Tutorial Letter 101/3/2018

Electricity and Magnetism

PHY 2602

Semesters 1 and 2

Physics Department

This tutorial letter contains important information about your module.
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Dear Student

1 INTRODUCTION

The Department of Physics at Unisa is very pleased to welcome you to this module and we hope that you will find it both interesting and rewarding. Throughout the year we shall do our best to make you succeed in this module. From your side we expect you (i) to try your best to start studying early in the year and (ii) to complete all your assignments thoroughly and on time.

During the year you will receive a number of tutorial letters either in print or online. Tutorial letters are our main way of communicating with you about teaching, learning and assessment.

Tutorial Letter 101 contains important information about the scheme of work, resources and assignments for this module. We urge you to read it carefully and to keep it close at hand when working through the study material, preparing the assignment(s), preparing for the examination and addressing questions to your module leader.

Please read Tutorial Letter 301 in combination with Tutorial Letter 101, as it gives you an idea of generally important information when studying at a distance through the Department of Physics.

In Tutorial Letter 101, you will find the assignments and assessment criteria as well as instructions on the preparation and submission of the assignments. This tutorial letter also provides all the information you need with regard to the prescribed study material and other resources and how to obtain it. Please study this information carefully and make sure that you obtain the prescribed material as soon as possible.

We have also included certain general and administrative information about this module. Please study this section of the tutorial letter carefully.

Right from the start we would like to point out that you must read all the tutorial letters you receive during the year immediately and carefully.

We hope that you will really enjoy this module and wish you all the best!

2 PURPOSE AND OUTCOMES

2.1 Purpose

The purpose of this module is to teach you the concepts of Electricity and Magnetism, using vector calculus. The following topics, from the prescribed textbook, are covered:

- Vector analysis
- Electrostatics
- Electric fields in matter
- Magnetostatics
- Magnetic fields in matter
- Electrodynamics

The primary goal of this module is to help you develop a conceptual understanding of these aspects continuing from the work done in the first year Electromagnetism course. The
introduction to vector analysis and some of its useful theorems provide the mathematical foundation to be able to describe electric and magnetic fields comprehensively, both in vacuum and matter.

2.2 Outcomes

A student who successfully complete this module should

a) Have a working knowledge of vector calculus.

b) Be able to apply Coulomb’s law and Gauss’ law to calculate electric fields due to a given charge distribution, calculate the related electric potentials and electrostatic energies; understand properties of conductors and dielectrics.

c) Be able to calculate the forces on charges moving in an electric field and currents flowing in a magnetic field, apply Biot-Savart and Ampere’s law to calculate the magnetic field and magnetic vector potential due to given current density.

d) Be able to calculate magnetic field in matter.

e) Be able to apply Faraday’s law and Maxwell’s equations.

3 LECTURER(S) AND CONTACT DETAILS

3.1 Lecturer(s)

The lecturer responsible for this module is

• Name : Dr. MJ Sithole
• Email address : sithomj@unisa.ac.za
• Telephone number : +27(0)11 670-9074

3.2 Department

For general queries and communication to the department on other matters than academic content, please contact the secretary of the department

Secretary: Departmental of Physics Tel: +27+(0)11 670-9066
Unisa Science Campus E-mail: physics@unisa.ac.za
Eureka Building
Office K-S-032
Private Bag X06
Florida Park, 1710

3.3 University

General contact details with the University about matters that are not directly related to the academic content of this module can be found in the brochure My Studies @ Unisa. Remember to always have your student number at hand when contacting the University.

4 RESOURCES

4.1 Prescribed books


NOTE: You should source the textbook from local booksellers or online.
Please consult the list of official booksellers and their addresses listed in *My studies @ Unisa*. You will also receive the Study Guide for this module, which is compiled by Unisa.

### 4.2 Recommended books

There are number of relevant Physics textbooks that you may consult in the Unisa Library at Florida Science Campus library. Please contact the UNISA libraries for these books.

### 4.3 Electronic reserves (e-reserves)

There are NO e-reserves for this module.

### 4.4 Library services and resources information

For brief information, go to [www.unisa.ac.za/brochures/studies](http://www.unisa.ac.za/brochures/studies)

For detailed information, go to [http://www.unisa.ac.za/library](http://www.unisa.ac.za/library). For research support and services of personal librarians, click on "Research support".

The library has compiled a number of library guides:

- finding recommended reading in the print collection and e-reserves – [http://libguides.unisa.ac.za/request/undergrad](http://libguides.unisa.ac.za/request/undergrad)
- requesting material – [http://libguides.unisa.ac.za/request/request](http://libguides.unisa.ac.za/request/request)
- postgraduate information services – [http://libguides.unisa.ac.za/request/postgrad](http://libguides.unisa.ac.za/request/postgrad)
- finding, obtaining and using library resources and tools to assist in doing research – [http://libguides.unisa.ac.za/Research_Skills](http://libguides.unisa.ac.za/Research_Skills)
- how to contact the library/finding us on social media/frequently asked questions – [http://libguides.unisa.ac.za/ask](http://libguides.unisa.ac.za/ask)

### 5 STUDENT SUPPORT SERVICES

For information on the various student support services available at UNISA (e.g. student counselling, tutorial classes, language support), please consult the brochure *My Studies @ Unisa* that you received with your study material during registration. For more information on other support services check the [myUnisa](http://www.unisa.ac.za/myUnisa) website, Unisa online learning management system.

**Study groups**

It is advisable to have contact with fellow students. One way to do this is to form study groups. The addresses of students in your area may be obtained from the following department:

Directorate: Student Administration and Registration  
Office K-S-032  
PO Box 392  
UNISA  
0003
myUnisa

The *myUnisa* Learning Management System is Unisa’s online campus that will help you to study, communicate with lecturers, communicate with other students and with administrative departments of Unisa. Please use it. To go to myUnisa website, start at the main Unisa website [www.unisa.ac.za](http://www.unisa.ac.za), and then follow the *myUnisa* link. Please consult the publication MyStudies@Unisa for more information.

**Tutorial classes**

There are NO tutorial classes for this module.

### 6 STUDY PLAN

<table>
<thead>
<tr>
<th>Semester 1</th>
<th>Semester 2</th>
<th>Study Plan</th>
</tr>
</thead>
<tbody>
<tr>
<td>By 12 March</td>
<td>By 13 August</td>
<td>Outcomes 2.2.a) and 2.2.b) achieved.</td>
</tr>
<tr>
<td>By 03 April</td>
<td>By 01 September</td>
<td>Outcomes 2.2.c) and 2.2.d) achieved.</td>
</tr>
<tr>
<td>By 20 April</td>
<td>By 17 September</td>
<td>Outcome 2.2.e) achieved.</td>
</tr>
<tr>
<td>By 28 April</td>
<td>02 October</td>
<td>Work through past question papers and revision.</td>
</tr>
</tbody>
</table>

### 7 PRACTICAL WORK AND WORK-INTEGRATED LEARNING

There is neither practical work nor work-integrated learning for this module.

### 8 ASSESSMENT

#### 8.1 Assessment criteria

- Formative Assessment: Two assignments
- Summative Assessment: Venue exam based examination

#### 8.2 Assessment plan

In each semester there are two compulsory written assignments for this module. Please make sure that you answer the questions for the semester for which you are registered. If you answer questions from the wrong semester, your solutions will not be marked and you will get zero marks for the assignments.

All two assignments count towards the semester mark. Your final mark for the module will be made up as follows:

- 30% from the assignments average, and
- 70% from the final examination.

#### 8.3 Assignment numbers

**8.3.1 General assignment numbers**

The assignments are numbered 01 and 02 for each semester.
8.3.2 Unique assignment numbers

Each assignment has a unique number, which you must use when submitting your assignments. Below find the unique numbers for the three assignments.

<table>
<thead>
<tr>
<th>Assignment number</th>
<th>Semester 1 unique Numbers</th>
<th>Semester 2 unique Numbers</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>844123</td>
<td>717162</td>
</tr>
<tr>
<td>02</td>
<td>837952</td>
<td>893165</td>
</tr>
</tbody>
</table>

8.4 Assignment due dates

The due dates for the assignments are as follows:

<table>
<thead>
<tr>
<th>Assignment number</th>
<th>Semester 1</th>
<th>Semester 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>12 March 2018</td>
<td>13 August 2018</td>
</tr>
<tr>
<td>02</td>
<td>20 April 2018</td>
<td>17 September 2018</td>
</tr>
</tbody>
</table>

8.5 Submission of assignments

All assignments must be submitted online via the myUnisa portal in PDF format.

8.6 The assignments

There are two assignments for each semester. Students registered for Semester 1 must write and submit only assignments of Semester 1. Similarly, students registered for the second semester should submit only assignments of Semester 2. If you submit assignments for the semester you are not registered to you will get zero marks.

- The assignments questions for Semester 1 are given in Addendum A.
- The assignments questions for Semester 2 are given in Addendum B.

8.7 Other assessment methods

There are NO other assessment methods for this module.

8.8 The examination

8.8.1 Examination Admission

To gain admission to the examination, you must submit at least one assignment.

8.8.2 Examination Period

If you are registered for the first semester you will write your examination in May/June 2018.
If you are registered for the second you will write your examination October/November 2018.

During the semester, the examination department will provide you with information regarding the examination in general: examinations venues, examination dates and times, for example.
8.8.3 Examination paper

The examination will be a single written paper of two hours. Refer to My Studies @ Unisa brochure for general examination guidelines and examination preparation guidelines. To gain admission to the examination, you must submit at least one assignment.

9 FREQUENTLY ASKED QUESTIONS

There are no Frequently Asked Questions. However, students are encouraged to check the Discussion Forum on the module website on myUnisa, from time to time.

10 SOURCES CONSULTED

The prescribed textbook was used in the compilation of this Tutorial letter.

11 IN CLOSING

We hope that you will enjoy this module and we wish you success with your studies!

12 ADDENDUM

ADDENDUM A: COMPULSORY ASSIGNMENTS FOR FIRST SEMESTER

ONLY FOR SEMESTER 1 STUDENTS

ASSIGNMENT 01

CLOSING DATE: 12 MARCH 2018

UNIQUE NUMBER: 844123

Attempt all the problems listed in the table below

(Total marks = 100)

<table>
<thead>
<tr>
<th>Chapter</th>
<th>Problems</th>
<th>Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>Problem 11</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>Problem 55</td>
<td>20</td>
</tr>
<tr>
<td>02</td>
<td>Problem 3</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>Problem 13</td>
<td>10</td>
</tr>
<tr>
<td>04</td>
<td>Problem 19</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>Problem 22</td>
<td>20</td>
</tr>
</tbody>
</table>
ONLY FOR **SEMESTER 1** STUDENTS

**ASSIGNMENT 02**

CLOSING DATE: 20 APRIL 2018

UNIQUE NUMBER: 837952

Attempt all the problems listed in the table below
(Total marks = 100)

<table>
<thead>
<tr>
<th>Chapter</th>
<th>Problems</th>
<th>Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>05</td>
<td>Problem 10</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>Problem 17</td>
<td>10</td>
</tr>
<tr>
<td>06</td>
<td>Problem 13</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>Problem 24</td>
<td>20</td>
</tr>
<tr>
<td>07</td>
<td>Problem 13</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>Problem 18</td>
<td>20</td>
</tr>
</tbody>
</table>

**ADDENDUM B:** COMPULSORY ASSIGNMENTS FOR SECOND SEMESTER

ONLY FOR **SEMESTER 2** STUDENTS

**ASSIGNMENT 01**

CLOSING DATE: 13 AUGUST 2018

UNIQUE NUMBER: 717162

Attempt all the problems listed in the table below
(Total marks = 100)

<table>
<thead>
<tr>
<th>Chapter</th>
<th>Problems</th>
<th>Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>Problem 34</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>Problem 43</td>
<td>20</td>
</tr>
<tr>
<td>02</td>
<td>Problem 12</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>Problem 50</td>
<td>10</td>
</tr>
<tr>
<td>04</td>
<td>Problem 15</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>Problem 19</td>
<td>20</td>
</tr>
</tbody>
</table>
ONLY FOR **SEMESTER 2** STUDENTS

**ASSIGNMENT 02**

CLOSING DATE: 17 SEPTEMBER 2018

UNIQUE NUMBER: 893165

Attempt all the problems listed in the table below
(Total marks = 100)

<table>
<thead>
<tr>
<th>Chapter</th>
<th>Problems</th>
<th>Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>05</td>
<td>Problem 9</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>Problem 60</td>
<td>10</td>
</tr>
<tr>
<td>06</td>
<td>Problem 7</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>Problem 17</td>
<td>20</td>
</tr>
<tr>
<td>07</td>
<td>Problem 8</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>Problem 37</td>
<td>20</td>
</tr>
</tbody>
</table>

END