SYLLABUS

DATE OF LAST REVIEW: 02/2013

CIP CODE: 48.0501

SEMESTER: Departmental Syllabus

COURSE TITLE: CNC Operations II

COURSE NUMBER: MACH0203

CREDIT HOURS: 6

INSTRUCTOR: Departmental Syllabus

OFFICE LOCATION: Departmental Syllabus

OFFICE HOURS: Departmental Syllabus

TELEPHONE: Departmental Syllabus

PREREQUISITES: MACH0103 Bench Work, MACH0105 Quality Control and Inspection, MACH0107 Machine Tool Processes, MACH0108 Machining Fundamentals I IV, MACH0109 MACH0202 and Fundamentals of Mathematics w/ a grade of "C" or higher or appropriate score on the Math assessment test.

REQUIRED TEXT AND MATERIALS: Please check with the KCKCC bookstore, http://www.kckcc.bookstore.com, for the required texts for your particular class.

COURSE DESCRIPTION:
This course will introduce the 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 in to the curriculum to achieve expected learner outcomes.

METHOD 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 too1ing
   B. Define special holders
   C. Determines correct tool holding methods
   D. Plan tooling lists and selects proper tooling
   E. Plan sequence of operations
   F. Equipment adjustments to maintain accuracy
   G. Properly start-up and shuts down equipment
   H. Edit programs
   I. Set-up communication links
   J. Identify control functions
   K. Establish offsets and work shifts
   L. Establish coordinate systems
   M. Program controls to run equipment
   N. Proper cleanliness of shop and related equipment
   O. Equipment safety
   P. Recordkeeping
   Q. Job planning

II. CNC lathe operations
   A. Conduct job hazard analysis for CNC lathe
   B. Set-up lathe equipment for operations
   C. Enter tool offsets (G54 ECT.)
   D. Run equipment in MDI mode
   E. Interrupt auto cycle manually to stop cycle run
   F. Execute emergency shutdown procedures
   G. Establish constant SFPM and G50
   H. Turn parts within tolerance ranges
   I. Record maintenance performed on equipment
   J. Machine maintenance
   K. Perform PMI on CNC lathes
   L. The student will be able to identify types and classification for fits.
   M. 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. Set-up milling equipment for operations
   C. Enter tool offsets (G54 ECT.)
   D. Run equipment in MDI mode
   E. Interrupt auto cycle manually to stop cycle run
   F. Execute emergency shutdown procedures
   G. Establish constant SFPM and G50
   H. Machine parts to proper tolerances
   I. Machine maintenance
   J. Perform PMI on CNC mills
   K. Record maintenance performed on equipment
L. The student will be able to identify types and classification for fits
M. Calculation of formulas for common mathematic problems used in milling operations

EXPECTED LEARNER OUTCOMES:
A. The student will be able to identify CNC lathes and CNC mills.
B. The student will be able to implement safety and working conditions.
C. The student will be able to correctly identify coordinate system of CNC lathe and CNC mills.
D. The student will be able to plan work methods for machining parts.
E. The student will be able to interpret programming codes.
F. The student will be able to select tooling for job planning.
G. The student will be able to set-up equipment for part producing.
H. The student will be able to identify and use carbide inserts.
I. The student will be able to perform machine communications.
J. The student will be able to perform operating procedures for CNC lathes.
K. The student will be able to perform operating procedures for CNC mills.
L. The student will be able to correctly use the machinery’s handbook.
M. The student will be able to perform shop math for CNC operations.

COURSE COMPETENCIES:
Upon completion of this course:

The student will be able to identify CNC lathes and CNC mills
1. The student will be able to identify parts of CNC milling machine.
2. The student will be able to identify parts of CNC lathes.
3. The student will be able to identify accessories for CNC mills.
4. The student will be able to identify accessories for CNC lathes.
5. The student will be able to part holding devices.

The student will be able to implement safety and working conditions
6. The student will be able to conduct a job hazard (JHA) for CNC lathes and CNC mills.
7. The student will be able to recite safety rules for CNC lathe and CNC mills.
8. The student will be able to perform machine maintenance.
9. The student will be able to record maintenance performed on CNC equipment.
10. The student will be able to safely operate CNC equipment.
11. The student will be able to apply precautions needed to minimize shop hazards with equipment.

The student will be able to correctly identify coordinate system of CNC lathe and CNC mills
12. The student will be able to describe Cartesian coordinate system.
13. The student will be able to identify machine axis on CNC mills.
14. The student will be able to identify machine axis on CNC lathes.

The student will be able to plan work methods for machining parts
15. The student will be able to create job analysis for production of parts from blueprints.
16. The student will be able to create job procedure list for sequence of operations.
17. The student will be able to create job analysis for one off replication of parts.
18. The student will be able to maintain log for tooling used.
19. The student will be able to set-up work holding fixtures for CNC mills.
20. The student will be able to set-up work holding fixtures for CNC lathes.
21. The student will be able to record preventative maintenance log.

_The student will be able to interpret programming codes_
22. The student will be able to identify from list G codes and their intent.
23. The student will be able to identify from list M codes and their intent.
24. The student will be able to describe conversational programming.
25. The student will be able to describe conventional programming.
26. The student will be able to identify alarm codes and their affirmative action.

_The student will be able to select tooling for job planning_
27. The student will be able to analyze blueprints to select correct tooling and layout.
28. The student will be able to set-up and select tooling.
29. The student will be able to set-up tool holders.
30. The student will be able to identify coolant application methods used.
31. The student will be able to select and apply cutting fluids.

_The student will be able to set-up equipment for part producing_
32. The student will be able to identify part holding chucks, collets, and centers.
33. The student will be able to power-up equipment.
34. The student will be able to engage emergency stopping procedures.
35. The student will be able to demonstrate homing machine.
36. The student will be able to describe machine home vs. machine work offset.
37. The student will be able to identify CNC equipment control knobs, buttons and lockout controls.

_The student will be able to identify and use carbide inserts_
38. The student will be able to identify carbide inserts.
39. The student will be able to select carbide inserts for intended applications.
40. The student will be able to install carbide inserts.
41. The student will be able to identify numbering system used by carbide mfg.

_The student will be able to perform machine communications_
42. The student will be able to prepare equipment to accept communication from PC.
43. The student will be able to download program from PC to machines control.

_The student will be able to perform operating procedures for CNC lathes_
44. The student will be able to machine parts to specified size.
45. The student will be able to perform machine maintenance.
46. The student will be able to take affirm actions to correct cutting conditions.
47. The student will be able to interrupt auto cycle manually to stop cycle run.
48. The student will be able to demonstrate MDI methods of axis movements.
49. The student will be able to demonstrate tool touch off and establish a G 54.
50. The student will be able to input tool offsets to create tool library for tool changes.
51. The student will be able to demonstrate offsetting tools with work shifts.
52. The student will be able to execute loading a program from equipments memory.
53. The student will be able to save a program to equipments memory.
54. The student will be able to delete a program from equipments memory.
55. The student will be able to verify CNC program prior to execution.
56. The student will be able to perform single block methods of operation.
57. The student will be able to edit a CNC program @ control.
58. The student will be able to input work shift coordinates equipment to maintain accuracy.
59. The student will be able to identify and adjust equipment for speed and feeds overrides.
60. The student will be able to perform turning operations to rough or finish a surface.
61. The student will be able to perform cylindrical Bore operations.
62. The student will be able to execute drilling, boring, reaming, chamfering, tapping and radii turning operations.
63. The student will be able to execute ID OD threading operations.
64. The student will be able to execute ID OD taper cutting operations.
65. The student will be able to execute contour turning operations.

*The student will be able to perform operating procedures for CNC mills*
66. The student will be able to interrupt auto cycle manually to stop cycle run.
67. The student will be able to describe machine home vs. machine work offset.
68. The student will be able to demonstrate homing machine.
69. The student will be able to demonstrate MDI Methods of axis movements.
70. The student will be able to demonstrate tool touch off and establish a G 54.
71. The student will be able to input tool offsets to create tool library for tool changes.
72. The student will be able to demonstrate offsetting tools with work shifts.
73. The student will be able to execute loading a program from equipments memory.
74. The student will be able to save a program to equipments memory.
75. The student will be able to delete a program from equipments memory.
76. The student will be able to verify CNC program prior to execution.
77. The student will be able to perform single block methods of operation.
78. The student will be able to edit a CNC program.
79. The student will be able to input work shift coordinates equipment to maintain accuracy.
80. The student will be able to identify and adjust equipment for Speed and Feeds overrides.
81. The student will be able to perform machine operations to rough or finish a surface.
82. The student will be able to perform pocket island operations.
83. The student will be able to execute drilling, boring, reaming, chamfering or radii turning operations.
84. The student will be able to execute ID OD Taper cutting operations.

*The student will be able to correctly use the Machinery's Handbook*
85. The student will be able to locate information in machinery’s handbook.
86. The student will be able to describe tolerances located in machinery’s handbook.
The student will be able to perform shop math for CNC operations

87. The student will be able to identify fits and calculate parts for final machining.
88. The student will be able to calculate feed and speeds with chip load per tooth.
89. The student will be able to calculate trigonometric functions.
90. The student will be able to convert metric to American and back to mm.
91. The student will be able to calculate depth of cuts.
92. The student will be able to calculate hole locations for patterning.
93. The student will be able to calculate RPM, SFPM.

ASSESSMENT OF LEARNER OUTCOMES:
Student progress is evaluated by means that include, but are not limited to, exams, written assignments, and class participation.

SPECIAL NOTES:
This syllabus is subject to change at the discretion of the instructor. Material included is intended to provide an outline of the course and rules that the instructor will adhere to in evaluating the student’s progress. However, this syllabus is not intended to be a legal contract. Questions regarding the syllabus are welcome any time.

Kansas City Kansas Community College is committed to an appreciation of diversity with respect for the differences among the diverse groups comprising our students, faculty, and staff that is free of bigotry and discrimination. Kansas City Kansas Community College is committed to providing a multicultural education and environment that reflects and respects diversity and that seeks to increase understanding.

Kansas City Kansas Community College offers equal educational opportunity to all students as well as serving as an equal opportunity employer for all personnel. Various laws, including Title IX of the Educational Amendments of 1972, require the college’s policy on non-discrimination be administered without regard to race, color, age, sex, religion, national origin, physical handicap, or veteran status and that such policy be made known.

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