COURSE INFORMATION

Fall 2009

EGR 260
Circuit Analysis

Pre-requisites: MTH 174, EGR 120
Co-requisite: MTH 279
Credits: 3
Lecture Hours: 3

Instructor: Paul Gordy
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Paul Gordy's Home Page - http://www.tcc.edu/faculty/webpages/PGordy/

Course Material:

1. Lecture Notes/PowerPoint Presentations - This is the primary source of information for this course. Material covered in lecture may not be found in the textbook. Students should print the PowerPoint presentations prior to class and use them to take notes as the presentations leave space for problems solved in class. If any lectures are missed, the student should try to copy the notes from another student.
2. Main Textbook - The primary textbook required for this course is ***Electric Circuits*, 8th Edition**, by Nilsson (ISBN: 9780135142929). This textbook is also used in EGR 261. This textbook includes a PSPICE supplement and will also be used for EGR 261 and EGR 270.
3. PSPICE Textbook - An additional text is recommended that will serve as a reference for PSPICE programming assignments made in EGR 260, 261, and 270. The text is ***Schematic Capture with Cadence PSPICE*, 2nd Edition**, by Marc Herniter (ISBN: 9780130484000).
4. Calculator - TCC Engineering students are required to own one of the following calculators: TI-85, TI-86, TI-89, TI-92, HP-48, HP-49, HP-50, Voyage 200, or TI-NSPIRE-CAS. These calculators have many advanced features that are especially useful in the electrical engineering courses. If you choose not to buy one of these calculators, you may be at a disadvantage to other students on a test.

Grading:

Course grades will be computed based on the following percentages:

4 Tests (15 % each)	60 %
Final Exam (comprehensive)	20 %
Homework Assignments	10 %
PSPICE Assignments	10 %

Grading Scale:

Grades will be based on the following scale:

A: 90 – 100
B: 80 – 89
C: 70 – 79
D: 60 - 69
F: 0 – 59

Homework:

Regular reading and problem assignments will be made, usually on a weekly basis. The problems may be collected on the assigned due date for grading. Problem solutions will be given to the student when the homework is collected. No late homework assignments will be accepted. The lowest homework grade of those collected will be dropped.

> **Homework Format** - Each assigned homework problem must be neatly presented and contain the complete problem statement as well as any associated circuits, diagrams, etc. A minimum 10% penalty may be given if these conditions are not met.

PSPICE Assignments:

Programming assignments will be made using PSPICE, a circuit analysis and simulation program produced by Cadence. The powerful evaluation version of PSPICE is free and is available in the supplemental PSPICE text for the course. PSPICE will be used in later electrical engineering courses both at TCC and at ODU or Virginia Tech.

Course Description:

EGR 260 is a study of linear circuit analysis, including the study of basic electrical properties, resistive circuits, network equations, network reduction techniques, network theorems, operational amplifiers, two-port parameters, inductors, capacitors, first-order and second-order circuits, and the analysis of sinusoidal steady-state circuits using phasor analysis. A significant use of the PSPICE circuit analysis program is included.

Course Objectives:

The general objectives of EGR 260 are to be able to:

- State and apply basic electrical laws, components, definitions, and units
- Manipulate and solve systems of equations using matrices
- Apply various network reduction techniques to simplify and/or analyze circuits
- Apply various network theorems to the analysis of resistive circuits.
- Analyze resistive networks using simultaneous network equations.
- Analyze operational amplifier circuits.
- Determine two-port model representation for resistive electrical networks and to use two-port models in further network analysis.
- Define and apply basic terms and relationships involving inductance and capacitance.
- Analyze linear circuits containing operational amplifiers
- Analyze first-order and second-order circuits to determine the complete circuit response.
- Analyze sinusoidal steady-state circuits using phasor analysis.
- Use PSPICE to analyze various types of electric circuits

Absence:

A missed test results in a grade of 0 unless the student notifies the instructor prior to class or within 24 hours of the class with an adequate reason. Notification may be made by phone or by message (mailboxes are in Building A). If a class is missed it is the responsibility of the student to obtain any information, assignments, etc., given during class.

Course Outline

Note: PSPICE is applied at various points throughout the course and is not listed in the outline.

I. BASIC DEFINITIONS AND UNITS (Ch. 1)
   A. System of Units
   B. Charge, Current, Voltage, Power, Energy

II. CIRCUIT ELEMENTS (Ch. 2)
   A. Active and Passive Devices
   B. Independent Sources and Dependent Sources
   C. Resistance
   D. Kirchhoff's Voltage Law and Kirchhoff's Current Law

III. SIMPLE RESISTIVE CIRCUITS (Ch. 3)
   A. Series, Parallel, and Series/Parallel Circuits
   B. Voltage and Current Division

TEST #1 (Ch. 1 - 3)

IV. NETWORK EQUATIONS (Ch. 4, Sections 1 - 8)
   A. Solution of Simultaneous Equations using Linear Algebra
   B. Independence of equations
   C. Node Voltage Analysis
   D. Mesh Current Analysis

V. THE OPERATIONAL AMPLIFIER (Ch. 5)
   A. Ideal operational amplifier properties and operational amplifier models
   B. Applications and examples

TEST #2 (Ch. 4, Sections 1 - 8, and Ch. 5)

VI. NETWORK THEOREMS (Ch. 4, Sections 9 - 13)
   A. Practical Sources and Source Transformations
   B. Superposition
   C. Thevenin's and Norton's Theorems
   D. Maximum Power Transfer

VII. INDUCTORS AND CAPACITORS (Ch. 6)
   A. Physical properties of inductors and capacitors
   B. Voltage, current, power, and energy
   C. Initial conditions

TEST #3 (Ch. 4, Sections 9 - 13, and Ch. 6)

VIII. RESPONSE OF FIRST-ORDER RL AND RC CIRCUITS (Ch. 7)
   A. Source-free RC and RL circuits
   B. Natural and forced responses
   C. Unit step functions, impulse functions, and piecewise-continuous functions
   D. Unit step responses

IX. SECOND-ORDER CIRCUITS (Ch. 8)
   A. Natural responses: over-damped, under-damped, and critically-damped circuits
   B. Forced response
   C. Series and parallel RLC circuits

TEST #4 (Ch. 7 - 8) - Take-home test

X. TWO-PORT CIRCUITS (Ch. 18)
   A. Parameter Representations
   B. Network Modeling

FINAL EXAM (Comprehensive, including material on Ch.18)

General Information

TCC College and Student Handbook

Students are responsible for being aware of the policies, procedures, and student responsibilities contained within the current edition of the Tidewater Community College Catalog and Student Handbook. Students should familiarize themselves with the College's policies regarding misconduct and inclement weather policies found in the Student Handbook.

Last Day to Withdraw Without Academic Penalty

You may withdraw from a course without academic penalty during the first 60% of a session and receive a grade of "W"(withdrawal). The last day to withdraw without academic penalty is **October 29, 2009.** After that date, the student will receive a failing grade of "F" or "U". Exceptions to this policy may be made ONLY when initiated by the instructor and approved by the division dean; ONLY if you are able to document mitigating circumstances; and ONLY if you were making satisfactory progress in the course. **Students are advised to discuss attendance irregularities with the instructor. Do not simply stop attending. Failure to properly complete the withdrawal procedure may result in the assignment of "F" or "U" grades to your permanent record.**

Disability Services Statement

Disabilities Services of Tidewater Community College provides students, faculty, and staff programmatic and physical access in a supportive atmosphere and in accordance with Section 504 of the 1973 Rehabilitation Act and the Americans with Disabilities Act of 1990. In appreciation of the unique talents and needs of students with disabilities and chronic health issues, Disabilities Services further provides an array of services designed to enhance all educational experiences. *Students with disabilities or chronic health problems are encouraged to identify themselves to a Disability Services [DS] Counselor as early as possible. DS Counselors are on all campuses. Students with documented disabilities may qualify for academic accommodations such as more time on tests, sign language interpreting or Braille.*

Emergency Procedures

In the event of a bomb threat, tornado, or fire, students and staff may be asked to evacuate the building or move to a secure location within the building. Evacuation routes for movement to an external location or to a shelter within the building are posted at the front of the room. Students should review the maps and make sure that the exit route and assembly location for the building are clearly understood. If you have a disability that may require assistance during an evacuation, please let your faculty know at the end of the first class.

Cheating

College rules state that a student may be subjected to disciplinary action for academic cheating, plagiarism, or assisting in cheating or plagiarism. Disciplinary penalties include college dismissal or suspension. In addition, cheating, plagiarism, or assisting such activity is a most serious form of academic misconduct, and will in the sole discretion of the faculty member result in a grade of F on the work or for the course. A single act of cheating may subject a student to both a failing grade in the course, and student disciplinary action perhaps involving suspension or dismissal from TCC.