El Paso Community College
Syllabus
Part II
Official Course Description

SUBJECT AREA   **Engineering**

COURSE RUBRIC AND NUMBER   **ENGR 2305**

COURSE TITLE   **Electromechanical Systems**

COURSE CREDIT HOURS   3   3 :   0

                                               Credits   Lec   Lab

I. Catalog Description

Principles of electrical circuits and systems. Provides basic circuit elements (resistance, inductance, mutual inductance, capacitance, independent and dependent controlled voltage, and current sources). Provides the topology of electrical networks; Kirchhoff 's laws; node and mesh analysis; DC circuit analysis; operational amplifiers; transient and sinusoidal steady-state analysis; AC circuit analysis; first- and second-order circuits; Bode plots; and use of computer simulation software to solve circuit problems. **Prerequisites: MATH 2414 <u>AND</u> PHYS 2325 and 2125. (3:0).**

II. Course Objectives

Upon satisfactory completion of this course, the student will be able to

A. Identify the relationship between Voltage, Current, and Resistance as described by Ohm's Law.

B. Reduce a series-parallel combination of resistances into a single equivalent resistance.

C. Apply Kirchoff's Voltage Law and Kirchoff's Current Law to analyze series-parallel DC circuits using loop and nodal analysis.

D. Use the Superposition Principle to analyze circuits with multiple sources.

E. Predict the transient response of circuits containing one energy storage element.

F. Calculate the amplitude, frequency, and phase of a sinusoidal function.

G. Calculate the steady-state sinusoidal response of AC circuits using phasor analysis.

H. Calculate real, apparent, and reactive power in electric circuits.

I. Predict primary and secondary voltage, current, and power in transformer circuits.

J. Discuss the nature and advantages of three-phase power systems.

K. Calculate voltage, current, and power in circuits with balanced three-phase loads.

L. Analyze and interpret nameplate data of induction motors.

III. THECB Learning Outcomes (ACGM)

Upon successful completion of this course, students will:
1.   Explain basic electrical concepts, including electric charge, current, electrical potential, electrical power, and energy

2. Apply concepts of electric network topology: nodes, branches, and loops to solve circuit problems, including the use of computer simulation.
3. Analyze circuits with ideal, independent, and controlled voltage and current sources.
4. Apply Kirchhoff's voltage and current laws to the analysis of electric circuits.
5. Explain the relationship of voltage and current in resistors, capacitors, inductors, and mutual inductors.
6. Derive and solve the governing differential equations for a time-domain first-order and second-order circuit, including singularity function source models.
7. Determine the Thévenin or Norton equivalent of a given network that may include passive devices, dependent sources, and independent sources in combination.
8. Analyze first and second order AC and DC circuits for steady-state and transient response in the time domain and frequency domain.
9. Derive relations for and calculate the gain and input impedance of a given operational amplifier circuit for both DC and frequency domain AC circuits using an ideal operational amplifier model.
10. Apply computer mathematical and simulation programs to solve circuit problems.

IV. Evaluation

A. Grading

It is recommended that four examinations be given, including the final examination. Quizzes and/or homework may also be assigned, and those grades may be included in the final average. The weight given to exams, quizzes, and homework is at the discretion of the instructor.

Grades will be assigned based on student's average, using the scale below:

A = 90 - 100%   B = 80 - 89%   C = 70 - 79%   D = 60 - 69%   F = Below 60%

B. I and W Grades

Incomplete (I) grades will be given at the instructor's discretion and only under special circumstances. The instructor is not obligated to issue a "W" (Withdrawal) grade. Students who wish to withdraw must submit the proper paperwork to the registrar prior to the "drop" deadline. A grade of "W" cannot be issued at the end of the semester.

V. Disability Statement (American with/Disabilities Act [ADA])

EPCC offers a variety of services to persons with documented sensory, mental, physical, or temporary disabling conditions to promote success in classes. If you have a disability and believe you may need services, you are encouraged to contact the Center for Students with Disabilities to discuss your needs with a counselor. All discussions and documentation are kept confidential. Offices located: VV Rm C-112 (831-2426); TM Rm 1400 (831-5808); RG Rm B-201 (831-4198); NWC Rm M-54 (831-8815); and MDP Rm A-125 (831-7024)

VI. 6 Drop Rule

Students who began attending Texas public institutions of higher education for the first time during the Fall 2007 semester or later are subject to a 6-Drop limit for all undergraduate classes. Developmental, ESL, Dual Credit and Early College High School classes are exempt from this rule. All students should consult with their instructor before dropping a class. Academic assistance is available. Students are encouraged to see Counseling Services if dropping because exemptions may apply. Refer to the EPCC catalog and website for additional information.

Revised by Discipline: Fall 2015 (next revision in 3 years)