Syllabus
5314/Robotics and Flexible Automation

3 credit hours
3 total contact hours

Fall 2019

Instructor Information

Instructor	Email	Office Location & Hours
Dr. Ivan Renteria Marquez	iarenteria@utep.edu	E-226E T & R 3:00 PM-4:30 PM

Course Materials

- **Textbook:**

"Automation, Production Systems, and computer-integrated manufacturing". Mikell Groover. 2019.

- **Supplemental material:**

"Grob's basic electronics". Mitchel Schults. 2016

"Digital fundamentals: a systems approach". Thomas L. Floyd. 2013.

"Technician's guide to programmable controllers". Terry Borden. 2013

"Industrial electronics". James Rehg. 2005.

General Information

Description

Modern concepts of robotics and flexible automation including power and control mechanisms, flexible material handling systems, programmable controllers, interfacing and end-of-arm tooling.

Course objectives

After successfully studying this course, student will be able to:

Understand the basic industrial automation technology and techniques on which the design of modern automation is based. These include: industrial power electronics, electrical motors, pneumatic actuators, motor control and sensors.

Understand the principle of operation of PLCs. This includes interfaces, simbology and programming language.

Topics

- Automation and manufacturing

1.1 Automation

- Ohm's Law

2.1 The current
2.2 The voltage
2.3 The resistance
2.4 Electric power
2.5 Open-circuit and short-circuit troubles

- Series circuits

3.1 Series IR voltage drops
3.2 Kirchhoff's voltage Law (KVL)
3.3 Polarity of voltage drops
3.4 Total power in series circuits
3.5 Troubleshooting: Opens and shorts in series circuits

- Parallel circuits

4.1 Parallel voltage
4.2 Kirchhoff's current Law (KCL)
4.3 Resistances in parallel
4.4 Total power in parallel circuits
4.5 Troubleshooting: Opens and shorts in parallel circuits

- Introduction to digital systems

5.1 Digital and analog signals and systems
5.2 Binary digits, logic levels, and digital waveforms
5.3 Logic operations
5.4 Combinational and sequential logic functions

- Logic gates and gate combinations

6.1 Introduction to Boolean algebra
6.2 The inverter
6.3 The AND gate
6.4 The OR gate
6.5 The NAND gate
6.6 The NOR gate
6.7 The exclusive-OR and exclusive-NOR gates
6.8 Gate performance characteristics and parameters

- Combinational logic

7.1 Basic combinational logic circuits
7.2 Boolean expressions and truth tables

7.3 DeMorgan's theorems

- Industrial controllers

8.1 Programmable logic controller (PLC) architecture.
8.2 PLC inputs and outputs
8.3 Ladder diagrams
8.4 Programming considerations
8.5 Siemens PLC wiring diagram
8.6 PLC labs

Course Grading Distribution:

Homework/Assignments/Quizzes	20%
Exam I	20%
Exam 2	20%
Final Exam	40%

Grading Scheme:

Grades will be distributed based on the following scale:

% of Points Possible	Grade Assigned
≥90	A
≥ 80	B
≥ 70	C
≥ 60	D
< 60	F

The instructor reserves the right to lower the grading scale at the end of the semester. It is expected that each assignment (homeworks, examinations and projects) be professional. The instructor reserves the right to penalize unprofessional responses to any assignment up to including awarding a zero (0) for the assignment.

Academic Honesty

During exams and quizzes, you are not allowed to use any form of wi-fi enabled electronic device, including cell phones or other electronic communication devices or methods (calculators, wrist watches, earbuds, etc.).

No electronic version of the book, loose paper print-outs of the book or extra sheets of paper of any kind are allowed unless explicitly mentioned in writing by the instructor. As a part of the zero-tolerance policy, if any proctor sees or hears any electronic device during the exam or if you share

your work with someone else, you will be reported to the proper authorities and you may receive a zero on the exam and an F in the class.

If you have a disability that requires the use of an electronic device during exams you must have a letter of accommodation from the Center for Accommodations and Support Services (CASS). This accommodation must be coordinated in advance with the instructor.

During exams, you will not be allowed to leave the examination room until you complete the exam. This includes restroom breaks. Students with disabilities must have a letter of accommodation and coordinate this in advance with the instructor. Instructors and/or proctors may record and/or use their personal cell phones to document activity during the exam. If you are suspected of scholastic dishonesty you may not be directly confronted about your conduct by the instructor or proctor. You will however, be reported to the Office of Student Conduct and Conflict Resolution (OSCCR) and your exam will not be admissible. Your grade in the class may not be available until OSCCR makes a final ruling, this may adversely impact your ability to enroll in other classes or graduation. If you arrive more than 15 minutes late to an exam, you will not be allowed to enter the examination room.

There will be no makeup exams administered. If you have a university approved excuse, your instructor will have a process for determining how to handle the missing grade outlined in the syllabus. However, no makeup exams will be given. If you miss more than one exam, the instructor may choose to administratively drop you from the class. This may adversely impact a visa and financial aid. Scholastic dishonesty on homework, lab assignments and all other class assignments will be held to the same standards and requirements of academic honesty as quizzes and exams.

12. Harassment Policy

The department has a zero-tolerance policy for harassment. Engagement in any behavior considered harassment will be reported to the proper authorities. In addition to generally understood forms of harassment, the department also treats the following behavior as harassment:

Repeated emails and/or calls regarding subjects about a grade or an administrative decision made. Once a decision has been made or a question answered, a student who continues to ask the same question will be given a warning by the recipient of the email/call.
Grades are NOT negotiable, ever. If you believe a grading mistake has be made, you must follow the process described in the UTEP catalog. Any request for a grade elevation that is NOT based on a mistake is considered harassment and will be reported immediately.
Remaining in an office after the occupant requests you leave is considered harassment and potentially threatening. You will be reported immediately without warning and depending on the severity, may be reported to law enforcement.