**Module code** | SP-1302  
**Module Title** | Electricity and Magnetism  
**Degree/Diploma** | Bachelor of Science (Applied Physics)  
**Type of Module** | Major Option  
**Modular Credits** | 4  
**Total student Workload** | 10 hours/week  
**Contact hours** | 4 hours/week  
**Prerequisite** | A Level Physics or equivalent  
**Anti-requisite** | SP-1202 Electricity and Magnetism,  
TG-1307 Engineering Electromagnetics  

**Aims**  
The module is designed to provide the students with the fundamental theoretical and practical knowledge of Electricity and Magnetism and prepare them for more advanced study in this area.  

**Learning Outcomes**  
*On successful completion of this module, a student will be expected to be able to:*  

| Lower order | 30% | - describe the interaction of electromagnetic waves with matter  
- Identify the paths of charges subject to both electrostatic and magnetic fields  
| Middle order | 50% | - perform calculations to determine the electric field distributions for complex arrangements of charge  
- calculate the magnetic fields due to moving charges in wires and solenoids  
- measure magnetic fields in coils and wires using for example Hall probe and search coil techniques  
- perform calculations on the interaction of electromagnetic waves with matter  
- measure charge carrier mobilities in for example semiconductors using electromagnetic techniques  
- use software to plot and interpret electric and magnetic field distributions for various charge arrangements  
- apply theoretical skills developed in the lectures to analysing and solving problems in electricity and magnetism  
| Higher order | 20% | - demonstrate their ability to use laboratory equipment by performing experiments relevant to the module  
- use an investigative approach to study employing resources such as books, lecture notes, the Internet and other sources.  

**Module Contents**  
- Introductory vector calculus  
- Electric charge, Coulomb’s law, electric field and field lines  
- Electric dipole, electric potential, Gauss’ law, electric flux  
- Properties of capacitors, storage of electrostatic energy, dielectrics  
- Magnetic field, Hall effect, magnetic dipole  
- Magnetic fields due to currents, the Biot-Savart law, Ampere’s law  
- Faraday’s law of induction, Lenz’s law, inductance, storage of electromagnetic energy, eddy currents, magnets and magnetic materials  

**Assessment**  
| Formative assessment | In-class questions, tutorials and feedback  
| Summative assessment | Examination: 50%  
Coursework: 50%  
- 2 work-based problems (20%)  
- 2 assignments (20%)  
- 1 class test (10%)