Course Outcomes [Related ME Program Outcomes in brackets]

1. Understand principles of operation of pumps, fans, compressors, and turbines. [A2, A3]
2. Develop the ability to size and select turbomachinery for a specific application. [A2, A3]
3. Develop the ability to analyze the performance of turbomachinery. [A2, A3]
4. Master the concepts of classic mean-line and quasi-3D design methods. [A2, A3]

Fundamental Concepts (3 wks)
1. Review of thermodynamics
2. Review of fluid mechanics
3. Introduction to 1-D compressible flow
4. Basics of energy transfer in a turbomachine

Dimensional Analysis (1 wk)
1. Corrected mass flow and corrected speed
2. Energy transfer coefficient and flow coefficient
3. Specific speed and specific diameter
4. Similitude

Performance Analysis (4 wks)
1. Performance criterion
2. Performance maps
3. Pump Sizing and cavitation
4. Off design performance

Design Method (8 wks)
1. Simple stage analysis
2. Streamline analysis
3. Radial equilibrium
4. Axial blade element design
5. Radial impeller design
6. Design of diffusers

Revision Date: June 12, 2013
1. **COURSE NUMBER AND NAME**: ME 43300 Principles of Turbomachinery

2. **CREDITS & CONTACT HOURS**: 3 credits  
   a. Lecture – 3 days per week at 50 minutes for 16 weeks

3. **COURSE COORDINATOR OR INSTRUCTOR**: Nicole Key

4. **TEXTBOOK**:  

5. **SPECIFIC COURSE INFORMATION**:  
   b. **Prerequisites**:  
      - ME 20000 – Thermodynamics I  
      - ME 30900 – Fluid Mechanics or AAE 33000 – Fluid Mechanics and AAE 33301 – Fluid Mechanics  
   c. **Status**: Elective

6. **SPECIFIC GOALS FOR THE COURSE**  
   a. **Course Outcomes**:  
      [Related ME Program Outcomes in brackets]:  
      1. Understand principles of operation of pumps, fans, compressors, and turbines. [A2, A3]  
      2. Develop the ability to size and select turbomachinery for a specific application. [A2, A3]  
      3. Develop the ability to analyze the performance of turbomachinery. [A2, A3]  
      4. Master the concepts of classic mean-line and quasi-3D design methods. [A2, A3]
   
   b. **Related ME Program Outcomes**:  
      [Related ABET Outcomes Listed in Brackets]  
      - A1. Engineering Fundamentals;  
      - A2. Analytical Skills;  
      - A3. Experimental Skills;  
      - A4. Modern Engr Tools;  
      - A5. Design Skills;  
      - A6. Impact of Engr Solns;  
      - B1. Communication Skills;  
      - B2. Teamwork Skills  
      - B3. Prof/Ethical Responsibility;  
      - B4. Contemporary Issues;  
      - B5. Life-Long Learning;  
      - C1. Leadership,  
      - C2. Global Engineering Skills;  
      - C3. Innovation;  
      - C4. Entrepreneurship

7. **LIST OF TOPICS**: See following page

**PREPARED BY**: Nicole Key  
**REVISION DATE**: June 12, 2013