

## Welcome to Materials Lab!

Samantha Ramirez, MSE

Lab Teaching Assistants:

Rolando Garcia  
Eric Gonzalez  
Elizabeth Medina  
Hector De Santiago

Fall 2016

## Mrs. Ramirez

- Office: ENGR 3.216
- Office Hours
  - MW 10:50 AM-12:05 PM
- E-mail: [samantha.ramirez@utrgv.edu](mailto:samantha.ramirez@utrgv.edu)
- Website
  - [faculty.utpa.edu/samantha.ramirez](http://faculty.utpa.edu/samantha.ramirez)
- BlackBoard Learn will be utilized

## Equipment

- Permanently bound notebook with gridded pages
- Ballpoint pen
- Safety glasses
- Appropriate lab clothing
  
- No Phones!

## SCHEDULE

Week	Lab
<b>Rotation I - Introduction</b>	
1	Introduction, Safety, Group assignments
	Introductory Lab
<b>Rotation II - Characterization of a Metal/Alloy</b>	
2	Determination of Case Depth (1,2,3,4)
3	Tensile Properties of Metals (2,3,4,1)
4	Analysis of Failing Steel Bolts (3,4,1,2)
5	Identifying the Impact Transition Temperature of Steel (4,1,2,3)
<b>Rotation III - Thermal Analysis of Materials</b>	
6	Residual Stress Approximation in Pipes (1,2,3,4)
7	Creep Testing of Polymers (2,3,4,1)
8	Jominy Test for Comparing Heat Treatability of Steels (3,4,1,2)
9	Phase Diagrams (4,1,2,3)
<b>Rotation IV - Characterization of Polymers</b>	
10	Rate Dependence of Thermoplastic Polymers (1&2, 3&4)
11	Impact Testing of Thermoplastic Polymers (3&4, 1&2)
<b>Rotation V - Final Project</b>	
12	Material Testing Assignment
13	Material Testing Assignment
14	Final Project Presentations

## Grades

- Reports (50%)
- Attendance (10%)
- Lab Notebook (15%)
- Final Project (15%)
- Quizzes (10%)

## Grades

- Reports (50%)

## Written Reports

- |   |  |
|---|--|
| <ul style="list-style-type: none"> <li>• Formal Lab Report           <ul style="list-style-type: none"> <li>◦ Multiple pages</li> <li>◦ Extensive analysis</li> <li>◦ Very thorough discussion</li> <li>◦ Relation of results to real world applications</li> </ul> </li> </ul> | <ul style="list-style-type: none"> <li>• Technical Memo           <ul style="list-style-type: none"> <li>◦ 1 page only</li> <li>◦ Only necessary analysis</li> <li>◦ Brief discussion</li> <li>◦ Simple conclusions</li> </ul> </li> </ul> |
|---|--|

## Formal Lab Report

- Cover Page
- Background & theory
- Objective
- Experimental Setup & Procedures
- Results & Discussion
- Conclusions
- References
- Appendix

## Technical Memo Format

- Brief discussion of your reason for and process of completing the experiment.
- Pertinent data and analysis with captions.
- Discussion and Conclusions in 1 paragraph.

**MEMO**  
 Date: August 26, 2012  
 To: Samantha Ramirez, MSE  
 From: John Doe, BSME  
 Subject: Quality Assurance Testing of Heat 25-95

The results of testing on the quality assurance samples from heat 25-95 are summarized below. The five samples were taken from rounds rolled from different billets poured from the heat. Each sample was cut into five tensile specimens which were hardness tested (Rockwell B scale) and then loaded to failure in a tension test. Samples were allowed to air cool to laboratory temperature and were aged twenty-four hours in the laboratory prior to testing. Mill scale was removed from the hardness test regions using a water-cooled belt grinder. Tensile tests utilized a constant strain rate of 0.05"/min and testing conformed to ASTM standard E-8.

**Results & Discussion:**

Sample ID	Mean Strength (ksi)	Yield Strength (ksi)	Standard Deviation	Mean Hardness (HRB)	Standard Deviation
25-95-1	65	7	70	3.52	
25-95-7	65.2	2.32	69.5	3.05	
25-95-11	65.1	2.13	71.2	3.65	
25-95-18	64.9	2.58	68.9	4.02	
25-95-22	50.7	2.31	61.4	2.57	

**Hardness and Strengths of Heats**

**Discussion** → Students' T-test (using a 95% confidence level) indicates that sample 25-95-22 is different from the prior samples by a statistically significant margin. Thus the last material rolled is substantially softer than earlier products.

**Conclusions** → The most likely explanation for this is the loss of carbon in the molten metal on the top of the ladle as it sits exposed to atmosphere while the ladle is drained. Spectroscopy has been requested to verify the composition of these specimens and results should be available within the week. Should you require further information please contact me.

## Written Reports

- Total of 7 Written Reports due 1 week after the end of the rotation.
  - Rotation I: Introduction (Due Sept 9)
  - Rotation II: Characterization of Metals (Due Oct 7)
  - Rotation III: Thermal Analysis of Materials (Due Nov 4)
  - Rotation IV: Characterization of Plastics (Due Nov 18)
- You will turn in an electronic copy on BlackBoard and a hard copy at the beginning of class.

## Late Written Reports

- **20 points** off per day
- No written reports accepted after it is **1 week** late.
  - You will receive a 0 for that report.

Week	Lab	Output	Due
<b>Rotation I - Introduction</b>			
	Introduction, Safety, Group assignments		
1	Introductory Lab	Report &/or Memo	9/9
<b>Rotation II - Characterization of a Metal/Alloy</b>			
2	Determination of Case Depth (1.2,3,4)	Memo	
3	Tensile Properties of Metals (2,3,4,1)	Graphs	10/7
4	Analysis of Failing Steel Bolts (3,4,1,2)	Memo	
5	Identifying the Impact Transition Temperature of Steel (4,1,2,3)	Memo	
<b>Rotation III - Thermal Analysis</b>			
6	Residual Stress Approximation in Pipes (1,2,3,4)	Memo	
7	Creep Testing of Polymers (2,3,4,1)	Results	11/4
8	Jominy Test for Comparing Heat Treatability of Steels (3,4,1,2)	Memo	
9	Phase Diagrams (4,1,2,3)	Diagram	
<b>Rotation IV - Characterization of a Polymer</b>			
10	Rate Dependence of Thermoplastic Polymers (1&2, 3&4)	Report	11/18
11	Impact Testing of Thermoplastic Polymers (3&4, 1&2)		
<b>Rotation V - Final Project</b>			
12	Material Testing Assignment		
13	Material Testing Assignment		
14	Final Project Presentations	Report, Slides	12/2

## Grades

- Written Reports (50%)
- Attendance (10%)

## Attendance

- Will be taken every week
- If late, you will be counted absent.
- 1 absence the entire semester
  - Only excused absences can be made up
  - Any more than 1 absence, you will be dropped.
- Do not leave the laboratory during lab time.
- Remain with your group at all times.

## Grades

- Written Reports (50%)
- Attendance (10%)
- Lab Notebook (15%)

## Lab Notebook

- Must be graded after each lab before you leave
  - Forgetting your notebook is not an excuse. You will not receive credit if you forget it.
- Only write in ballpoint pen
- Must be legible
- Scratch out with one line
- Do not write on scratch paper and recopy later.
- Make mistakes

## Importance of a Lab Notebook

- A detailed record of all experimental work which includes study rationale, materials, methods, models, raw experimental data, incorrectly performed work, interpretations, calculations, conclusions, and future work
- Ensures that future workers may repeat the previously done work
- Verifies unclear results and intellectual property

## Lab Notebook Grading Sheet

MECE 2140 Materials Laboratory  
Lab Notebook Grading Sheet

Lab Day: Monday Tuesday Wednesday Thursday Friday Group #: 1 2 3 4

Name: \_\_\_\_\_

		Objective (1 point)	Procedure (1 point)	Data (1 point)	Analysis (3 points)	Conclusions (3 points)	Shared Data with Class? (1 point)	Total Grade
Characterization of Metals	Case Depth							
	Tensile Testing							
	Falling Weight Bolts							
	Impact Test							
Thermal Properties of Metals	Residual Stress							
	Creep							
	Diffusion							
Characterization of Polymers	Phase Diagram							
	Rate Dependence							
	Impact Test							
								Final Lab Notebook Grade

\*No points will be given if your entries are illegible.  
\*\*Grades are determined at the end of each lab before you leave.  
\*\*\*Forgetting your notebook is not an excuse. You will not receive credit if you do not have your notebook with you in class.

## Grades

- Written Reports (50%)
- Attendance (10%)
- Lab Notebook (15%)
- Quizzes (10%)

## Quizzes

- Cover laboratory procedures and safe operating procedures for the lab you will be performing that day
- Must know terminology definitions
- Must be completed in BlackBoard Learn before lab time each week.

## Grades

- Written Reports (50%)
- Attendance (10%)
- Lab Notebook (15%)
- Quizzes (10%)
- Final Project/Presentation (15%)

## Final Project

- Research project of your choosing but approved by me
- Final project presentation week of April 27, 2016
- Final project report and slides due at time of presentation

## Plagiarism

- DO NOT CHEAT!
- If caught, you will:
  - Lose credit for the work
  - Be reported to the Dean of Students

## Acknowledgement of Receipt of Syllabus

- Take quiz in Blackboard by next week.

## General Safety

- Fire Alarm
- Fire extinguisher for small fire
- No food or drinks!
- Locate the following:
  - Nearest safety exit
  - Nearest fire extinguisher
  - Nearest telephone
  - Electrical power panels
  - Nearest shower and eye wash station



**Remember!**



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## Dress Code

- Safety Glasses
- No long sleeve shirts, jackets, sweaters, etc.
- Tuck in shirts (aprons available)
- Closed toe shoes
- Full length pants (jeans preferred)
- No jewelry
- Tie back long hair
- Wear caps backwards



## Operating Machinery

- Do not use it unless you know how it works
- No sitting while machines are running
- All blades must be at a complete stop before opening
- Clean up when you are done
- Return all tools
- Know where the emergency stop button is





## Behavior

- You must fix any safety violation ***IMMEDIATELY.***
- NO HORSEPLAY
- Any extremely careless behavior that endangers the safety of others will result in you immediately losing lab privileges for the semester
- Safety quiz by next week!
  - All information in lab procedures