Introduction:

There is a growing demand for individuals in the field of Industrial Automation with an emphasis on programmable logic control, robotics, industrial networks and project management. This program will prepare individuals to competitively challenge for a variety of positions in the automation and control systems areas. Niagara College students will be well trained automation specialists with highly skilled expertise.

Prerequisites:

Students must be familiar with Windows software and have the ability to navigate through Windows software. Since the ControlLogix is a big brother or sister to the Allen-Bradley PLC 5 and related to the SLC 500 PLC, any past experience with these two Allen-Bradley platforms will help the student transition into the world of ControlLogix.

ControlLogix Software:

- Studio5000
- RSLinx
- Factorytalk View

ControlLogix Hardware for Lab Exercises

Slot 0	1756-L71S	Logix5571 Controller
Slot 1	1756-L7SP	Safety Controller
Slot 2	1756-IB16 /A	16 Pt DC Input Card
Slot 3	1756-IF16 I/A	Analog Input Card
Slot 4	1756-OF6 CI/A	Analog Output Card
Slot 5	1756-OW16 I/A	Relay Output Card
Slot 6	1756-ENBT/A	Ethernet Card

Summary:

Week	Topic	**PowerPoint** (pages)	**Homework / Tests**
1/2	**Introduction and Lecture 1**	Intro: 1 to 34	Assignment #1 Basic Binary Numbers and Logic
	RSLinx Configuration (for Lab)	Lab: 1 to 12	Demo – Tutorial Using file: Flasher.ACD
3	**Lecture 2** - Hardware	Hardware: 1 to 67	Chapter 1: *Introduction to Hardware* Assignment #2
	Lab 2 – PLC Communication & Ladder Creation	Lab: 1 to 23	Lab 2 - Design and test ladder logic. Deliverable is hand drawn logic. Assignment to be completed during lab hours.
4	**Lecture 3** – Software **Lecture 3** – ControlLogix Project Organization **Lecture 4** – Tags (Alias) **Lecture 5** – Control Logix I/O Config	Software: 1 to 26 Project: 1 to 52 Tags: 1 to 35 I/O: 1 to 23	Chapter 2: *Introduction to Software* Chapter 4: *RsLogix Project Organization* Chapter 5: *Understanding Addressing* Chapter 6: *Modular Control Logix I/O Configuration*
	Lab 3 – Analog Input Module	Lab: Follow Instructions	Lab 3 - Programming Lab requires both a Demo to the Instructor and an assignment to be submitted.
5	**Quiz / Test (50 min)** **Lecture 4** – Tags (Alias) **Lecture 5** – Control Logix I/O Config	Tags: 1 to 35 Config: 1 to 22	Chapter 9: *Creating and Monitoring Tags* Chapter 7: *Compact Logix I/O Configuration*
	Lab 4 – Using Timers and Counters.		Lab 4 - Lab requires both a Demo to the Instructor and an assignment. Includes Toggle Function Test / Simulated Logic.
6	**Lecture 6** – Ladder Logic Programming	Programming: 1 to 29	Chapter 13: *Adding Ladder Rung Documentation*
	Lab 5 – Toggle Function Test using Function Blocks (two week lab)		Lab 5 - Lab requires both a Demo to the Instructor and an assignment.
7	**Midterm** – Moved to week 8 due to holiday		
	Lab 5 – Toggle Function Test using Function Blocks (two week lab) ---- Continuation		Student can use lab time to work on Lab 5, ask questions and update their skill before Reading Week.

Summary (Con't)

Week	Topic	**PowerPoint** (pages)	**Homework / Tests**
8	**Reading Week**		
9	**Lecture 7** – HMI Modernization	HMI: 1 to 30	
	Lab 6 – HMI	Lab: 1 to 20	Lab 6 - Lab requires both a Demo to the Instructor and an assignment
10	**Lecture 7** – HMI Modernization		
	Lab 7a – BCD Counter and Display by Segment	Lab: 1 to 20	Lab 7a - Demo and Students work on their own – no assignment due
11	**Lecture 8** - Introduction to Arrays	Arrays: 1 to 51	
	Lab 7b – Display Code by Segment (two week assignment)	(Same as Lab 7a)	Lab 7b - Students work on their own – Lab included a required demonstration as well as some material to be handed in.
12	**Lecture 9** – UDT **Lecture 9** – Comparison Instructions	UDT: 1 to 19 Compare: 1 - 16	Chapter 15: *Comparison Instruction* Chapter 14: *Control Logix Counter Instructions*
	Lab 7b - Continues		Lab 7b – Checkout and Review
13	**Lecture 10** – Use of GSV and SSV **Lecture 10** – Data Handling Instructions	GSV: 1 to 24 Data: 1 to 28	Chapter 17: *Introduction to GSV & SSV Instructions* Chapter 16: *Data Handling Instructions*
	Lab 8 – Working with UDT, Compare, GSV and SSV instructions (two week assignment)	Lab: 1 to 20	Lab 8 – Students work on their own – Lab includes a required demonstration as well as some material to be handed in.
14	**Review Session – Exam Prep.**	Review: 1 to 15	
	Lab 8 – Continues		Lab 8 – Lab Checkout and Review as needed.
15	**Final Exam**		

(Based on 7-1-7 Total 14 Weeks)

NOTE: Labs are integral parts of learning in this course, and some preparation is required prior to labs to be successful. Student projects and presentations are to be accomplished outside of class time.

Evaluation:

Lecture Portion	
Tests	50%
Assignments	15%
Quizzes/Take-home ...	5%
Labs	30%

Tests:

There will be 1 Midterm and 1 Final Exam focusing on information covered in the Lecture, Assignments and Lab Materials. Test is scheduled into the normal lecture period.

Assignments:

The assignments are MANDATORY to complete as specified by the instructor.

Lab & Lab Reports:

Lab attendance is MANDATORY. Some labs will have attached check points were the lab instructor will verify that you have achieved a functional level. Completed lab reports must be submitted detailing some literature review of the task at hand, what was accomplished and its application in an industrial setting. Lab due dates are one week after the lab itself.

Performance Deductions	Late / Absent	-1 / -3		
	Due Date	-3		
	Prelab	-4		
RUBRIC	Content	5		
	Analysis	5		
	Presentation	5		
Total		15		

Lab Rubric explanation:

Lab Performance: (Possible Deductions From Your Overall Lab Score)

Late:	Arriving 5 minutes or more receives a penalty mark of (-1)
Missing the lab period:	A penalty mark of (-3)
Prelab:	Failing to present the pre-lab during signing will result in a (-4) penalty.
Due Date:	Labs are due one week after the scheduled lab. Late labs will be given a penalty of (-3). Labs submitted more than one week late receive **zero (0)** value.

Lab Evaluation:

Content:

This is the evaluation of calculations, measurements, accuracy and relevancy of data. Graphs must be complete and details with axis values. Code is provided with comments.

Analysis:

This is the evaluation of the validity of the long answers provided to explain the solution to lab questions. Questions are original and fully answered correctly.

Presentation:

This is the neatness of the lab; inclusion of all correct units; correct graphical displays; grammar; spelling. Good use of external references.

Lab Attendance:

Students will be placed on course condition if two or more labs are missed. Missing additional labs will result in expulsion from the course. Students will receive formal Niagara College course condition email and notification from the department office.

OUTCOMES AND LEARNING OBJECTIVES:

Upon successful completion of this course, the student has reliably demonstrated the ability to:	Learning Objectives:
1. Identify key components of the RSLogix5000 Controller and RSLogix5000 software.	1. Operate the RSLogix5000 software. 2. Identify ControlLogix System Components. 3. Distinguish the various parts of the Controller Organizer Window (COW).
2. Establish communications in the RSLinx Classic environment.	1. Identify key components of RSLinx Communication Software. 2. Explore the different types of drivers and their supported protocols. 3. Establish serial and Ethernet communications to RSLogix5000 Controller. 4. Perform upload/download and going online with Logix5000 Controllers.
3. Program in an RSLogix5000 environment.	1. Create and modify an RSLogix5000 application. 2. Locate I/O Tags and Devices in an RSLogix5000 environment. 3. Configure local 1756-I/O devices. 4. Monitor tags in an RSLogix5000 project. 5. Force I/O and toggle bits in RSLogix5000 project. 6. Draft Ladder Logic for an RSLogix5000 routine.
4. Apply commonly used instructions in an RSLogix5000 software project.	1. Apply basic Ladder Logic Instructions for an RSLogix5000 routine. 2. Enter Ladder Logic components in an RSLogix5000 routine. 3. Perform online edits. 4. Verify an RSLogix5000 project.
5. Analyze the Panelview Plus platform of HMI's using the FactoryTalk View (FTV) ME Studio development environment.	1. Configure a Panelview Plus terminal and prepare it for operation. 2. Customize a FTV ME Studio application. 3. Configure RSLinx Enterprise Communications. 4. Create and modify tags. 5. Add graphic displays. 6. Create Graphic Objects. 7. Download/Upload FTV ME runtime files