SYLLABUS

1. **Course name: ELECTRIC CIRCUITS**
2. **Course code:** ELCI140144
3. **Credits:** 4 (4/0/8)

   Duration: 15 weeks (including 4 hours for attending class and 8 hours for self-study per week)
4. **Instructors:**
   1. Tran Tung Giang, M.Eng. (Mrs)
   2. Le Thi Thanh Hoang, M.Eng. (Mrs)
   3. Le Thi Hong Nhung, M.Eng. (Mrs)
   4. Tran Duc Loi, M.Eng. (Mr)
5. **Course conditions**

   Former subjects: **Advanced Maths 1, 2, 3**
6. **Course description**

This course provides students the knowledge of electrical circuit analysis including basic concepts such as voltage, current, resistance, impedance, Ohm's and Kirchoff's law; basic electric circuit analysis techniques, resistive circuits, transient and steady-state responses of RLC circuits; circuits with DC and sinusoidal sources, steady-state power and three-phase balanced systems, including Laplace and Fourier transforms applications for solving circuit problems.

7. **Course Goals**

Goals	***Goal description*** *(This course provides students:)*	**ELOs**
G1	Knowledge of mathematics, science, and engineering to sloving basic electric circuits.	01 (H)
G2	Ability to identify different types of circuits and devise analytical methods suitable circuit.	02 (H)
G3	An ability to use the software tools to analyze circuits	03 (L)
G4	An ability to apply the knowledge related to electric circuits and methods for analysis and design basic electric circuits	07 (M)

** Note: High: H; Medium: M; Low: L*

8. **Course Learning Outcomes (CLOs)**

CLOs		***Description*** *(After completing this course, students can have:)*	**Outcome**
	G1.1	Ability to describe and identify the electric circuit and the basic elements of the electric circuit	01 07
	G1.2	the ability to apply the Kirchoff's law, equivalent transformation for solving the circuit problems. Determine the supply power, dissipation power, and the power preservation in a circuit.	01 07
	G1.3	Ability to analyze circuits using the node-voltage method, the mesh-	01

		current method, Thevenin and Norton equivalents, and superposition property.	07
	G1.4	Ability to understand and solve AC circuits one phase and three phase	01, 07
	G1.5	Ability to determine the parameters of two-port network	01,07
	G1.6	Ability to analyze and calculate the values of the transient responses and sketch waveforms of the currents and drop voltages in the time domain	01 07
	G1.7	Ability to analyse and calculate the current and voltage in the time responses with non-sinusoidal source and Bode plots.	01 07
	G1.8	Ability to analyse and determine the currents in the nonlinear circuits.	01,07
G2	G2.1	Ability to identify different types of electric circuits and choose the suitable method in techniques of circuit analysis	02
G3	G3.1	Ability to use Multisim and Matlab software to simulate simple circuits	03

9. Study materials

- Textbooks:

[1] Tran Tung Giang – Le Thi Thanh Hoang, ***Electric Circuits***, HCMUTE, 2007 [2] Nguyen Huu Phuong, *Mach so*, NXB thống kê 2004.

- References:

[2] Pham Thi Cu, ***Electric Circuits 1&2***, HCMUT, 1996.

[3] Pham Thi Cu,***Electricity Exercises 1&2***, HCMUT, 1996.

[4] David E. Johnson, Electric Circuit Analysis, Prentice-Hall International Editions -1989

[5] D.E. Johnson, J.L. Hilburn, I.R. Johnson, P.D. Scott. Basic Electric Circuit Analysis. 5th edition, Prentice Hall International, 1996.

[6] Charles Alexander & Matthew Sadiku, Fundamentals of Electric Circuits, (3rd Ed.),,McGraw-Hill, 2007,ISBN: 0-07-297718-3.

[7] Nilsson and Riedel, Prentice Hall, Electric Circuits, 9th Edition Reference books: - an introduction to numerical analysis for electrical and computer engineers Christoper J.Zarowski - University of Alberta, Canada.

[8] Steven T. Karris, Circuit Analysis I & II with MATLAB® Computing andSimulink®/ SimPowerSystems®Modeling.

10. Sudent Assessments

- Grading points: 10

- Planning for students assessment is followed:

Type	Contents	Linetime	Assessment techniques	CLOs	Rates (%)
Midterms					**50**
Quick test	Work at class	Weeks 1-15	Paper munite, think-pair-share, E3..	G1.1, G1.3, G1.4, G1.5, G1.6.	10%

				G1.7 G1.8	
Online test	Online class in LMS (learning manage system) website.	Weeks 1-15	Online	G1.2, G1.3, G1.4, G1.6 G1.7	15%
Exam#01	Calculate the current and voltage, the supply power, dissipation power, and the power preservation in DC, AC circuits one phase and three phase	week 8	Exam	G1.2, G1.3, G1.4 G2.1	25%
Report	Project	Week 10	Power point Presentation	G1.2, G1.3, G2.1, G3.1	25%
Exam#02	- Determined the parameters Z,Y of two-port network - Calculate the values of the transient responses and sketch waveforms of the currents and drop voltages in the time domain - Calculate transfer functions and draw Bode plots	Week 14	Exam	G1.5, G1.6, G1.7, G2.1	25%
Final exam					**50**
Final Exam	- The exam covers all contents related to the expected learning outcomes of the course.		Exam	G1.1, G1.2, G1.3, G1.4, G1.5, G1.6, G1.7, G2.1,	

11. Course details:

Weeks	Contents	CLOs
	Chapter 1: **< BASIC CONCEPTS >** *(8/0/16)*	
	A/ **Contents and teaching methods***: (classroom, 4 hours)* **Contents:** 1.1 Circuits and Models, Energy and Power. 1.2 Circuit Elements 1.3 Kirchoff's Law: KCL, KVL, and giving examples 1.4 Equivalent transformation and its examples **Teaching methods**:	G1.1, G1.2

	+ Lecture + Problem solving + Disscuss. + Teamwork Questions	
	***B/* Self-study contents**: *(8)* + Homework using KCL, KVL. + Homework using the equivalent transformation, the current divider.	G1.1, G1.2
	***Chapter 1:* < BASIC CONCEPTS (cont.) >** *(8/0/16)*	
	***A/* Contents and teaching methods**: *(4)* **Contents:** 1.5 Equivalent transformation: examples and homework. 1.6 Exercises and guide learners to solve the problems chapter 1 **Teaching methods**: + Lecture + Problem solving + Disscuss. + Teamwork.	G1.1 G1.2 G2.1
	***B/* Self-study contents**: *(8)* + Review. + Doing homework related to equivalent transformation.	G1.1 G1.2 G2.1 G3.1
	***Chapter 2:* < ANALYTICAL METHODS FOR CIRCUITS >** *(8/0/16)*	
	***A/* Contents and teaching methods**:*(4)* **Contents:** 2.1 Node method and examples. 2.2 Mesh method and examples. 2.3 Special cases of node method with an ideal voltage source and illustrated examples. **Teaching methods**: + Lecture + Problem solving + Disscuss. + Teamwork.	G1.3
	***B/* Self- study contents**: *(8)* + Review + Doing homework related to analytical methods for circuits.	G1.3 G2.1 G3.1
	***Chapter 2:* < ANALYTICAL METHODS FOR CIRCUITS (cont.) >** *(8/0/16)*	
	***A/* Contents and teaching methods**: *(4)* **Contents:** 2.4 Superposition theorem and examples. 2.5 Thevenin-Norton theorem and examples. 2.6 Exercises chapter 2 **Teaching methods**: + Lecture + Problem solving + Disscuss. + Teamwork.	G1.3 G2.1 G3.1

	***B/* Self- study contents**: *(8)* + Review + Exercises	G1.3 G2.1 G3.1
	***Chapter 3:* < SINUSOIDAL STEADY-STATE CIRCUITS >** *(12/0/24)*	
	A/* Contents and teaching methods: (4)* **Contents:** 3.1 Sinusoidal waveforms and complex amplitude methods. 3.2 Voltage – Current Relation of sinusoidal steady state circuits involving R, L, and C 3.3 The Phasor Diagrams 3.4 Sinusoidal Steady-State Power Calculations: Instantaneous Power, Average and Reactive Power, The RMS Value and Power 3.5 Analytical methods for AC circuits and example. **Teaching methods**: + Lecture + Problem solving + Disscuss. + Teamwork.	G1.4 G2.1
	***B/* Self- study contents**: *(8)* + Practise complex operations by using calculator. + Doing homework related to AC circuits.	G1.4 G2.1
	***Chapter 3:* < SINUSOIDAL STEADY-STATE CIRCUITS (cont.) >** *(12/0/24)*	
	A/* Contents and teaching methods: (4)* **Contents:** 3.6 Operational amplifier and examples. 3.7 Mutual circuits and examples. **Teaching methods**: + Questions and answers + Guide to do exercises	G1.1 G1.2 G1.4 G2.1
	***B/* Self- study contents**: *(8)* + Homework related to OPAMP, mutual circuits.	G1.4 G2.1
	***Chapter 3:* < SINUSOIDAL STEADY-STATE CIRCUITS (cont.) >** *(12/0/24)*	
	A/* Contents and teaching methods: (4)* **Contents:** 3.8 Impedance matching and examples. 3.9 Resonant circuits and examples. **Teaching methods**: + Lecture + Problem solving + Disscuss. + Teamwork.	
	***B/* Self- study contents**: *(8)* + Homework related to resonant circuits. Determine the value of matched load for maximum power dissipation.	

8	***Chapter 4:*** **< THREE PHASE CIRCUITS >** *(8/0/16)*	
	A/ **Contents and teaching methods***: (4)* **Contents:** 4.1 Concept of 3-phase system. 4.2 Star/Triangle connection. 4.3 Three-phase power. 4.4 Analytical methods for 3-phase circuits and example 4.5 Tests 1 **Teaching methods**: + Lecture + Problem solving + Disscuss. + Teamwork.	G1.1 G1.4 G2.1
	B/ **Self- study contents**: *(8)* + Homework related to symmetric 3-phase circuits.	G1.1 G1.4 G2.1
	Chapter 4: **< THREE PHASE CIRCUITS (cont.) >** *(8/0/16)*	
	A/ **Contents and teaching methods***: (4)* **Contents:** 4.6 Analytical methods for asymmetric 3-phase circuits and examples. **Teaching methods**: + Lecture + Problem solving + Disscuss. + Teamwork.	
	B/ **Self- study contents**: *(8)* Homework related to asymmetric 3-phase circuits	
	Chapter 5**< TWO PORT NETWORK >** *(4/0/8)*	
	A/ **Contents and teaching methods***: (4)* **Contents:** 5.1 Concept of 2-port network. 5.2 Basic matrices A, H, Z, Y. 5.3 Types of 2-port networks. 5.4 Applications. **Teaching methods**: + Lecture + Problem solving + Disscuss. + Teamwork.	
	B/ **Self- study contents**: *(8)* + Homework related to 2-port networks	
	Chapter 6: **< ANALYSE CIRCUITS IN THE TIME DOMAIN >** *(8/0/16)*	

	A/* Contents and teaching methods: (4)* **Contents:**. 6.1 Concept of transient response. 6.2 Initial conditions. 6.3 Analytical methods for the transient response and steady state circuits. **Teaching methods**: + Lecture + Problem solving + Disscuss. + Teamwork.	G1.2 G1.6 G2.1
	***B/* Self- study contents**: *(8)* + Homework related to steady state circuits.	G1.6
	***Chapter 6:* < ANALYSE CIRCUITS IN THE TIME DOMAIN (cont.) >** *(8/0/16)*	
	A/* Contents and teaching methods: (4)* **Contents:** 6.4 Laplace transformation. 6.5 Apply the Laplace transfromation to solve the transient response and steady state circuits. 6.6 Examples. **Teaching methods**: + Lecture + Problem solving + Disscuss. + Teamwork.	
	***B/* Self- study contents**: *(8)* + Review Laplace transformation and do related homework.	
	***Chapter 7:* < ANALYSE CIRCUITS IN THE FREQUENCY DOMAIN >** *(8/0/16)*	
	A/* Contents and teaching methods: (4)* **Contents:** 7.1 Fourier series. 7.2 Transfer function and their types. **Teaching methods**: + Lecture + Problem solving + Disscuss. + Teamwork.	
	***B/* Self- study contents**: *(8)* + Do related homework with nonsinusoidal source, apply the superposition property to have the best solution.	
	***Chapter 7:* < ANALYSE CIRCUITS IN THE FREQUENCY DOMAIN (cont.) >** *(8/0/16)*	
	A/* Contents and teaching methods: (4)* **Contents:** 7.3 Concept of Bel and Decibel. 7.4 Magnitude and Phase response	G1.7 G2.1

	7.5 Tests 2 **Teaching methods**: + Lecture + Problem solving + Disscuss. + Teamwork.	
	***B/* Self- study contents**: *(8)*. + Homeworks	G1.7 G2.1
	***Chapter 8* < NONLINEAR CIRCUITS >** *(4/0/8)*	
	A/* Contents and teaching methods: (4)* **Contents:** 8.1 Concept of nonlinear elements and their types. 8.2 Analytical methods for nonlinear circuits. 8.3 Overall Review. 8.4 Announce the final average marks of mid-term tests. **Teaching methods**: + Lecture + Problem solving + Disscuss. + Teamwork.	
	***B/* Self- study contents**: *(8)* + Do homework chapter 8. + Review all chapters and prepare the final test.	

12. Learning ethics:

- Students must do their homework by themselves. If there are any copies which are found, student will be taken zero mark of the finally overall score of this subject for this forbidden action.

13. First approved date: August 01 2012

14. Approval level:

Dean **Department** **Instructor**

15. Syllabus updated process

1st time: Updated content dated	Instructors
2st time: Updated content dated	Head of department