



North Central State College
MASTER SYLLABUS
2019-2020

- A. Academic Division: Business, Industry, and Technology
- B. Discipline: Engineering Technology
- C. Course Number and Title: ENGR 2010 Engineering Programing, Robotics, and PLC
- D. Course Coordinator: Jonathan Dewitt
Assistant Dean: Toni Johnson, PhD

Instructor Information:

- Name: Click here to enter text.
- Office Location: Click here to enter text.
- Office Hours: Click here to enter text.
- Phone Number: Click here to enter text.
- E-Mail Address Click or tap here to enter text.

- E. Credit Hours: 3
Lecture: 2 hours
Laboratory: 2 hours
- F. Prerequisites: ENGR1010 or ENGR1910
- G. Syllabus Effective Date: Fall, 2019
- H. Textbook(s) Title:

Mechatronics (A-B CompactLogix L16/Studio 5000) Student Reference

- Authors: Amatrol
- Copyright Year: 2016
- Edition: H2005
- **PROVIDED BY INSTRUCTOR**

- I. Workbook(s) and/or Lab Manual:
- J. Course Description: This course is designed to help students with very little or no computing background, learn the basics of building simple interactive applications. This course will also cover the basic principles behind the operation of programmable controllers, the relationship between PC's and the relay ladder logic, programming of PC's, and troubleshooting of programmable controller circuits. The primary focus is on the use of automatic parts-handling equipment, contour applications and interfacing with emphasis on design for manufacturing. Topics include the use of conveyers, parts feeders, positioning equipment and safety systems. Hands-on laboratory experiences include operation of robots using the teach pendant.

K. College-Wide Learning Outcomes:

College-Wide Learning Outcome	Assessments - - How it is met & When it is met
Communication – Written	
Communication – Speech	
Intercultural Knowledge and Competence	
Critical Thinking	
Information Literacy	
Quantitative Literacy	

L. Course Outcomes and Assessment Methods:

Upon successful completion of this course, the student shall:

Outcomes	Assessments – How it is met & When it is met
1. Describe computer basics, programs, and operating systems.	Labs, quizzes, and exams
2. Write a simple C++ program for console output.	Labs, quizzes, and exams
3. Identify OSHA’s standards and terminology for robotic safety.	Quizzes
4. Demonstrate basic robotic programming commands and concepts, particularly those that are associated with articulated arm robots.	Labs, quizzes, and exams
5. Describe any robot encountered in terms of: arm geometry, power source, drive system, control technique, path control, and possible applications.	Labs, quizzes, and exams
6. Interface external devices such as limit and proximity switches, conveyor systems and other robot controllers to the controller.	Labs, quizzes, and exams
7. Describe and demonstrate the use of ladder programming syntax.	Labs, quizzes, and exams
8. Interpret tags and aliases to differentiate between physical and virtual addresses of external devices and internal memory locations. Demonstrate how to edit ladder logic programs by reassigning addresses, tags and aliases, inserting and deleting rungs, changing data values and documenting instructions, rungs and programs.	Labs, quizzes, and exams

ABET Outcomes:

- *Outcome j.* Electrical circuits (ac and dc) and electronic controls;
- *Outcome k.* Application of industry codes, specifications and standards.

M. Topical Timeline (Subject to Change):

A. Programing

- 1) Computers, programs, and C++
- 2) Elementary programming

- 3) Selections, Loops
- B. Robotics
 - 4) History and Safety of Robotics
 - 5) Programming FANUC Robots
 - 6) Robot Systems, Teach Pendant
 - 7) Coordinate Systems
 - 8) Errors, Faults and Recovery
 - 9) Frames and Motion, Editing Programs
- C. PLC
 - 10) Studio 5000 Platform (Memory, communications, controls and flexible architecture) and configurations
 - 11) Hardware (RIUP, chassis, discrete I/O, installation, and setup)
 - 12) Creation and modification of Tasks, Programs and Routines
 - 13) Program documentation, Tags and Aliases
 - 14) Timers, counters and sequencing
 - 15) Ethernet, Searching, forcing and program editing

N. Course Assignments:

- Laboratory
- Quizzes
- Exams

O. Recommended Grading Scale:

NUMERIC	GRADE	POINTS	DEFINITION
93-100	A	4.00	Superior
90-92	A-	3.67	Superior
87-89	B+	3.33	Above Average
83-86	B	3.00	Above Average
80-82	B-	2.67	Above Average
77-79	C+	2.33	Average
73-76	C	2.00	Average
70-72	C-	1.67	Below Average
67-69	D+	1.33	Below Average
63-66	D	1.00	Below Average
60-62	D-	0.67	Poor
00--59	F	0.00	Failure

P. Grading and Testing Guidelines:

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Q. Examination Policy:

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R. Class Attendance and Homework Make-Up Policy:

[Click here to enter text.](#)

S. Classroom Expectations:

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T. College Procedures/Policies:

Important information regarding College Procedures and Policies can be found on the [syllabus supplement](https://sharept.ncstatecollege.edu/committees/1/curriculum/SiteAssets/SitePages/Home/SYLLABUS%20SUPPLEMENT.pdf) located at <https://sharept.ncstatecollege.edu/committees/1/curriculum/SiteAssets/SitePages/Home/SYLLABUS%20SUPPLEMENT.pdf>

The information can also be found choose an item.