

IOWA STATE UNIVERSITY

Department of Ag & Biosystems Engineering

TSM 240: Introduction to Manufacturing Processes

SYLLABUS

Catalog Description: (1-4) Cr. 3. A study of selected materials and related processes used in manufacturing. Lecture and laboratory activities focus on materials, properties, and processes. This includes plastics and metals.

Class Meeting Times & Locations:

Lecture: Monday	2:10pm-3:00pm	TBD
Lab: Tuesday, Thursday	8:00am-9:50am (Section A)	Davidson 124
Tuesday, Thursday	10:00am-11:50am (Section B)	Davidson 124

Instructors: Dr. D. Grewell
Office: Davidson 132A
Office Phone: 294-2036
Email: dgrewell@iastate.edu

Office Hours: During lab sessions or arranged

Course Text: Fundamentals of Modern Manufacturing 4th, M. Groover (978-0470-467002)

Lab Fee: There is a \$75.00 lab fee for this course. The fee is billed through the business office. This fee covers all lab supplies, maintenance, and materials.

Purpose of the Course: The purpose of this course is to provide students with an introduction to materials and processes used in the manufacturing environment.

Course Objectives: Upon completing this course, the student will:

1. Demonstrate the ability to work both as an individual and as a team member.
2. Correctly utilize a variety of technical terminology needed to communicate in a manufacturing environment.
3. Safely utilize industrial manufacturing equipment, materials, and processes.
4. Understand some basic principles of materials properties and testing.
5. Become comfortable in a manufacturing setting, as well with department laboratories and equipment.
6. Develop an appreciation for the skills, expertise, and responsibilities of skilled workers and their impact on the manufacturing environment.
7. Understand the standard and metric system and how they are used in manufacturing.
8. Develop or enhance a background in metallic materials and processes, which can be carried to other courses, later research, and employment in manufacturing.

Grading:

Requirement	Points	Weight
Lecture & Readings:		
Exam 1 (75% written + 25% practical)	100	33%
Final Exam (75% written + 25% practical)	100	33%
Quiz (4 Web-CT)	100	33%
TOTAL	300	100%

Percentage Scale for Letter Grades

A	95-above	A-	90-94		
B+	87-89	B	84-86	B-	80-83
C+	77-79	C	74-76	C-	70-73
D+	67-69	D	64-66	D-	60-63
F	59-below				

Extra Credit. Five points are added to the final score for attending three manufacturing society meetings (same society). Seven points are added for being an officer in a manufacturing related society. These include but not limited to NAIT, SPE, SME, ASSE, etc. Forms are provided for signatures during attendance of meetings and must be returned to Dr. Grewell by Week 14.

Course Policies:

Attendance will be recorded, and is crucial for completing the work in this course. Students will be responsible for initialing the sign-in sheet during every lab meeting. Excusable absences will be reviewed and accepted at the instructor's discretion. Falsifying sign-up sheets or cheating on exams, result in automatic failing grade.

Absence from Exams: Make up exams will be provided and administered during off-hours by myself or a TA, provided that the absence is excusable.

Absence from Labs: Off-hours lab work will be allowed provided it fits into the instructor or lab assistant's schedule, and provided the student makes arrangements beforehand.

Excessive Absences: Every 5 unexcused absences will result in a deduction of 10% from your final grade percentage. For example, if you have 5 to 9 absences, you will lose 10% off your final grade percentage; if you have 10 to 14 absences, you will lose 20%. I will contact you personally to discuss any excessive absences. Make-up work or special circumstances will be considered at my discretion, and excused absences will be dismissed.

Late Work Unless otherwise agreed or excusable delays, no late homework is accepted.

Disability Statement. Iowa State University complies with the American with Disabilities Act and Section 504 of the Rehabilitation Act. Any student who requires an accommodation under such provisions should contact me as soon as possible, with the proper documentation from the Disability Resources office. No retroactive accommodations will be provided in this class. See your academic advisor for help with obtaining documentation.

Laboratory Requirements:

The laboratories are intended to give each student practical experience with various manufacturing processes. Students are required to attend all labs, and a portion of the exams will be based on individual practical demonstrations (namely, injection molding, welding, lathe and end mill operation).

SAFETY IS THE MOST IMPORTANT PART OF THIS CLASS-Anyone behaving in an unsafe manner can be asked to leave the lab. Anyone noticing unsafe behavior or equipment is responsible to report this to the instructor. Safety is everyone's responsibility.

Basic Safety Rules & Concepts. The statements below apply to safe, orderly use of laboratory facilities; in all cases the instructor or lab assistant has the right to take action as they deem necessary in cases where a student's attitude and actions regarding safety is below standard.

1. Students are required to read the safety manual and pass the safety examination before performing any activities in the metals or test laboratories. All safety rules in the safety manual shall be observed.
2. Industrial quality eye protection must be worn in this laboratory. Even if not using a piece of machinery yourself, particles may fly across room without warning from unguarded machines or various processes.
3. Closed-toe shoes are to be worn in the laboratories. No sandals!
4. Long pants are to be worn in the laboratories.
5. Long sleeves, loose clothing, and long hair shall be secured to prevent them from being caught in the machinery. No ties!

6. Additional safety gear – i.e., gloves, aprons, hoods – shall be worn as prescribed by the instructor or project manuals.
7. Students not properly prepared per rules 1 through 6 shall be asked to correct the situation immediately. This may include being asked to leave the class to obtain proper clothing or safety gear.

In order to assure that all students are familiar with safe practices separate safety requirements for the plastics and metals laboratory are detailed below. These requirements must be satisfied before working in each laboratory respectively.

Metal Laboratory Safety Exam. During the first laboratory meeting/class each student must bring a safety metal laboratory safety exam (from WEB-CT). Each student can either answer the exam questions prior to the class or take the exam in class (30 minutes). All exams will be graded by other students in class. All students MUST score a minimum of 80%. After grading, the class will go through all questions to assure that all procedures are understood. Student scoring less than 80% MUST retake the exam until a minimum score of 80% is achieved. ALL exams must be signed.

Plastics Laboratory Safety Exam. During the first laboratory meeting/class each student must watch a SPE safety video and sign a form indicating compliance and understanding of the video.

Industrial Eye Protection. The department requires ALL persons working in the laboratories to provide themselves with industrial quality eye protection. These must be worn whenever you are in any laboratory of this course, even if you are not operating or watching a machine.

Lab Cleanup will be the responsibility of each team member, after completion of the project section. During the grading of the individual and group projects, an assessment will be made of your assigned area, to ensure that all material, tools, and literature are put away; floors, equipment, and tables are swept off; and trash is thrown away. This requirement will carry equal weight as other requirements for grading of the projects.

During the final lab period, everyone will be expected to sign up for an area and clean up.

Student Requirements (Summary)

- ___ Textbook
- ___ Printout of lecture notes before each class
- ___ Safety glasses (if you want your own style)
- ___ Work clothes, coveralls, or street clothes with long pants, no loose sleeves
- ___ Boots or closed-toed shoes (no sandals)
- ___ Calculator (for lab and exams)

Class Schedule and Assignments:

Week	Lecture 1 and reading assignments (1 hr)	Lab 1 (Polymers) (2+2 hr)	Lab 2 (metals) (2 +2 hrs)
1	(V) Class introduction/Materials (25-38 pgs)	(T) Safety/Review of math fundamentals, units (77-86 pgs) (R) Solvent s/Creep/Composites	(T) Safety/Intro to the Lab & Review of math fundamentals, units (R) Safety exam
2	(G) Strength of materials (40-60 pgs) Metallurgy (98-120 pgs)	(T) Fiber glass/Blends-clipboards (R) Wind turbine blade	(T) Welding (R) Pewter Foundry
3	No Class	(T) Injection molding (R) Foaming / Rotational molding	(T) Manual Mill & Lathe (R) Begin CNC Lathe
4	(G) Alloys/Blends (120-133 pgs)	(T) Blown film simulator (R) Blown film	(T) Finish CNC Lathe (R) Begin CNC Mill
5	(S) Polymer chemistry (153-184 pgs) Visco-elastic properties (60-63pgs)	(T) Melt flow index (R) Vacuum forming/hot gas welding	(T) Finish CNC Mill (R) Begin Project Design
6	(G) Ceramics (136-144) (G) Composites (187-196)	(T) Mold flow (R) Arena	(T) Finalize Project Design (R) Projects
7	(G) Manufacturing and Costs (918-941)	(T) Circuit boards (R) O-LEDS	(T) Projects (R) Projects
8	(G) Plant layout/Arena Exam 1	(T) Practical Exam/practical Exam (R) Safety/ Solvent /Creep/Composites	(T) Final Project Due (R) Safety Exam /Intro to the Lab
9	(V) CNC (894-898 pgs) (G) Machining, electroplating (483-501, 675-677 pgs)	(T) Fiber glass/Blends-clipboards (R) Wind turbine blade	(T) Welding (R) Pewter Foundry
10	(Sandvik) Tool section (507-546 pgs)	(T) Injection molding (R) Foaming / Rotational molding	(T) Manual Mill & Lathe (R) Begin CNC Lathe
11	(V) Cold/hot working (387-388 pgs)	(T) Blown film simulator (R) Blown film	(T) Finish CNC Lathe (R) Begin CNC Mill
12	(G) Welding (693-743 pgs)	(T) Melt flow index (R) Vacuum forming/hot gas welding	(T) Finish CNC Mill (R) CNC Practice
13	(G) Net-shape forming Injection molding/Casting (286-395, 205-220pgs)	(T) Mold flow (R) Arena	(T) Begin Project Design (R) Finalize Project Design
14	(S) Sustainability	(T) Circuit boards (R) O-LEDS	(T) Projects (R) Projects
15	(G) Micro-fabrication (853-867 pgs)	(T) Practical Exam/practical Exam (R) Clean up	(T) Projects (R) Final Project Due
16	Exam 2		

(G) Lecture by Dr. Grewell, (V) Lecture by Joe Vanstrom, (S) Lecture by Srinivasan