ENGT 060: INDUSTRIAL ELECTRONICS

Originator
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Justification / Rationale
Labor market indicators show that there are jobs available and an advisory committee recommends the course.

Effective Term
Fall 2019

Credit Status
Credit - Degree Applicable

Subject
ENGT - Engineering Technology

Course Number
060

Full Course Title
Industrial Electronics

Short Title
INDUSTRIAL ELECTRONICS

Discipline

Disciplines List
Engineering Technology

Modality
Face-to-Face

Catalog Description
This course includes basic topics related to industrial electronics. A brief review of analog circuits is expanded upon to develop more advanced circuit concepts. Topics include FETs, SCRs, basic components involved in motor control, DC and AC motors, and their controller circuits will be covered. Operational amplifiers will be covered, and their applications to sensor instrumentation. Transducers and applications to various sensors for heat, flow, force, etc. will be developed. Troubleshooting techniques for the above topics will be incorporated with each section.

Schedule Description
This course includes basic topics related to industrial electronics.
Prerequisite: ENGT 022

Lecture Units
3

Lecture Semester Hours
54

Lab Units
1

Lab Semester Hours
54

In-class Hours
108

Out-of-class Hours
108

Total Course Units
4
Total Semester Hours
216

Prerequisite Course(s)
ENGT 022

Required Text and Other Instructional Materials

Resource Type
Web/Other

Description
Various web based resources will be used.

Class Size Maximum
30

Entrance Skills
Interpret and troubleshoot electronic circuits.

Prerequisite Course Objectives
ENGT 022-Define electromagnetic terminology concepts such as voltage, current, resistance, capacitance, inductance and alternating current.
ENGT 022-Practice and demonstrate electrical safety.
ENGT 022-Obtain electrical measurements using a digital multimeter.

Course Content

1. Rectifiers
   a. Single phase
   b. Three phase
   c. Half wave
   d. Full wave
   e. Filters
2. Transistors
   a. Circuits
   b. Inverts
   c. Converters
   d. Voltage regulators
3. Field Effect Transistors
   a. FETs
   b. JFETs
   c. MOSFET
4. Thyristors
   a. Silicon Controlled Rectifiers
   b. Phase angle control
   c. Converters
   d. Inverters
   e. Triacs
   f. Diacs
5. Industrial control devices
   a. Proximity switches
   b. Control relays
   c. Seal-in circuits
   d. Electromagnetic contactors

   e. Overload relays
   f. Solenoid
6. DC motor and control circuits
7. AC motor and control circuits
8. Operational Amplifier circuits
9. Transducer circuits

Lab Content

1. Diode Circuits
   a. Rectifiers
   b. Rectifier filters
   c. Build and troubleshoot rectifier circuits
2. Transistor circuits
   a. Inverters
   b. Converters
   c. Voltage regulators
   d. FETs
   e. JFETs
   f. MOSFETs
   g. Insulated Gate Bipolar Transistors (IGBT)
3. Thyristor circuits
   a. Silicon Controlled Rectifiers
   b. Phase angle control
   c. Converters and inverters
   d. Triacs and diacs
   e. Silicon Bilateral Switch (SBS)
   f. Gate Turnoff Thyristor (GTO)
   g. Programmable Unijunction Transistor (PUT)
4. Industrial Control Devices
   a. Proximity switches
   b. Control relays
   c. Seal-in circuits
   d. Electromagnetic Contactors
   e. Overload relays
   f. Solenoids
   g. Relay logic Diagrams
5. DC Motor and control Circuits
   a. DC Motors
   b. Dynamos
   c. Servomotors
   d. Brushless
   e. Stepper motors
   f. Speed Controls and braking systems
6. AC Motor and control circuits
   a. Single-Phase and shaded pole induction motors
   b. AC Servomotors
   c. Universal motors
   d. Synchronous motors
   e. AC motor speed controls and braking systems
7. Operational Amplifiers
   a. OpAmp Charactersitics
   b. Configurations
      i. Inverting
      ii. Non-Inverting
      iii. Differential
      iv. Summing Amplifier
   c. Comparators

d. Zero-crossing detectors
e. Voltage Regulators
f. Log amps

8. Analog and Digital Transducer circuits
a. Thermocouples
b. Thermistors
c. Displacement and flow transducers
d. Strain gauges
e. Photoelectric devices
f. Optical shaft encoders
g. Hall effect devices

Course Objectives

	Objectives
Objective 1	Troubleshoot industrial control devices
Objective 2	Describe the basic function of FETs
Objective 3	Describe the basic functions of an operational amplifier
Objective 4	Describe the basic function of Silicon Controlled Rectifiers

Student Learning Outcomes

	Upon satisfactory completion of this course, students will be able to:
Outcome 1	Examine and troubleshoot industrial control devices
Outcome 2	Examine and troubleshoot DC motor control circuits
Outcome 3	Analyze and troubleshoot operational amplifier circuits
Outcome 4	Explain devices such as: proximity switches, control relays, seal-in circuit, electromagnetic contractors, overload relays and solenoids

Methods of Instruction

Method	Please provide a description or examples of how each instructional method will be used in this course.
Discussion	Students will discuss the material during lecture and lab.
Laboratory	Students will perform hands-on experiments in lab to obtain a practical experience of theory presented in lecture.
Lecture	Lecture will provide a theoretical introduction and explanation of the material being covered.
Participation	Students will be asked questions during lecture and lab.

Methods of Evaluation

Method	Please provide a description or examples of how each evaluation method will be used in this course.	Type of Assignment
Mid-term and final evaluations	Students will be tested through Canvas to determine their understanding of the material.	In Class Only
Group activity participation/observation	During lab students will work in teams to perform and solve the lab report. Students will also discuss their findings with their classmates.	In Class Only
Laboratory projects	Laboratory projects and findings will be evaluated to gain a better understanding for the students' comprehension of the material. In lab, students will perform the lab. At home, students will write their lab report.	In and Out of Class
Student participation/contribution	Students will be evaluated by their participation in both lecture and lab.	In Class Only
Tests/Quizzes/Examinations	Quizzes and Exams will include multiple choice questions.	In Class Only

Written homework	Homework will be assigned via Canvas and some questions will require a short answer written response. Lab reports will also be written at home.	Out of Class Only

Assignments

Other In-class Assignments

1. Take notes
2. Lab work
3. Lab notebook
4. Quizzes
5. Exams
6. Discussion

Other Out-of-class Assignments

1. Reading assignments
2. Writing assignments
3. Lab write-ups

Grade Methods
Letter Grade Only

MIS Course Data

CIP Code
15.0000 - Engineering Technology, General.

TOP Code
092400 - Engineering Technology, General

SAM Code
C - Clearly Occupational

Basic Skills Status
Not Basic Skills

Prior College Level
Not applicable

Cooperative Work Experience
Not a Coop Course

Course Classification Status
Credit Course

Approved Special Class
Not special class

Noncredit Category
Not Applicable, Credit Course

Funding Agency Category
Not Applicable

Program Status
Not program-applicable

Transfer Status
Not transferable

Allow Audit
No

Repeatability
No

Materials Fee
No

Additional Fees?
No

Files Uploaded

Attach relevant documents (example: Advisory Committee or Department Minutes)
EngrTech Advisory 02-27-18 Minutes and Handouts.pdf

Approvals

Curriculum Committee Approval Date
11/15/2018

Academic Senate Approval Date
11/29/2018

Board of Trustees Approval Date
12/14/2018

Chancellor's Office Approval Date
3/20/2019

Course Control Number
CCC000603622

Programs referencing this course
Engineering Technology AS Degree (http://catalog.collegeofthedesert.eduundefined?key=209)