

# Basic Electrical Engineering

## ECS 203

**Asst. Prof. Dr. Prapun Suksompong**

[prapun@siit.tu.ac.th](mailto:prapun@siit.tu.ac.th)

**Introduction to ECS 203**

**Office Hours:**

**BKD 3601-7**

**Tuesday 9:30-10:30**

**Tuesday 13:30-14:30**

**Thursday 13:30-14:30**

# Course Syllabus



Sirindhorn International Institute of Technology  
Thammasat University  
School of Information, Computer and Communication Technology

## ECS 203: Basic Electrical Engineering

Semester/Year: 2/2014

**Course Title:** Basic Electrical Engineering  
**Instructor:** Asst. Prof. Dr.Prapun Suksumpong ([prapun@siit.tu.ac.th](mailto:prapun@siit.tu.ac.th))  
**Course Web Site:** <http://www2.siiit.tu.ac.th/prapun/ecs203/>

Please check the course web site regularly for updated information about this course.

### Lectures:

ECS 203 is taught weekly in two lecture sessions of 80 min each. In addition, there will be one-hour weekly tutorial session to reinforce concepts learned in lecture through problem solving.

The meeting time and place are arranged according to the following schedule:

Type	Time	Room
Lecture	Wednesday 13:00-14:20	BKD 2501-2
Lecture	Thursday 09:00-10:20	BKD 2501-2
Tutorial	TBA	TBA

You are STRONGLY encouraged to attend lectures. (See the grading policy below.)

### Undergraduate Student Dress Code:

- Undergraduate students must wear Thammasat University uniform OR polite dress.
- Plain white shirt, properly tucked in.
- Plain trouser/skirt in dark color.
- The followings are not allowed:
  - Sandals
  - T-shirt (even with the shop shirt)
  - Polo-shirt (even with the shop shirt)

### Course Information

**Prerequisite:** None

**Course Description:** This course introduces basic electrical engineering principles and technology to students outside the electronics and communication curriculum. Topics include electrical signals, basic circuit theory, DC and AC circuit analysis, Kirchhoff's law, Thevenin/Norton theorems, basic electronic devices and circuits, fundamental of operational amplifiers, fundamentals of power systems, and three-phase circuits.

**Textbook:** C.K. Alexander and M.N.O. Sadiku, Fundamentals of Electric Circuits, 5th ed., McGraw-Hill, International Edition, 2013. (TK454 A452 2013)

### References:

- J. D. Irwin, Basic Engineering Circuit Analysis, John Wiley & Sons, 2002 (TK454 I78 2002).
- J. O'Malley, Schaum's Outline of Theory and Problems of Basic Circuit Analysis, 2nd Edition, 1992 (TK454 O46 1992).

**Grading Policy:** Coursework will be weighted as follows:

Assignments	5%
Quiz	5%
<b>Class Discussion/Participation</b>	<b>10%</b>
Midterm Examination	40%
Final Examination (comprehensive)	40%

- No late assignments will be accepted.
- Cheating will not be tolerated
- Copying homework/quiz/exam = cheating
  - Punishment:
    - First time cheater receives zero on that assignment
    - Second time cheater receives zero on all quizzes and/or HWs

**Assignments:** Homework will be assigned throughout the semester. Only some selected problem will be graded. Of course, you do not know which problems will be selected; so you should work on all of them. The complete solutions to all problems will be posted on the course web site.

### Quizzes and Exams:

Exams will be closed book.

Quizzes will test current and previous topics. A quiz may be given at any time during any class period – at the beginning or end of a class, etc. There will be no make-up quizzes. Quizzes will be given only to those students who are present when the quizzes are passed out.

**Students should notify the instructor before missing any exam if at all possible and immediately thereafter when not possible.** The instructor (and/or the fact-finding committee) will determine if the absence from an exam is legitimate. Simply not feeling well is not a reason to miss an exam. In the case of legitimate absence, an oral and/or written make-up exam could be arranged.

**Expectations:** You should expect to spend extra 5-8 hours per week studying outside of class. However, I do expect you to come to class and *participate actively* in class discussions. If you must miss a class, I expect you to find out and catch up with what happened in lecture, either from me or one of your classmates. You are responsible for all materials that are discussed in class.

### Academic Integrity

The work you submit in ECS 203 is expected to be the result of your individual effort. You are free to discuss course material, approaches to problems with your colleagues or the instructor but you should never misrepresent someone else's work as your own.

It is your responsibility to protect your work from unauthorized access. For example, do not discard copies of your programs/assignments in public places.

### Course Outline

The following is a tentative list of topics with their corresponding chapters from the textbook by Alexander and Sadiku. Each topic spans approximately one week.

Topics	Textbook Chapter
1. Intro, math review, units, quantities & measurements	1
2. Intro electric circuits: Ohm's Law, node-branches/loops, Kirchhoff's Laws, resistive circuits	2
3. Series/parallel resistors, voltage divider, current divider, nodal analysis	2, 3
4. Mesh analysis, linearity, superposition	3, 4
5. Source transformation, Thevenin's/Norton's equivalent circuits, maximum power transfer	4
6. Basic electronics: Op amps	5
7. Capacitors and inductors	6
8. MIDDLETERM: 5 Mar 2015 TIME: 09:00 - 12:00	
9. Electric power systems, Sinusoids, phasors; complex number review	9
10. Phasor relationships for circuit elements, impedance and admittance, Kirchhoff's laws in frequency domain, impedance combinations.	9
11. Sinusoid steady-state analysis: nodal/mesh analysis, superposition theorem, source transformation, Thevenin/Norton equiv. circuits	10
12. AC power analysis: instantaneous and average power, maximum average power transfer, effective or RMS value, apparent power and power factor. Power factor correction.	11
13. First-order circuits	7
14. Second-order circuits	8
15. Three-phase circuits	12, 13
16. FINAL: 14 May 2015 TIME: 09:00 - 12:00	

# Course Organization

- **Course Web Site:**

<http://www2.siit.tu.ac.th/prapun/ecs203/>

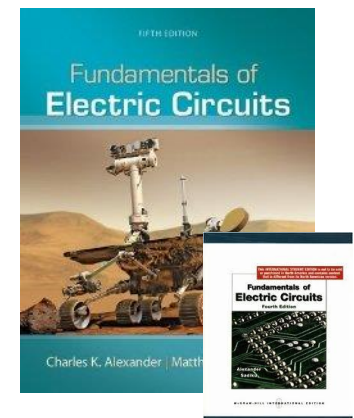
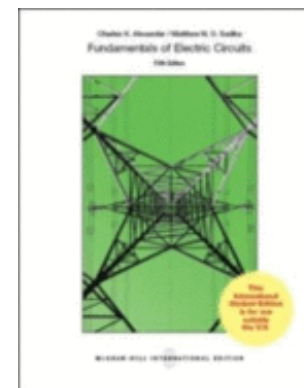
- **Lectures:**

Type	Time	Room
Lecture	Wednesday 13:00-14:20	BKD 2501-2
Lecture	Thursday 09:00-10:20	BKD 2501-2
Tutorial	Wednesday 16:15-17:15	BKD 2501-2

- **Textbook:**

- **Fundamentals of Electric Circuits**

- By C.K. Alexander and M.N.O. Sadiku
- 5th ed., International Edition, 2013.



# Course Web Site

- Please check the course website regularly.
- Announcements
- References
- Handouts (Posted before corresponding lectures)
- Annotated Notes/Slides (Posted after corresponding lectures)
- Calendar
  - Exams
  - HW due dates

**ECS203: Basic Electrical Engineering**

**Synopsis**  
This course introduces basic electrical engineering principles and technology to students outside the electronics and communication curriculum.

**Announcements**

- This site can be accessed via [ecs203.prapun.com](http://ecs203.prapun.com).
- A **crude RSS feed is provided. You may find it useful for following class updates.**
- Welcome to ECS203! Feel free to look around this site.

**General Information**

- **Instructor:** Asst. Prof. Dr.Prapun Suksumpong ([prapun@siit.tu.ac.th](mailto:prapun@siit.tu.ac.th))
- **Course Syllabus**
- **Office Hour:**
  - TBA
  - **Please feel free to ask any question or express any concern after class.**
- **Required Textbook:** C.K. Alexander and M.N.O. Sadiku, *Fundamentals of Electric Circuits*, 5th ed., McGraw-Hill, International Edition, 2013. (TK454 A452 2013)
  - [Chapter 2](#) of the textbook is available here.
- **References**
  - J. D. Irwin, *Basic Engineering Circuit Analysis*, John Wiley & Sons, 2002 (TK454 I78 2002).
  - A. Agarwal and J. Lang, *Foundations of Analog and Digital Electronic Circuits*, Morgan Kaufmann, 2005
    - [Video lectures from MIT's 6.002 Circuits and Electronics](#)
  - J. O'Malley, *Schaum's Outline of Theory and Problems of Basic Circuit Analysis*, 2nd Edition, 1992 (TK454 O46 1992).

**Handouts and Course Material**

- **Slides:** Introduction to ECS 203
- **Lecture Notes:** Part 1A

**Problem Set**

Note that, for each HW, only a part of ONE question will be graded. Of course, you do not know which one will be selected, so you should work on all of them.

HW#	Due Date	Remarks/Solutions
HW1		

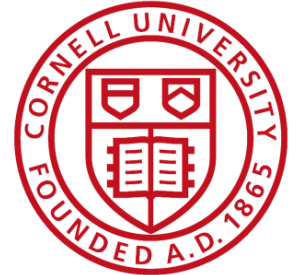
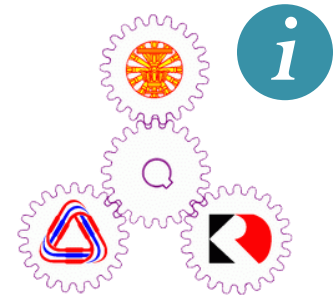
**Calendar**



[www2.siit.tu.ac.th/prapun/ecs203/](http://www2.siit.tu.ac.th/prapun/ecs203/)

# Me?

- Ph.D. from **Cornell** University, USA
- In Electrical and Computer Engineering
- Minor: Mathematics (Probability Theory)
- Ph.D. Research: Neuro-Information Theory
- Current Research:  
Wireless Communications
- 2009 and 2013 SIIT Best Teaching Awards
- 2011 SIIT Research Award
- 2013 TU Outstanding Young Researcher Award



[prapun.com](http://prapun.com)



# Calendar

Lectures

M	T	W	R	F
12-Jan-15	13-Jan-15	14-Jan-15	15-Jan-15	16-Jan-15
19-Jan-15	20-Jan-15	21-Jan-15	22-Jan-15	23-Jan-15
26-Jan-15	27-Jan-15	28-Jan-15	29-Jan-15	30-Jan-15
2-Feb-15	3-Feb-15	4-Feb-15	5-Feb-15	6-Feb-15
9-Feb-15	10-Feb-15	11-Feb-15	12-Feb-15	13-Feb-15
16-Feb-15	17-Feb-15	18-Feb-15	19-Feb-15	20-Feb-15
23-Feb-15	24-Feb-15	25-Feb-15	26-Feb-15	27-Feb-15
2-Mar-15	3-Mar-15	4-Mar-15	5-Mar-15	6-Mar-15
9-Mar-15	10-Mar-15	11-Mar-15	12-Mar-15	13-Mar-15
16-Mar-15	17-Mar-15	18-Mar-15	19-Mar-15	20-Mar-15
23-Mar-15	24-Mar-15	25-Mar-15	26-Mar-15	27-Mar-15
30-Mar-15	31-Mar-15	1-Apr-15	2-Apr-15	3-Apr-15
6-Apr-15	7-Apr-15	8-Apr-15	9-Apr-15	10-Apr-15
13-Apr-15	14-Apr-15	15-Apr-15	16-Apr-15	17-Apr-15
20-Apr-15	21-Apr-15	22-Apr-15	23-Apr-15	24-Apr-15
27-Apr-15	28-Apr-15	29-Apr-15	30-Apr-15	1-May-15
4-May-15	5-May-15	6-May-15	7-May-15	8-May-15
11-May-15	12-May-15	13-May-15	14-May-15	15-May-15
18-May-15	19-May-15	20-May-15	21-May-15	22-May-15

Songkran ←

Exams

# Grading System

- Coursework will be weighted as follows:

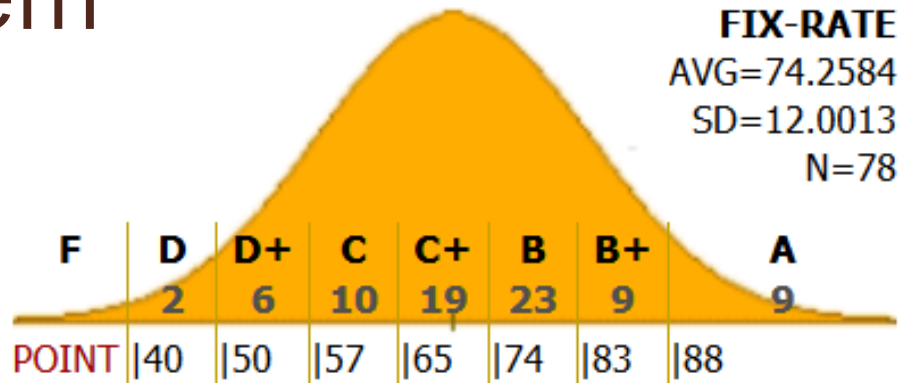
Assignments	5%
Class Participation and Quizzes	15%
Midterm Examination •5 Mar 2015 TIME 09:00 - 12:00	40%
Final Examination (comprehensive) •14 May 2015 TIME 09:00 - 12:00	40%

- Mark your calendars now!
- Late HW submission will be rejected.

# Grading System

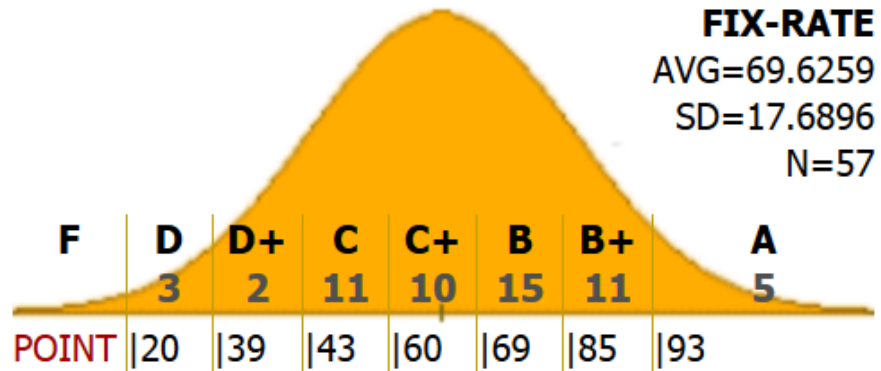
ECS203: 2013

CLASS GPA.: 2.76



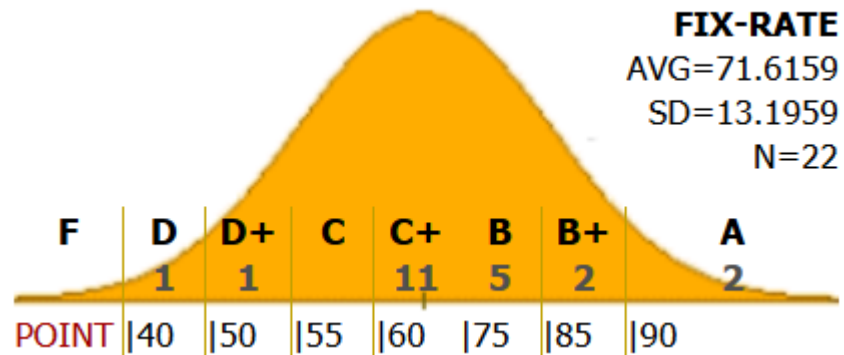
ECS203: 2010

CLASS GPA.: 2.73



ECS303: 2009

CLASS GPA.: 2.75





# Class Participation

- NOT the same as class attendance!
- If you come only to **receive**, you will fall **asleep**.
  - Do not simply sit quietly in the class.
- Need **interaction** between lecturer and students.
- **Ask question** when there is something that you don't understand.
  - Don't be shy!
  - It is very likely that your friends don't understand it as well.
- If you already understand what I'm presenting, **SHOW ME!**
  - Point out the errors/typos.
  - I will raise many issues/questions in class. Try to comment on them.

# Class Participation (2)

- Record what you have done.
- Submitted before the midterm and before the final.

## ECS 203: Self-Evaluation 2014

1. The class participation score for this class is judged by how much you actively participate in the class discussion both inside and outside of the classroom.
2. Please honestly answer the following questions. Please provide as much information as possible. Do not include the activities that you have already stated in the first self-evaluation form.

Name

Student ID

How many times have you been absent from the class? Are there any specific reason(s)? Please explain.

How many times have you been late (> 30s) for the class? Are there any specific reason(s)? Please explain.


How many times have you participated (provided comments, asked questions, answered questions, etc) in the lectures? Be specific. Provide some short description for each event. Number alone does not count.

How many times have you correctly informed the instructors the typo or mistake on the whiteboard/slides/hw/etc? Please provide some short description about each of the issues.

How many times have you discussed with the instructor outside of class? (Ask questions, express concerns, etc.) Be specific.

# Policy

Which clock?

- We will start the class **on time** and will finish **on time**.
  - I recommend arriving at least 3 minutes before the start time.
  - Raise your hand and tell me immediately if I go over the time limit.
    - Does NOT mean that I will leave the room immediately after lecture.
    - I will stay and answer questions.
- Mobile phones *must* be turned off or set in silent mode. 
- We may have some **pop quizzes** (without prior warning or announcement) and in-class activities.
- Attendance and pop quizzes will be taken/given irregularly and randomly.
- Cheating will not be tolerated.

# Policy (con't)

- Feel free to stop me when I talk too fast or too slow.
- I will surely make some **mistakes** in lectures / HWs / exams.
  - Some amount of class participation scores will be reserved to reward the **first** student who inform me about each of these mistakes.
    - Grammatical errors are best informed/corrected after class.
- Points on quizzes/ exercises/ exams are generally based on your entire solution, not your final answer.
  - You can get full credit even when you have the wrong final answer.
  - You may get **zero** even when you write down a right answer without justification.

# Policy (con't)

- Please stop me if I go over the time limit.
- Please stop me if I talk too fast.
- Please stop me if you have any question.



# Help and Office Hours

- Get some help!
  - Do not wait until the final exam time or after the grade is out.
  - Right after lecture is always a good time to ask question.
- Office Hours (BKD-3601-7)
  - Time: T9:30-10:30, T13:30-14:30, W13:30-14:30
  - Appointment can be made.
  - Tutorial session can be arranged.
  - Feel free to come to my office and chat!
  - Don't be shy.

## Office Hours:

**BKD 3601-7**

**Tuesday 9:30-10:30**

**Tuesday 13:30-14:30**

**Thursday 13:30-14:30**

# Warning

- This class can be **difficult**.
  - Keep up with the lectures.
  - Make sure that you understand the concepts presented in the lecture before you go home.
- I will **evaluate** your understanding of the course **regularly** through
  - In class problems/ activities
  - Quizzes
  - Exams



# Course Outline

1. Intro, math review, units, quantities & measurements
2. Intro electric circuits: Ohm's Law, node/branches/loops, Kirchoff's Laws, resistive circuits
3. Series/parallel resistors, voltage divider, current divider, nodal analysis
4. Mesh analysis, linearity, superposition
5. Source transformation, Thevenin's/Norton's equivalent circuits, maximum power transfer
6. Basic electronics: Op amps
7. Capacitors and inductors; diodes
8. First-order circuits
9. Second-order circuits
10. Electric power systems. Sinusoids, phasors; complex number review
11. Phasor relationships for circuit elements, impedance and admittance, Kirchoff's laws in frequency domain, impedance combinations.
12. Sinusoid steady-state analysis: nodal/mesh analysis, superposition theorem, source transformation, Thevenin/Norton equiv. circuits
13. AC power analysis: instantaneous and average power, maximum average power transfer, effective or RMS value, apparent power and power factor. Power factor correction.
14. Three-phase circuits, transformers, household/industry wiring