



Module Title Electronic Circuits	Module Code MSDE 240	Semester (Sem 1 / Sem 2) Sem 2
Credits 10	Level 4	Professor and email Gwanho Yoon gwanho@seoultech.ac.kr
Delivery Method Lecture	Delivery Location SeoulTech, Mugung Hall	

Module Synopsis

This module aims to provide knowledge and physical insight on electrical circuits consisting of linear passive components with DC/AC sources. At the beginning of the module, basic circuit analysis techniques including Kirchhoff's laws, and the individual working principles of elementary circuit components such as resistors, inductors, capacitors and amplifiers are introduced. Then, complicated circuits that consist of more than two different components will be discussed. Students will be able to understand that any electrical circuits can be described by a set of ordinary differential equations. The core of this module is to understand the relation between the response of electrical circuits and the solution of those differential equations.

The module will be delivered by combination of lectures and independent learning. Assessment is made through a final exam which accounts for the majority of the module mark.

Outline Syllabus

Basic Circuit Analysis

Ohm's law, Kirchhoff's current/voltage laws, Node-Voltage/Mesh-Current methods, Source transformation, Thévenin/Norton equivalents, Superposition

Operational Amplifier

Inverting/Non-inverting terminals, Saturation, Common node, Ideal operational amplifier, Inverting/Non-inverting/Summing/Difference amplifiers

RL & RC Circuits

Capacitance, Inductance, Mutual inductance, Transient/Steady-state responses, Natural/Step responses, Time constant, Integrating/Differentiating amplifiers

RLC Circuits

Underdamped/Overdamped/Critically-damped responses, Natural frequency, Damping factor, Cascaded integrating amplifiers

Steady-state AC Circuits

Sinusoidal source, Phasor, Impedance, Transformer, Average/Reactive/Complex power, Maximum power transfer

Laplace Transform in Circuit Analysis



S-domain representation, Transfer function, Sinusoidal transfer function

Indicative Reading

- 1) James W. Nilsson and Susan A. Riedel, Electric Circuits, 10th edition, Pearson.
- 2) J. David Irwin and R. Mark Nelms, Basic Engineering Circuit Analysis, 10th edition, Wiley.

NOTIONAL STUDENT WORKLOAD	Hours
MODE OF DELIVERY (FT / PT / DL)	FT
Lectures	50
Seminars	
Tutorials	
Laboratories/studios/practical	
Directed learning	
Independent Learning	50
Work experience/fieldwork	
Other: eg formal presentation	0
Total Workload 100 hours for a 10 credit module 200 hours for a 20 credit module	100

Module Outcomes

KU1,2,3	KU1. Demonstrate basic knowledge of the scientific and mathematical foundations of engineering to solve basic problems. KU2. Perform simple analysis of familiar engineering systems. KU3. Identify and utilise basic methodologies to create solutions to specific engineering problems.
IPSA1,4	IPSA1. Demonstrate the use of fundamental approaches to solving readily defined engineering problems. IPSA4. Illustrate solutions to basic engineering problems.



MSDE Module Descriptor

PVA2	PAV2. Demonstrate creativity in discussing solutions to standard problems.

Assessments	Assessment Type	Weighting %	Midterm/interim/final
Coursework			
Project			
Quiz			
Test			
Laboratory			
Exam	Final exam	100	Final
Presentation			