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>
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<tbody>
<tr>
<td>Math312</td>
<td>Electromagnetism and Special Relativity</td>
<td>2009-2010</td>
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<tr>
<th>Specialization:</th>
<th>No. of instructional units:</th>
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<tbody>
<tr>
<td>Mathematics and Physics</td>
<td>lecture 4</td>
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2. course Aim

This course is designed to encourage in students a sense of interest for Electromagnetism and Special Relativity. Provide a solid foundation in the major areas of Electromagnetism and Special Relativity. Provide education and training of high quality in Electromagnetism and Special Relativity.

3. Intended learning outcome

a) Knowledge and understanding

a1. Describe the main concepts, definitions of Electromagnetism and Special Relativity.

a2. Mention theories and concepts used in Electromagnetism and Special Relativity.

a3. Identify an understanding of the contribution and impacts of Electromagnetism and Special Relativity and in scientific, social, economic, environmental, political and cultural terms.

b) Intellectual skills

b1. Apply appropriate theories, principles and concepts relevant to Electromagnetism and Special Relativity.

b2. Assess and evaluate the literature within the field of Data Structures.

b3. Deduce and interpret information from a variety
of sources relevant to Electromagnetism and Special Relativity.

c) **Professional skills**

- c1. Plan and design applications using techniques and procedures appropriate to Electromagnetism and Special Relativity.
- c2. Plan practical activities using techniques and procedures appropriate to Electromagnetism and Special Relativity

d) **General skills**

- d1. Develop appropriate effective written and oral communication skills relevant to the specific course of Electromagnetism and Special Relativity.
- d2. Work effectively as part of a group.
- d3. Set tasks and solve problems relevant to Electromagnetism and Special Relativity using ideas and techniques some of which are at the forefront of the discipline.

### 4. course content

- Coulomb's law – The Galilean Transformation 194
- The electrostatic field, electric intensity- The Fundamental Postulate of Relativity 201
- Lines of force- The Lorentz Transformation 203
- Potential of the field- Simultaneity 213
- Lines of force for collinear charges- Relativistic Mass 217
- Electric doublet- Transformation of a Momentum and of a Relativistic Energy.
- Gauss's Theorem – Invariance of Electric Charge 228
- Poisson's equation- Force Exerted on a Moving Charge by Another Charge Moving at the Same Constant Velocity 248
- Laplace's equation- Transformation of Electric and Magnetic Fieds 261
- Conductors, Condensers and method of electrical images- The Vector Potential 264
- Dielectrics- The Scalar Potential . The Electric Field Intensity Expressed in. Terms of and 266
- Magnetism – The Lorentz Condition.
### 5. Teaching and learning methods

- 5.1 Lectures.
- 5.2 Tutorials
- 5.3 Homework
- 5.4 Oral discussion

### 6. Teaching and learning methods for students with special needs

Non

### 7. Student Assessment

#### a. Procedures used:

Final exam

#### b. Schedule:

Assessment 1 Final exam Week 15

#### c. Weighing of Assessment:

Final exam 200 Marks (100%)

### 8. List of Textbooks and References:

#### a. Course Notes

Course notes provided by the staff member of Math department, to be handed at the beginning of the semester.

#### b. Required Books (Textbooks)

| Course Instructor: | Prof. Dr. Moktar Shonoda  
|                  | Prof. Dr. Magdi Sayed El-Serwa  
| Head of Department: | Dr. Ragab Omar Abd El-Rahman  

**Date:** / /