Course specification

University/Academy: Damanhour University
Faculty/Institute: Science
Department: Mathematics

1. course Data:

<table>
<thead>
<tr>
<th>Course code:</th>
<th>Course title:</th>
<th>Academic year/level:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Math405</td>
<td>Measure Theory, Numerical Analysis and Difference Equations</td>
<td>2010-2011</td>
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<table>
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<tr>
<th>Specialization:</th>
<th>No. of instructional units:</th>
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<tbody>
<tr>
<td>Special Mathematics</td>
<td>lecture 4 tutorial 2 practical -</td>
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2. course Aim

Demonstrate theoretical knowledge and have practical skills in the subject of numerical analysis, difference equations and measure theory. Demonstrate an ability to initiate and sustain in-depth research relevant to measure theory or numerical analysis or difference equations. Have an opportunity to put theory into practice via work-based learning through different application in numerical analysis, difference equations and measure theory.

3. Intended learning outcome

a) Knowledge and understanding

a1. Explain the theories and concepts used in the numerical analysis, difference equations and measure theory.

a2. Identify the steps required to carry out a piece of research on a topic within numerical analysis, difference equations and measure theory.

b) Intellectual skills

b1. Apply appropriate theories, principles and concepts relevant to the numerical analysis, difference equations and measure theory.

b2. Analyze and interpret information and evaluate the literature within numerical analysis, difference equations and measure theory.

b3. Formulate a reasoned argument from a variety
of sources relevant to numerical analysis, difference equations and measure theory.

b4. Select a reasoned argument to the solution of familiar and unfamiliar problems relevant to numerical analysis, difference equations and measure theory.

c) Professional skills

  c1. Plan practical activities using techniques and procedures appropriate to numerical analysis, difference equations and measure theory.

  c2. Design a piece of independent research using numerical analysis, difference equations and measure theory techniques.

d) General skills

  d1. Deal with appropriate effective written and oral communication skills relevant to numerical analysis, difference equations and measure theory.

  d2. Work effectively as part of a group, involving leadership, group dynamics and interpersonal skills such as listening, negotiation and persuasion relevant to these topics.

  d3. Use organization skills (including task and time management) relevant to analysis and numerical analysis both individually and in a group situation.

  d4. Think independently problems relevant to numerical analysis, difference equations and measure theory techniques some of which are at the forefront of the discipline.

4. course content

  1-σ-rings.
  Initial-value problems for ordinary differential equations
  2- Set functions.
  Euler's method-Euler modified method – higher order Taylor methods
  3- Construction of Lebesgue measure.
  Runge – Katta method
  4-Measure spaces and measurable functions
     multistep methods
  5-Lebesgue integrals.
     Higher – order equations
  6- Systems of differential equations
### 5. Teaching and learning methods

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<tr>
<th>5.1</th>
<th>5.2</th>
<th>5.3</th>
<th>5.4</th>
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<tbody>
<tr>
<td>Lectures.</td>
<td>Tutorials</td>
<td>Homework</td>
<td>Oral discussion</td>
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### 6. Teaching and learning methods for students with special needs

None

### 7. Student Assessment

<table>
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<tr>
<th>a) Procedures used:</th>
<th>Final exam</th>
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<tr>
<td>b) Schedule:</td>
<td>Assessment 1 Final exam Week 15</td>
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<tr>
<td>c) Weighing of Assessment:</td>
<td>Final exam 150 Marks (100%)</td>
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### List of Textbooks and References:

| d) Course Notes | Course notes provided by the staff member of Math department, to be handed at the beginning of the semester. |
**e) Required Books (Textbooks)**


**f) Recommended Books**

|   | None |

**g) Periodicals, web sites,…,etc**

|   | None |

**Course Instructor:** Dr. Ragab Omar Abd El-Rahman

**Head of Department:** Dr. Ragab Omar Abd El-Rahman

**Date:** / /