 4.1** 1, 3, 5(a,b), 7(a,b). 20
Second Exam			
12-14		**Numerical Integration** • Numerical integration Trapezoidal Rule Simpson's Rule • Composite numerical integration • Goussian quadrature formulas	**Ex. Set 4.3** 1(a,b,c), 3(a,b,c) 5(a,b,c), 7(a,b,c), 22 **Ex. Set 4.4** 1(a,b,c), 3(a,b,c), 7(a,b) **Ex. Set 4.7** 1(a), 5.
Final Exam			