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| **Course: Introduction to Computerized Manufacturing** | **Credits: 3** |
| **Subject Abbreviation:** | **Course #** | **Section #** |  |
| **MACHTL** | **301** | **001** |  |
| **Class Meets: According to the Students schedule** |  |
| Start Date:  | **End Date:**  |
| **Instructor: Dr. George A. Garland Jr.** |
| **Phone number: 414 - 269 – 9820** | **E-mail:** **garlandg@matc.edu** |
| **Course Description:** Course is Project Based. It is designed to give students background in Machine Tools Operations and shop practices. Students will learn to apply Blueprint Interpretation, Mathematic principles and Shop Practices through “Hands-on” Projects which simulate Machine Shop activities. These Projects include Drilling, Facing, Machining Pockets and Profiling. They also include Machine Set-up and Operations, Quality practices and Measurements, plus Shop Safety practices. |
| Prerequisites: Referral from sponsoring agency |
| **Textbook:** The course material consists of related subject material in binders, handouts, worksheets and videos. |
| **Supplies:** Provided to the student as needed  |
| **Competency Based Training:** Students learn by successfully completing “hands- on” Activities and course Assignments. |
| **Test –** Pre-quizzes, in- course quizzes and Post quizzes |
| **Course calendar:** Open-entry and Self-paced course lasting for 14-16 weeks. |
| **Assessment Activities:** Hands-on Projects that relate to On-the-job work activities.Each activity is related to what would be required in CNC Job Shop. |
| **Grading Standards:** You will receive a Certificate of Completing for successfully completing the training. |
| **Homework Assignment:** You should study your assigned reading and Class assignments at home. This will help you to understand the course material better. Write down any questions and ask the Instructor for help when you come to class. |
| **Attendance Policy:** You are expected to attend the class session as scheduled. We are required to notify Case Workers about your attendance.  |
| **Behavior:** All students are expected to follow the **IESI Code of Conduct**  Posted at the entrance and in the classroom |
| **Cell Phones –** Please set on silent & please no conversations or texting during class time .You will be asked to leave class if you disturb the class. |
| **Calculator Use:** Do not use your cell phone as a calculator for class work. You will be given a scientific calculator required to do the class work. |
| **Student Complaint Procedure:** Any complaints should discussed first with the Instructor. If it is not addressed satisfactorily. The next step is discuss it with the IESI CEO Dr. George Garland. The last step would be to contact the Sponsor Agency. |
| **Note: This Syllabus is subject to change** |

**Project Based “Hands-on” Project Activities**

There are five (5) Hands-on projects in this course. Each Project is given as a step-by-step process as it would occur in a “Shop Setting”. An Instructor guides the student through each project to ensure that it is done properly. The steps are as follows:

1. The student is given a Project summary sheet describing the Scope of the Project Intent.
2. The student is given a Blueprint of the Project to Interpret.
3. The student will determine the required “Tool Path” movements and write the Coordinate positions for it.
4. The student will write the Machine G-Code Program required for the “Tool Path” movement. They then run the program using Simulation software (Intelitek) to debug it.
5. The student is given a Project “Process Inspection Sheet” outlining a Step-by-step Procedure required to do the Project. Plus the Inspection Method to verify it.
6. The student will “Set-up” the “Stock” Part on the Machine.
7. The student will Machine the “Stock” Part to the required Specifications.
8. The student will measure the “finished Part” to determine if it meets the Specifications.
9. When the student finishes the Project they are given a tutorial showing them how to do it using MASTERCAM a CNC Software program. The student will setup the program and run a “simulation”

to make sure it setup correctly. Then they will generate the G-Code program from the Software.

**The “Hands-on” Projects**

1. **Squaring the Stock to 3.25” x 1.5” Dimension with a 3/8 ” Endmill**

This project is done on the student’s first day to give them an introduction to the Machining Process. A rectangular stock part with uneven and rough edges is machined (Faced). The Instructor walks them through the process. The student does not program or Machine the procedure. They observe the process and measure the stock part before and after it is Machined to understand the procedure.

1. **Drill 5 evenly space ¼ ” diameter holes in a 1.5” rectangular area**

The student first has to determine the hole placement coordinates for the holes. Coordinate Geometry is used to determine each hole position. The hole depth is ¾”. Then they follow the step-by-step process to program, setup and machine the holes. Two Machine (G-Code) programs are used to drill the holes. One for Straight drilling and one for Canned Cycle drilling. When the project is completed the student will be given a tutorial to do it using MASTERCAM software program. The tutorial gives them the step-by-step procedure of how to set it up, run a simulation and then generate a G-Code program.

1. **Machining evenly spaced Lettering (IESI) in a 1.5” area**

The student has to determine the Horizontal and Vertical spacing of the lettering. Each letter is 0.750” high and 0.375” wide. The cut depth for the lettering is 1/8”. Coordinate Geometry is to determine each letter position. Then they follow the step-by-step process to program, setup and machine the letters. When the project is completed the student will be given a tutorial to do it using MASTERCAM software program. The tutorial gives them the step-by-step procedure of how to set it up, run a simulation and then generate a G-Code program.

1. **Machining a Pocket and Profile cut on 3.25” rectangular area**

The student follows the step-by-step process to program, setup and machine the Pocket and Profile cut. They have to program it to be machined using two Endmill tools with automatic tool change. The Profile cut will be done with a single cut using a 1/8” Endmill. It has a 3” x 1¾” rectangular shape with a 30 degree slant on the top left corner and a 1/8” depth. The Pocket will be done using 2 tools, 3/8” Endmill and a 1/8” Endmill. It has a 2” x ¾” rectangular shape with a 30 degree slant on the top left corner and a ¼” depth. Coordinate Geometry will be used to determine the tool movement for the Profile and Pocket. Trigonometry functions (Sign and Cosign) will be used to determine the 30 degree tool movement. It will be programed using 3 cuts, a Rough a semi-finish and Finish cut. The inside of the Pocket is done with the 3/8” Endmill. The side walls of the Pocket will be Finished with the 1/8” Endmill . When the project is completed the student will be given a tutorial to do it using MASTERCAM software program. The tutorial gives them the step-by-step procedure of how to set it up, run a simulation and then generate a G-Code program.

1. **Drill six(6) ¼ “ diameter holes at a 60 degree angle using Polar Coordinates in a 3.25” x 3” area**

The student has to determine each hole placement coordinate. This will be done using Trigonometry functions (Sign and Cosign). The hole depth will be ¼ “. Then they follow the step-by-step process to program, setup and machine the holes. It will be programmed using Canned Cycle drilling. When the project is completed the student will be given a tutorial to do it using MASTERCAM software program. The tutorial gives them the step-by-step procedure of how to set it up, run a simulation and then generate a G-Code program.

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| IESI Core AbilitiesThe Core Abilities are skills that allow students to continually adapt and learn. They have been called “employability skills,” soft skills, and professional attributes. You may not be tested for all of the Core Abilities directly, but you will demonstrate or apply them to complete lessons or to improve skills. The Core Abilities and indicators are listed below, and the ones you will be focusing on in this course are checked. | **Applies to Course** (•) |
| Communicate Effectively |  |
| a. Use effective oral communication skills | Yes |
| b. Use effective written communication skills | Yes |
| c. Apply standard rules of language structure, including grammar and spelling | Yes |
| d. Listen actively to others | Yes |
| e. Derive meaning from text | Yes |
| f. Communicate in a bias-free manner | Yes |
| g. Support viewpoints with evidence |  |
| Collaborate with Others |  |
| a. Demonstrate respect in relating to people | Yes |
| b. Cooperate and resolve conflicts effectively | Yes |
| c. Participate in shared problem solving | Yes |
| Respect Diversity |  |
| a. Acknowledge personal prejudices and biases | Yes |
| b. Appreciate perspectives of people outside own background/culture | Yes |
| Demonstrate Responsibility |  |
| a. Attend classes as scheduled | Yes |
| b. Turn in quality work | Yes |
| c. Adhere to safety rules and regulations | Yes |
| d. Act professionally to fulfill job duties within chosen field | Yes |
| e. Demonstrate flexibility and self-directedness in learning | Yes |
| Think Critically |  |
| a. Differentiate between fact and fiction | Yes |
| b. Consider other viewpoints and perspectives | Yes |
| c. Present logical arguments | Yes |
| d. Evaluate sources of information to solve problems | Yes |
| Utilize Technology |  |
| a. Solve problems using technology | Yes |
| b. Use technology for Manufacturing Processes | Yes |
| c. Use technology to communicate | Yes |
| d. Use appropriate technology to manage information | Yes |
| e. Recognize the impacts of technology | Yes |
| Apply Math and Science |  |
| a. Apply math concepts and principles appropriately | Yes |
| b. Apply scientific concepts and principles appropriately | Yes |
| c. Interpret meaning from quantitative data | Yes |
| d. Interpret meaning from scientific data | Yes |

Solve problems using technology