Subject Description Form

Subject Code	EIE2302
Subject Title	Electricity and Electronics
Credit Value	3
Level	2
Pre-requisite	Nil
Co-requisite/ Exclusion	Nil
Objectives	1. Introduce the fundamental concepts of operation of electric circuits applicable to engineering students. 2. Develop ability for solving problems involving electric circuits. 3. Understand the function and application of basic electronic devices. 4. Develop skills for experimentation on electric circuits. 5. Impart relevant skills and knowledge in basic electricity and electronics for independent learning of other subjects that require such skills and knowledge.
Intended Learning Outcomes	**Upon completion of the subject, students will be able to:** Category A: Professional/academic knowledge and skills 1. Understand the operating principles of some fundamental electric circuits. 2. Solve simple problems in electric circuits. 3. Use suitable instrumentation to carry out experimental investigations to validate the theoretical investigations. 4. Understand the basic function and application of some basic electronic devices.
Subject Synopsis/ Indicative Syllabus	**Syllabus:** 1. DC circuits - Introduction to electric circuits. Potential and potential difference. Current. Resistance. Ohm's law. Kirchhoff laws. Voltage divider, current divider, series and parallel circuits. Node Voltage and Mesh Current Analyses. Thévenin and Norton Equivalents, Wheatstone bridge. Power dissipation and maximum power transfer. 2. Basic AC elements and simple AC circuits. 3. Electrical machines and protection - Generators. Motors. Mutual inductance and transformer. Circuit breakers. Motor selection. 4. Basic electronic devices - Junction diodes, bipolar junction transistors, field-effect transistors and their applications in simple mechatronics. 5. Applications of electronic devices – Solid state relays. ADC. Display drivers. Motor controllers, Power supplies. Frequency converters. **Laboratory Experiments:** 1. Introduction to laboratory instrumentation / Thévenin and Norton theorems 2. Voltage regulators 3. Transformer tests and characteristics.

Teaching/ Learning Methodology

Teaching and Learning Method	Intended Subject Learning Outcome	Remarks
Lectures, supplemented with interactive questions and answers	1, 2, 4	In lectures, students are introduced to the *knowledge* of the subject, and *comprehension* is strengthened with interactive Q&A.
Tutorials, where problems are discussed and are given to students for them to solve	1, 2, 4	In tutorials, students *apply* what they have learnt in solving the problems given by the tutor.
Laboratory sessions, where students will perform experimental verifications. They will have to record results and write a report on one of the experiments.	2, 3, 4	Students *acquire* hands-on experience in using electronic equipment and *apply* what they have learnt in lectures/tutorials to experimentally validate the theoretical investigations.
Assignments	1, 2, 3, 4	Through working assignments, students will develop a firm understanding and *comprehension* of the *knowledge* taught.

Alignment of Assessment and Intended Learning Outcomes

Specific Assessment Methods/ Task	% Weighting	Intended Subject Learning Outcomes to be Assessed (Please tick as appropriate)			
		1	2	3	4
1. Continuous Assessment (Total 40%)					
• Assignments	10%	✓	✓		✓
• Laboratory works and reports	10%		✓	✓	✓
• Mid-semester test	10%	✓	✓		✓
• End-of-semester test	10%	✓	✓		✓
2. Examination	60%	✓	✓		✓
Total	100%				

Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:

Specific Assessment Methods/Tasks	Remark
Assignments	Assignments are given to students to assess their competence level of *knowledge* and *comprehension*. The criteria (i.e. *what* to be demonstrated) and level (i.e. the *extent*) of achievement will be graded according to six levels: (A+ and A), Good (B+ and B), Satisfactory (C+ and C), Marginal (D) and Failure (F). These will be made known to the students before an assignment is given. Feedback about their performance will be given promptly to students to help them improvement their learning.
Laboratory works and reports	Students will be required to perform three experiments and submit a report on one of the experiments. Expectation and grading criteria will be given as in the case of assignment.
Mid-semester test	There will be a mid-semester test to evaluate students' achievement of all the learning outcomes and give feedback to them for prompt improvement. Expectation and grading criteria will be given as in the case of assignments.
End-of-semester test and Examination	There will be an end-of-semester test and examination to assess students' achievement of all the learning outcomes. These are mainly summative in nature. Expectation and grading criteria will be given as in the case of assignments.

Student Study Effort Expected	**Class contact (time-tabled):**	
	• Lecture	26 Hours
	• Tutorial	4 Hours
	• Laboratory	9 Hours
	Other student study effort:	
	• Revision	36 Hours
	• Tutorial and Assignments	21 Hours
	• Log book and Report Writing	9 Hours
	Total student study effort:	**105 Hours**

Reading List and References

Textbooks:

1. G. Rizzoni, *Fundamentals of Electrical Engineering*, 1st ed., McGraw-Hill, 2009.
2. A.S. Sedra and K.C. Smith, *Microelectronic Circuits*, 6th ed., Oxford University Press, 2009.

References:

	1. R.L. Boylestad and L. Nashelsky, *Electronic Devices and Circuit Theory*, 10th ed., Prentice Hall, 2008. 2. R.C. Jaeger and T.N. Blalock, *Microelectronic Circuit Design*, 4th ed., McGraw Hill, 2010. 3. C.K. Tse, *Linear Circuit Analysis,* London: Addison-Wesley, 1998. 4. D.A. Neamen, *Microelectronics: Circuit Analysis and Design*, 4th ed., McGraw Hill, 2009. 5. R.A. DeCarlo and P.M. Lin, *Linear Circuit Analysis*, 2nd ed., Oxford University Press, 2001. 6. A.H. Robbins and W.C. Miller, *Circuit Analysis: Theory and Practice*, Thomson Learning, 4th ed., 2006.
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