A. **TITLE:** Technical Dynamics

B. **COURSE NUMBER:** MECH 301

C. **CREDIT HOURS:** 3

D. **WRITING INTENSIVE COURSE:** No

E. **COURSE LENGTH:** 15 weeks

F. **SEMESTER(S) OFFERED:** Fall

G. **HOURS OF LECTURE, LABORATORY, RECITATION, TUTORIAL, ACTIVITY:**
   3 lecture hours per week

H. **CATALOG DESCRIPTION:**
   Students study the principles of dynamics and the solution of applied engineering problems. Two-dimensional dynamic analysis of particles and rigid bodies are resolved using fundamental analytical methods and computer simulation. Rectilinear, curvilinear, and rotary motion, D'Alembert's principles of work and energy, impulse and momentum, and three-dimensional kinematics and dynamics are covered.

I. **PRE-REQUISITES/CO-REQUISITES:**
   a. Pre-requisite(s): CONS 272: Strengths of Materials or Junior level status or permission of instructor
   b. Co-requisite(s): None

J. **GOALS (STUDENT LEARNING OUTCOMES):**
   By the end of this course, the student will be able to:

<table>
<thead>
<tr>
<th>Course Objective</th>
<th>Institutional SLO</th>
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<tbody>
<tr>
<td>1. Describe particle and general planar rigid body motion</td>
<td>1. Communications</td>
</tr>
<tr>
<td>2. Apply kinematical equations using cylindrical and normal/tangential components</td>
<td>2. Critical Thinking</td>
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<tr>
<td>3. Describe accelerated particle motion and general planar rigid body motion</td>
<td>1. Communications</td>
</tr>
<tr>
<td>4. Apply the principles of work and energy, linear impulse and angular momentum to develop kinetic relationships for particles and rigid bodies</td>
<td>2. Critical Thinking</td>
</tr>
<tr>
<td>5. Solve a system of equations related to a kinetics problems</td>
<td>2. Critical Thinking</td>
</tr>
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<td>3. Professional Competence</td>
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K. **TEXTS:**

L. **REFERENCES:** None

M. **EQUIPMENT:** None

N. **GRADING METHOD:** A-F
O. **MEASUREMENT CRITERIA/METHODS:**
- Exams
- Quizzes
- Homework
- Participation

P. **DETAILED COURSE OUTLINE:** (must use the outline format listed below)

I. Kinematics of a Particle
   - A. Rectilinear motion
   - B. Continuous motion
   - C. Curvilinear motion
   - D. Relative motion analysis

II. Kinetics of a Particle: Force and Acceleration
   - A. Newton’s laws of motion
   - B. Equation of motion
   - C. Normal and Tangential coordinates
   - D. Cylindrical coordinates
   - E. Space mechanics

III. Kinetics of a Particle: Work and Energy
   - A. Principle of work and energy
   - B. Power and efficiency
   - C. Conservation of energy

IV. Kinetics of a Particle: Impulse and Momentum
   - A. Linear impulse and momentum
   - B. Conservation of momentum
   - C. Angular momentum
   - D. Angular impulse
   - E. Propulsion

V. Planar Kinematics
   - A. Rigid body
   - B. Force and acceleration
   - C. Work and energy
   - D. Impulse and momentum

Q. **LABORATORY OUTLINE:** None