



University of Science and Technology of Hanoi
 Address: Building 2H, 18 Hoang Quoc Viet, Cau Giay, Hanoi
 Telephone/ Fax: +84-4 37 91 69 60
 Email: officeusth@usth.edu.vn
 Website: <http://www.usth.edu.vn>

COURSE SYLLABUS

Subject: Electronics

Academic field: Renewable Energy

Lecturer: Dr. Pham Nguyen Thanh Loan

Phone:

E-mail: loanpham.sinhvien@gmail.com

Academic year: 2012-2013

COURSE DESCRIPTION

Credit points	3	
Level	Undergraduate	
Teaching time Location	University of Science and Technology of Hanoi	
Time Commitment	Lecture	30 hrs
	Exercises	hrs
	Practicals	6 hrs
	Total	36 hrs
Prerequisites	Physics	
Recommended background knowledge		
Subject description:		
Objectives & Out-come	<ol style="list-style-type: none"> 1. Basic knowledge on operations of elemental semiconductor components such as diode, BJT, FET, Op-amp used in common electronic circuits. 2. Ability to apply maths and physics to analyze and interpret equations related to functions of these circuits. 3. Ability to analyze and calculate parameters (dimensions, values) of each electronic component used to build a specific electronic circuit (team project/will be defined by the lecturer). 4. Ability to read English textbooks and to solve homework problems given in the textbooks. 5. Ability to work as a team to solve a given problem (team project). 	



	6. Mastering electronic software (Circuit Marker, Proteus) in solving homework exercises and in realizing team project.	
	7. Ability to present the team's project solutions to the whole class.	
Assessment/ Evaluation	Attendance/Attitude	5_%
	Exercise(s)	5_%
	Practicals	20_%
	Mid-term test	20_%
	Final exam	50_%
Prescribed Textbook(s)	[1] Electronic Devices, Thomas Floyd, 7 th edition	

COURSE CONTENTS & SCHEDULE

Over the course of the semester you will:

+ During class time (3 teaching hours/week)

1. Attend lectures given by lecturer or some of your classmates.
2. Be randomly and impromptu requested to present a term or a definition of what you learn during the lecture or what you will be asked to read and prepare at home.
3. Use the required software (with your laptop/ or classmate's laptop) to simulate a specific circuit to practice what you have learnt in class.
4. Prepare and present in group a complex circuit chosen from the list given by the lecturer (bonus points for English presentation).
5. Be given two quick tests (quizzes) without prior notice at the beginning or at the end of course.

+ At home:

1. Do homework
2. Review the material given in previous classes and prepare for the next class (for test without prior notice)
3. Work in team to prepare for the team project.

REQUIRED PRIMARY AND SECONDARY MATERIAL

1. Bring your laptop, if you have one, to certain classes that will be informed by the lecturer. Install the required software (CM or Proteus) in your laptop.

Class	Contents	Hours			Ref./Resources	Assignment(s)
		Lect.	Exr.	Prc.		



1	<p>+ Course overview (4 chapters: Introduction/ Semiconductor Devices/ Analog Circuits and Applications/ Pulse Circuits)</p> <p>Chapter 1: Introduction (4 teaching hours)</p> <p>1.1 Fundamental parameters: U, I, R.</p> <p>1.2 Voltage source, current source.</p> <p>1.3 Information and signals</p> <p>1.4 Typical electronic systems</p> <p>Class Summary</p> <p>CHAPTER 2. SEMICONDUCTOR DEVICES (18 teaching hours)</p> <p>2.1 Semiconductor diode (6 t.hrs)</p> <p>2.1.1 N-type and P-type semiconductors</p> <p>2.1.2 PN junction and properties</p> <p>2.1.3 V-A characteristic curve of a diode</p>	3				
	<p>Class Summary</p> <p>2.1.4 Classification and application of a Diode</p> <p>2.2 BJT (4 t.hrs)</p> <p>2.2.1 Structure, operating mechanism and basic equations</p> <p>2.2.2 Basic schemes and DC characteristic</p> <p>2.2.3 Equivalent model of a BJT and parameters (S, β, R_{in}, R_{out}, h_{ij}, Z_{ij}, equivalent model using h_{ij}, Z_{ij}, T-shape)</p> <p>Class Summary –</p>	3				
2 + 3						



	<p>2.2.4 DC bias, DC point, DC load line and temperature stabilization</p> <p>2.2.5 Homework</p> <p>2.3 JFET and MOSFET (4 t. hrs)</p> <p>2.3.1 Structures, operating mechanisms, and DC bias</p>					
4	<p>Class Summary –</p> <p>2.3.2 Typical application schemes, parameters, characteristic, operating modes</p> <p>2.4. Silicon controlled rectifier – SCR (2 hrs)</p> <p>2.4.1. Thyristor, Triac: Structure, operating mechanism, characteristic and parameters</p> <p>Class Summary –</p> <p>2.5 Operational amplifier (OA) (2 hrs)</p> <p>2.5.1. Structure, parameters, transfer characteristic, frequency characteristic</p> <p>CHAPTER 3. ANALOG CIRCUITS AND APPLICATIONS (18 hrs)</p> <p>3.1 Amplifier (10 hrs)</p> <p>3.1.1 General concept and fundamental parameters</p> <p>3.1.2 Feedback and properties</p>	3				
5	<p>Class Summary –</p> <p>3.1.3 BJT amplifiers (EC, BC, CC): Circuit, operating principle, equivalent models, analysis methods for calculation of circuit parameters</p> <p>3.1.4 FET amplifiers: Circuit, parameters and properties</p>	3				



	3.1.5 Homework				
6	<p>Class Summary – 3.1.6 Multistage amplifiers</p> <p>3.1.7 Amplifier for low frequency signals.</p> <p>3.1.8 Differential amplifiers</p> <p>3.1.8 Differential amplifiers</p> <p>3.1.8 Power amplifiers: concept, A, B, AB modes; push-pull power amplifiers.</p> <p>3.1.9 OA: Inverse and non-inverse amplifiers, addition and subtraction circuits, integrator and differentiator, function generators.</p> <p>3.1.10 Homework</p>	3			
7	<p>Class Summary – 3.2 Oscillators (4 hrs)</p> <p>3.2.1 Principle and oscillation condition</p> <p>3.2.2 LC methods</p> <p>3.2.3 RC methods</p> <p>3.2.4 Function generator based methods</p> <p>3.2.5 Homework</p>	3			
8	<p>Class Summary – 3.3 Regulators (4 hrs)</p> <p>3.3.1 Small power rectifiers and filters</p> <p>3.3.2 Voltage regulator with Zener diode</p> <p>3.3.3 Serial and switching voltage</p>	3			



	<p>regulators</p> <p>3.3.3. Regulator IC</p> <p>3.3.5 Current regulator</p> <p>3.3.6 Homework</p>					
9	<p>Class Summary – CHAPTER 4: PULSE CIRCUITS (20 hrs)</p> <p>4.1 General concepts (2 hrs)</p> <p>4.1.1 Properties and parameters of a pulse</p> <p>4.1.2 Saturation mode of BJT and OA</p> <p>4.1.3 Comparator</p> <p>4.2 Square signal generator (6 hrs)</p> <p>4.2.1 Monostate multivibrator using BJT and OA</p>	3				
10	<p>OA</p> <p>4.2.2 Astate multivibrator using BJT and OA</p> <p>4.2.3 Schmitt trigger using BJT and OA</p> <p>4.2.4 Homework</p> <p>Class Summary –</p> <p>4.3 Triangle signal generator (2 hrs)</p> <p>4.3.1 Using BJT (Miller, Bootstrap)</p> <p>4.3.2 Using OA</p>	3				

Notes:

- Abbreviation: *Lect.* (lecture), *Exr.* (Exercise), *Prc.* (Practise).



University of Science and Technology of Hanoi

Address: Building 2H, 18 Hoang Quoc Viet, Cau Giay, Hanoi

Telephone/ Fax: +84-4 37 91 69 60

Email: officeusth@usth.edu.vn

Website: <http://www.usth.edu.vn>

- Exercises may include assignment, reports, student's presentation, homework, class exercises ...for each class sessions
- Practicals mostly refer to Lab- work or outside practice such as field trip.

Reference Literature:

[1] Electronic Devices, Thomas Floyd, 7 th edition
[2]. Foundations of Analog and Digital Electronic Circuits, Anant Agarwal and Jeffrey H. Lang
[3].
[4].