1. Course Title:

Metallurgy/Materials and Processes
MET351 – 4 Credits

3 hours lecture and 2 hours lab per week
MET Core Program Requirement
Prerequisite: CHEM 111 or CHEM 181
This is a Technical content course under ABET Criterion 5

2. Faculty Member Information:

Instructor: Dr. Craig Johnson
Office: Hogue 304
Phone: 509- 963-1118
E-mail: cjohnson@cwu.edu

3. Course Description:

Ferrous and nonferrous metals and alloys; polymeric, ceramic and cellular materials; use of phase diagrams, cooling curves, stress-strain diagrams and metallography.

4. Textbook and other required materials for the course:

Engineering Materials Technology, current ed., by Jacobs & Kilduff; Prentice Hall Publ.
Software: Net access, word processing, spreadsheet and graphing capability required

5. Specific Learner and Expressive Outcomes and Assessment Strategies:

ABET Outcome Criteria #	Learner Outcomes The student should show their ability to:	Assessment Students will be assessed through
3b,f 9a,f	1. classify and identify materials in engineering context	labwork and examinations
3a,c,e,g 9a,d,e,n	2. design and process materials to obtain predicted properties	labwork and project work
3b,g 9a,d	3. track specific materials in a structure and describe their life cycle	labwork and examinations
3b,j 9a,b,f	4. specify materials and processes to meet technical and social criteria	project work and examinations

6. Course Topics and Schedule:

0	Intro – **C**reation, **D**esign & **S**election (car part LCA) Chapter 1, 2	Quiz1
	History: Who used what, when? Why are wars fought?	CS1:History Case Study
	HS American Steel(1hr)	
1	Nature of Materials, Bonds (2.1-2), Poly/Ceramics/Comp Ch 3	Activity1: Character (mat'l family)
	Process & Structure: **C**rystallography first (3.1-2)	Activity2: Selection 1pg due Mon
		Quiz 2
2	Atomic Structure, **D**efects, Grains (3.2- cont'd), in-class Met Act	Activity3: Metallography
	Phase Diagrams (3.4,5)	Act 5: Build Diagram, H2O/sugar
3	**G**rains (9.3.1 pg 317): **M**icrography: Boundaries, Sizes & Shapes Ch 4	Activity4: Micrograph Critique
Mechanical **P**roperties (4.2)	CS3: Tensile	
4	Testing & Failure Analysis , **F**atigue, Creep(4.3-6)	CS4: Fatigue
	Corrosion: (4.4), Etching and Thermal Properties	Lab 1: Corrosion /Demo?
5	**M**etallurgical Preparation Techniques: Chapter 5	Lab 2: Structure/Property
	Steel, Thermal Processing :**TTT**, Heat Treating: (9.1-4) Ind Projects,	Demo: Quenching, Casting
6	Exam #1	
	Age Hardening, **H**ardenability; (5.5-6)	Lab3: Workability/Demo?
7	Week 8: Intro to Jominy Lab and Web Resources	Lab 4: Jominy Tests
	Metallurgical Evaluation Techniques (Hardness, E8, E112, E82)	
8	**C**asting, Hardening and Surface Modifications (5.7)	
	Ferrous Metals: Cast and Wrought : (10)	Jominy Hardness Profile Review
9	Exam #2	
10	**N**on-**F**errous Alloys: Aluminum and Copper: (11)	
	Powder Metallurgy: (12) We will meet individually to help with your individual projects.	

Final (Presentations and Project Reports)

7. Grading:			
	HW / Lab Assignments	(5+)	40%
	Exams, Quizzes	(2)	40%
	Individual Project	(1)	10%
	Professionalism/Ethics	(30)	10%

A(92-100), A-(90-92), B+(88-90), B(82-88), B-(80-82), C+(78-80), C(72-78), C-(70-72), D+(68-70), D(62-68), D-(60-62), F(<60)

8. ADA Statement:

Students who have special needs or disabilities that may affect their ability to access information and or material presented in this course are encouraged to contact me or Robert Harden, ADA Compliance Officer, Director, ADA Affairs and Students Assistance on campus at 963-2171 for additional disability related educational accommodations.

Prepared by Roger Beardsley June 24, 2009