

<u>Jordan University of Science & Technology</u>	
<u>Faculty of Science and Arts</u>	
<u>Department of Mathematics and Statistics</u>	
Year:	2007/2008
Semester:	Fall

Course Information	
Course Title	Numerical Analysis (I)
Course Number	MATH 721
Prerequisites	
Course Website	www.just.edu.jo/~towaiq/MATH721
Instructors	Dr. Mohammad Al-Towaiq
Office Location	PH3, CS Dept.
Office Phone	7201000 Ext. 23661
Office Hours	TBA or by appointment
E-mail	towaiq@just.edu.jo

Text Book	
Title	Burden and Faires, " Numerical Analysis ", 7th ed., Brooks/Cole, 2001 and Class notes.
References	(1) W. Cheney and D. Kincaid , " <i>Numerical Mathematics and Computing</i> ", 4 th ed., Brook/Cole, 1999. (2) Dahlquist, Bjorck, and Anderson , " Numerical Methods", Prentice Hall. (3) Gregory and Redmond , " Introduction to Numerical Analysis", 1994. (4) K. Atkinson , " Elementary Numerical Analysis", 2nd ed., Wiley, 1993.

Assessment Policy		
Assessment Type	Expected Due Date	Weight
First Exam	Week 5 or 6	15%
Second Exam	Week 11 or 12	15%
Quizzes, HWs , Projects, and Reports	TBA	20%
Final Exam	TBA	50%

Teaching & Learning Methods
<ul style="list-style-type: none"> • Class lectures, exams, and quizzes are designed to achieve the course objectives. • You should read the assigned chapters before class and participate in class and do whatever it takes for you to grasp this material. Ask questions. Ask lots of questions. • You are responsible for all material covered in the class. • Please communicate any concerns or issues as soon as practical either in class, by phone or by Email.

Course Objectives

COURSE OBJECTIVES

" Numerical Analysis is the study of **Algorithms** for the problems of Science " [Crandall 1994].

The general objectives of this course are:

- 1- To present most of the available numerical methods for solving problems with concentration on a sufficient number of methods to handle the problems likely to be encountered in practice.
- 2- To introduce students to the potentialities of modern computer for solving problems in science and technology.
- 3- To develop the students skills in computer programming by carrying out a variety of programming exercises.
- 4- To present a wide diversity of topics so that the student can see at once the immense range of applications for the subject.

Course Content

Chapter 1	Interpolation Theory: Polynomial Interpolation Theory; Newton Divided Differences; Finite Differences and Table-Oriented Interpolation Formulas; Errors in Data and Forward Differences; Hermite Interpolation.	2 weeks
Chapter 2	Approximation Theory: Review of discrete Least Squares Approximation; Orthogonal Polynomials and Least Squares, Chebyshev, Polynomials; Rational Functions, and Trigonometric Polynomial Approximations.	3 week
Chapter 3	Numerical Integration: Newton's Cotes Formulas; Romberg Integration; Adaptive Quadrature Methods; Multiple Integrals; Improper Integrals.	2 weeks
Chapter 4	Numerical Methods for ODE's: (IVP) : Taylor Series Methods; Runge-Kutta Methods; Stability and Adaptive Runge-Kutta Methods; Multi-Steps Methods. Boundary-Value Problems: The Shooting Method; Finite-Difference Methods.	3 weeks
Chapter 5	The Matrix Eigenvalue Problem: Linear Algebra and Eigenvalues; Gerschgorin Theorem; The Power Method; the QR Algorithm.	2 weeks
Chapter 6	Numerical Solutions to PDE's: Elliptic PDE; Parabolic PDE; Hyperbolic PDE; An Introduction to Finite-Eliminate Method.	2 weeks

Additional Notes

Exams	<ul style="list-style-type: none"> • The format for the exams is generally (but NOT always) as follows: Computation, analysis, and design. • Grades will not be given out via e-mail. • The final exam covers all the material in the course.
Quizzes	<ul style="list-style-type: none"> • Quizzes (10-15 minutes) will be given at the end of the lecture. Typically they will involve some questions that are designed to test the understanding of the material discussed in the preceding lectures. • There will be 3 Quizzes. The highest 2 grades will be counted.
Makeup Exams	<ul style="list-style-type: none"> • Let the instructor know about your makeup exam before 3 days prior to the scheduled exam time. • Makeup exam should not be given unless there is a valid excuse.

Drop Date	<ul style="list-style-type: none"> • Last day to drop the course is before May 3, 07.
Cheating	<ul style="list-style-type: none"> • Cheating or copying from neighbor on exam, or quiz is an illegal and unethical activity. • Standard JUST policy will be applied.
Attendance	<ul style="list-style-type: none"> • Excellent attendance is expected. • JUST policy requires the faculty member to assign ZERO grade (35) if a student misses 10% of the classes that are not excused. • Sign-in sheets will be circulated. • If you miss class, it is your responsibility to find out about any announcements or assignments you may have missed.
Workload	<ul style="list-style-type: none"> • Average work-load student should expect to spend is 6 hours/week.
Graded Exams	<ul style="list-style-type: none"> • Instructor should return exam, quiz, Hw's, and project papers graded to students during the week after the due date.
Participation	<ul style="list-style-type: none"> • Participation in, and contribution to class discussions will affect your final grade positively. Raise your hand if you have any question.
Finally	<ul style="list-style-type: none"> • Smoking is prohibited in all in-door places.