RARITAN VALLEY COMMUNITY COLLEGE ACADEMIC COURSE OUTLINE

ENGR 240 – Introduction to Mechanics of Materials

I. Basic Course Information

A. Course Number and Title: ENGR 240 – Introduction to Mechanics of Materials

B. New or Modified Course: New Course

C. Date of Proposal: Spring 2019

D. Effective Term: Fall 2019

E. Sponsoring Department: Science and Engineering

F. Semester Credit Hours: 3

G. Weekly Contact Hours: 4 Lecture: 4

Lab: 0

Out of class student work per week: 8 hours

H. Prerequisites: ENGR 132 – Engineering Mechanics I - Statics

MATH 152 - Calculus II

I. Laboratory Fees: None

J. Name and Telephone Number or E-Mail Address of Department Chair at time of approval: Chair Dr. Marianne Baricevic <u>Marianne.Baricevic@raritanval.edu</u>; Dean Dr. Sarah Imbriglio, <u>Sarah.Imbriglio@raritanval.edu</u>

II. Catalog Description

Prerequisites: ENGR 132 – Engineering Mechanics I - Statics

MATH 152 - Calculus II

This is a fundamental Engineering course for the analysis of materials used in structures. Focus is on stress and strain in elastic solids such as shafts and beams, combined stresses, and statically indeterminate beams.

III. Statement of Course Need

- **A.** It is a standard course of an engineering program, 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. Stress at a point; tensile, compressive, and shear stresses
- B. Stress in statically indeterminate bars, thermal stresses
- C. Stresses on inclined planes, strain energy
- D. Torsion of circular shafts, E and G relation, power transmission
- E. Statically indeterminate torsion, strain energy in torsion
- F. Shear forces and bending moments in beams
- G. Bending stress and strain in beams, shear stress in beams
- H. Design of beams, Composite beams
- I. Stress transformation, principal stresses, maximum shear stress
- J. Mohr's circle, generalized Hooke's law
- K. Spherical and cylindrical pressure vessels
- L. Combined stresses in beams, Failure theories
- M. Deflection of beams, Castigliano's theorem
- N. Statically indeterminate beams, method of superposition
- O. Buckling of columns

VI. General Education and Course Learning Outcomes

A. General Education Learning Outcomes:

- 1. Analyze text and interpret problem data. (GE-NJ 2*)
- 2. Compose hypotheses and apply problem solving strategies. (GE-NJ 2)
- * Embedded critical thinking

B. Course Learning Outcomes:

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

- 1. Apply the concepts of the stress at a point, strain, stress-strain relations, stress transformation, and failure theories to create engineering designs.
- 2. Calculate the stress, strain, and deformation in bars, thin-walled pressure vessels, shafts, beams, buckling of columns, statically indeterminate beams.

C. Assessment Instruments

The following assessment methods may be used:

- 1. Ouizzes
- 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:

o "Mechanics of Materials", R.C. Hibbler

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