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]

1Numbers in brackets refer to method(s) used to evaluate the course objective.
Relationship to Program Outcomes: 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. *Numbers in brackets refer to course objective(s) that address the Program Outcome.*

Contribution to Meeting Professional Component: (in semester hours)

<table>
<thead>
<tr>
<th>Component</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mathematics and Basic Sciences</td>
<td>1.0</td>
</tr>
<tr>
<td>Engineering Sciences and Design</td>
<td>2.0</td>
</tr>
<tr>
<td>General Education Component</td>
<td></td>
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Prepared By: Hassan El-Kishky Date: Jan 4, 2010
Revised: January 9, 2010