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|  | **MFG 101**  **Precision Machine Tool Technology I**  **Fall 2013** |

**Instructor Name**: Mathew T. Higgins

**Email Address**: [mhiggins@jjc.edu](mailto:mhiggins@jjc.edu)

**Office Location**: C-1012

**Office Telephone**: 815-280-2516

**Office Hours**: Monday: 8:00 – 9:00 AM & 3:40 – 4:40 PM Tuesday: 12:00 – 1:00 PM

Wednesday: 12:00 – 1:00 PM Thursday: 3:30 – 4:30 PM

**Course Description**:

MFG 101 is designed to include both classroom and hands-on shop experience. In the shop, emphasis is placed on exercises and projects that embody the basic processes and operations in using hand tools, layout tools and machine tools such as vertical saw, drill presses, engine lathes, vertical milling machines, and surface grinders. In the classroom, emphasis is placed on the theory related information that is essential to set up and operate machine tools and to perform basic processes and operations in the machine shop.

**IAI number:** \* NONE

**Students The Course Is Expected To Serve**: Students enrolled in the Manufacturing (MFG), Welding (WELD), Cadd (Cadd), Orthotics and Prosthetics (OPT), and Industrial Maintenance (IMT) programs are served by enrollment in this course.

**Credit** **and Contact Hours**

\* **Credit Hours : 4**

\* **Lecture/Demonstration : 2**

\* **Lab/Studio/Clinical : 5.5**

**Prerequisites**: \* NONE

**Books, Supplies, and Supplementary Materials**

* **Required Textbooks/Reading list**

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| |  |  | | --- | --- | | 1. | Walker. Machining Fundamentals Workbook. GW, ISBN: 9781590702505 |  |  |  | | --- | --- | | 2. | John R. Walker. Machining Fundamentals. Goodheart-Wilcox Co., 0 |  |  |  | | --- | --- | | 3. | ITW. Trigonometry Tables and Involute Funct. ASHDE, ISBN: 978970318070 | |
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* **Supplementary texts/materials**

1. Notebook, paper, pencil.

2. Calculator

3. Safety Glasses with side shields

* **Other resources utilized**

Handouts provided by the Instructor

**Methods of Instruction:**

**Lecture**

**Laboratory**

**Student Learning** **Outcomes**

Upon successful completion of this course, the student will be able to:

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| 1. | Work using the proper safety habits and attitudes needed in an industrial atmosphere. |
| 2. | Demonstrate the appropriate knowledge and skill needed for using hand tools, layout tools, measuring tools and machine tools necessary to permit entrance into the various occupations of the machine metal trades at a level considerably higher than that of a non-trained person. |
| 3. | Command an understanding of the basic principles of machine design and shop processes well enough to transfer from one machine or job shop to another in an industrial setting. |
| 4. | Correlate all their academic subjects, especially mathematics, English, and the sciences with their laboratory work. |
| 5. | Recognize the interrelationship of their chosen occupation or present occupation with other occupations, and the potential of their occupation within the universal economic structure. |
| 6. | Possess knowledge of the job placement activities and follow-up activities of the Manufacturing Department and J.J.C. |
| 7. | Describe the opportunities in apprenticeship programs and trade school extension training offered by other schools, interested agencies, and businesses. |
| 8. | The teacher will outline the knowledge students will need for employer-employee relationships to include: state agencies, federal agencies, and labor laws. |
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**General Education Student Learning Outcomes :**

1. Students will learn to reason mathematically when calculating machine motion and coordinates. Shop Trigonometry is also used in the production of students projects. The student will measure and evaluate tolerances in the process of producing their project as well.
2. The student will hone their critical thinking skills when planning the sequence of operations needed to machine their projects.
3. Memory skills will be honed by requiring students to memorize speed and feed values used on the machines, as well as remembering setup information that carries from one class period to the next.

**Graded Assignments and Policies**

**Graded Assignments** :

1. Graded assignments are to include Trigonometry worksheets.
2. Workbook assignments determined by the instructor.
3. A Midterm Exam, and Final Exam.
4. A lab project consisting of two parallel clamps machined and assembled by the student will be completed. All work must be done on site in the JJC machine shop during class time.
5. Periodically homework may be collected and graded at the discretion of the Instructor.
6. An additional project may be assigned by the instructor if time allows.

**Grading Policy** \* **Note:** The instructor will determine the minimum amount of work to be completed.

The performance of each student will be based upon a system of letter grades derived from all assignments as listed above under course description.

Lab Project 60%

Homework (Workbook) 15%

Trig, Blueprint, Metrology quizzes 5%

Midterm Exam 15%

Final Exam 5%

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100%

The performance of the students is based on a system of letter grades as follows:

A = 93% - 100%

B = 84% - 92%

C = 78% - 83%

D = 70% - 77%

E = 69% & Below

**Major Tests and Quizzes** As stated above, there are Two Exams and multiple quizzes.

**Classroom Policies and Procedures**

1. **General Information** :
2. Students are required to maintain an atmosphere of respect for the instructor and fellow students alike.
3. There will be an occasional pop quiz used to evaluate the level of expertise the class as a whole has attained on any of the materials covered in class. This will be done at the instructor’s discretion.
4. All “Hands On” work will be performed in the Machine Shop, on site, in the presence of the Instructor.
5. All written and laboratory assignments must be submitted by the student to the Instructor at the designated time. Any assignment not submitted at the appropriate time will receive a grade no higher than 85 – “C” and reduced by 5 points every day after that.
6. If the student does not complete all tests, written assignments, laboratory exercises, projects, and laboratory maintenance the student will fail or receive an incomplete grade for the course.
7. A reduction of the student’s grade may be made due to tardiness, poor attendance, leaving early, or not participating in laboratory maintenance.
8. **Attendance Policy**
9. A student is allowed to be absent a total of four (4) occasions for classes that meet twice a week, but only two(2) occasions for classes that meet only once per week. A student may make up an absence by attending another class, but only with the Instructors permission.
10. Tardiness and leaving early will be counted as 1/4 day for each occurrence.
11. The student will have 10 points deducted from their total semester grade point average for each instance after the times listed above.
12. The instructor may drop a student if in the opinion of the instructor the student’s excessive tardiness, absenteeism, or leaving class early will prevent the student from completing the course requirements.
13. **Make-up Policy** If a student is absent from class, it is the responsibility of the student to contact their instructor during the instructor’s office hours to obtain information about assignments missed. All missed assignments or tests must be made up prior to the next class meeting.
14. **Extra-credit Policy** Extra Credit will be offered at the discretion of the Instructor. The amount of Extra credit points awarded is dependent upon the work being performed and the instructor’s discretion.
15. **Final Exam Information** The Final Exam will be taken the last day of class. Normally this class takes the Exam during the normal class day and time, and not the Final Exam Schedule that the school publishes. If this poses a problem for the student, accommodations will be made to suit the students schedule.
16. **Academic Honor Code**

The objective of the academic honor code is to sustain a learning-centered environment in which all students are expected to demonstrate integrity, honor, and responsibility, and recognize the importance of being accountable for one’s academic behavior.

The penalty for academic dishonesty is immediate expulsion from class resulting in a zero grade for the semester. Additional sanctions may be warranted depending upon the infraction.

1. **College Statement about grades of “F” and withdrawal from class**.

* *Students may withdraw from a course by processing an add/drop form during regular office hours through the Registration and Records Office at Main Campus or Romeoville Campus, or by phone at 815-744-2200. Please note the withdrawal dates listed on your bill or student schedule. Every course has its own withdrawal date. Failure to withdraw properly may result in a failing grade of “F” in the course.*
* *At any time prior to the deadline dates established, an instructor may withdraw a student from class because of poor attendance, poor academic performance or inappropriate academic behavior, such as, but not limited to, cheating or plagiarism.*

1. **Intellectual Property**

Students own and hold the copyright to the original work they produce in class. It is a widely accepted practice to use student work as part of the college’s internal self-evaluation, assessment procedures, or other efforts to improve teaching and learning and in promoting programs and recruiting new students. If you do not wish your work to be used in this manner, please inform the instructor.

1. **Student Code of Conduct**   
   Each student is responsible for reading and adhering to the Student Code of Conduct as stated in the college catalog.
2. **Sexual Harassment**

*Joliet Junior College seeks to foster a community environment in which all members respect and trust each other. In a community in which persons respect and trust each other, there is no place for sexual harassment. JJC has a strong policy prohibiting the sexual harassment of one member of the college community by another.* See Catalog or Student Handbook.

1. **Student Support** [**http://jjc.edu/services-for-students/pages/default.aspx**](http://jjc.edu/services-for-students/pages/default.aspx)
   1. Disability Services: <http://jjc.edu/services-for-students/disability-services/Pages/default.aspx>. Student Accommodations and Resources (StAR):  *If you need disability-related accommodations, specialized tutoring, or assistive technology in this class, if you have emergency medical information you wish to share with me, or if you need special arrangements in case the building must be evacuated, please inform me immediately. Please see me privately after class or at my office.* New students should request accommodations and support by scheduling an appointment with the Student Accommodations and Resources (StAR) Office, Campus Center 1125, (815) 280-2230.
   2. Tutoring: <http://jjc.edu/services-for-students>
   3. Counseling and Advising: [http://jjc.edu/services-for-students/counseling-advising](http://jjc.edu/services-for-students/counseling-advising/Pages/default.aspx)
   4. Academic Resources: [http://jjc.edu/services-for-students/academic-resources](http://jjc.edu/services-for-students/academic-resources/Pages/default.aspx)
   5. Support Programs: <http://jjc.edu/services-for-students/support-programs-services>
   6. Technology Support: <http://jjc.edu/services-for-students/Pages/technology-support.aspx>
2. **Safety**
3. Students with an impaired ability to concentrate may jeopardize safety in this classroom for themselves, their classmates and their instructor. If your ability to concentrate is impaired you should discuss this matter with your instructor.
4. Students are responsible for reporting to their instructor any condition that would impair the ability to concentrate. Failure to notify your instructor of this issue may be a violation of the Student Code of Conduct.
5. At no time should a student attempt to operate the shop machinery when impaired in any way.
6. Safety Glasses with side shields will be worn at all times, except during sit down lectures when no machines are being utilized.
7. Watches, rings, and loose jewelry will be removed during hands-on lab work.
8. Disruptive behavior or horse play or other improper actions will not be tolerated in the machine shop and are grounds for permanent expulsion from class.
9. The use of Cell phones, blue tooth’s, iPods, or any other similar electronic devices are not permitted within the MFG laboratory during active class times.

**Topical Outline**

**WEEK TOPICS or CLASS ACTIVITY**

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| 1. Introduction to Precision  Machine Tool Metalwork  Importance of Precision machining  History of Precision Machining | Objectives  Evaluation (Grading Policy)  Shop Procedures  Shop Safety Assignment: Topic 2  Basic Blue Print Reading  Project Discussion |
| 2. Measuring Instruments  Lab/Lecture | 6" steel scale  Inside Micrometers Assignment: Topics  Outside Micrometers 3 ,4, 5, 6  Layout Practices |
| 3. Cut-off Machines  Lab/Lecture—Begin Project  Project Demonstration | Types of cut off machines  Horizontal/Vertical Band Saw  Basics of applied Bench work materials  Hand tools  Hand tool safety Assignment: Topic Safety Procedures 12 Hand Outs |
| 4. Lathe Work  Lab/Lecture  Project Demonstration | Nomenclature of the parts of the lathe  Work holding devises (chucks & collects)  Lathe tools, tool holders & tool set up  Calculations of proper feeds/speeds  Facing, turning, & Machining to a shoulder  Knurling Assignment: Topics Safety procedures 14, 15, 16, 17, 18 ,19 |
| 5. Vertical Milling  Lab/Lecture  Project Demonstration | Nomenclature of the parts of milling machines  Cutter holding devices  Clamping & holding the work piece  Procedure for slab & end milling  Procedure for Drilling & Tapping  Procedure for Milling Pockets  Milling the Project  Safety Procedures Assignment: Topics  9, 10 & Hand Outs  Tap/Drill quiz |
| 6. Drilling Machines  Lab/Lecture  Project Demonstration | Nomenclature of the Parts of the Drilling Machine  Proper use of Cutter Holding Devices  Proper use of Work Holding Devices  Proper use of Coolant  Proper Hole Drilling Procedures  Proper Countersinking/Counterboring Procedures  Project Lathe work  Safety Procedures Assignment: Topics 13 Hand Outs |
| 7. Applied Trigonometry  Lab/Lecture  Open Lab | Machining functions using Trigonometry  Trigonometry functions  Angles & Sides of a triangle  Sine bars & gage blocks Assignment:  Trig Worksheet |
| 8. **Mid-Term Exam**  Lab/Lecture | Review for Mid-Term  Mid-Term Exam will consist of all material to date  Continuation of Hands-on Projects |
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| 9. Continuation of Lathe & Mill Exercises Lab/Lecture | Mid-Term Review  Open Lab |
| 10. Continuation of Lathe & Mill Exercises  Lab/Lecture | Hands-on project  Open Lab |
| 11. Continuation of Hands-on Projects  Lab/Lecture | Hands-on project  Open Lab |
| 12. Surface Grinder  Lab/Lecture | Nomenclature of parts of a grinder  Dressing & Truing grinding wheels  Grinding flat surfaces  Grinding angular surfaces  Safety Procedures |
| 13. Hardening Principles  Lab/Lecture  Continuation of Mill & Lathe | Safety Procedures  Types of hardening procedures  Preparation for casehardening, Quenching & Tempering  Proper use of heat treat furnace  Hardness testing |
| 14. Dry Blasting (sand)  Project Completion  Lab/Lecture  Continuation of Mill & Lathe | Procedures for finishing project  Sand blasting procedures  Blacking procedures  Safety procedures |
| 15. All Projects Due  Review for Final Exam  Lab/Lecture | All projects due last day of scheduled class |
| 16. **Final Exam** | GOOD LUCK |

**Effective Date:** August 2013 (MTH)

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Signature of Department Chair: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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