Course Specifications of
Mathematics III – B211 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 : Second year- First semester

Date of specification approval : / / 2009

A - Basic Information

Title : Mathematics Code : B211

Credit Hours : N.A. Lecture : 3

Tutorial : 2 Lab : 0

B – Professional Information

1. Overall aims of the course

By the end of this course the student will be able to:

- Form a differential equation through the elimination of arbitrary constants or expressing some physical phenomena.
- Classify a differential equation regarding its order, degree and linearity.
- Solve a first order differential equation and obtain the orthogonal trajectories.
- Obtain the general solution of an n^{th} order differential equation with constant coefficients and with variable coefficients in the Euler form.
- Obtain the general solution of an n^{th} order linear differential equation with constant coefficients using variation of parameters.
- Obtain the solution of a system of linear differential equations.
- Evaluate integrals leading to a Gamma or a Beta function.
- Recognize and graph quadratic surfaces in E^3.
- Deal with vector functions of one real variable.
- Obtain the domain and range of a real function of two and three real variables.
- Obtain the partial derivatives of a function of several variables.
- Obtain the directional derivative and the total differential and apply them on to obtain the tangent plane and the normal line to a surface.
- Obtain the Taylor expansion of a function of two variables and apply it to the estimation of errors.
- Solve optimization problems in several dimensions.
- Solve constrained optimization problems in several dimensions using Lagrange's multipliers.

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

Topic	№ of hours	Lecture	Tutorial
Classification, formation and types of solutions of ode	5	3	2
Solution of first order ode – orthogonal trajectories	10	6	4
n^{th} order homogeneous differential equations with constant coefficients	5	3	2
Particular solution of non-homogeneous differential equations by operators	5	3	2
Variation of parameters - Euler equation – Reduction of order	5	3	2
Systems of linear differential equations	5	3	2
Gamma and Beta functions.	5	3	2
Curves and surfaces in three dimensions	5	3	2
Vector functions of one variable	5	3	2
Scalar functions of several variables – Partial derivatives	5	3	2
Directional derivatives – Total derivatives – Tangent planes – Normal lines	5	3	2
Taylor expansions – Error and approximation	5	3	2
Maximums, minimums and saddle points – Lagrange's multipliers	5	3	2
Optimization problems	5	3	2

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

Ordinary Differential Equations I Staff members

Multivariable Calculus I 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