Benha Faculty of engineering
Benha University

Program on which the course is given: All programs
Major or minor elements of program: N.A.
Departments offering the program: All departments
Department offering the course: Department of Basic Science
Academic year/level: Fourth year - First semester
Date of specification approval: / / 2009

A - Basic Information

Title: Mathematics
Credit Hours: N.A.
Tutorial: 2
Lecture: 3
Lab: 0

B - Professional Information

1. Overall aims of the course
   By the end of this course the student will be able to:

   2. Intended Learning Perform numerical solutions of systems of linear and nonlinear algebraic equations.
   Compute Lagrange's, Newton's and Hermite's interpolation.
   Obtain least square fits for numerical data.
   Perform numerical integration using Newton-Cotes and Steifel methods.
   Solve some initial value problems using Rung-Kutta and multi-step methods.
   Solve some boundary value problems for ordinary differential equations using finite differences.
   Solve some initial and boundary value problems in partial differential equations.
   Be acquainted with concepts of probability theory (sample space – probability space – conditional probability – independence – discrete and continuous random variables)
   Get familiar with some famous discrete and continuous statistical distributions.
   Have a concrete idea about sampling techniques and sampling distributions.
   Deal with statistical point and interval estimations for the mean and variance.

   outcomes of the course
   (a) Knowledge and understanding
      (i) Acquire knowledge for subsequent courses in mathematics.
      (ii) Acquire tools for introductory and advanced engineering courses.
   (b) Intellectual skills
      (i) Develop prerequisite analytical skills for subsequent courses in mathematics.
      (ii) Acquire familiarity with modeling physical and engineering problems.
   (c) Professional and practical skills
      N.A.
   (d) General and transferable skills
      N.A.
3. Contents

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<thead>
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<th>Topic</th>
<th>№ of hours</th>
<th>Lecture</th>
<th>Tutorial</th>
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</thead>
<tbody>
<tr>
<td>Numerical solution of system of linear equations.</td>
<td>6</td>
<td>4</td>
<td>2</td>
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<tr>
<td>Numerical solution of non linear equations.</td>
<td>4</td>
<td>2</td>
<td>2</td>
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<tr>
<td>Lagrange, Newton and Hermite interpolation.</td>
<td>8</td>
<td>5</td>
<td>3</td>
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<tr>
<td>Least square approximation and curve fitting.</td>
<td>4</td>
<td>2</td>
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<tr>
<td>Newton Cotes and Steifel integrations.</td>
<td>7</td>
<td>4</td>
<td>3</td>
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<tr>
<td>Initial value problem for ordinary differential equations by Runge-Kutto and multi step methods.</td>
<td>8</td>
<td>5</td>
<td>3</td>
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<tr>
<td>Boundary value problems for ordinary differential equation by finite difference methods.</td>
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<td>2</td>
<td>2</td>
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<tr>
<td>Initial boundary value problems for partial differential equations.</td>
<td>11</td>
<td>7</td>
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<tr>
<td>Probability space, conditional probability.</td>
<td>6</td>
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<tr>
<td>Probability density and distribution functions, basic theorems.</td>
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<td>3</td>
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<tr>
<td>Discrete and continuous distributions.</td>
<td>6</td>
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<tr>
<td>Statistical estimation.</td>
<td>4</td>
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4. Teaching and learning methods
   
   (a) Lectures (power point presentation recommended)
   
   (b) Class tutorials

5. Students’ assessment methods
   
   (a) Midterm examination
   
   (b) Assignments and quizzes
   
   (c) Final examination

5.1 Assessment schedule
   Weekly

5.2 Weighting of assessments

<table>
<thead>
<tr>
<th>Assessment Type</th>
<th>Weighting</th>
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</thead>
<tbody>
<tr>
<td>Class participation and attendance</td>
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<tr>
<td>Assignments and quizzes</td>
<td>10%</td>
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<tr>
<td>Midterm examination</td>
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<tr>
<td>Final examination</td>
<td>60%</td>
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6. List of references
   
   (i) Lecture Notes
       Staff members
       Staff members

   (ii) Reference Books

7. Facilities required for teaching and learning

   Data show – projector
   Course Coordinator
   Head of Department