

108SE Electrical Science

Module Description

1. Aims and Summary

The module aims to provide a broad basic introduction to electrical science for non-specialists. It places an emphasis on dc circuit theory, electrical supply and rotating machinery.

2. The intended learning outcomes are that on completion of this module the student should be able to:

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1. Employ the basic laws and analysis techniques of dc, single-phase and three-phase electrical systems.
2. Identify the requirements of various standard electrical systems and predict their performance.
3. Apply the fundamental laws of electromagnetism to transformers, motors, generators, and solenoids.

3. Indicative Content

- Electrical quantities: resistance, inductance, capacitance, current, voltage, power, energy.
- Circuit theorems & analysis: Linearity, Ohm's law, Kirchoff's laws, application to dc circuits.
- Periodic waveforms, peak, mean and rms values.
- Simple phasor diagrams, power in ac circuits.
- Three-phase sources, balanced three-phase star connected loads.
- Magnetic fields: flux density, field strength, magnetic materials, permanent magnets, electromagnetism, Ampere's law, forces in magnetic systems.
- Energy storage: secondary batteries, fuel cells, capacitors and inductors. Common secondary battery technologies and their characteristics.
- Electromagnetic induction, the ideal transformer, forces on a conductor. Operation of a dc machine, 3 phase induction motor, synchronous machines. Generation of voltage.

4. Essential Reading

Course notes and on-line resources

5. Recommended Reading

- Warnes, L. (1998); *Electronic and Electrical Engineering-Principles and Practice*, 2nd Edition, UK: Macmillan Press Ltd (ISBN 0333743113)
- Cogdell, J.R. (1999); *Foundations of Electric Power*, UK: Prentice-Hall (ISBN 0139077677)
- Hughes, E. (2008) *Electrical and Electronic Technology*, 10th Edition Harlow, UK: Pearson Prentice Hall (ISBN 0132060110)

6. Pass requirements

To pass this module you must achieve a module mark of at least 40%. This is calculated as the average of the assessment marks using the weightings shown. Coursework briefs will be posted on Moodle.

Assessment	Hours	Weighting	Learning Outcomes		
			1	2	3
Coursework	15	50%	✓	✓	
In class test	15	50%	✓	✓	✓

If you fail to achieve a pass in the module at the first attempt resit coursework will be available on Moodle for completion over the summer.

7. Module Evaluation

You may be asked to complete a module questionnaire giving your views on how the module has gone. Please answer as honestly, thoughtfully and fully as you can. The results will be used to guide the future development of the module and help fellow students.