MAE 305 L
Manufacturing Practices
Fall 2011

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Class: Room 118 - Engineering Building from 2:00-4:45 pm on Tuesday and Thursday.

Catalogue Data: Theory and applications of metal working machinery. Industrial safety. Engineering and technological aspects of joining operations. Interpretation of engineering drawings. Introduction to design of simple jigs and fixtures.

Objectives: Familiarity with welding, use of the lathe and milling machine and use of other common shop machines such as sheet metal benders, drill presses and hack saws.

Prerequisites: PHY 141 (IDM majors) or EGR 232 (MAE specialization : C or better), MAE 205

Texts: Machining Fundamentals, by JR Walker, Goodheart-Willcox, 2004. Welding Technology Fundamentals by WA. and K. E. Bowditch,, Goodheart-Willcox, 2010.

References: The library has several books, which contain useful information. Four of these are listed below.

- T. J. Drozda, ed., Jigs and Fixtures, Third Edition, Society of Manufacturing Engineers, 1989.

- W. Boyes and R. Baskerjian, Handbook of Jig and Fixture Design, Second Edition, Society of Manufacturing Engineers, 1989.

- E. G. Hoffman, ed., Fundamentals of Tool Design, Second Edition, Society of Manufacturing Engineers, 1984

- T. J. Drozda, ed., Tool and Manufacturing Engineers Handbook, Fourth Edition, Volume I, Machining, Society of Manufacturing Engineers, 1983.

Grading:

Written Tests (2)	15% each
Practical Tests (3)	10%
Quizzes (7)	5%
Design Project	40% total (3 parts)
Performance	15%

Attendance: Attendance is important. The object of the course is to provide each student with a hands-on familiarity with the machines and tools used in fabrication of a device. Your instructor expects you to be both on-time for the start of, and present for the entirety of each session. An absent student cannot acquire the desired level of familiarity with the equipment to be used. Consequently, a late arrival for a lab, or an absence from lab will affect your grade in the following manner:

- Each recorded late arrival will result in a one point reduction of your final average, computed before your letter grade is assigned.

- Each recorded absence will result in a four point reduction of your final average, computed before your letter grade is assigned.

Overall Description of the course: The course consists of three major parts:

1 - machine shop familiarization,
2 - welding technique familiarization,
3 - design project.

At the first meeting, each student will be assigned to a team of two or three members. The members of each team will work together on all group activities during the term, one of which is the design and construction of a fixture which will accomplish the assigned goal. The team will also test the device designed and demonstrate its performance to the class. The final eight sessions of the class are devoted to the team effort of building fixtures according to the team's design. This is followed by a demonstration of the performance of the fixture.

Written Tests: There will be two closed book exams during the term. If you have a good reason for missing an exam, such as an anticipated medical requirement, military orders or an athletic team trip, tell the instructor in advance. The student has the responsibility for arranging for a makeup exam!

Practical Tests: At the end of each block of instruction in shop skills there will be a test of your ability to use the skills that have been covered. Thus, at the end of the welding segment you will be asked to demonstrate some of the welding skills you have learned. Similarly, at the end of the machine shop segment you will demonstrate your ability to perform tasks in the machine shop.

Quizzes: There will be seven short quizzes during the term. These quizzes will cover material of current interest.

Design Project: The design project will require your attention during a significant portion of the term. The problem will be assigned during the third week of the course. You and your team members will then develop and submit a preliminary design to satisfy the goal. The approach selected is a team effort. Once the preliminary design has been accepted, the team develops a final design. Each team will submit a final design report, including drawings, before beginning construction of the device. The final seven sessions of the course are devoted to construction of the device designed followed by a demonstration of its performance. The weight assigned each portion of the design process is as follows:

- Preliminary Report (group) 15% (of course grade)
- Final Design Report (group) - 15% (of course grade)
- Functional Test of the Device - 10% (of course grade)

You will receive more detailed information about the project when it is assigned.

Performance: Your performance in this course will be rated in at least two areas. First, you will be doing a number of exercises to develop skill in using machine tools or welding equipment. If you approach these activities in a positive manner, doing what you are asked to do, trying to be helpful where you can, then you will do well. If you approach these tasks in a surly, negative manner, doing as little as you can, you will do poorly. Second, an important part of this course is your team activity, in both the design project and the skill exercises. The faculty takes your functioning as a part of the team seriously. We consider your performance as a team member an important part of your development as an engineer. Thus, your performance as a member of your team will be an important part of your performance grade.

Planned Subject Outline and Reading Assignment:

1. 24 August 2011
   Introduction
   Machine shop introduction and hands on machines

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2. 29 August 2011
   Machine shop - Drawings, planning
   Read before class: Machine Shop Book - Chapters 1,2,3

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3. 31 August 2011
   Machine Shop - Measurement, layout, drilling and related operations
   Read before class: Machine Shop Book - Chapters 4,5

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4. 7 September 2011
   Machine Shop - Hand Tools, drilling, grinding, sawing
   Read before class: Machine Shop Book - Chapters 6,10,11,12,19,20
   Machine Shop Quiz #1 Due at Beginning of Class

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5. 12 September 2011
   Machine Shop - Lathe, dimensioning, tolerancing, manufacturing drawing
   Read before class: Machine Shop Book - Chapters 9,13

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6. 14 September 2011
   Machine Shop - Milling
   Read before class: Machine Shop Book - Chapters 17,18
   Machine Shop Quiz #2 Due at Beginning of Class
   DESIGN PROJECT ASSIGNED

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7. 19 September 2011
   Machine Shop - Threads, thread classes, fits
   Read before class: Machine Shop Book - Chapters 7,8,14,15

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8. 21 September 2011
   Machine Shop – shear, brake, roll
   Machine Shop Quiz #3 Due at Beginning of Class

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9. 26 September 2011
Machine Shop - Workholding, jigs, fixtures, planning

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10. 28 September 2011
Machine Shop - Shear, brake, (Start Machine Shop Practical Exam)
Read before class: Machine Shop Book - Chapters 16,21,22,26
Machine Shop Quiz #4 due at beginning of class

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11. 3 October 2011
Machine Shop
Machine Shop Practical Exam
PRELIMINARY DESIGN REPORT DUE AT THE BEGINNING OF CLASS

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12. 5 October 2011
Machine Shop
Machine Shop Written Exam, Closed Book
Machine Shop Practical Exam

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13. 10 October 2011
Machine Shop
Machine Shop Practical Exam

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14. 12 October 2011
Machine Shop
Machine Shop Practical Exam

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15. 17 October 2011
Welding Shop
Read before class: Welding Book- Chapters 1,4,19,20,21,22,23,24,25
Oxyfuel Gas Welding - Welding Quiz # 1 Due at Beginning of Class

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16. 19 October 2011
Welding Shop
Read before class: Welding Book – Chapters 5,6,7,8,9,10,11,12,13,14
SMAW/GMAW - Welding Quiz #2 Due at Beginning of Class

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17. 24 October 2011
Welding Shop – GTAW, Resistance Welding , Plastic Welding & Soldering - Quiz # 3 Due
Read before class: Welding Book – Chapters 15,16,17,18,26,27,28,31

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18. 26 October 2011
Welding Shop Written Exam, Closed Book -30 Minutes
Welding Practical Exam
FINAL DESIGN REPORT DUE AT THE BEGINNING OF CLASS

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19. 31 October 2011
Machine Shop
Work on Final Project

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20. 2 November 2011
Machine Shop
Work on Final Project

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21. 7 November 2011
Machine Shop
Working on final Project

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22. 9 November 2011
Machine Shop
Working on final Project

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23. 14 November 2011
Machine Shop
Work on Final Project

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24. 16 November 2011
Machine Shop
Work on Final Project

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25. 21 November 2011
Machine Shop
Work on Final Project

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26. 28 November 2011
Machine Shop
Work on Final Project

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27. 30 November 2011
Machine Shop
Work on Final Project

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28. 5 December 2011
Machine Shop
Fixture Must Be Ready to Begin Testing Today

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29. 7 December 2011
Machine Shop
Demonstrate Final Design Project
