

Course Outline

1. COURSE INFORMATION

Session Offered	Fall 2012	
Course Name	SYSTEM CONTROL AND DATA ACQUISITION II	
Course Code	PROC TECH 3SD3	
Program Name	Process Automation Technology	
Calendar Description	SCADA architecture, bus standards and protocols, multi-loop PID control, workstation design, system safety, redundancy and maintenance and SCADA project design.	
Instructor(s)	Jack Zou (lecture) Bill Rolfe (lab) Nem Stefanovic (lab)	E-Mail: zouzhen@mcmaster.ca E-Mail: bill.rolfe@mohawkcollege.ca E-mail: stefano@mcmaster.ca

2. COURSE SPECIFICS

Course Description	This course provides the basics of SCADA used for process control with an industrial controller. The topics covered include basic concepts, controller designation, hardware and software system components & configuration, project structure, CFCs and SFCs, & technological blocks. In the lab, students are configuring and setting up the controller and its components for SCADA applications. A SCADA related independent study is conducted by each student.		
Instruction Type	Code	Type	Hours per term
	C	Classroom instruction	36
	L	Laboratory, workshop or fieldwork	36
	T	Tutorial	
	DE	Distance education	
	Total Hours		72
Resources	ISBN	Textbook Title & Edition	Author & Publisher
	Other Supplies	Source	
Prerequisite(s)	PROCTECH 2CE3, 3CT3, 3SC3 and registration in Level III or above of Process Automation Technology		
Corequisite(s)			
Antirequisite(s)			
Course Specific Policies	<ul style="list-style-type: none"> • Lab reports after grading will become the property of the department and will not be returned to the students. The student will be able to view them after grading. • Plagiarism: Any plagiarism detected in reports and exams will be dealt with the McMaster University Policy on Plagiarism. • <i>Laboratory attendance is compulsory. A mark of zero will be allocated for missed laboratory experiments.</i> • <i>Late lab reports will result in 5% reduction in the assigned marks for each</i> 		

	<p>day the report is late. Re-writes in tests/exam will be allowed only after an accepted MSAF has been submitted.</p> <ul style="list-style-type: none"> • Laboratory Safety Policy: The students must follow the departmental safety policy. The students not following the safety policy will not be allowed to work in the laboratory and will not be allowed to make up such missed labs. • Final exam will include questions from the independent study projects.
Departmental Policies	<p>Students must maintain a GPA of 3.5 on a 12 point scale to continue in the program.</p> <p>In order to achieve the required learning objectives, on average, B.Tech. students can expect to do at least 3 hours of “out-of-class” work for every scheduled hour in class. “Out-of-class” work includes reading, research, assignments and preparation for tests and examinations.</p> <p>The use of cell phones, iPods, laptops and other personal electronic devices are prohibited from the classroom during the class time, unless the instructor makes an explicit exception.</p> <p>Announcements made in class or placed on Avenue are considered to have been communicated to all students including those not in class.</p>
3. SUB TOPIC(S)	
Week 1	<p>Introduction & Basic Concepts</p> <ul style="list-style-type: none"> Introduction Course Objectives Course Policies and Evaluation Basic definitions Controller Designations
Week 2	<p>System Overview</p> <ul style="list-style-type: none"> Entire Plant View Totally Integrated Automation Simatic Control System AS/PLC I/O Peripherals HMI Communication Bus
Week 3	<p>Configuration overview</p> <ul style="list-style-type: none"> Configuration with Function Blocks System Example PCS Hardware PCS Software Configuration Steps
Week 4	<p>System Configuration</p> <ul style="list-style-type: none"> PCS 7 Components

	Configuring AS Hardware Compiling and Downloading AS Hardware Errors & Diagnostics OS Requirements ES Requirements Corporate Requirements	
Week 5	System & Network Configuration Safety Concerns Configuring the PC Station Setting the PC Station SCE Network Structure Use of NetPro Creating and Downloading S7 Connections Other S7 Connections	
Week 6	Project Structure Project Environment Our System: Multiproject PH Assignment; HID Generation OS Hierarchy AS/OS Process Object View Names in the Component View	
Week 7	CFC Midterm Exam Libraries and Blocks Organization Blocks	
Week 8	CFC CFC Basics- Configuring, Compiling-Downloading, Testing Introduction to PLCSIM Motor Control System Program and Data Control Loops CFC Chart-in-Chart Block Data Structure & Changes	
Week 9	SFC	

	Overview-SFC Sequence Structure Action & Transitions	
Week 10	SFC Operating Mode Logic & Sequence External View of SFC Sequence Control Example	
Week 11	Technological Blocks PID Motor Control Other Blocks	
Week 12	Driver Blocks Signal processing Blocks Other Blocks	
Week 13	Independent Study Project Presentations	
Final Examination	Scheduled during the regular University Final Examination period established by the Registrar's Office.	
Proposed list of experiments		
Lab 1	Introduction & PCS7 System Components	
Lab 2	PCS7 System Configuration	
Lab 3	PCS7 System Configuration	
Lab 4	PCS7 System Configuration	
Lab 5	Programming Using CFCs	
Lab 6	Programming Using CFCs	
Lab 7	Project 1	
Lab 8	Project 1	
Lab 9	Project 2	
Lab 10	Project 2	
Lab 11	Project 3	
Lab 12	Project 3	
Lab schedule	Some of the labs will be performed on a rotating basis. The actual lab schedule will be provided by the instructor	
<p>Note that this structure represents a plan and is subject to adjustment term by term. The instructor and the University reserve the right to modify elements of the course during the term. The University may change the dates and deadlines for any or all courses in extreme circumstances. If either type of modification becomes necessary, reasonable notice and communication with the students will be given with explanation and the opportunity to comment on changes.</p>		
4. ASSESSMENT OF LEARNING		Weight
Midterm		15%
Project (written report and classroom presentation)		10%
Labs: *Laboratory Marks will be further broken down as follows: 1. PCS7 System Lab 8%, 2. Programming Using CFCs Lab 8%, and 3. Three Projects 24%		40%
Project questions in final examination		10%

Final Examination (questions other than project questions)	25%
TOTAL	100%
Course results determined on a percentage scale will be converted to an official letter grade, as indicated in the Undergraduate Calendar. The results of all courses attempted will appear on your transcript as letter grades.	
5. LEARNING OUTCOMES	
1. Explain the common terms used in a control system	
2. Select controllers according to application, design, parameter components, control structure, and control process; DCS vs PLC	
3. Use network configuration tools, CFCs, and technological and driver blocks for an automation project	
4. Plan, implement, and test a process control automation workstation	
5. Design and implement a process control project using PCS 7, and prepare project reports	
6. Summarize, explain, and illustrate a special topic in the field of SCADA through a report and a presentation, after independent study in the topic.	
6. POLICIES	
Anti-Discrimination	
The Faculty of Engineering is concerned with ensuring an environment that is free of all discrimination. If there is a problem, individuals are reminded that they should contact the Department Chair, the Sexual Harassment Officer or the Human Rights Consultant, as soon as possible. http://www.mcmaster.ca/policy/General/HR/Anti-Discrimination%20policy.pdf	
Academic Integrity	
Attention is drawn to the Statement on Academic Ethics and the Senate Resolutions on Academic Dishonesty as found in the Senate Policy Statements distributed at registration and available in the Senate Office. Any student who infringes one of these resolutions will be treated according to the published policy.	
Academic dishonesty consists of misrepresentation by deception or by other fraudulent means and can result in serious consequences, e.g. the grade of zero on an assignment, loss of credit with a notation on the transcript (notation reads: "Grade of F assigned for academic dishonesty"), and/or suspension or expulsion from the University.	
It is your responsibility to understand what constitutes academic dishonesty. For information on the various kinds of academic dishonesty please refer to the Academic Integrity Policy, specifically Appendix 3, located at: http://www.mcmaster.ca/policy/Students-AcademicStudies/AcademicIntegrity.pdf	
Requests for Relief for Missed Academic Term Work (Assignments, Mid-Terms, etc.)	
The McMaster Student Absence Form is a self reporting tool for Undergraduate Students to report absences that last up to 5 days and provides the ability to request accommodation for any missed academic work. Please note, this tool <u>cannot</u> be used during any final examination period.	
You may submit a maximum of 1 Academic Work Missed requests per term. It is YOUR responsibility to follow up with your Instructor immediately regarding the nature of the accommodation.	
If you are absent more than 5 days or exceed 1 request per term you MUST visit your Associate Dean's Office (Faculty Office). You may be required to provide supporting documentation.	
This form should be filled out immediately when you are about to return to class after your absence. http://www.mcmaster.ca/msaf/	
E-Learning Policy	
Consistent with the Bachelor of Technology's policy to utilize e-learning as a complement to traditional classroom instruction, students are expected to obtain appropriate passwords and accounts to access Avenue To Learn for this course. Materials will be posted by class for student download. It is expected that students will avail themselves of these materials prior to class. Avenue can be accessed via	

<http://avenue.mcmaster.ca>

Communications

It is the student's responsibility to:

- Maintain current contact information with the University, including address, phone numbers, and emergency contact information.
- Use the University provided e-mail address or maintain a valid forwarding e-mail address.
- Regularly check the official University communications channels. Official University communications are considered received if sent by postal mail, by fax, or by e-mail to the student's designated primary e-mail account via their @mcmaster.ca alias.
- Accept that forwarded e-mails may be lost and that e-mail is considered received if sent via the student's @mcmaster.ca alias.
- Check the McMaster/Avenue email and course websites on a regular basis during the term.

Protection of Privacy Act (FIPPA)

The Freedom of Privacy of Information and Protection of Privacy Act (FIPPA) applies to universities. Instructors should take care to protect student names, student numbers, grades and all other personal information at all times. For example, the submission and return of assignments and posting of grades must be done in a manner that ensures confidentiality.

<http://www.mcmaster.ca/univsec/fipppa/fipppa.cfm>

Academic Accommodation of Students with Disabilities Policy

The Centre for Student Development is committed to the continuous improvement of accessibility for students with disabilities. Students are encouraged to contact CSD as early as possible before each term starts to become familiar with the services offered and to confirm their accommodations.

Students must forward a copy of the CSD accommodation to the instructor of each course and to the Program Administrator of the B.Tech. Program immediately upon receipt. If a student with a disability chooses NOT to take advantage of a CSD accommodation and chooses to sit for a regular exam, a petition for relief may not be filed after the examination is complete. <http://csd.mcmaster.ca>

Student Code of Conduct

The Student Code of Conduct (SCC) exists to promote the safety and security of all the students in the McMaster community and to encourage respect for others, their property and the laws of the land. McMaster University is a community which values mutual respect for the rights, responsibilities, dignity and well-being of others. The purpose of the Student Code of Conduct is to outline accepted standards of behavior that are harmonious with the goals and the well-being of the University community, and to define the procedures to be followed when students fail to meet the accepted standards of behavior. All students have the responsibility to familiarize themselves with the University regulations and the conduct expected of them while studying at McMaster University.

<http://judicialaffairs.mcmaster.ca/pdf/SCC.pdf>