

# ES 220: Electrical Circuits

## Course Outline Fall '10

### Instructor:

Dr. Mohammad Rafiqul Haider, Ph. D. Email: [haider@sonoma.edu](mailto:haider@sonoma.edu)

**Day:** Tuesday and Thursday

**Times:** 9:20 am to 10:35 am

**Location:** Salazar Hall 2009A

**Office Hours:** Monday, Tuesday and Thursday (11:00 – 12:00), Wednesday (5:00 - 6:00)

**Office:** 2010B Salazar Hall

**Phone:** (707)664-3462

**Pre-Requisite:** Math 211, Calculus II, Phy 214

### Course Description:

This course covers the basic concepts of electrical circuits, voltage, current, power, DC and AC, KVL and KCL, different circuit analysis techniques, Node voltage, Mesh, Thevenin, Norton, maximum power transfer, superposition, AC circuit components, inductors, capacitors, phasor analysis, transformers and filters.

### Course Text Book:

Nilsson and Riedel, *Electric Circuits*, 8<sup>th</sup> Ed., Pearson Prentice Hall.

### Reference Books:

[1] R. L. Boylestad, *Introductory Circuit Analysis*, 11th ed., Prentice Hall, 2006.

[2] J. D. Irwin, R. M. Nelms, *Basic Engineering Circuit Analysis*, 8th ed, John Wiley, 2004.

| Point distribution  |                            | Grading Scale |          |
|---------------------|----------------------------|---------------|----------|
| <b>Examinations</b> | <b>Percentage</b>          | 90-100%       | <b>A</b> |
| Midterm @ 100 point | <b>30%</b>                 | 80-89%        | <b>B</b> |
| Final @ 100 point   | <b>30%</b>                 | 70-79%        | <b>C</b> |
| Attendance          | <b>10%</b>                 | 60-69%        | <b>D</b> |
| Quiz and Homework   | <b>(15% + 15%)<br/>30%</b> | 0-59%         | <b>F</b> |
| <b>Total</b>        | <b>100%</b>                |               |          |

### Class Policy:

All teaching guidelines and policies of SSU apply to this class. In order to get credit for an exam the student must notify the instructor prior to a class session if they will be unable to attend (and reschedule for a different date).

**Attendance:**

Attendance is mandatory. There will be no excused absences except in the case of emergencies that could be substantiated.

**Examinations:**

Each student is expected to keep up with the assignments. Examinations are based upon theory and practice material and may include multiple choice, true/false, short answers, and problems. Exams and projects marks will be scaled to take into account the overall class performance.

**Policy on the Submission of Home Work:**

1. All homeworks must be done individually unless instructed otherwise.
2. Tables and graphs in the homework submissions must be neat and clean with proper explanation.
4. Each homework submission is due at the beginning of the class on the specified date.

Failing to do any of the above, a submission may not be accepted resulting in the loss of grade in that assignment.

**Success:**

To be successful in this class we suggest the following:

- Attend all classes (or communicate to the instructor)
- Listen attentively
- Take notes
- Participate in discussions
- Attempt all homework
- Form study groups

**Class Schedule:**

| <b>Class</b> | <b>Topic</b>  | <b>Reference</b> |
|--------------|---|------------------|
| <b>1</b>     | Basic concepts of electrical systems, Circuit theory                            | 1.1, 1.2         |
| <b>2</b>     | Overview of Circuit Analysis, DC and AC, Voltage and Current                    | 1.3, 1.4         |
| <b>3</b>     | Basic circuit elements, power and energy  | 1.5, 1.6         |
| <b>4</b>     | Voltage and current sources, ohm's law  | 2.1, 2.2         |
| <b>5</b>     | KVL and KCL   | 2.4              |
| <b>6</b>     | Source Transformation, Circuit using dependent source                           | 4.9, 2.5         |
| <b>7</b>     | Resistive circuits, series and parallel connection, series-parallel combination | 3.1, 3.2         |
| <b>8</b>     | Voltage and current divider circuits  | 3.3, 3.4         |

|    |  |                  |
|----|--|------------------|
| 9  | Delta-to-Wye (Pi-to-Tee) conversion                                  | 3.7              |
| 10 | Superposition Theorem  | 4.13             |
| 11 | Node-Voltage Method  | 4.1, 4.2         |
| 12 | Mesh Current Method  | 4.5              |
| 13 | Thevenin Theorem   | 4.10             |
| 14 | Norton Theorems  | 4.11             |
| 15 | <b>Mid Term Examination</b>  |                  |
| 16 | Maximum Power Transfer   | 4.12             |
| 17 | AC circuit elements, Inductor and Capacitor                          | 6.1, 6.2         |
| 18 | Series-parallel combination, Mutual inductance                       | 6.3, 6.4         |
| 19 | Transient response of R-L and R-C Circuits                           | 7.1, 7.2         |
| 20 | AC circuit fundamentals, sinusoidal source, average value, RMS value | 9.1, 9.2         |
| 21 | Phasor analysis, Impedance, Reactance                                | 9.3, 9.4         |
| 22 | AC series-parallel circuit analysis                                  | 9.5, 9.6         |
| 23 | AC Mesh, Nodal and Thevenin  | 9.8, 9.9         |
| 24 | Transformer  | 9.10             |
| 25 | AC Filter, Low-pass and High-pass filter                             | 14.1, 14.2, 14.3 |
| 26 | <b>Review</b>  |                  |
| 27 | <b>Final Examination</b>   |                  |

**Outcomes:**

By attending this course students will learn

1. an ability to apply knowledge of mathematics, science, and engineering

2. an ability to design a system, component, or process to meet desired needs within realistic constraints
3. an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice

**Academic Honesty:**

You are responsible to behave ethically & honestly. Copying, cheating, forgery, and other unethical or dishonest actions are not tolerated.

See [http://www.sonoma.edu/uaffairs/policies/cheating\\_plagiarism.htm](http://www.sonoma.edu/uaffairs/policies/cheating_plagiarism.htm)

**Important Dates:**

- September 8, last day to add
- September 20, Last day to Drop with 'W' (done online)
- November 5, Last day to Petition to Withdraw from a Class