JEFFERSON COLLEGE

COURSE SYLLABUS

BET200

ELECTRONIC CONTROL TECHNOLOGY

3 Credit Hours

Prepared by: Scott Sebaugh
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BET200 Electronic Control Technology

I. CATALOGUE DESCRIPTION

A. Pre-requisites:
   1. Reading Proficiency
   2. ETC104 AC Circuits, with a Grade of "C" or Better or Instructor Permission

B. 3 Credit Hour Award

C. Electronic Control Technology covers the fundamental elements of most electronic medical device systems, including sensors, motors, wiring, switching, grounding, and electronic control units. Prior to introducing specific medical devices, it is imperative that students understand the fundamentals of operation and safety. Control types, microprocessing, signal conditioning, switches, mechanical systems, motors, sensors, and actuators are covered in this course. (F)

II. EXPECTED LEARNING OUTCOMES/CORRESPONDING ASSESSMENT MEASURES

| Demonstrate knowledge and understanding of electrical safety | Participation/Attendance Homework Exams Hands-On Skill Exercises |
| Demonstrate knowledge and understanding of electrical schematics, diagrams, symbols, and control logic | Participation/Attendance Homework Exams Hands-On Skill Exercises |
| Demonstrate knowledge and understanding of proper use of test equipment for troubleshooting | Participation/Attendance Homework Exams Hands-On Skill Exercises |
| Demonstrate knowledge and understanding of input control devices, solenoids, relays, contactors, and motor starters | Participation/Attendance Homework Exams Hands-On Skill Exercises |
| Demonstrate knowledge and understanding of AC, DC, and variable frequency drive motors | Participation/Attendance Homework Exams Hands-On Skill Exercises |
III. OUTLINE OF TOPICS

A. Electrical Safety
1. Describe what determines the severity of an electrical shock
2. State where and when lockout/tagout device should be used
3. Describe the types of personal protective equipment (PPE) needed to prevent electrical shock
4. State the purpose of grounding

B. Symbols and Diagrams
1. Identify the differences between pictorial drawings, wiring diagrams, schematic diagrams, line diagrams, block diagrams, and flow charts
2. Demonstrate knowledge and understanding of different schematics and symbols used in the medical equipment

C. Test Instruments
1. Demonstrate how to properly test for continuity in a circuit
2. Demonstrate how to properly test for voltage in a circuit
3. Describe the procedure to set a multi-meter to AC and DC voltage

D. Control Logic
1. Demonstrate knowledge and understanding of basic rules of line diagrams
2. Define and give examples of logic functions
3. Demonstrate knowledge and understanding of control circuit troubleshooting

E. Mechanical Input Control Device
1. Describe the different parts and functions of a pushbutton
2. Explain the purpose and functions of selector, limit, foot, pressure, temperature, flow, and level switches
3. Identify and draw the symbols for selector, limit, foot, pressure, temperature, flow and level switches

F. Solenoids
1. Define electromagnetic and state its characteristics
2. Define what a solenoid is and how it functions
3. Describe the steps required to test a solenoid with a multi-meter

G. Electromechanical Relays
1. Define relays and how they function
2. Define the different types of relays and their purposes
3. Describe the steps required to test a relay with a multi-meter

H. Transformers
1. Define transformers and how they function
2. Explain the turns ratio of a transformer and why it is important
3. Describe how to troubleshoot a transformer by taking resistance and voltage readings
I. Contactors and Magnetic Motor Starters
   1. Define manual contactors and explain how they are used
   2. Explain the difference between a manual starter and a manual contactor
   3. Describe how overload relays protect motors
   4. Define magnetic contactors and explain how they are used
   5. Explain how to select the correct overload heater for a given motor
   6. State the procedure for troubleshooting a motor starter

J. DC Motors
   1. List and describe the parts of a DC motor
   2. List the basic types of DC motors
   3. Define work and state how it is calculated
   4. Explain how to troubleshoot brushes and commutators
   5. Explain how to troubleshoot for grounded, open, and shorted circuits

K. AC Motors
   1. List and describe the parts of an AC motor
   2. List and explain the different types of AC motors
   3. Explain how a 3ph motor operates
   4. Explain how to troubleshoot a shaded-pole, split-phase, capacitor, and 3ph motor

L. Semiconductor Input Devices
   1. Define thermistor and its different classes
   2. Describe photocells and explain how to test them
   3. Define photodiode and how it operates
   4. Define and describe flow detection sensors
   5. Define proximity sensors and explain how it operates
   6. Define ultrasonic sensors and explain how it operates

M. Photoelectric Semiconductors, Fiber Optics, and Light-Based Applications
   1. Describe photoelectric devices
   2. Define photoelectric sensors
   3. Describe how photoelectric sensors are used

N. Motor Drives
   1. Define and describe motor drives
   2. Describe motor frequencies and pulse width modulation
IV. METHOD(S) OF INSTRUCTION

A. Lectures

B. Readings from Textbook

C. Supplemental Handouts/Industry Journals and Websites

D. Peer Interactive Activities/Discussions in Classroom

V. REQUIRED TEXTBOOK(S)


VI. REQUIRED MATERIALS

Flash Drive

VII. SUPPLEMENTAL REFERENCES

Class Handouts

VIII. METHOD OF EVALUATION

A. Distribution of the Final Grade
   1. Participation/Attendance 10%
   2. Homework 30%
   3. Hands on skill exercises 25%
   4. Exams 35%

B. Assignment of Final Letter Grade:
   A – 90 to 100%
   B – 80 to 89%
   C – 70 to 79%
   D – 60 to 69%
   F – Below 60%

IX. ADA AA STATEMENT

Any student requiring special accommodations should inform the instructor and the Coordinator of Disability Support Services (Library phone 636-481-3169).
X. ACADEMIC HONESTY STATEMENT

All students are responsible for complying with campus policies as stated in the Student Handbook (see College website, http://www.jeffco.edu).

XI. ATTENDANCE STATEMENT

Regular and punctual attendance is expected of all students. Any one of these four options may result in the student being removed from the class and an administrative withdrawal being processed: (1) Student fails to begin class; (2) Student ceases participation for at least two consecutive weeks; (3) Student misses 15 percent or more of the coursework; and/or (4) Student misses 15 percent or more of the course as defined by the instructor. Students earn their financial aid by regularly attending and actively participating in their coursework. If a student does not actively participate, he/she may have to return financial aid funds. Consult the College Catalog or a Student Financial Services representative for more details.

XII. OUTSIDE OF CLASS ACADEMICALLY RELATED ACTIVITIES

The U.S. Department of Education mandates that students be made aware of expectations regarding coursework to be completed outside the classroom. Students are expected to spend substantial time outside of class meetings engaging in academically related activities such as reading, studying, and completing assignments. Specifically, time spent on academically related activities outside of class combined with time spent in class meetings is expected to be a minimum of 37.5 hours over the duration of the term for each credit hour.