

SAN JOSE STATE UNIVERSITY
Department of Aviation & Technology
College of Engineering
Fall 2013

Tech 115(01)

Automation & Control (3 credits)

Rooms: IndS. 216 for Lecture and IndS. 117 for Labs

Class Meets: **M 6:00 pm- 7:45 pm for Common Lecture &
W (Section11) & R (Section12) 6:00 pm- 8:45 pm for Labs**

Instructor: Dr. Mohan Kim, Professor

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Office Hours: (MW: 5:00 - 6:00pm)

COURSE OUTLINE

CATALOG DESCRIPTION:

Theory and application of automation elements including analog and digital sensors, controllers, indicators, actuators. Control modes for proportional, derivative, and integral control systems. Hands-on integration practices among PLC, robots, automatic identification devices, computers, and other industrial equipment. Prerequisite: TECH 060, PHYS 002A, PHYS 002B, MATH 071. Misc/Lab: Lecture 2 hours/lab 3 hours.

COURSE OBJECTIVES:

Upon completion of this course, students will be able to:

- a. Demonstrate their understanding in the many types of instrumentation components and their importance to industrial control systems.
- b. Design a prototype for an automatic system with interfacing features.
- c. Select appropriate sensors, controllers, actuators, and other control components in a specific control environment.
- d. Understand the basic theory and design of industrial control systems including industrial process control, numerical control, computer process control, hydraulics and pneumatics, and electrical systems.

Required Texts: None

Major References:

1. Process Instrumentation (Schoolcraft Publishing- Telemedia, Inc.) (2001)
2. Thomas E. Kissel, Industrial Electronics, Prentice Hall Inc., 3rd Edition. (2003)
1. Andrew E. Parr, Industrial Control Handbook, Industrial Press., 3rd Edition. (2000)

2. Curtis D. Johnson, Process Control Instrumentation Technology, Prentice-Hall, 8th Edition (2006)

3. Robert N. Bateson, Introduction to Control System Technology, Prentice-Hall Inc., 7th Edition. (2002)

Evaluation Criteria & Weights:

Mid-Term Tests (2)	30%
Final Comprehensive Exam	15%
Quizzes (2-3)	15%
Control Project (Group)	18%
Control Project Report	7%
Presentation	5%
Homework & other activities	10%
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Total	100%

Course Requirements

- A. Control Project (Automatic Control System) Due
Weight: 20% of total grading

Design and construct an automatic control system. Be creative in design and make it as attractive as possible. Transducers should be properly identified and the lettering should be neatly done. Your control system should meet the following criteria:

Evaluation Criteria:

1. Completeness (sensors, indicators, comparator, controller, and actuators)
2. Interfacing adequacy (Interfacing of minimum of three areas of the followings: electronic, hydraulic, pneumatic, computer, robot, PL/C, automatic identification, mechanical system, micro-controllers)
3. Safety Feature (fuse, connections, wiring, encasement, guards, etc.)
4. Appearance/Labeling
5. Presentation/ Group Effort in Production

B. Report (10% of total grading): Both the **proposal** and the **final report** should include:

1. Introductory Statement
2. Control Objective/ Sequence of Operation
3. Bill of Materials
4. Mounting Arrangement Diagram/ Snapshot
5. Circuit Diagram (Electric/ Hydraulic/ Pneumatic etc.)
6. Transducers and Transducing Effects
7. Conclusion /Problems/Limitations etc.

C. Presentation:

1. Preparations for Presentation

- a. Diagram and hand out
- b. Visuals, such as:
 - Flip charts
 - Overhead view graphs
 - CDs
 - Slides
 - Power Points
 - Video tape, etc.

2. Presentation Suggestions:

- a. Introduce your group.
- b. Introduce your project and its objectives.
- c. Speak slowly and loudly.
- d. Have eye contact with people in the room.
- e. Ask questions if you think they missed an important point.
- f. Present project - don't stand in their line of a sight - also don't talk to the chalkboard.
- g. Summarize the important points of your presentation.
- h. Make efficient use of all group members.

D. **Academic Integrity:** *Your own commitment to learning, as evidenced by your enrollment at San Jose State University's academic Integrity Policy requires you to be honest in all your academic course work. Faculty members are required to report all infractions to the office of Student conduct and ethical development. The policy on academic integrity can be found at http://sa.sjsu.edu/student_conduct.*

E. *American with Disabilities Act:* "Your own commitment to learning, as evidenced by your enrollment at San José State University, and the University's Academic Integrity

Policy requires you to be honest in all your academic course work. Faculty members are required to report all infractions to the Office of Student Conduct and Ethical Development. The policy on academic integrity can be found at http://sa.sjsu.edu/student_conduct.

F. Late Assignment: *No assignments will be accepted late. Exceptions will be made to this policy only in **emergency situations**. Please call or email Dr. Kim as soon as possible. If you are absent the day an assignment is due, you should arrange to one of the following:*

(a) drop off the assignment in the Dep't office (IS 111) before 4:00 p.m. on the due date

(b) mail the assignment to me at the university (It must be post-marked on or before the due date).

(c) send the assignment to me by EMAIL or FAX (It must be date- and time-stamped before the due date indicated in the assignment).

F. Grade distribution: *The final grade distribution will be as follows: 93-100 A; 90-92 A-88-89 B+; 83-87 B; 80-82 B-; 78-79 C+; 73-77 C; 70-72 C-; 69 D+; 65-68 D; below 65 F*

G. PLAGIARISM:

At SJSU plagiarism is the act of representing the work of another as one's own (without giving appropriate credit) regardless of how that work was obtained, and submitting it to fulfill academic requirements. Plagiarism at SJSU includes but is not limited to:

1.2.1 The act of incorporating the ideas, words, sentences, paragraphs, or parts of, and/or the specific substance of another's work, without giving appropriate credit, and representing the product as one's own work;

1.2.2 Representing another's artistic/scholarly works such as musical compositions, computer programs, photographs, paintings, drawings, sculptures or similar works as one's own.

Each research exercise will be submitted to your instructor through Turnitin.com (<http://www.turnitin.com>). You will be given details about this in class.

This green sheet is subject to change with a fair notice.

Tech 115 Course Schedule

Date	Text Chapter(s)	Contents	Due Date
<u>8/26</u>		<u>Intro. To Course</u>	
<u>9/9</u>		<u>Digital & Relay Logics</u>	
<u>9/16</u>		<u>Programmable Logic Controller</u>	
<u>9/23</u>	-----	<u>(continue)</u>	----- <u>Quiz 1</u>
<u>9/30</u>		<u>Operational Amplifiers</u>	
<u>10/7</u>		<u>Controller Principles</u>	
<u>10/14</u>	-----	<u>(continue)</u>	----- <u>Mid-term 1</u>
<u>10/21</u>		<u>Sensor/Transducers (I)</u>	
<u>10/28</u>		<u>Sensor/Transducer (II)</u>	
	-----	<u>(continue)</u>	----- <u>Quiz 2</u>
<u>11/4</u>		<u>Sensor/Transducer (III)</u>	
<u>11/18</u>		<u>PID Controllers</u>	
<u>11/25</u>			<u>Mid-Term 2</u>
<u>12/2</u>		<u>ADC, DAC & Robots/ Motion Control</u>	

12/9 & 12/16

Output Devices , Overview for the Final

Comprehensive Final Exam: (Monday, Dec. 16, 2013 : 6:00-8:00pm)