**ABET COURSE SYLLABUS**

**ENGR 2303 Electrical Science**

**Course Catalog Description:** This course teaches analysis techniques for electrical circuits which consist of resistors, capacitors, and inductors. The circuits analyzed are driven by constant and sinusoidal voltage and current sources.

**Course Prerequisites:** PHY 2114 with a minimum grade of “C” and ENGR 2311 or concurrent enrollment in ENGR 2311.

**Course Co-requisites:** ENGR 2303D.

**Prerequisites by Topic:** 1.Ohm's Law

2. Basic mathematical operations with complex number

**Textbook:** “Fundamentals of Electric Circuits”, 4th edition by Alexander and Sadiku. ISBN: 978-0-07-352955-4

**References:**

**Course Website:** http://www.engineering.uco.edu/~mbingabr

**Coordinators:** Mohamed Bingabr, Professor of Engineering and Physics.

**Instructor:** Mohamed Bingabr, Professor of Engineering and Physics

**Office Location:** Howell Hall 221B

**Phone: (**405)974-5718

**Email:** mbingabr@uco.edu

**Course Meeting Time:** MWF 11:00 am – 11:50 am

**Course Meeting Location:** Howell Hall 205

**Office Hours:** MWF 12:00 – 1:00, TR 3:00 - 4:00, and by appointment.

**Overall Education Objective:** To introduce methods and techniques for electrical circuit analysis and design with DC and AC sources.

**Course Learning Objective:** At the end of this course, students should be able to:

1. Understand and analyze dc and ac electrical circuits with resistors, capacitors, inductors, operational amplifier, independent and dependent sources;
2. Understand and use ohm's and Kirchhoff's laws in circuit analysis;
3. Understand and use Nodal and Mesh analysis in circuit analysis;
4. Understand and use superposition, Thevenin's, and Norton's theorems in circuit analysis;
5. Analyze and design circuits with operational amplifiers;
6. Conduct ac and dc power analysis of a electrical circuit;
7. Conduct frequency analysis of electrical circuit.

**Topics Covered**:

|  |  |
| --- | --- |
| **Subject** | **Reading** |
| Basic Concepts and Resistive Circuits  Ohm’s Law  Kirchhoff’s Law  Series and Parallel Resistor | Ch1  Ch2 |
| Nodal and Loop Analysis Techniques  Nodal Analysis  Loop Analysis | Ch3 |
| Operational Amplifiers  Op-Amp Models  Fundamental Op-Amp Circuits  Comparators  **Test 1** | Ch4 |
| Additional Analysis Techniques  Superposition  Thevenin’s and Norton’s Theorem  Maximum Power Transfer | Ch5 |
| Capacitance and Inductance  Capacitor and Inductor Combinations  RC Operational Amplifier Circuits | Ch6 |
| First Order Transient Circuits  First-Order Circuits  **Test 2** | Ch7 |
| AC Steady-State Analysis  Sinusoidal and Complex Forcing Functions  Phasors  Impedance and Admittance  Analysis Techniques | Ch9  Ch 10 |
| Steady-State Power Analysis  Instantaneous and Average Power  Maximum Average Power Transfer  Effective or rms Values | Ch11  11.1-11.3 |
| Variable-Frequency Network Performance  Variable-Frequency Response Analysis  Sinusoidal Frequency Analysis  Resonant Circuits  Filter Networks  **Final Exam** | Ch14  14.7 |

**Distribution of Points:**

Homework 15%

Attendance 10%

Quizzes 20%

2 Tests 30%

Final Exam 25%

**Grading Scale:** A: 90-100; B: 80-89; C: 70-79; D: 60-69; F: 0-59

**COURSE EXPECTATION & CONDUCT:**

It is expected that each student will actually spend a total of 6 to 8 hours per week on the course (not including lecture times). I don’t expect you to memorize formulas but I expect you to understand them. So, you will be allowed to bring to the exam one sheet of paper that contains any relative formulas you might need, but make sure you know how to use them conceptually and not just mechanically. Should you miss a quiz or test due to illness or an emergency, you will be required to give advance notice or provide a doctor's excuse in order to be allowed to make-up on the tests and quizzes you missed. Make-up tests and quizzes are usually harder than the regular tests and quizzes given during the class.

**HOMEWORK:**

The reality is this: you will not truly understand the technical concepts by just paying attention to lectures and reading the materials and examples in the book. To truly understand engineering concepts you have to solve the homework problems yourself even if you are struggling solving them. For this reason, regular homework assignments will be made. The quizzes will be similar to the homework problems.

**Computer Usage:** None

**Laboratory Resources:** None

**Laboratory Policy:** None

**Relationship of Course to Program ABET Outcomes1:**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  |  | **None** | **Low** | **High** | **Assessment** |
| a | Ability to apply mathematics, science, and engineering principles. |  |  | x | Quizzes, Exams |
| b | Ability to design and conduct experiments, analyze and interpret data | x |  |  |  |
| c | Ability to design a system, component, or process to meet desired needs |  | x |  |  |
| d | Ability to function on multidisciplinary teams. | x |  |  |  |
| e | Ability to identify, formulate, and solve engineering problems. |  |  | x | Quizzes, Exams |
| f | Understanding of professional and ethical responsibility. | x |  |  |  |
| g | Ability to communicate effectively. |  | x |  |  |
| h | The broad education necessary to understand the impact of engineering solutions in a global and societal context |  | x |  |  |
| i | Recognition of the need for and an ability to engage in life-long learning. | x |  |  |  |
| j | Knowledge of contemporary issues. | x |  |  |  |
| k | Ability to use techniques, skills, and modern engineering tools necessary for engineering practice. | x |  |  |  |
| l | Probability and statistics | x |  |  |  |

**Contribution of the course to the professional component**

|  |  |  |  |
| --- | --- | --- | --- |
|  | **None** | **Low** | **High** |
| General Education | x |  |  |
| Mathematics |  |  | x |
| Basic Sciences |  |  | x |
| Laboratory Experience | x |  |  |
| Engineering Science |  |  | x |
| Engineering Design |  | x |  |

**Alignment of Course with Transformative Learning2:**

|  |  |  |
| --- | --- | --- |
|  | **Course Goal** | **Assessment Method** |
| Discipline Knowledge | x | Exams & HW |
| Leadership |  |  |
| Problem Solving | x | Exams & HW |
| Knowledge of contemporary issues. |  |  |
| Service Learning and Civic Engagement |  |  |
| Global and Cultural Competencies |  |  |
| Health and Wellness |  |  |

1Required by Department.

2Required by University.

**Course Structure:** The class meets three times a week, 50 minutes each for total 3 credit hours.

**Student Information Sheet:**

http://www.busn.ucok.edu/academicaffairs/FORMS/StudentINFOSheetSyllabusSPRING04.pdf

## ***ADA STATEMENT:***

"The University of Central Oklahoma complies with Section 504 of the Rehabilitation Act of 1973 and the American with Disabilities Act of 1990. Students with disabilities who need special accommodations should make their requests by contacting the coordinator of Disability Support Services, Kimberly Fields at 974-2549. The office is located in the Nigh University Center, Room 415. Students should also notify the instructor of special accommodation needs by the end of the first week of class."

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| **Prepared by:** | Mohamed Bingabr, Associate Professor of Engineering and Physics |
| **Date:** | January 11, 2015 |