

COURSE OUTLINE FOR STUDENTS AT NTU

Academic Year	2021/2022	Semester	Sem 1 & 2
Course Coordinator	Assistant Professor Li Hong (Semester 1) Associate Professor Domenico Campolo (Semester 2)		
Course Code	MA2009 / MA5705		
Course Title	Introduction to Electrical Circuits & Electronic Devices / Aircraft Electrical and Electronics Circuits		
Pre-requisites	Nil		
No of AUs	3		
Contact Hours	Lectures: 26 hours Tutorials: 13 hours		
Proposal Date	Jan 2022		

Course Aims

This course is designed to introduce Engineering students with a basic knowledge of electrical networks, filter design and applications of electronic components.

Intended Learning Outcomes (ILO)

After taking this course, you are expected to be able to:

- 1) Analyse simple linear networks with resistive and reactive components in both time and frequency domain;
- 2) Explain the properties of simple passive filters and tune their parameters for applications in signal conditioning;
- 3) Explain the working principles of operational amplifiers and select basic configuration for analogue computations..

Course Content

	Topic	Hours
1.	Analysis of Resistive Linear Networks Ohm's Law, Kirchhoff's Laws, Independent and Dependent Sources. Nodal Analysis and Mesh Analysis. Linearity and Superposition. Thevenin's Theorem, Norton's Theorem, Maximum Power Transfer Theorem.	7
2.	Energy Storage Elements and Transient Analysis Capacitance, Inductance. Solution of circuits with reactive elements. First order circuits: DC steady state, initial, final conditions and time constant. Simulation of electrical networks.	6
3.	AC network analysis Periodic signals, sinusoids and their mathematical description via complex numbers. AC analysis and basic sinusoidal frequency response with passive filters.	6

4.	Operational Amplifiers and applications Ideal operational amplifier. Inverting and non-inverting amplifiers. Integrator and differentiator. Bias and offset compensations. Active filters and applications. Nonlinearity, a brief overview.	7
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Assessment (includes both continuous and summative assessment)

Component	Course LO Tested	Related Programme LO or Graduate Attributes	Weighting	Team/ Individual	Assessment rubrics
1. Continuous Assessment 1 – Quiz 1	LO#1	<i>EAB SLO a, b</i>	20%	Individual	
2. Continuous Assessment 2 – Quiz 2	LO#2 LO#3	<i>EAB SLO a, b, c</i>	20%	Individual	
3. Final Examination – Closed Book; 2.5hrs	LO#1 LO#2 LO#3	<i>EAB SLO a, b, c</i>	60%	Individual	
Total			100%		

Formative feedback

We provide the weekly review session to you to highlight important and difficult topics. After the two quizzes during the semester, we review and explain the quiz questions during the tutorial sessions. We also answer the questions in the online NTULearn course site and by email. Weekly, we provide the students 2-3 consultation hours. Special consultation sessions are arranged between students and lecturers/tutors.

Learning and Teaching approach

Approach	How does this approach support students in achieving the learning outcomes?
Lectures	Course content is delivered through pre-recorded lectures, where you are able to go through every concept at your own pace, and through live-lectures where key concept are re-explained, slowly and with proper examples. An anonymous weekly feedback is also used to gather input from students and steer the live-lectures in the following week.
Tutorials	You are guided through the solution of standard problems step-by-step and, at times, exposed to network simulation software to double check your own results.

Reading and References

Textbook

1. Rizzoni, Giorgio, Principles and applications of Electrical Engineering, McGraw Hill, 6th Edition, 2016

References

Nil

Course Policies and Student Responsibilities

As a student of the course, you are required to abide by both the University Code of Conduct and the Student Code of Conduct. The Codes provide information on the responsibilities of all NTU students, as well as examples of misconduct and details about how students can report suspected misconduct.

The university also has the Student Mental Health Policy. The Policy states the University's commitment to providing a supportive environment for the holistic development of students, including the improvement of mental health and wellbeing. These policies and codes concerning students can be found in the following link.

<http://www.ntu.edu.sg/SAO/Pages/Policies-concerning-students.aspx>

Academic Integrity

Good academic work depends on honesty and ethical behaviour. The quality of your work as a student relies on adhering to the principles of academic integrity and to the NTU Honour Code, a set of values shared by the whole university community. Truth, Trust and Justice are at the core of NTU's shared values.

As a student, it is important that you recognize your responsibilities in understanding and applying the principles of academic integrity in all the work you do at NTU. Not knowing what is involved in maintaining academic integrity does not excuse academic dishonesty. You need to actively equip yourself with strategies to avoid all forms of academic dishonesty, including plagiarism, academic fraud, collusion and cheating. If you are uncertain of the definitions of any of these terms, you should go to the [academic integrity website](#) for more information. Consult your instructor(s) if you need any clarification about the requirements of academic integrity in the course.

Course Instructors

Instructor	Office Location	Phone	Email
Domenico Campolo	N3.2-02-74	6790 5610	D.CAMPOLO@ntu.edu.sg
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Pham Quang Cuong	N3-02c-90	6790 5597	cuong@ntu.edu.sg

Planned Weekly Schedule

Week	Topic	Course LO	Readings/ Activities
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1	Intro and examples of linear equations / matrix algebra	LO#1	Pre-recorded and live-lectures
2	Kirkchoff's current and voltage laws, Ohm's Law	LO#1	Pre-recorded and live-lectures
3	Node Voltage Method	LO#1	Pre-recorded and live-lectures
4	Mesh Current Method	LO#1	Pre-recorded and live-lectures
5	Superposition & Thevenin	LO#1	Pre-recorded and live-lectures
6	Maximum Power Transfer	LO#1	Pre-recorded and live-lectures
7	Energy Storage devices and DC steady state	LO#2	Pre-recorded and live-lectures Online CA (quiz 1)
8	Simulations of Electrical network	LO#2	Pre-recorded and live-lectures
9	Periodic signals, sinusoids and complex numbers	LO#2	Pre-recorded and live-lectures
10	AC analysis and basic sinusoidal frequency response	LO#2	Pre-recorded and live-lectures
11	Passive Filters	LO#2	Pre-recorded and live-lectures
12	Operational Amplifiers	LO#3	Pre-recorded and live-lectures
13	Active Filters and Applications	LO#3	Pre-recorded and live-lectures Online CA (quiz 1)