Course Specifications of
Mathematics II – B112 2008/2009

Faculty: Benha Faculty of engineering
University: Banha

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: First year - Second semester
Date of specification approval: / / 2009

A - Basic Information

Title: Mathematics
Credit Hours: N.A.
Tutorial: 2
Lecture: 4
Lab: 0

B - Professional Information

1. Overall aims of the course
   By the end of this course the student will be able to:
   - Manipulate laws of matrix algebra
   - Apply matrix algebra to the solution of a set of linear equations
   - Know the concepts of a vector space (as an algebraic structure) and the concept of a subspace.
   - Deal with linear combination and the span and linear dependence and linear independence.
   - Know the definition of an inner product space and understand the orthogonality of vectors.
   - Find the eigenvalues and the corresponding eigenspaces and hence diagonalize square matrices.
   - Know the space of free vectors V₃ and use its algebra to deal with linear geometry in three dimensions.
   - Deal with graphing in polar coordinates.
   - Know the standard forms of conic sections and their properties.
   - Know the definition of the complex number system and manipulate its algebra.
   - Know the definition of an indefinite integral and its rules.
   - Apply rules of integration to problems in dynamics.
   - Evaluate integrals using different methods of integration.
   - Deal with definite integrals and its rules and applications to areas, volumes of revolution and lengths of curves.
   - Know the concept of convergence of sequences and series and obtain Taylor’s and Maclaurin’s expansion of functions.

2. Intended Learning 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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<td>Solution of linear systems and applications</td>
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<td>Vector spaces and vector subspaces</td>
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<td>Inner product spaces</td>
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<td>Eigenvectors and eigenvectors</td>
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<td>Diagonalization of matrices</td>
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<td>Vector algebra and linear geometry in three dimensions</td>
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<td>Polar coordinates – conic sections</td>
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<td>Indefinite integral and its applications</td>
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<td>Methods of integration</td>
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<td>Definite integral and applications</td>
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<td>Sequences and series – Taylor’s expansion of functions</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**
   - Class participation and attendance: 10%
   - Assignments and quizzes: 10%
   - Midterm examination: 20%
   - Final examination: 60%

6. **List of references**
   (i) **Lecture Notes**
       - Linear Algebra and geometry: Staff members
       - One Variable Calculus II: Staff members
   (ii) **Reference Books**
       - Thomas and Finney: Latest edition

7. **Facilities required for teaching and learning**
   - Data show – projector
   - Course Coordinator
   - Head of Department