1. Course Title:

Machine Design I
MET 418 – 5 Credits
Four hours lecture and two hours laboratory per week
MET Core Program Requirement
Prerequisite: MET 426, MET 327, IET 265
This is a Technical content course under ABET Criterion 5

2. Faculty Member Information:
   Instructor: Charles Pringle
   Office: Hogue 308
   Phone: 509-963-2437
   E-mail: pringlec@cwu.edu

3. Course Description:
Study of shafts, springs, couplings, clutches, bearings, cams, linkages and crank mechanisms.

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,i,k 9d,g</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>3b,f 9b,c,f</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,b,g,j</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>
</tr>
</tbody>
</table>
6. Course Topics and Schedule:

Week 1  Class: Introduction, course overview  
    Lab: Design Project 1 – ASME Student Design Concept
Week 2  Class: Properties of Metals Review, Materials  
    Class: Composite Materials & Design  
    Lab: Design Project 2 – ASME Team Design
Week 3  Class: Stress Analysis Review, Mohr’s Circle Review, Pure Bending of Curved Beams  
    Class: Failure Theories, Types of Loading, Design Procedures for Failure Modes  
    Lab: Design Project 3 – ASME Single Part Loading
Week 4  Class: Design Problem Examples  
    Class: Design Factors, Example Problems  
    Lab: Design Project 3 – ASME Single Part Loading (Cont)
Week 5  Class: Design Factors, Example Problems  
    TEST #1 (Chapters 1 – 5)
Week 6  Class: Column Design Review, Column Design computer Program  
    Class: Belt Drives, Chain Drives  
    Lab: Design Project 4 – Lever Design
Week 7  Class: Kinematics of Gears, Spur Gears, Spur Gear Interferences  
    Helical and Bevel Gear Geometry, Worm Gearing  
    Lab: Gear Design Project
Week 8  Class: Complex Gear Trains  
    Lab: Gear Design Project 2
Week 9  Chapter 6-8 Review  
    Test #2(Chapters 6-8)
Week 10 Spur Gear Forces, Spur Gear Materials & Loading  
    Spur Gear Design  
    Lab: Project 5 – Belt or Chain Design

Final Exam

7. Grading:

Homework and Quizzes  35%  
2 Exams and Final  30%  
Lab Projects  25%  
Participation/Involvement  10%  

Total 100%

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