John Wood Community College Instructor: James Fuhrman

1301 South 48th Street Office:

Quincy, IL 62305 Phone: (217) 641-4928

E-mail Address: Jfuhrman@jwcc.edu

JWCC Mail Box Location:

**MFG 135**

**Precision Machining I**

Semester and Year

**COURSE CATALOG DESCRIPTION:**

This course provides an overview of machining processes.  The course introduces a wide variety of skills in the planning, machining, and finishing of metal products.  Students develop basic skills in the use of hand tools, drill press, band saw, engine lathe, vertical milling machine, and related equipment. 3 credit hours (1.5 lecture / 3 lab)

**PREREQUISITES**

Mfg 102 Introduction to Manufacturing and Safety, and Mfg 104 Introduction to Quality and Continuous Improvements.

**TEXT/REFERENCES**

**Precision Machining Technology, 1st Edition.** Peter J. Hoffman, Eric S. Hopewell, Brian Janes, Kent M. Sharp, Jr. ISBN-13: 9781435447677

**COURSE GOALS/OBJECTIVES**: Students who satisfactorily complete this course will be able to perform these goals without the use of reference materials unless otherwise noted.  Individual levels of performance will comply with standards set within the textbook, through classroom and lab presentation and participation in lab activities.

1.     Identify common shop hazards.

2.     Identify and use common shop safety equipment.

3.     Identify threads and threaded fasteners.

4.      Read and interpret common detail drawings found in the machine shop.

5.     Identify common methods of measurement and conversion.

6.     Identify various kinds of rules and there applications.

7.     Measure and record dimensions to an accuracy of plus or minus .001” with a micrometer.

8.     Measure and record dimensions to an accuracy of plus or minus .001” with od micrometers.

9.     Measure and record dimensions using dial and digital calipers.

10.     Prepare a work piece for layout.

11.     Measure and scribe layout lines on the work piece with various features.

12.     Locate and establish hole centers using a layout prick punch and center punch.

13.     Lay out a work piece to a tolerance of +/- 1/16.

14.     Calculate correct cutting speeds for various machine tools and grinding machines.

15.      Explain the correct uses and care in using several cutting fluids.

16.     List the various types of cutting fluids.

17.     Describe several methods of cutting fluid applications.

18.     Select a carbide tool for a job a by reference to operating conditions, carbide grades, nose radii, tool style, rake angles, shank size, and invert size shape, and thickness.

19.     Use saw blade terminology. Describe the conditions that define blade selection. Identify the major parts of the reciprocating and horizontal band cutoff machine.

20.     Properly install blades on reciprocating and horizontal band machines.

21.     Properly use reciprocating and horizontal band machines in cutoff applications.

22.     Properly and sharpen a twist drill on a pedestal grinder so that it will drill a hole not more than .005 to .010in oversize.

23.     Determine the correct drilling speeds for five given drill diameters.

24.     Set up the correct feed on a machine by using a feed table.

25.     Identify the parts on a lathe and there importance and function.

26.     List all the lubrication points for one lathe in the lab.

27.     Determine the type of lubrication needed for a lathe.

28.     Identify standard, quick-change, and turret-type tool holders mounted on a lathe carriage.

29.     Identify tool holding for the lathe tailstock.

30.     Explain the purpose of rake and relief angles, chop breakers, and form tools.

31.     Explain the uses and care of independent and universal chucks.

32.     Show how to adjust feeds on lathe.

33.     How to calculate the feeds needed on a lathe.

34.     Explain the relationship between longitudinal feeds and cross feeds.

35.     Correctly set up a work piece and face the ends.

36.     Correctly center drill the ends of a work piece.

37.     Determine the proper feeds and speeds for a work piece.

38.     Explain how to setup to make facing cuts to a given depth and how to measure those depths.

39.     Describe the correct setup procedure for turning between centers.

40.     Check for taper with a test bar and restorer alignment by adjusting a tailstock.

41.     Describe different types of tapers and methods used to produce and measure tapers.

42.     Identify common cutters for the vertical milling machine.

43.     Select a proper cutter for a given vertical milling machine.

44.     Square the tool head on the vertical milling machine.

45.     Set u and align a work piece on the table of the vertical milling machine.

46.     Setup and align a mill vise on the vertical milling machine.

47.     Learn how to use edge finders

48.     Learn how to use dial indicators.

49.     Learn how to find X and Y on a part.

50.     Learn how to check the Z on a mill and set the tram.

51.     Learn how to use digital read outs on a vertical mill.

52.     Learn how to use the dials on a vertical mill.

53.     Learn how to use digital read outs on a lathe.

54.     Learn how to use the dials on a lathe.

55. Turn a part down to .003” on a lathe.

This outline is subject to change with notice.

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| --- | --- |
| Week |  |
| 1. | Introduction, Syllabus, Textbook **section Unit 1**, introduction to Machining. History of machining, where it was and where it is going. |
|  | Unit 2 Careers in Machining, |
|  | Unit 3 Workplace skills, |
| 2.  3.  4.  5.  6.  7.  8. | **Section 2**, unit 1 introduction to safety, (brief everyone should have gone though MSSC safety.  Unit 2 Measurement Systems and machine tool math overview.  Unit 3 Semi-Precision measurement  Unit 4 Precision Measurement.  Unit 5 Quality Assurance, process planning and quality control.  Unit 6 Metal composition and classification  Unit 7 Heat treatment of metals  Unit 8 maintenance, lubrication and cutting fluid overview.  **Section 3 Job Planning, Bench work, and Layout.**  Unit 1 understanding Drawings,  Unit 2 Layout  Unit 3 Hand tools  Unit 4 Saws and Cutoff Machines  Unit 5 Offhand Grinding  Unit 6 Drilling, Threading, Tapping, and Reaming.  Take NIMS Bench work.  **Section 4 Drill Press**  Unit 1 Introduction to the Drill Press  Unit 2 Tools, Tool holding, and Work holding for the Drill Press,  Unit 3 Drill Press Operations  Take NIMS drill press test  **Section 5 turning**  Unit 1 Introduction to the Lathe  Unit 2 Work holding and tool holding Devices for the Lathe.  Unit 3 Machining Operations on the Lathe,  Unit 4 Manual Lathe Threading  Unit 5 Taper Turning  **Section 6 Milling**  Unit 1 Introduction to the Vertical Milling Machine  Unit 2 Tools, Tool holding, and Work holding for the Vertical Milling Machine.  Unit 3 Vertical Milling Machine Operations,  Unit 4 Indexing and Rotary Table Operations, |

**STUDENT CONTRIBUTIONS**

The student is expected to attend all class sessions as well as all lab sessions.  Any missed class or lab session must be made up (at the discretion of the instructor).  The student is expected to study outside of the classroom as well as create the various lab assignments in the WDC lab.

**Attendance Policy:**

All students are expected to attend each lecture session.  Three consecutive class sessions missed or five total absences within the term may result in an immediate administrative withdrawal.  Make-up will be required at the discretion of the instructor.  Students are expected to attend all laboratory sessions.   Make-up will be required for all missed lab sessions.

**Internet Use Policy**

College owned or operated computing resources are provided for use by students to support their academic pursuits. As such, students are expected to use these resources appropriately.    Students are not to use class or lab time to play games, blog, IM, etc… since these activities may be disruptive or at least cause the student to not focus on the material presented in the class.

Students will be verbally warned for a first offense, upon a second offense disciplinary action through the Director of CTWE, or the Vice-President for Student Services will be pursued.  Disciplinary action may lead to the removal from the course and or reduction of grades.

**DROP POLICY**

All students are expected to attend each lecture session.  Three consecutive class sessions missed or five total absences within the term may result in an immediate administrative withdrawal.  Make-up will be required at the discretion of the instructor.  Students are expected to attend all laboratory sessions.   Make-up will be required for all missed lab sessions.

Following a withdrawal for courses longer than eight weeks, grades are recorded as follows:

|  |  |
| --- | --- |
| Drop during first ten days of class | No grade recorded; class does not appear on transcript |
| Drop up to midterm | W |
| Drop after midterm, up to 75% completion of the course | WI |
| Drop after 75% completion of the course | Grade earned, A-B-C-D-F, as outlined in the syllabus |

For courses eight weeks or less but more than two days

|  |  |
| --- | --- |
| Drop during first five days of class | No grade recorded; class does not appear on transcript |
| Drop up to midterm | W |
| Drop after midterm, up to 75% completion of the course | WI |
| Drop after 75% completion of the course | Grade earned, A-B-C-D-F, as outlined in the syllabus |

**ACCOMMODATIONS FOR A DISABILITY**

Students with disabilities who believe they have accessibility needs or the need for academic accommodations must contact Disability Services, where those concerns are handled.  Disability Services is located within the Support Center in the Student/Administrative Center building on the Quincy campus.

**COURSE EVALUATION**

Your progress and achievement in this class will be measured on a point system.  Those points will be totaled and a grade assigned according to the following ranges.  That percentage figure may then be converted to a letter grade by the following chart.

A 90% - 100%

B 80% - 89%

C 70% - 79%

D 60% - 69%

F  0% - 59%

Points will be earned by the following criteria:

Lab Assignments and Projects      50%

Quizzes, Written Reports, & Tests.    50%

**COURSE SCHEDULE**

This course will meet on \_\_\_\_\_\_\_\_\_\_\_\_ from \_\_\_\_\_\_\_\_\_\_\_\_ in room \_\_\_\_\_\_\_\_\_\_\_\_.

**INTELLECTUAL PROPERTY RIGHTS**

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