# Course specification

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

<table>
<thead>
<tr>
<th>Course code:</th>
<th>Course title:</th>
<th>Academic year/level:</th>
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</table>
| Math407      | Statistical Mechanics and Electrodynamics | 2010-2011  
Forth year - First term |

**Specialization:** Special Mathematics  
**No. of instructional units:**  
<table>
<thead>
<tr>
<th>lecture</th>
<th>tutorial</th>
<th>practical</th>
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<td>4</td>
<td>2</td>
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## 2. course Aim

Demonstrate theoretical knowledge and have practical skills and personal attributes that will be required for Statistical Mechanics and Electrodynamics. Demonstrate an ability to initiate and sustain in-depth research relevant to Statistical Mechanics and Electrodynamics.

## 3. Intended learning outcome

**a) Knowledge and understanding**

a1. State the theories and concepts used in Statistical Mechanics and Electrodynamics.

a2. Identify the steps required to carry out a piece of research on a topic within the field of Statistical Mechanics and Electrodynamics.

a3. Recognize the contribution and impacts of Statistical Mechanics and Electrodynamics in scientific, social, economic, environmental, political and cultural terms;

**b) Intellectual skills**

b1. Apply appropriate theories, principles and concepts relevant to the Statistical Mechanics and Electrodynamics.

b2. Evaluate the literature within Statistical Mechanics and Electrodynamics.

b3. Analyze and interpret information from a variety...
of sources relevant to Statistical Mechanics and Electrodynamics.

b4. Deduce a reasoned argument to the solution of familiar and unfamiliar problems relevant to Statistical Mechanics and Electrodynamics.

c) Professional skills

c1. Plan practical activities using techniques and procedures appropriate to Statistical Mechanics and Electrodynamics.

c2. Execute and communicate a piece of independent research using Statistical Mechanics and Electrodynamics media and techniques.

d) General skills

d1. Deal with an appropriate effective data relevant to Statistical Mechanics and Electrodynamics.

d2. Think independently to work effectively as part of a group to solve problems relevant to Statistical Mechanics and Electrodynamics.

d3. Solve problems relevant to Statistical Mechanics and Electrodynamics using ideas and techniques some of which are at the forefront of the discipline.

d4. Communicate with the scientific data in both Arabic and English

4. course content

<table>
<thead>
<tr>
<th>Thermodynamics derivation</th>
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<tr>
<td>Thermodynamics functions for open systems.</td>
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<tr>
<td>Euler's theorem and Gibbs.</td>
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<tr>
<td>Duhem relation.</td>
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<td>Lagrange multipliers and Stirling's approximation</td>
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<tr>
<td>The fundamental distribution laws for Fermi, Dirac, Bose - Einstein and Boltzmann</td>
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<td>Thermodynamic functions for a system of corrected Fermi- Dirac and Bose - Einstein Statistics.</td>
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<tr>
<td>The electromagnetic field equations.</td>
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<td>Boundary conditions.</td>
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<tr>
<td>Energy of the field. Poynting's theorem.</td>
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</tbody>
</table>
The magnetic field produced by steady electric currents.
Electromagnetic waves, plane wave, reflection and refraction, polarized waves.

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
None

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%)

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)
  Electromagnetic fields and waves y: P.Lorrain & D.R.Corson
  Elementary statistical mechanics by: G.Kumar
<p>| | |</p>
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<tr>
<td>f) <strong>Recommended Books</strong></td>
<td>None</td>
</tr>
<tr>
<td>g) <strong>Periodicals, web sites,…etc</strong></td>
<td>None</td>
</tr>
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**Course Instructor:** Prof. Dr. Sami Kassem

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

**Date:** / /