CE305 = CEE Computation

INSTRUCTOR = Dr. Duc T. Nguyen (dnguyen@odu.edu)
OFFICE   = 1319 ECSB
PHONE   = 683-3761
Off. Hrs. = T-R; 12:20-1:20pm

Date/Time/Room = see http://www.odu.edu, or see/hear instructor's message

Book = Numerical Methods with Applications: Customized for O.D.U.
       By Kaw, Nguyen and Kalu (2010)

Purchase only on-line at:

http://www.lulu.com/product/paperback/numerical-methods-with-applications-customized-for-old-dominion- university/12194832

(~ 716 pages, ~ $49.99, paperback, excluding shipping/handling, within 5-7 days).

Power Point Presentation Lectures:
http://www.lions.odu.edu/~skadi002

then select & CLICK CEE-305 Course Materials
then select & CLICK Numerical Methods – Website
 then select & CLICK "resources by context: Power Points"

Intro. to Probability and Statistics (10th Ed., ISBN# 0-534-35778-4) by Mendenhall, Beaver, and Beaver (Brooks/Cole Publishing Co.)

To get the FREE FORTRAN compiler: GOOLE Search For force 2.0.8
(g77 FORTRAN compiler) http://downloads.zdnet.co.uk

To get the FREE C++ compiler: www.BloodShed.net
 go to downloads Dev_C++

"TENTATIVE" PLANS FOR PRACTICAL DEMONSTRATIONS:
 (a) Invited seminars by researchers/engineers from NASA LaRC/NNS industries
     and/or
 (b) Students' take home exam to summarize books/journal papers on practical
     and/or
     (real life) applications of CE-305 course materials
 (c) Computer Graphical Simulations (STADD III/Drs. Hou's/Bunting's videos)
     and/or
 (d) Visit ODU Laboratories

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"TENTATIVE" TOPICS

Notes: Do all "odd Home Work numbers" for "odd year", and
    do all "even Home Work numbers" for "even year"

[1] INTRODUCTION, APPROXIMATION & ERRORS
    Chapter 01.01 Introduction to numerical methods
    Chapter 01.02 Measuring errors
    Chapter 01.03 Sources of error
    Chapter 01.04 Binary representation of numbers
    Chapter 01.05 Floating point representation ^^
    Chapter 01.06 Propagation of errors
    Chapter 01.07 Taylor theorem revisited

[2] DIFFERENTIATION
    Physical problems
    Chapter 02.02 Differentiation of continuous functions
    Chapter 02.03 Differentiation of discrete functions

    Notes:
    Distribute Prof. Kaw's Demographics Survey (14 questions)

[3] NONLINEAR EQUATIONS
    Physical problems
    Chapter 03.01 Solution of quadratic equations
    Chapter 03.03 Bisection method of solving a nonlinear equation
    Chapter 03.04 Newton Raphson method of solving a nonlinear equation
    Chapter 03.05 Secant method of solving a nonlinear equation
    Chapter 03.06 False Position method of solving a nonlinear equation

[4] SIMULTANEOUS LINEAR EQUATIONS
    Physical problems
    Chapter 4.1 Introduction to matrix algebra
    Chapter 04.06 Gaussian elimination
    Chapter 04.07 LU decomposition
    Chapter 04.08 Gauss-Seidel method
    Chapter 04.09 Choleski and L D L Algorithms, and "Chess-Like" Game
     see http://www.lions.odu.edu/~amoha006/Fillinterms/FILLINTERMS.html

    Notes:
    Implementing Prof. Nguyen's "chess-like" game on SLE, as students'a
     special (graded) test !!
    Implementing Prof. Kaw's "endless quizes" on SLE, as students'
     special (graded) test !!

[5] INTERPOLATION
   Physical problems
   Chapter 05.01 Background of interpolation
   Chapter 05.02 Direct method of interpolation
   Chapter 05.03 Newton's divided difference interpolation
   Chapter 05.?? Lagrange interpolation

   Notes:
   Distribute Prof. Kaw's Cal. I, II, III, ODE, Age, Gender,
    Transfer Student Survey
    (to be merged/used later with Prof. Kaw-Nguyen's 40 Final Exam
    Questions/Answers Survey)

[6] REGRESSION
   Physical problems
   Chapter 06.01 Statistics background of regression analysis
   Chapter 06.02 Introduction of regression analysis
   Chapter 06.03 Linear regression
   Chapter 06.04 Nonlinear models for regression

[7] INTEGRATION
   Physical problems
   Chapter 07.02 Trapezoidal rule of integration
           Multiple-segment trapezoidal rule
   Chapter 07.03 Simpson's 1/3 rule of integration
           Multiple-segment Simpson 1/3 rule
   Chapter 07.05 Gauss quadrature
   Chapter 07.06 Simpson's 3/8 rule of integration
           Multiple-segment Simpson 3/8 rule

   Notes:
   Distribute Prof. Kaw-Nguyen's Overall Survey about reading/class
    presentation/problem sets (27 questions)

[8] ORDINARY DIFFERENTIAL EQUATIONS (ODE)
   Physical problems
   Chapter 08.02 Euler's method for ODE
   Chapter 08.03 Runge-Kutta 2-nd order (Heun, Mid-Point, Ralston) method

   Notes:
   Dr. Gwen-Lee Thomas needs 45-60 minute class time for conducting
    VERBAL SURVEY !!
   Distribute Dr. Gwen-Lee Thomas' 61 Questions Survey

[11] FOURIER SERIES, DISCRETE FOURIER TRANSFORM (DFT),
    FAST FOURIER TRANSFORM (FFT)

Chapter 11.01 Fourier series
Chapter 11.02 Fourier transform pair: frequency and time domain^
Chapter 11.03 Discrete fourier transform (DFT)^
Chapter 11.04 Informal development of fast fourier transform (FFT)^
Chapter 11.05 Theoretical development of (N=2^r) fast fourier transform
        (FFT)^
Chapter 11.06 Theoretical development of (N=r1*r2) fast fourier
        transform (FFT)^

[12] INTRODUCTION TO STATISTIC AND PROBABILITY
    Based on instructor's class notes

FINAL ("comprehensive") EXAM (in "multiple choice questions" mode) !!

^ These topics may be included "if" time permits !!

NOTES:
    The symbol ^ indicates the topic will be covered "very briefly", or "totally skipped"

    Homeworks will be assigned and collected
    No late assignments will be accepted

    Approx. 2 or 3 tests (and quizzes) + Final exam will be given

    Students will be allowed to bring his/her own 1 page formula sheet, for usage in the
tests/final exam.

    Course grade will be based upon:
     2 or 3 tests 45% + Quizes & ALL computer programs 15% + final exam 40%

    Numerical accuracy of calculations is critical for grading tests/exam

    No make-up tests/quizes or final exam will be given, unless medical certificate of illness is
produced (make-up test, if permitted, will be MORE DIFFICULT than the regular test !!)

    HONOR CODE is observed