MASTER SYLLABUS

COURSE NUMBER – COURSE NAME
MECH 301 – TECHNICAL DYNAMICS

Created by: Dr. Lucas Craig

Updated by:

Canino School of Engineering Technology

Department: MET

Semester/Year: Fall 2021
A. **TITLE:** Technical Dynamics

B. **COURSE NUMBER:** MECH 301

C. **CREDIT HOURS:** 3 credit hour(s) per week for 15 weeks

- [x] One hour of lecture 3 times a week
- [ ] Two to three hours of lab or clinical per week
- [ ] Two hours of recitation per week
- [ ] 40 hours of internship

D. **WRITING INTENSIVE COURSE:** Yes [ ] No [x]

E. **GER CATEGORY:** None: [x] Yes: GER
   *If course satisfies more than one: GER*

F. **SEMESTER(S) OFFERED:** Fall [x] Spring [ ] Fall & Spring [ ]

G. **COURSE 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.

H. **PRE-REQUISITES:** None [ ] Yes [x] If yes, list below:

   (CONS 172 or ENGS 201) and MATH 162 or permission of the instructor

   **CO-REQUISITES:** None [x] Yes [ ] If yes, list below:
I. **STUDENT LEARNING OUTCOMES**: *(see key below)*

By the end of this course, the student will be able to:

<table>
<thead>
<tr>
<th>Course Student Learning Outcome [SLO]</th>
<th>Program Student Learning Outcome [PSLO]</th>
<th>GER [If Applicable]</th>
<th>ISLO &amp; SUBSETS</th>
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<tbody>
<tr>
<td>Describe particle and general planar rigid body motion</td>
<td>1,2,6</td>
<td>2-Crit Think ISLO ISLO</td>
<td>PS Subsets Subsets Subsets</td>
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<td>Apply kinematical equations using cylindrical and normal/tangential components</td>
<td>1,6</td>
<td>2-Crit Think ISLO ISLO</td>
<td>PS Subsets Subsets Subsets</td>
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<tr>
<td>Describe accelerated particle motion and general planar rigid body motion</td>
<td>1,6</td>
<td>2-Crit Think ISLO ISLO</td>
<td>PS Subsets Subsets Subsets</td>
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<td>Apply the principles of work and energy, linear impulse and angular momentum to develop kinetic relationships for particles and rigid bodies</td>
<td>1,6</td>
<td>2-Crit Think ISLO ISLO</td>
<td>PS Subsets Subsets Subsets</td>
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<td>Solve a system of equations related to a kinetics problems</td>
<td>1,6</td>
<td>2-Crit Think ISLO ISLO</td>
<td>PS Subsets Subsets Subsets</td>
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<td>KEY</td>
<td>Institutional Student Learning Outcomes [ISLO 1 – 5]</td>
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<td>ISLO #</td>
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<td>Oral [O], Written [W]</td>
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<td>Critical Thinking</td>
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<td>Critical Analysis [CA], Inquiry &amp; Analysis [IA], Problem Solving [PS]</td>
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<td>Foundational Skills</td>
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<td>Information Management [IM], Quantitative Lit./Reasoning [QTR]</td>
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<td>Social Responsibility</td>
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<td>Ethical Reasoning [ER], Global Learning [GL], Intercultural Knowledge [IK], Teamwork [T]</td>
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<td>5</td>
<td>Industry, Professional, Discipline Specific Knowledge and Skills</td>
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*Include program objectives if applicable. Please consult with Program Coordinator.
J. **APPLIED LEARNING COMPONENT:** Yes ☑️ No ☐

If YES, select one or more of the following categories:

☑️ Classroom/Lab  ☑️ Civic Engagement  ☐ Creative Works/Senior Project
☐ Internship  ☐ Research  ☐ Entrepreneurship (program, class, project)
☐ Clinical Placement  ☐ Practicum  ☐ Service Learning
☐ Practicum  ☐ Creative Works/Senior Project  ☐ Research
☐ Service Learning  ☐ Treatment  ☐ Entrepreneurship (program, class, project)
☐ Community Service

K. **TEXTS:**


L. **REFERENCES:**

N/A

M. **EQUIPMENT:** None ☑️ Needed:

N. **GRADING METHOD:** A-F

O. **SUGGESTED MEASUREMENT CRITERIA/METHODS:**

Homework, exams, projects

P. **DETAILED COURSE OUTLINE:**

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 ☒ Yes ☐