

The University of Texas at Tyler
Electrical Engineering Bachelor of Science

EENG 5340 – Numerical Methods (Elective)

Syllabus

Catalog Description:

A basic exploration of the numerical methods used in the solution and analysis of engineering problems. Focus will be given to linear systems, ordinary differential equations, and partial differential equations.

Prerequisites: MATH 3305 and successful completion of a structured programming language course.

Credits: 3 (3 hours lecture, 0 hours laboratory per week)

Text(s): *Numerical Methods for Engineers*, Chopra and Canale, McGraw-Hill

Additional Material: None

Course Coordinator: Hassan El-Kishky

Topics Covered:

Taylor Series; Root solution techniques; Matrix solution methods; Numerical Differentiation; Numerical Integrations; Romberg Methods; Numerical Solution of Ordinary Differential Equations; Runge-Kutta Methods; Partial Differential Equations-Finite difference methods.

Evaluation Methods:

1. Examinations / Quizzes
2. Homework
3. Reports
4. Computer Programming
5. Project
6. Presentation
7. Course Participation
8. Peer Review

Course Objectives¹: By the end of this course students will be able to:

1. solve for the roots of complex equations by several techniques [1,3]
2. solve systems of equations via matrix solution methods [1,3]
3. curve-fit equations through least squares regression [1,3]
4. numerically solve ordinary differential equations [1,3]
5. numerically solve partial differential equations [1,3]
6. program numerical methods into computers [1,3]

¹*Numbers in brackets refer to method(s) used to evaluate the course objective.*

Relationship to Program Outcomes²: This course supports the following Mechanical Engineering Program Outcomes, which state that our students will be able to:

1. **Graduates of the program will possess a breadth and depth of knowledge in electrical and computer engineering:** Students will possess and be able to apply knowledge and principles at a graduate level in two or more of the following areas utilizing modern engineering tools: electronics, power systems, controls, advanced engineering mathematics, signal processing, communications, real-time systems, computer systems, electromagnetic and power electronics.
2. **Graduates of the program will possess and demonstrate oral and written communication skills:** Students will be adequately prepared for entrance into advanced careers or into a doctoral program through reports, papers, publications or presentations.
3. **Graduates of the program will demonstrate the capability to perform independent learning and investigation:** Students will successfully address electrical or computer engineering problems through independent research activity in coursework or a thesis.
- 4.

²Numbers in brackets refer to course objective(s) that address the Program Outcome.

Contribution to Meeting Professional Component: (in semester hours)

Mathematics and Basic Sciences:	1.0	hours
Engineering Sciences and Design:	2.0	hours
General Education Component:		hours

Prepared By: Hassan El-Kishky

Date: Jan 4, 2010

Revised: January 9, 2010