COURSE SYLLABUS

LAST REVIEW   Fall 2022

COURSE TITLE   CNC Operation

COURSE NUMBER   BEMT 0110

DIVISION   Career and Technical Education

DEPARTMENT   BEMT

CIP CODE   46.0401

CREDIT HOURS   3

CONTACT HOURS/WEEK Class: 1   Lab: 4   Clinical: X

PREREQUISITES   BEMT 0108

COURSE DESCRIPTION
This course will introduce he learner with operations and to properly identify, set-up and operate Computer Numerical Controlled (CNC) metal turning, milling equipment safely. This course will emphasize hands on approach as well as classroom activities to familiarize the student with the process to complete job task analysis. This course will also cover common mathematical formulas that will be implemented into the curriculum to achieve expected learner outcomes.

PROGRAM LEARNING OUTCOMES
Students will demonstrate an adherence to safety standards and proficiency in the skills necessary for carpentry basics, and both the construction of new or evaluation/repair of existing framing structures, floors, walls, dry wall, painting, windows, doors, stairs, wood joints, and moldings.

TEXTBOOKS
http://kckccbookstore.com/

METHODS OF INSTRUCTION
A variety of instructional methods may be used depending on content area. These include but are not limited to: lecture, multimedia, cooperative/collaborative learning, labs and demonstrations, projects and presentations, speeches, debates, panels, conferencing, performances, and learning experiences outside the classroom. Methodology will be selected to best meet student needs.

COURSE OUTLINE
I. General applications.
    A. Analyze special tooling.
    B. Define special holders.
    C. Determines correct tool holding methods.

D. Equipment adjustments to maintain accuracy
E. Properly starts-up and shuts down equipment.
F. Identifies control functions.
G. Establishes offsets and work shifts.
H. Establishes coordinate systems.
I. Program controls to run equipment.
J. Proper cleanness of shop and related equipment
K. Equipment safety.
L. Recordkeeping.
M. Job Planning.
II. CNC lathe operations.
A. Conduct job hazard analysis for CNC lathe.
B. Sets-up lathe equipment for operations.
C. Enter tool offsets (G54 ECT.)
D. Run equipment in MDI mode
E. Executes emergency shutdown procedures.
F. Establishes constant SFPM and G50.
G. Record maintenance performed on equipment.
H. Machine maintenance.
I. Performs PMI on CNC lathes.
J. Calculation of formulas for common mathematic problems used in lathe operations
III. CNC vertical milling machine operations.
A. Conduct job hazard analysis for CNC mill.
B. Sets-up milling equipment for operations.
C. Enter tool offsets (G54 ECT.)
D. Run equipment in MDI mode.
E. Execute emergency shutdown procedures.
F. Machine parts to proper tolerances. Machine maintenance.
G. Perform PMI on CNC mills
H. Record maintenance performed on equipment.
I. Calculation of formulas for common mathematic problems used in milling operations

COURSE LEARNING OUTCOMES AND COMPETENCIES
Upon successful completion of this course, the student will:

A. Identify CNC Lathe, CNC mills.
   1. Define NC/CNC.
   2. Conduct a job hazard (JHA) for CNC lathes and CNC mills.

B. Implement safety and working conditions.
    3. Recite safety rules for CNC lathe and CNC mills.
    4. Adhere to safety of equipment.
    5. Perform machine maintenance.

C. Correctly identify parts of CNC Lathe and CNC Mills.
    6. Recite nomenclature of parts for CNC lathe and CNC mills.
    7. Identify machine axis.
    8. Record preventative maintenance log.
    9. Record maintenance performed on equipment.

D. Conduct job hazards analysis.
    10. Apply precautions needed to minimize shop hazards with equipment.

E. Identify types of programming methods.
    11. Describe conversational programming.
    12. Describe conventional programming.
    13. Identify from list G codes and their intent.
    14. Identify from list M codes and their intent
    15. Identify alarm codes and their affirmative actions.

F. Create operations procedures.
    16. Set-up tool holders.
    17. Create job procedure list for sequence of operations.
    18. Take affirmative action to correct cutting conditions.

G. Perform CNC lathe operations.
    19. Identify part holding chucks, collets, and centers.
    20. Identify CNC lathe control knobs, buttons and switches.
    21. Power-up equipment.
    22. Engage emergency stopping procedures.
    23. Interrupt auto cycle manually to stop cycle run.
    24. Describe machine home vs. machine work offset.
    25. Demonstrate homing machine.
    26. Demonstrate MDI methods of axis movements.
    27. Demonstrate tool touch off and establish a G 54 ~XXX.
    28. Input tool offsets to create tool library for tool changes.
    29. Save a program to equipment's memory.
    30. Perform single block methods of operation.

31. Input work shift coordinates equipment to maintain accuracy.
32. Identify and adjust equipment for speed and feeds overrides.
33. Perform turning operations to rough or finish a surface.
34. Perform cylindrical bore operations.
35. Execute drilling, boring, reaming, chamfering, tapping and radii turning operations.
36. Execute contour turning operations.

H. Perform CNC mill operations.
37. Identify part holding chucks, collets, and centers.
38. Identify CNC milling machine control knobs, buttons and switches.
39. Power-up equipment.
40. Engage emergency stopping procedures.
41. Describe machine home vs. machine work offset.
42. Demonstrate homing machine.
43. Demonstrate MDI methods of axis movements.
44. Demonstrate tool touch off and establish a G 54 ~XXX.
45. Execute loading a program from equipment's memory.
46. Save a program to equipment's memory.
47. Delete a program from equipment's memory.
48. Verify CNC program prior to execution.
49. Perform single block methods of operation.
50. Input work shift coordinates equipment to maintain accuracy.

I. Calculate mathematical problems used in machining operations.
51. Identify fits and calculate parts for final machining.
52. Calculate feed and speeds with chip load per tooth.
53. Calculate trigonometric functions.
54. Convert metric to American and back to mm.
55. Calculate depth of cuts.
56. Calculate hole locations for pattering.
57. Calculate RPM, SFPM.

ASSESSMENT OF COURSE LEARNING OUTCOMES AND COMPETENCIES
Student progress is evaluated through both formative and summative assessment methods. Specific details may be found in the instructor's course information document.

COLLEGE POLICIES AND PROCEDURES
Student Handbook

https://www.kckcc.edu/files/docs/student-resources/student-handbook-and-code-of-conduct.pdf

College Catalog
https://www.kckcc.edu/academics/catalog/index.html

College Policies and Statements
https://www.kckcc.edu/about/policies-statements/index.html

Accessibility and Accommodations
https://www.kckcc.edu/academics/resources/student-accessibility-support-services/index.html.