**MODULE CODE MODULE NAME CREDITS**

EMES301 Marine Electrical Systems 302 14

**PURPOSE**

This course introduces the learner to the fundamental principles behind power generation, distribution and analysis. The aim of this course is to provide the core knowledge, principles and techniques necessary to understand, interpret and analyse electrical systems and circuits, configurations and phenomena commonly observed or used in the generation and distribution of electricity.

After completing this module, the student should be able to:

* Understand the concept of alternating current and define concepts such as instantaneous value, peak amplitude, peak-to-peak value, period, cycle and frequency.
* Understand the concepts of admittance, conductance and susceptance.
* Understand, interpret and perform calculations on simple AC voltage and current divider networks.
* Understand different load types: Resistive, Inductive and capacitive.
* Understand and explain the following concepts: Inductive and capacitive reactance, impedance.
* Know and understand phasor diagrams.
* Analyse RLC series and parallel circuits.
* Explain concepts of conductance, susceptance and admittance.
* Understand the effects of frequency variation on a circuit.
* Understand and explain concepts such as resonance, Q-factor and bandwidth
* Describe power factor and its significance in a circuit.
* Know and explain the difference between and the unit of measure of true power (P), reactive power (Q) and apparent power (S) and how these relate to the impedance triangle.
* Describe the basic construction of an iron core transformer and perform basic calculations covering the emf equation, turns ratio and the transformer rating.
* Describe what is meant by a complex wave and what constitutes it
* Carry out the necessary calculations to determine the following in a complex wave circuit. Calculate the effective (RMS) value, total power dissipated, total apparent power, total power factor, current response, harmonic impedance’s.
* Understand symmetrical 3 phase supplies and know the difference between a 3 phase 3 wire and 3 phase 4 wire system - understand star and delta configurations
* Know the difference between voltage and current sources and explain the difference between a dependent and independent source.
* Convert a voltage source to an equivalent current source and vice versa.
* Understand and apply the Superposition theorem, Nortan’s theorem, Thevinin’s theorem and Maximum power transfer.

# ESSENTIAL CONTENT

The following are essential aspects/ topics of this course:

* AC Networks
* Resonance
* Power Factor Correction (Single Phase)
* Transformers
* Harmonics
* Three Phase circuits
* DC and AC theorems

**ASSESSMENT**  
Class Mark – 40%, Examination Mark – 60%

**MODERATION**

Internal

**PREREQUISITE MODULE/s**

PHYV102 (Physics 2) & MATV302 (Mathematics 3)

**CO-REQUISITE MODULE/s**

None