

**Department of Mathematics, Engineering and Computer Science  
LaGuardia Community College  
City University of New York  
Spring I, 2016**

**Course: MAE213**  
**Course Title: Electrical Circuits I**  
**Class hours: 3**  
**Credits: 3**

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**Course Description**

Students are introduced to the analysis of basic DC and AC circuits containing resistors, capacitors, and both independent and dependent sources of voltage and current. Voltage division and current division yield simplified analysis of resistors (impedances) in series and in parallel, respectively. Thevenin's and Norton's theorems are used to determine equivalent sub circuits. Differential equation techniques are presented to simplify the analysis of AC circuits.

**Prerequisites/Co-requisites**

*Prerequisites:* SCP231

*Co requisite:* MAT 203

**Student Learning Outcomes**

At the end of this course, students will be able to:

1. Design and analyze basic AC and DC circuits containing resistors, inductors, and capacitors.
2. Use computer software for design and analysis.
3. Solve and analyze engineering problems.
4. Use of mathematical concepts such as transformations to analyze electrical circuits.
5. Understand and effectively use some electrical concepts such as current and voltage laws.

**Required Text**

Charles K. Alexander and Matthew N.O. Sadiku: “*Fundamentals of Electric Circuits*”, McGraw Hill, 2007.

<b><u>Evaluation</u></b>	1.) Quizzes and HW	10%
	2.) Three Tests	45% (15% each)
	3) Projects	15 %
	3.) Final Exam	30%

### **Course Content Outlines:**

#### **Part 1: DC Circuits**

##### Chapter 1: Basic Concepts

- 1.1 Introduction
- 1.2 Systems of Units
- 1.3 Charge and Current
- 1.4 Voltage
- 1.5 Power and Energy
- 1.6 Circuit Element

Problems: Section 1.3, 1.4 and 1.5

##### Chapter 2: Basic Laws

- 2.1 Introduction
- 2.2 Ohm’s Law
- 2.3 Nodes, Branches and loops
- 2.4 Kirchhoff’s Law
- 2.5 Series Resistors and Voltage Division
- 2.6 Parallel Resistors and Current Division
- 2.7 Wye-Delta Transformation

Problems: Section 2.5, 2.6 and 2.7

##### Chapter 3: Method Analysis

- 3.1 Introduction
- 3.2 Nodal Analysis
- 3.3 Nodal Analysis with Voltage Source
- 3.4 Mesh Analysis
- 3.5 Mesh Analysis with Current Sources
- 3.6 Nodal and Mesh Analysis by Inspection

Problems: Section 3.2, 3.3 3.4, 3.5 and 3.6

##### Chapter 4: Circuit Theorems

- 4.1 Introduction
- 4.3 Superposition
- 4.4 Source Transformation
- 4.5 Thevenin’s Theorem

4.6 Norton's Theorem  
Problems: Section 4.3, 4.5 and 4.6

Chapter 5: Operational Amplifiers

- 5.1 Introduction
- 5.2 Operational Amplifiers
- 5.3 Ideal Op Amp
- 5.4 Inverting Amplifier
- 5.5 Non-inverting Amplifier
- 5.6 Summing Amplifier

Problems: Section 5.4 5.5 and 5.6

Chapter 6. Capacitors and Inductors

- 6.1 Introduction
- 6.2 Capacitors
- 6.3 Series and Parallel Capacitors
- 6.4 Inductors
- 6.5 Series and Parallel Inductors

Problem: Section 6.2 and 6.4

Chapter 7. First Order Circuits

- 7.1 Introduction
- 7.2 The Source-Free RC Circuit
- 7.3 The Source-Free RL Circuit

Problem: Section 7.2 and 7.3

Chapter 8. Second Order Circuits

- 8.1 Introduction
- 8.2 Finding Initial and Final Values
- 8.3 The Source-Free Series RLC Circuit
- 8.4 The Source-Free Parallel RLC Circuit

Problem: Section 8.2 , 8.3 and 8.4

## **Part 2: AC Circuits**

Chapter 9: Sinusoid and Phasors

- 9.1 Introduction
- 9.2 Sinusoids
- 9.3 Phasors
- 9.5 Impedance and Admittance
- 9.7 Impedance Combination

Problems: Section 9.5 and 9.7

Chapter 10: Sinusoidal Steady-State Analysis

- 10.1 Introduction
- 10.2 Nodal Analysis

10.3 Mesh Analysis  
10.4 Superposition Theorem  
Problems: Section 10.2 and 10.3

Chapter 15: Introduction to the Laplace Transform  
15.1 Introduction  
15.2 Definition of the Laplace Transform  
15.3 Properties of the Laplace Transform  
15.4 The Inverse Laplace Transform  
Problems: Section 15.2, 15.3 and 15.4

Chapter 16: applications of the Laplace Transform  
16.1 Introduction  
16.2 Circuit Element Model  
16.3 Circuit Analysis  
16.4 Transform Functions  
Problems: Section 16.2, and 16.3

## **Class Policies**

### **EXAMINATIONS AND QUIZZES:**

The course includes two midterms and one final exam. If a student misses an exam because of documented illness from a physician, then his/her course grade will be computed based on the remaining taken exams. For example, if a student misses one exam due to documented illness, then the remaining three taken exams will be weighted 90%, quizzes and HW 10%. Undocumented absences from exams will be counted as ZERO.

### **Final Exam:**

Students who are failing the course prior to the final exam and do not show up for final exam will not be assigned the grade INC. Final exam is an all inclusive exam and so are the preliminary exams and midterms.

### **Calculators:**

During exams, calculators which are programmable, or which can store formulas, or which have functions other than arithmetic, trigonometric and exponential/logarithm functions are not permitted.

### **Homework:**

Late homework will not be accepted for any reason.

### **Note:**

**All exams and quizzes are closed book and notes. Quizzes cannot be made up for any reason.**

**Regrading Policy:**

Student may submit his or her exam for regrading, in which case all the exam problems will be reassessed. Therefore, the new grade may be higher or lower than the original one. Exams for regrading must be submitted within one week of the date the original grade was received by the student. Exams written even in part using pencil or erasable ink will not be accepted for regrading.

**STUDENT OBLIGATIONS:**

**1. The student attendance policy:**

As stated in the college catalog: "Attendance in class is a requirement and will be considered in the evaluation of student performance. Instructors are required to keep an official record of student attendance. The maximum number of unexcused absences is limited to 15% of the number of class hours.

**Note:** Absences are counted from the first day of class even if they are a result of late registration or change of program" (173).

**2. The academic Dishonesty Policy:**

The college has established an Academic Integrity Policy that describes procedures and penalties for students who are suspected of academic dishonesty. As stated in the catalog: "Academic Dishonesty is prohibited in the City University of New York and is punishable by penalties ranging from a grade of 'F' in the course or suspension or expulsion from the College. Academic Dishonesty includes:

- Cheating
- Plagiarism
- Internet Plagiarism
- Obtaining Unfair Advantage
- Falsification of Records and Official Documents
- Misconduct in Internships: (173).

**3. Policy on assigning the grade of Incomplete:**

As stated in the college catalog:

*Eligibility:* The Incomplete grade **IN** is intended for situations which arise that are beyond the student's control. It is reserved for a student in good academic standing (maintaining a passing GPA) and for whom there is reasonable expectation of satisfactory course completion - defined as both satisfactory course completion - defined as both satisfactory attendance in the class and having not completed at most two major assignments or examinations by the end of the course.

*Restrictions:* An **IN** is not to be initiated by an instructor without the student's consent and is not permitted to replace a failing grade in a course.

*Documentation:* The student must provide a documented reason beyond her/his control, satisfactory to the instructor, substantiating the request for an **IN**. Additionally, the student must fill out an Incomplete Grade Request Form with the course's instructor.

*Completion:* The request form includes a deadline by which any missed assignment(s) must be completed in order for the instructor to consider changing the grade. A student receiving an **IN** is required to submit all completed work before the end of the semester following the one in which the **IN** is given. The student is required to assume responsibility for submitting work by the agreed-upon deadline in order to be eligible for a change of grade. The student may not re-register for the same course while the **IN** is in effect. In addition, any course in which the student has received an **IN** cannot be used as a pre-requisite.

*Grade Change:* Upon completion of course work, the course instructor must submit an official Change of Grade Form by the end of the semester following the one in which the **IN** was given. Failure to submit a Change of Grade Form for any reason will result in automatic conversion of the **IN** to a **FIN**, or failing grade, for the course.

**ALL CELL PHONES MUST BE OFF DURING CLASSES AND EXAMS.**