RARITAN VALLEY COMMUNITY COLLEGE
ACADEMIC COURSE OUTLINE

ENGR 201 – Introduction to Materials Science and Engineering

I. Basic Course Information

A. Course Number and Title: ENGR 201 – Introduction to Materials Science and Engineering

B. New or Modified Course: Modified Course

C. Date of Proposal: Fall 2018

D. Effective Term: --- Fall 2019

E. Sponsoring Department: Science and Engineering

F. Semester Credit Hours: 3

G. Weekly Contact Hours: 3 Lecture: 3
Laboratory: 0
Out of class student work per week: 6 hours

H. Corequisites: CHEM 104 – General Chemistry II

I. Laboratory Fees: None

J. Name and Telephone Number or E-Mail Address of Department Chair & Divisional Dean at time of approval: Dr. Marianne Baricevic (Chair), Marianne.Baricevic@raritanval.edu; Dr. Sarah Imbriglio (Dean), Sarah.Imbriglio@raritanval.edu

II. Catalog Description

Corequisite: CHEM 104 – General Chemistry II.
This course introduces students to theory and application of engineering materials. Topics explore the relations between the properties, microstructure, and behavior during use of metals, polymers, ceramics, and composite materials. Useful applications and limitations of those materials are presented, and means of modifying their properties are discussed.

III. Statement of Course Need

A. It is a standard course offered as a requirement or a technical elective at many 4 year engineering schools. It is equivalent to the required course 14:635:203 of the Materials Science and Engineering program at Rutgers.

B. This course has no lab component.

C. This course generally transfers as a requirement or a technical elective of engineering programs.

IV. Place of Course in College Curriculum

A. This course is a Free Elective.
B. This course serves as a Technical Elective for any of the Engineering Program tracks
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. Atomic Structure and Interatomic Bonding
B. The Structure of Crystalline Solids; Imperfections in Solids
C. Diffusion
D. Mechanical Properties of Metals; Dislocations and Strengthening Mechanisms; Failure; Phase Diagrams; Phase Transformations in Metals: Development of Microstructure and Alterations of Mechanical Properties; Metal Alloys
E. Structures and Properties of Ceramics; Applications and Processing of Ceramics
F. Polymer Structures; Characteristics, Applications, and Processing of Polymers; Composites
G. Corrosion and Degradation of Materials
H. Properties of Materials: Electrical, Thermal, Magnetic, Optical
I. Overview of Nanomaterials and Nanotechnology
J. Economic, Environmental, and Societal Issues in Materials Science and Engineering

VI. General Education and Course Learning Outcomes

A. General Education Learning Outcomes:

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

1. Analyze and interpret a 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. Explain what materials science means, and recall and identify what matter and its different states are.
2. Explain the formation of material microstructures in metals, ceramics, and polymers
3. Explain how material microstructures affect material mechanical and physical properties.
4. Evaluate the effect of processing on materials properties.
5. Have an informed view of the role of material professionals and challenges in the future

C. Assessment Instruments

The following assessment methods may be used:

1. Quizzes
2. Exams
3. Homework
4. Research Project

VII. Grade Determinants

Factors that may enter into the determination of the final grade

A. Quizzes
B. Chapter Exams
C. Homework
D. Research Project

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 textbook: “Materials Science and Engineering: An Introduction”, W.D. Callister, Jr., Wiley, most recent edition.

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 Options: None