

Mr. Dalton and his TA's welcome you to IMSE 303 – Manufacturing Processes Laboratory where our students have an opportunity to have hands on experience in completing four different processes: Auto CAD / CNC, Welding, Machine, and Casting.

Semester: Spring 2014

Number of credit hours: 1

Description: Laboratory experiments and demonstrations of the basic manufacturing operations of casting, machining, and joining. Process parameter measurement, inspection techniques, and CNC programming are performed and laboratory report writing is emphasized.

Prerequisite: Concurrent with IMSE 302

Textbook: Manufacturing Processes IMSE 303 Laboratory Manual
IMSE Department – James Dalton & etc.

Instructor: James Dalton

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Course Goals:

1. To familiarize students with the basic manufacturing processes of machining, welding, and casting.
2. To provide students with experience using CNC and CAD programming.
3. To provide students with experience of writing laboratory reports.

Students Learning Objectives:

Upon completion of the course, students will be able to:

- a) Make a sand casting and understand the basic test performed in sand testing.
- b) Use a machine tool for metal cutting and understand the basic parameters of cutting speed, feed, depth of cut and metal removal rate.
- c) Perform different joining processes, such as arc welding and oxy-acetylene torch welding, and understand the basic process variables of travel speed, current, distortion, and penetration.
- d) Make a drawing using the computer-drawing package AutoCAD.
- e) Write a program using the existing drawing to machine a part using CNC machines.

Course Topics:

Introduction to manufacturing processes and safety (2 weeks)

Casting design and sand testing (3 weeks)

Welding Processes and parameters (3weeks)

CNC programming (2 weeks)

CAD design and programming (1 week)
Machining processes and design (3 weeks)

Course Contribution to Professional Component:

Engineering Topics – 100%, the course has 10% design content.

Course Relationship to Program Educational Outcomes:

The course relates strongly to the outcome of the continuous improvement program.

1. The course enables the students to acquire the ability to make a sand casting and understand the basic tests performed in sand testing. The key abilities the students will acquire are as below.
 - a) Form a pattern that releases properly.
 - b) Test samples for density, moisture content, shear strength and compact ability.
 - c) Operate equipment safely and in the correct manner.
 - d) Follow procedures and direction from a manual.
2. The course enables the students to acquire the ability to use a machine tool, and understand the basic parameters for machining a part. The key abilities the student will acquire are as below.
 - a) Ability to machine a metal block to the desired dimensions.
 - b) Perform surface roughness test and test the hardness in Brinell and Rockwell hardness measures.
 - c) Set up and operate a shaper, radial drill, and sensitive drill safely.
 - d) Understand and take data on cutting feeds, and speeds.
3. The course enables the students to acquire the ability to weld two parts together, and understand the process parameters involved when welding a part. The key abilities the student will acquire are as below.
 - a) Strike an arc using the arc welder to join parts together.
 - b) Set up an oxy-acetylene torch to get the desired flame temperature.
 - c) Set up and weld different types of joints using steel and brazing welding rods.
 - d) Measure the effects of different current and speed setting on the quality of a weld and the different parameters such as distortion, deposition, and penetration.
 - e) Understand the safety procedures associated with arc and gas welding.
4. The course enables the students to acquire the ability to make a computer drawing (Outcome 4), and machine a part using a CNC machine. The key abilities the student will acquire are as below.
 - a) Design a computer drawing to using AutoCAD 2000.
 - b) Draw a part to the correct dimensions and print.
 - c) Form a tool path program using G code.
 - d) Simulate a part program, and cut a project a CNC mill and lathe.

Grades:

Laboratory Reports (4 @ 15%)	60%
Laboratory Assignment Evaluation	40%
Assignment Evaluation	20%
Quizzes	15%
Work-site evaluation	5%

Statement on Attendance:

Laboratory Attendance is Mandatory. Students who miss class will receive a zero for the laboratory assignment evaluation for that day. Make-up classes must be arranged for prior to the absence except in emergency situations. The basis for an excused absence will follow University and IMSE policy.

Statement on Social Justice:

West Virginia University is committed to social justice. I concur with that commitment. I expect to foster a nurturing learning environment that is based upon open communication, mutual respect, and non-discrimination. Our University does not discriminate on the basis of race, sex, age, disability, veteran status, religion, sexual orientation, color, or national origin. Any suggestions as to how to further such a positive and open environment in this class will be appreciated and given serious consideration. If you are a person with a disability and anticipate needing any type of accommodation in order to participate in this class, you must make appropriate arrangements through Disability Service (304-293-6700). They will identify the nature of the accommodation your disability requires.

Note: EMAIL cannot be used to inform that **YOU** are not showing up to your scheduled lab class.

Prepared By: James Dalton, IMSE