

ENGR 480 Manufacturing Systems Spring 2005

Facts:

- Instructor: Ralph Stirling
- Office: CSP262, 527-2071, stirra@wwc.edu
- Class: 12:00 – 12:50 MWF CSP165, Lab 2:00-5:00 T KRH105
- Webpage: <http://enr.wwc.edu/students/classes/enr480>
- Text: A Study of the Toyota Production System, by Shigeo Shingo

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 each week from a trade magazine or journal, such as Manufacturing Engineering, Design News, Machine Design, Industrial Automation, or ASME or SME publications. These may be 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.
- Shop safety – your grade may be penalized if you cause an accident in the shop or lab that results in injury to anyone or damage to equipment, through negligence, ignorance, or carelessness.
- Grade thresholds will be **approximately**: A: 95%, A-: 90%, B+: 85%, B: 80%, B-: 75%, C+: 70%, C: 65%, C-: 60%, D: 55%

Useful Supplemental References:

- “Designing Technical Reports” by J.C.Mathes and Dwight W. Stevenson
- “Mechanical Assemblies”, by Daniel Whitney
- “Metal Cutting Principles”, by Milton Shaw
- “Manufacturing Automation”, by Yusuf Altintas
- “Pneumatic Systems – Principles and Maintenance” by S.J.Majumdar
- 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 as soon as you have finished an operation. Put aluminum chips in the barrel marked "ALUMINUM", and steel chips in the barrel marked "STEEL". 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. Clamp work down, remove chuck keys, and use proper feeds and speeds.
- ONLY USE MACHINES YOU ARE FAMILIAR WITH. No power tool is to be used unless you have been checked out on it first by Peter Scheidler (lab assistant), David Danner (lab assistant), Greg Brooks (all-around engineer) or myself. The shop courses taught by the Department of Technology are highly recommended as preparation. You also may have parts fabricated by Technical Support Services.
- 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 28	12:00	Analyzing product and process
	Mar 29	2:00	<i>Lab – examine cutting cells & parts</i>
	Mar 30	12:00	Memos & reports
	Apr 1	12:00	Liaison diagrams
2	Apr 4	12:40	Generating motion - linear
	Apr 5	2:30	<i>Lab – Nelson Irrigation tour</i>
	Apr 6	12:40	Generating motion - linear
	Apr 8	12:40	Generating motion - rotary
3	Apr 11	12:00	Position sensing - discrete
	Apr 12	2:00	<i>Lab – work on fixture designs</i>
	Apr 13	12:00	Part Feeding
	Apr 15	12:00	Part Fabrication
4	Apr 18	12:00	“ “ “
	Apr 19	2:00	<i>Lab – fabricate machine components</i>
	Apr 20	12:00	Position sensing – proportional
	Apr 22	12:00	Motion Control – pneumatics, relays
5	Apr 25	12:00	PLC's – digital logic
	Apr 26	2:00	<i>Lab – machine assembly and test</i>
	Apr 27	12:00	PLC's – ladder diagrams
	Apr 29	12:00	PLC's – timing diagrams
6	May 2	12:00	“ “ “
	May 3	2:00	<i>Lab – Machine assm & programming</i>
	May 4	12:00	PLC's – state machines
	May 6	12:00	“ “ “
7	May 9	12:00	“ “ “
	May 10	2:00	<i>Lab – PLC programming</i>
	May 11	12:00	Advanced PLC operations
	May 13	12:00	“ “ “
8	May 16	12:00	Proportional control
	May 17	2:00	<i>Lab – complete cell testing</i>
	May 18	12:00	Factory communications – wiring
	May 20	12:00	“ “ - signalling
9	May 23	12:00	“ “ - protocols
	May 24	2:00	<i>Lab – machine refinement</i>
	May 25	12:00	Additional Topics
	May 27	12:00	“ “
10	May 30	12:00	Memorial Day – no class
	May 31	2:00	<i>Lab – final testing of project</i>
	June 1	12:00	Additional topics
	June 3	12:00	“ “
	June 6	10:00	Final project presentations/Test

29 lectures, 10 labs