1. Course Title:

Machine Design II
MET 419 – 5 Credits
Four hours lecture and two hours laboratory per week
MET Core Program Requirement
Prerequisite: MET 418.
This is a Technical content course under ABET Criterion 5

2. Faculty Member Information:

Instructor: Roger Beardsley
Office: Hogue 302
Phone: 509-963-1596
E-mail: beardslr@cwu.edu

3. Course Description:

Fasteners, welds, machine frames, pressure vessels, hydraulic cylinders, electrical motors and actuators

4. Textbook and other required materials for the course:


5. Specific Learner and Expressive Outcomes and Assessment Strategies:

<table>
<thead>
<tr>
<th>ABET Outcome Criteria #</th>
<th>Learner Outcomes</th>
<th>Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>3a,d,e,j,k 9b,c,d,g,i</td>
<td>Proceed from a design concept to a complete design including analysis, part drawings, and material specification</td>
<td>lab work, projects and examinations.</td>
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<tr>
<td>3a,c,f 9b,c,f,g</td>
<td>Analyze applications of standard machine components such as shafts, gears, bearings, clutches, etc</td>
<td>Homework, lab work and examinations.</td>
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<tr>
<td>3a,g 9c,d,f</td>
<td>Use engineering methodology in analyzing a complete design in terms of weight and cost estimates, as well as ‘buy’ decisions</td>
<td>Homework, lab work and examinations.</td>
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</tbody>
</table>
6. Course Topics and Schedule:

Week 1  Helical Gears, Bevel Gears, Worm Gearsets
Laboratory #1: Group Design: Brainstorming

Week 2  Keys, Splines, Pins, & Tapered Bushings
Couplings & Joints, Retaining Rings and Seals
Laboratory #2: Analysis of Ford 3 speed transmission

Week 3  Shaft Design; Component Forces
Shaft Design, Stress Concentrations
Laboratory #3: Model T Planetary Gear Transmission

Week 4  TEST #1 - Ch 10 thru 12
Tolerance & Fit, Geometric Tolerancing & Tolerance Issues
Manufacturability & Cost effects
Laboratory #4: Shaft Design Lab A; Loading & Stress Analysis

Week 5  Roller Bearings: Types & Material
Roller Bearing Design Factors
Laboratory #5: Shaft Design Lab B: Select bearings & Final design

Week 6  Plain Surface (Journal) Bearings,
Lubrication Design
Laboratory #6: Group Design Problem Definition

Week 7  Threaded Fastener Types; Torque & Clamping
TEST #2 , Chapters 13, 14, 15, 16 & 18
Laboratory #7: Group Design Progress Report

Week 8  Machine Frames & Welded Joints, Linear Motion
Linkages, Cams, & Intermittent Motion
Laboratory #8: Group Design Progress Report

Week 9  Spring Types &Applications, Spring Stress & Deflection
Electric Motor Controls; Motion Control; Clutches & Brakes
Laboratory #9: Group Design Project Presentation

Week 10 Fluid Power: Hydraulics, Pneumatics
Course Review
Laboratory #10: Fluid Power

Final Exam

7. Grading:  

Homework Sets/Quizzes  20%
Exams & Final  (3)  40%
Lab Reports  30%
Participation/involvement  10%  (weightings are approximate)

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)

Prepared by Roger Beardsley June 24, 2009