

ENGR 480 Manufacturing Systems Spring 2004

Facts:

- Instructor: Ralph Stirling
- Office: CSP262, 527-2071, stirra@wwc.edu
- Class: 1:00 – 1:50 MWF CSP165, Lab 2:00-5:00 T KRH105
- Webpage: <http://enr.wwc.edu/students/classes/enr480>
- Text: Industrial Automation and Process Control, by Jon Stenerson

Most Important Background:

- Basic circuit analysis – if you have forgotten all your Circuits, you will have trouble in this class – review will be in order.
- Instrumentation – if you were completely baffled by sensors and signal conditioning, you may have trouble in this class.
- Machine design and Advanced CAD – you will need to design a lot of fixtures and parts for the lab project.

What you will learn in this course:

- What manufacturing is all about
- How to automate the handling and creation of parts
- How to make nifty mechanical widgets that actually do things
- How to use pneumatics
- How to write useful memos and reports that your boss will be pleased with
- How to do some machining
- How to wire electrical controls

What your grade will be based on:

- Memos and reports – most of your work will be documented in memo and report format. Grading will be on content and writing quality.
- Lab notebook – keep a record of your lab and shop work in a bound notebook. Also a good place to jot down notes and ideas for designs.
- Quizzes, homework, and tests – I will have some more traditional forms of evaluation from time to time as needed.
- Reading – you will receive 2% extra credit for reading an article per week from a trade magazine or journal, such as Design News, Industrial Automation, Sound & Vibration, Motion Control, ASME or SME publications (print or online editions). Just send me an email each week telling me what article you read.
- Attendance – marginal grades may be decided by attendance record. Attendance means not just physical presence, but engagement in the classroom activities. Surfing the web or reading email on your laptop is not attendance.
- Grade thresholds will be **approximately**: A: 95%, A-: 90%, B+: 85%, B: 80%, B-: 75%, C: 70%, C-: 65%, D: 60%

Useful Supplemental References:

- “Designing Technical Reports” by J.C.Mathes and Dwight W. Stevenson
- “Pneumatic Systems – Principles and Maintenance” by S.J.Majumdar
- Reid Tool catalog
- Automation Direct PLC manual

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Special considerations:

If you have a learning disability or otherwise need special consideration, please contact the appropriate campus office and have them discuss your needs with me. Since you are all seniors, I assume you will know this process by now if you have such a problem.

Notes on Laboratory and Shop Usage:

- CLEAN UP after yourself. There are shop vacuums, brooms, and brushes in both the lab and the shop. Teams will have a rotating schedule to give the Haas TM-1 mill and the shop a complete cleaning once a week. There will also be a webcam in the shop for me to monitor the condition of the room before and after use.
- PUT TOOLS AWAY. Each team has a lockable tool cabinet for the most basic tools. You may also put parts you are machining in your toolbox so they don't end up in someone else's fixture. Don't hog shared tools or raw materials in your locked drawers though!
- USE SAFETY EQUIPMENT. Eye shields, ear protectors, gloves and other measures are provided to protect you when using machinery. Please use them.
- ONLY USE MACHINES YOU ARE FAMILIAR WITH. If you haven't used a lathe before, don't use the shop lathe without instruction. If you haven't used a vertical mill before, get help first. Sources of help are me, Mat Barton (lab assistant), Robert George (lab assistant), Jim Forsyth (Technical Support Services), Don Dawes (Dept of Tech), and Greg Brooks (all-around engineer, recent graduate).
- RECORD YOUR WORK in your lab notebook.
- DO NOT LET OTHERS INTO THE SHOP. If another student wishes to have shop access, they must get approval and an access code. I can give approval, and Renee gives access codes.

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Approximate Schedule

Week	Date	Time	Topic
1	Mar 29	1:00	Introduction, history, terms
	Mar 30	2:00	<i>Lab – examine cutting cells & parts</i>
	Mar 31	1:00	Memos & reports
	Apr 2	1:00	Fit and tolerance
2	Apr 5	1:00	Fabrication & Feeding of parts
	Apr 6	2:00	<i>Lab – Nelson Irrigation tour</i>
	Apr 7	1:00	Fabrication & Feeding
	Apr 9	1:00	“ “
3	Apr 12	1:05	Generating motion – linear
	Apr 13	2:10	<i>Lab – work on fixture designs</i>
	Apr 14	1:05	Generating motion – linear
	Apr 16	1:05	Generating motion – rotary
4	Apr 19	1:00	Position sensing
	Apr 20	2:00	<i>Lab – fabricate machine components</i>
	Apr 23	1:00	Position sensing
	Apr 23	1:00	Motion Control – pneumatics, relays
5	Apr 26	1:00	PLC's – digital logic
	Apr 27	2:00	<i>Lab – machine assembly and test</i>
	Apr 28	1:00	PLC's – ladder diagrams
	Apr 30	1:00	PLC's – timing diagrams
6	May 3	1:00	“ “ “
	May 4	2:00	<i>Lab – Machine assm & programming</i>
	May 5	1:00	PLC's – state machines
	May 7	1:00	“ “ “
7	May 10	1:00	“ “ “
	May 11	2:00	<i>Lab – PLC programming</i>
	May 12	1:00	Advanced PLC operations
	May 14	1:00	“ “ “
8	May 17	1:00	Proportional control
	May 18	2:00	<i>Lab – complete cell testing</i>
	May 19	1:00	Factory communications – wiring
	May 21	1:00	“ “ - signalling
9	May 24		“ “ - protocols
	May 25	2:00	<i>Lab – machine refinement</i>
	May 26	1:00	Additional Topics
	May 28	1:00	“ “
10	May 31	1:00	Memorial Day – no class
	June 1	2:00	<i>Lab – final testing of project</i>
	June 2	1:00	Additional topics
	June 4	1:00	“ “
	June 7	2:00	Final project presentations/Test

29 lectures, 10 labs