

**STATE UNIVERSITY OF NEW YORK  
COLLEGE OF TECHNOLOGY  
CANTON, NEW YORK**



**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

- 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

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

F. **SEMESTER(S) OFFERED:** Fall  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  If yes, list below:

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

**CO-REQUISITES:** None  Yes  If yes, list below:

**I. STUDENT LEARNING OUTCOMES: (see key below)**

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

<u>Course Student Learning Outcome</u> <u>[SLO]</u>	<u>Program Student Learning Outcome</u> <u>[PSLO]</u>	<u>GER</u> <i>[If Applicable]</i>	<u>ISLO &amp; SUBSETS</u>	
Describe particle and general planar rigid body motion	1,2,6		2-Crit Think ISLO ISLO	PS Subsets Subsets Subsets
Apply kinematical equations using cylindrical and normal/tangential components	1,6		2-Crit Think ISLO ISLO	PS Subsets Subsets Subsets
Describe accelerated particle motion and general planar rigid body motion	1,6		2-Crit Think ISLO ISLO	PS Subsets Subsets Subsets
Apply the principles of work and energy, linear impulse and angular momentum to develop kinetic relationships for particles and rigid bodies	1,6		2-Crit Think ISLO ISLO	PS Subsets Subsets Subsets
Solve a system of equations related to a kinetics problems	1,6		2-Crit Think ISLO ISLO	PS Subsets Subsets Subsets
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<b>KEY</b>	<b><u>Institutional Student Learning Outcomes [ISLO 1 – 5]</u></b>
<b>ISLO #</b>	<b>ISLO &amp; Subsets</b>
<b>1</b>	<b>Communication Skills</b> Oral [O], Written [W]
<b>2</b>	<b>Critical Thinking</b> <i>Critical Analysis [CA], Inquiry &amp; Analysis [IA], Problem Solving [PS]</i>
<b>3</b>	<b>Foundational Skills</b> <i>Information Management [IM], Quantitative Lit./Reasoning [QTR]</i>
<b>4</b>	<b>Social Responsibility</b> <i>Ethical Reasoning [ER], Global Learning [GL], Intercultural Knowledge [IK], Teamwork [T]</i>
<b>5</b>	<b>Industry, Professional, Discipline Specific Knowledge and Skills</b>

\*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:

- |   |  |
|---|--|
| <input checked="" type="checkbox"/> Classroom/Lab | <input type="checkbox"/> Civic Engagement              |
| <input type="checkbox"/> Internship               | <input type="checkbox"/> Creative Works/Senior Project |
| <input type="checkbox"/> Clinical Placement       | <input type="checkbox"/> Research                      |
| <input type="checkbox"/> Practicum                | <input type="checkbox"/> Entrepreneurship              |
| <input type="checkbox"/> Service Learning         | (program, class, project)                              |
| <input type="checkbox"/> Community Service        |  |

K. **TEXTS:**

Hibbeler, R. Engineering Mechanics: Dynamics (14th edition). New York: Prentice Hall, 2016.

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