DEPARTMENT OF ELECTRICAL ENGINEERING
ECET 3000 – Electrical Principles

1- Department, number, and title of course:
   Electrical and Computer Engineering Technology
   ECET 3000
   Electrical Principles
   CRN: 8541/8542/8543

2- Course Designation:
   Required, non-major

3- Course (catalog) description:
   This course covers basic circuit theory including the ac and dc characteristics of resistors, capacitors and inductors as used in elementary single and three-phase circuits. Characteristics of basic industrial electric motors and single and three-phase connections are studied. Basic factory automation is covered including sensors, relay control and programmable logic controllers. Laboratory exercises supplement the material discussed in class. This course cannot be used for credit by CpET, EET, or TCET majors.

4- Prerequisites:
   PHYS 1112K

5- Textbook:

6- Course learning outcomes / expected performance criteria.
   After successfully completing this course, students, will able to demonstrate that they can do the following:
1. Compute the resistance of a simple rectangular/circular cylindrical solid conductor with resistivity \( \rho \).
2. Calculate the capacitance of a parallel plate structure, given the dielectric properties of the insulating medium.
3. Calculate the voltage induced in a closed circuit due to a time varying magnetic flux through the circuit, at normal and oblique angles of incidence.
4. Calculate the force developed upon a linear current in a conductor situated in a uniform magnetic field.
5. Calculate the equivalent impedance of relatively simple series and parallel combinations of resistors, capacitors or inductors. Determine the resonant frequency of series and parallel L-C circuits.
6. Develop the Thévenin and Norton equivalent circuits of a simple network of voltage sources and resistors.
7. Calculate the load impedance for a given network that will result in maximum power transfer (MPT) to the load. Apply Thévenin's theorem to MPT theorem.
8. Determine the speed and efficiency of a dc shunt motor driving a load of constant torque or horsepower.
9. Describe the general torque-speed (slip) characteristics or an induction motor and calculate the running speed of an induction motor given a linear model of the \( \tau - s \) curve in rated operation range and particular load characteristics, e.g., constant torque, constant power.

10. Sketch and wire a rudimentary across-the-line starter incorporating discrete control circuit elements.

7- Topics covered.
1. Basic DC circuits and general DC circuit analysis
2. Transient circuits
3. AC circuits and steady-state AC circuit analysis
4. Magnetic circuits
5. Three-phase circuits
6. Transformers
7. DC and AC machines
8. Programmable logic controllers (PLC)
9. Diodes and their applications
10. Transistors
11. Operational amplifiers (Op-Amp)
12. Digital electronics (basic concepts)

8- Class / Laboratory schedule:
3 lecture sessions per week, 50 minutes per session: M, W, F; 11:00-11:50 am, Q-311
1 lab session per week, 170 minutes: M or W; 12:00 – 2:50 pm, Q-215

9- Contribution of course to meeting the requirements of Curriculum (Criterion 5)
Engineering Technology/Renewable Energy Topics – 4 Credit Hours

10- Relationship of Course to Program Outcomes

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S – Strong    M – Medium    W – Weak

11- Evaluation of Student Performance
Examinations: Each chapter will be concluded with a 10-minutes test. There will be three 50-minutes Term-Exams, and one 120–minutes Final-Exam.
Homework: will be graded, and will be collected before each Term-Exam and the Final Exam. A schedule assignment page will be provided during the first day of class, and it is available on the instructor’s web page. The homework will be presented on engineering paper. No exceptions!
Laboratory: Laboratory experiments are an essential part of ECET courses. 20% of the laboratory experiments are simulation, 80% of the experiments are real-time performed on physical devices. The ability to report technical information in a clear and concise manner is one of the most important practical skills that a technically trained person can develop.
If we were to rate the skills possessed by an individual trained to use and understand electrical and electronic theory, the ability to communicate effectively in written English would surely rank as high as, if not higher than the ability to construct reliable circuits, make accurate measurements, and understand the results of the experiments. The results and conclusions drawn from experimental procedures are of little value unless they can be communicated to others.

Students are required to document all laboratory activity in a bound, quadruple, composition notebook. Adherence to the format will help ensure that the report is complete and well organized. Students are graded for format, procedure, clarity and coherence, originality, grammar and spelling, accuracy, effort, completeness, neatness and promptness.

**SPSU requires a passing lab grade in order to pass the class.** Roll will be taken in each lab. No makeup labs will be given unless previous arrangements are made with your instructor. Otherwise, a grade of zero will be recorded for any missed labs. In the case of extreme emergencies, contact your instructor as soon as possible.

**12-Grading Policy**

Work that is sloppy and/or contains spelling and grammatical errors will be penalized. You may appeal any grade received. If you choose to appeal a grade, the instructor reserves the right to re-grade the entire test or assignment. **All appeals for re-evaluation of a grade must be made within one week of the assignment being returned to you.** You are responsible for being academically honest as defined by the academic dishonesty rules in the general catalog. **Cheating will not be tolerated.**

**Grading:**

Final Exam: _________________ 25%
Term Exams: ________________ 45%
Homework: ________________ 10%
Lab: _________________ 20%

Grades: 90%–100%: A, 80%–89%: B, 70%–79%: C, 60%–69%: D, below 60%: F

Students with disabilities who believe that they may need accommodations in this class are encouraged to contact the counselor working with disabilities at (678) 915-7244 as soon as possible to better ensure that such accommodations are implemented in a timely fashion.

**13-SPSU Honors Code:** [www.spsu.edu/honorcode](http://www.spsu.edu/honorcode)

As a member of the Southern Polytechnic State University community of scholars, I understand that my actions are not only a reflection on myself, but also a reflection on the University and the larger body of scholars of which it is a part. Acting unethically, no matter how minor the offense, will be detrimental to my academic progress and self-image. It will also adversely affect all students, faculty, staff, the reputation of this University, and the value of the degrees it awards. Whether on campus or online, I understand that it is not only my personal responsibility, but also a duty to the entire SPSU community that I act in a manner consistent with the highest level of academic integrity. Therefore, I promise that as a member of the Southern Polytechnic State
University community, I will not participate in any form of academic misconduct. I also understand that it is my responsibility to hold others to these same standards by addressing actions that deviate from the University-wide commitment to working, living, and learning in an environment conducive to a quality education. Thus, I affirm and adopt this honor code of Southern Polytechnic State University.

14- Instructor
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