



Sustainable Manufacturing 386 – Manufacturing Automation Systems
Course Syllabus – Spring 2019
January, 22 2019

Course Logistics

Lecture:	M, W, F 9:00AM – 9:50AM LANG 104
Laboratory:	Th. 5:00PM – 7:50PM OCNL 431 & OCNL 339
Prerequisites:	SMFG 360, PHYS 202B
Instructors:	Mr. Charlie Pooler (cjpooler@csuchico.edu) Lecturer Office: O'Connell 423 Office Hours: TBA Phone: 898-4960

About the Course

A study of the programming and function of industrial robots and other automation systems used in modern manufacturing environments. Concepts include end-effector design, material movement, storage and retrieval systems, programmable logic controllers, and vision systems. Lecture, demonstrations, and laboratory exercises are designed to promote understanding of manufacturing automation.

Course Usage of Blackboard Learn

Copies of the course syllabus and major assignments may be found on Blackboard Learn. You are responsible for regularly checking the online resources, which is accessed through the Chico State Portal at <http://portal.csuchico.edu>. Support materials for the course will be provided via the portal and it is expected that you will either have hardcopies or electronic access to the materials during in-class activities.

Required Texts and Equipment

Required: Industrial Robotics 1st Edition, by Keith Dinwiddie, ISBN: 9781133610991
Cengage Learning

Recommended: Programmable Logic Controllers, Fifth Edition, Frank Petruzella,
McGraw-Hill; 2016; ISBN: 9780073373843

– (If not obtained a second edition copy may be made available ask instructor)

Introduction to Programmable Logic Controllers, 2nd Edition 2011 Author(s): Glen A.
Mazur, William J. Weindorf ISBN: 9780826913852

Software and On-Line Content

Recommended: Software: LogixPro found at <http://thelearningpit.com/lp/downloads.asp>

- Free for 15 days or \$46.00 for a license
 - **The free version of LogixPro does not have access to simulations.**
- OMRON ACE: <https://industrial.omron.us/en/misc/forms/download-ace-software-requeste-form>
- OMRON Learning Registration: <https://omronlearning.com/#/login>

Safety

Read and understand the Department's Lab Safety Policies and Procedures. Fill out the Acknowledgement of Lab Safety Policies and Procedures form, sign it and turn it in for filing. The wearing of safety glasses is required for this lab whenever any pneumatic devices are in use.

General

The use of technology is encouraged for in-class coursework and activities, however extra-curricular activities (phone calls, texting, email, web surfing, etc.,) are not allowed during class. Students violating this policy will be asked to leave as they are potentially distracting to their colleagues who are engaged in learning.

Communication

If you need to meet or contact the instructors outside of class hours please attend office hours or email cjpooler@csuchico.edu.

In the event that I need to contact the class members for matters between class meetings (schedule, assignment, or class changes, etc.), it will be done via your university email account linked to the Portal. University policy requires students to monitor campus email accounts and it is suggested that you set up email forwarding if you have another preferred email account.

Dropping and Adding

You are responsible for understanding the policies and procedures about add/drops, academic renewal, etc. found <http://www.csuchico.edu/catalog/>. You should be aware of the new deadlines and penalties for adding and dropping classes.

Assignments and Grading Policy

Assignments are due according to the class schedule and are subject to change depending on course progress through the semester. Changes to the schedule will be announced during class or via the communication protocol described above.

Homework assignments are due at the start of the class and can be submitted either digitally or in person. If class has started, work is considered late and late work is not accepted.

Assigned readings or movie viewing are to be completed before class. Class discussion period will be used to review topics covered within the reading, clarify student questions, and expand on the topics through real-world applied examples.

Course Grade Breakdown:

Quizzes/ Participation	10%
Homework/ Article Reviews	20%
Laboratory Activities	30%
Midterm Exam	20%
Final Exam	<u>20%</u>
Total	100%

University Policies and Campus Resources

Academic integrity

Students are expected to be familiar with the University's Academic Integrity Policy. Your own commitment to learning, as evidenced by your enrollment at California State University, Chico, 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 Judicial Affairs. The policy on academic integrity and other resources related to student conduct can be found at:

<http://www.csuchico.edu/sjd/integrity.shtml>.

IT Support Services

Computer labs for student use are located on the first and fourth floor of the Meriam Library, Room 116 and 450, Tehama Hall Room 131, and the Bell Memorial Union (BMU) basement. You can get help using your computer from IT Support Services; contact them through their website, <http://www.csuchico.edu/itss>. Additional labs may be available to students in your department or college.

Student Services

Student services are designed to assist students in the development of their full academic potential and to motivate them to become self-directed learners. Students can find support for services such as skills assessment, individual or group tutorials, subject advising, learning assistance, summer academic preparation and basic skills development. Student services information can be found at:

<http://www.csuchico.edu/current-students>.

Americans with Disabilities Act

If you need course adaptations or accommodations because of a disability or chronic illness, please make an appointment with me as soon as possible, or see me during office hours. Please also contact Accessibility Resource Center (ARC) as they are the designated department responsible for approving and coordinating reasonable accommodations and services for students with disabilities. ARC will help you understand your rights and responsibilities under the Americans with Disabilities Act and provide you further assistance with requesting and arranging accommodations.

Accessibility Resource Center

<http://www.csuchico.edu/arc>

530-898-5959

Student Services Center 170

arcdept@csuchico.edu

Student Learning Center

The mission of the Student Learning Center (SLC) is to provide services that will assist CSU, Chico students to become independent learners. The SLC prepares and supports students in their college course work by offering a variety of programs and resources to meet student needs. The SLC facilitates the academic transition and retention of students from high schools and community colleges by providing study strategy information, content subject tutoring, and supplemental instruction. The SLC is online at <http://www.csuchico.edu/slc>. The University Writing Center has been combined with the Student Learning Center.

SMFG 386, Tentative Schedule, Spring 2019

(Note: subject to change with fair notice.)

Week	Date	Topic	Reading	Assignments Due
1	1/22	Course Intro, automation, and PLCs	PLC Ch. 1, 2	OMRON On-Line Learning Quiz
		No Lab		
2	1/29	Electrical Safety, Electrical Circuits, and Electrical Principles of PLCs.	PLC 3	OMRON On-Line Learning Quiz
		Basic Electrical and power supplies		
3	2/5	Discrete (binary) logic vs. Analog, Boolean Logic, Logic gates and Boolean algebra	PLC 4, 5	OMRON On-Line Learning Quiz
		Fundamentals of Logic, RS Logix500 Simulation with LogixPro		
4	2/12	Elements of ladder logic, timers, delays, and enables	PLC 7	OMRON On-Line Learning Quiz
		Simulations with LogixPro		
5	2/19	Elements of ladder logic, counters and combining counter and timer functions. Wiring activities with NX1P.	PLC 8	Homework 1
		Simulations with LogixPro		
6	2/26	PLC Hardware	PLC 6	OMRON On-Line Learning Quiz
		Wiring and Communications with NX1P. Automation project introduced.		
7	3/5	Pneumatic control, subroutines and branching	PLC 9, 10	Homework 2
		Pneumatics Activity		
8	3/12	Motors and Midterm	PLC 11, 12	OMRON On-Line Learning Quiz
		Motor Control using NX1P and Applied Motion 3540i to stepper		
9	3/19	Spring Break		
		Spring Break		
10	3/26	PLC Installation Practices, troubleshooting, sequencer shift and register instructions	PLC 13, 14	Article Review
		Creation of HMI interface with NA5-7W001B		
11	4/2	Intro to Siemens TIA Portal and Allen Bradley CompactLogix	Handouts	Homework 3
		Work on Projects		
12	4/9	Intro to Robotics, coordinate systems, end effectors	Robot 1,2,3	
		Project Presentations		
13	4/16	Guest Lecturer SynTouch and Industrial Applications for Robots	Robot 4, 5	OMRON On-Line Learning Quiz
		OMRON Cobra Robots Simulation with ACE		
14	4/23	Implementation: Plan, develop, mock-up, test, install	Robot 12	OMRON On-Line Learning Quiz
		Hands on programming OMRON Cobra		
15	4/30	Machine vision systems, acquisition and analysis	Robot 8	OMRON On-Line Learning Quiz
		Hands on programming OMRON Cobra Activity 2		
16	5/7	Collaborative Robots		Homework 4
		Collaborative Robotics Programming		
17	5/14	Finals		