RARITAN VALLEY COMMUNITY COLLEGE
ACADEMIC COURSE OUTLINE

EMET 109 Manufacturing Processes II

I. Basic Course Information

A. Course Number and Title: EMET 109 Manufacturing Processes II

B. New or Modified Course: New

C. Date of Proposal: Semester: Fall Year: 2020

D. Effective Term: Fall 2021

E. Sponsoring Department: Science & Engineering

F. Semester Credit Hours: 3

G. Weekly Contact Hours: 4 Lecture: 2
Laboratory: 2
Out of class student work per week: 5

H. Prerequisite: EMET 107 Manufacturing Processes I

I. Laboratory Fees: no

J. Name and Telephone Number or E-Mail Address of Department Chair and Divisional Dean at time of approval: Dr. Ed Carr, Edward.carr@raritanval.edu; Dr. Sarah Imbriglio, sarah.imbriglio@raritanval.edu

II. Catalog Description

Prerequisite: EMET 107 Manufacturing Processes I

This course is a continuation of industrial processes with an emphasis on semi-production and the function of the methods engineer. Medium run production equipment setup, economy, tolerance, fixtures, CNC programing using CAD/CAM and related planning are covered. Also covered are press work, time and motion, machinability, feeds, speeds and job-cost estimating. Students' end-of-term reports include completion of a finished product incorporating modern manufacturing methods.

III. Statement of Course Need

A. This course meets a program requirement for the Mechanical Engineering Technology A.A.S. degree.
B. This course has a laboratory component. The lab will provide students with hands-on experience in basic manufacturing techniques and give students a better understanding of the core manufacturing processes in the field.
C. This course generally transfers as a program requirement or a free elective.

IV. Place of Course in College Curriculum

A. Free Elective
B. This course meets a program requirement for the Mechanical Engineering Technology A.S. 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. Use of computer design software
    1. Introduction to Master Cam software
    2. Overview of the Graphic User Interface
    3. Overview of program functionality (Tool paths, setting grid, creating geometry)

B. Project Planning 1
    1. Setting up for designing of a three-dimensional wire frame drawing.
    2. Create a list of parts
    3. Calculate production and cutting times, horsepower, scrap weight, densities
    4. Calculate cutting speed for parts.
    5. Using major part-design commands of the software.

C. Project Planning 2
    1. Use of software - 2D geometry, tapping, contouring, pocketing
    2. Design of separate parts
    3. Creating operation sheets
    4. Selection of tools based on lot size
    5. Introduction of MRP (Materials Resource Planning)
    6. Setup, production and cutting time.
    7. Detailed cost estimating sheets.
    8. Selection and design of gages for quality control, d
    9. Development of a flow process chart.
    10. Design, and selection of commercially available jigs and fixtures

D. Part Design - Using Manufacturing Software

1. Creating point position, rectangle, line, arc polar, and trim, mirror, tangent arc, break, join, and offset, rotate, polygon.
2. Designing of project parts.

E. Part Design – Machining Toolpaths 1
1. Create toolpaths using Toolpaths operation Manager.
2. Select stock of material.
3. Select tools from the tool library.
4. Machining of specific parts using CAD-CAM, CNC
5. Use of punch presses, heat treatment of parts and special tool design.

F. Part Design – Machining Toolpaths 2
1. Create 2D geometry and island pocketing
2. Set the machine type, select tools, and generate the CNC program.
3. Using 2D transform
4. Generating Toolpaths using rotate and mirror.
5. Create parallel line, create a rectangle, trim and fillets, mirror and rotate the part.
6. Simulate the cutting operation.

G. Production Economics
1. Economics of purchasing equipment, robots and other automation equipment.
2. Compare prices of all purchased equipment from a point of investment return.

H. Final Term Project
1. Production of all parts
2. Assemble parts of the project
3. Discussion related to the term project
4. Assessment of quality of the project.
5. Review of the project, corrections and comments.

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 text, interpret problem data, and prepare laboratory reports. (GE-NJ 2, GE-NJ 3)*
2. Compose hypotheses and apply problem solving strategies. (GE-NJ 2, GE-NJ 3)*
3. Select appropriate equipment and materials for manufacturing applications. (GE-NJ 2)
4. Identify, analyze, and solve technical problems related to the design of a manufacturing system. (GE-NJ 3, GE-NJ 4)*
5. Communicate effectively using appropriate commercial codes and standards in homework and design project. (NJ-GE 1)

6. Incorporate the latest technologies in the course work. (NJ-GE 4)

* Embedded critical thinking

B. Course Learning Outcomes:

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

1. Apply design and engineering principles and use of the state-of-the-art CAD/CAE/CAM software.
2. Finish the assigned project with quality, to meet design deadline, to develop a continuous improvement strategy in the industrial project.

C. Assessment Instruments

1. quizzes
2. exams
3. homework
4. lab reports
5. projects

VII. Grade Determinants

A. quizzes
B. chapter exams
C. homework
D. lab reports
E. projects
F. final cumulative exam

Given the goals and outcomes described above, LIST the primary formats, modes, and methods for teaching and learning that may be used in the course:

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

VIII. Texts and Materials

A. Suggested textbook: Computer-Integrated Manufacturing, James A. Rehg, Pearson Prentice Hall, ISBN 0-13113413-2

(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

A. Advanced Manufacturing laboratory in the Workforce Training Center

X. Honors Options [if relevant]

This course does not have an Honors Option.