

RARITAN VALLEY COMMUNITY COLLEGE ACADEMIC COURSE OUTLINE

ENGR 133 – Engineering Mechanics II - Dynamics

I. Basic Course Information

A. Course Number and Title: ENGR 133 – Engineering Mechanics II - Dynamics

B. New or Modified Course: Modified Course

C. Date of Proposal: Fall 2022

D. Effective Term: Fall 2023

E. Sponsoring Department: Science and Engineering

F. Semester Credit Hours: 3

G. Weekly Contact Hours: 4

Lecture: 4

Laboratory: 0

Out of class student work per week: 8 hours

H. ☒ Prerequisite (s): ENGR 132 - Engineering Mechanics I – Statics

☐ Corequisite (s):

☐ Prerequisite (s) and Corequisite (s):

I. Additional Fees: None

J. Name and E-Mail Address of Department Chair and Divisional Dean at time of approval: Dr. Marianne Baricevic marianne.baricevic@raritanval.edu, Dr. Sarah Imbriglio, sarah.imbriglio@raritanval.edu

II. Catalog Description

Prerequisites: ENGR 132 - Engineering Mechanics I – Statics

The course is the second of a two-semester sequence in engineering mechanics. It covers kinematics and kinetics. Topics include rectilinear motion; curvilinear motion of particles and rigid bodies; Newton's law for particles and rigid bodies; principle of impulse and momentum; plane motion of rigid bodies. Free body diagrams and vector analysis methods are used.

III. Statement of Course Need

- A. It is a standard course in engineering programs as Mechanical and Civil, and it is needed to ensure the credibility and transfer articulations of our engineering program.
- B. This course has no lab component.
- C. This course generally transfers as a requirement of engineering programs.

IV. Place of Course in College Curriculum

- A. This course is a Free Elective.
- B. This course meets a program requirement for the Engineering Science AS degree.
- C. To see course transferability: a) for New Jersey schools, go to the NJ Transfer website, www.njtransfer.org; b) for all other colleges and universities, go to the individual websites.

V. Outline of Course Content

- A. Kinematics of particles: Rectilinear motion - Uniformly accelerated motion – Curvilinear motion - Tangential and normal components. Kinetics of particles: Newton's second law - Equations of motion.
- B. Kinetics of particles: Energy and momentum methods - Work and kinetic energy - Conservation of energy - Impulsive motion - Impact.
- C. System of particles: Motion of system of particles - Energy and momentum methods for systems of particles.
- D. Kinematics of rigid bodies: Translation and rotation about fixed axis – Velocities in general plane motion - Instantaneous center of rotation.
- E. General plane motion of rigid bodies: Forces and acceleration method – General plane motion of rigid bodies – Constrained general plane motion.
- F. Plane motion of rigid bodies: Energy and momentum method - Work and energy - Impulse and momentum methods - Conservation of angular momentum - Impulsive motion - Eccentric impact.

VI. A. Course Learning Outcomes:

At the completion of the course, students will be able to:

1. Analyze text and interpret problem data. (GE-2)
2. Compose hypotheses and apply problem solving strategies. (GE-2, GE-3)
3. Apply the method of Work and Energy.
4. Solve a problem with the method of Impulse and Momentum.
5. Evaluate the Instantaneous Center of Rotation.
6. Calculate the General Plane Motion.

B. Assessment Instruments

The following assessment methods may be used:

1. Quizzes
2. Exams
3. Homework

VII. Grade Determinants

Factors that may enter into the determination of the final grade

- A. Quizzes
- B. Chapter Exams
- C. Homework
- D. Final Cumulative Exam

Primary formats, modes, and methods for teaching and learning that may be used in the course:

- A. lecture/discussion
- B. small-group work
- C. student collaboration
- D. independent study

VIII. Texts and Materials

The following types of course materials will be used.

Suggested textbooks:

- “Vector Mechanics for Engineers – Dynamics”, F.P. Beer & E.R. Johnston, Jr., McGraw Hill, most recent edition
- “700 Solved Problems In Vector Mechanics for Engineers”, Vol. II: Dynamics, J.F. Shelley, McGraw Hill.

Please Note: The course outline is intended only as a guide to course content and resources. Do not purchase textbooks based on this outline. The RVCC Bookstore is the sole resource for the most up-to-date information about textbooks.

IX. Resources

No other type of resources are needed

X. Honors Option

Not applicable.