I. Basic course Information

A. Course Number and Title: ENTC-110 Electricity and Robotics

B. Date of Proposal or Revision: Spring 2003

C. Sponsoring Department: Science and Engineering Department

D. Semester Credit Hours: 3

E. Weekly Contact Hours: Lecture 2  Laboratory 2

F. Prerequisites: Intermediate Algebra or MATH-025 – Algebra MOD 4;  
Co-requisite: CISY 102 - Computer Literacy

G. Laboratory Fees: YES

II. Catalog Description

This course teaches the fundamentals of electricity, electric control, and introduces the 
student to robot operations and programming. Topics in electricity include AC and DC, 
basic circuit analysis, inductance and capacitance, Ohm’s Law, Kirchhoff’s Laws, power, 
deal transformers, basic control logic and ladder diagrams. A laboratory scale industrial 
robot is used to teach robot operations, robot programming and the design of robotic 
applications. Subject matter is presented in both a lecture and laboratory environment.

III. Statement of Course Need:

This course is taken in the first semester of the first year. It is required to give the student 
the fundamentals of electricity as it applies to facilities maintenance. Robotics introduces 
the student to automation in plant facilities. Based on industry standards, this course will 
provide students with a basic understanding of electrical controls and robotics in the 
facilities engineering field. Students will have the opportunity to design and operate 
electrical controls and a robot. Without this course students will not be able to learn the 
important aspect of electrical controls of this industry. Subject matter will be presented
with a hands-on emphasis applicable to facilities maintenance. Robotics applications are presented to illustrate how automation is an integral part of plant facilities.

IV. Place of Course in College Curriculum

A. Satisfies general education requirements

B. Degree program, option or certificate requirement (specify program, option or certificate)

Associate of Applied Science in Facilities Engineering Technology

C. Course transferability___________________

V. General Education Goals

A. To develop the ability to think analytically.

B. To collect organize and evaluate information to address different kinds of problems.

C. To have the technical knowledge to oversee the safe and efficient operation of plant facilities.

VI. Student Learning Outcomes

The student will be able to

- Apply the fundamentals of electricity to understanding the operation, installation and troubleshooting of facilities electrical equipment.
- Operate an electrical multimeter.
- Understand critically important electrical safety procedures.
- Understand series and parallel circuits.
- Understand Ohm’s Law and Kirchoff’s Laws.
- Understand inductance and AC circuits.
- Understand how capacitors and inductors are part of electrical power supplies.
- Design and calculate current load on a transformer.
- Understand how to tap a transformer.
- Describe the functions of five basic robot components.
- Program a robot.
- Operate a robot through a teach pendant.
VII. Outline of Course Content

I  Electricity

1. Basic Electrical Circuits
2. Circuit Analysis
3. Electrical Measurements
4. Inductance and Capacitance
5. Combination Circuits
6. Transformers
7. Control Logic
8. Sequencing Control
9. Timers and Advanced Systems
10. Electrical Wiring Techniques
11. Wiring System Installation

II  Robotics

12. Basic Robot Operation
13. Teach Pendant Programming
14. PC Software Programming
15. Application Development
16. Flexible Manufacturing Cells
17. Quality Control
18. Production Control
19. Robot Simulation Software

VIII. Suggested Materials


Amatrol Equipment: Electrical Laboratory Station T-7017, Motor Control System PN-17305, Applied Electrical Control Station 90-EC, Pegasus Robot and Appurtenances

Amatrol Course Material (Learning Activity Packets and multimedia software) for:
  Electrical Systems 1 and Robotics and Computer Programming 1