COURSE SYLLABUS

LAST REVIEW	Fall 2022
COURSE TITLE	Machining IV
COURSE NUMBER	MACH 0202
DIVISION	Career and Technical Education
DEPARTMENT	MACH
CIP CODE	48.0501
CREDIT HOURS	3
CONTACT HOURS/WEEK	Class: 1 Lab: 4
PREREQUISITES	MACH 0103, MACH 0105, MACH 0107, MACH 0108, MACH 0109, MACH 0201

COURSE DESCRIPTION
This course will introduce the learner with the advanced operations and to properly identify, setup, and operate metal turning, milling equipment and Surface Grinders 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. Materials covered in this course will enhance the procedures learned in MACH 0108, 0109, 0201. This course will also cover common mathematical formulas that will be implemented in to the curriculum to achieve expected learner outcomes.

PROGRAM ALIGNMENT
This course is part of a program aligned through the Kansas Board of Regents and Technical Education Authority. For more information, please visit:
https://kansasregents.org/workforce_development/program-alignment

PROGRAM LEARNING OUTCOMES

1. Students will be able to select tools, set up, and operate CNC mills and lathes.
2. Students will be able to program CNC mills and lathes by reading and interpreting technical drawings.
3. Students will be able to create CAD drawings of precision parts based on written descriptions and rough sketches.
4. Students will be able to make adjustments to CNC offsets based on measured dimensions to machine parts within specified print tolerances.

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. Plan tooling lists and selects proper tooling
   E. Plan sequence of operations
   F. Equipment adjustments to maintain accuracy
   G. Identifies backlash and corrective actions
   H. Proper cleanness of shop and related equipment
   I. Equipment safety
   J. Recordkeeping
   K. Job planning
   L. Identifies backlash and corrective actions

II. Lathe operations.
   A. Adjust equipment for speeds and feeds
   B. Machines parts to proper tolerances
   C. Set-up equipment for operations
   D. Turn parts within tolerance ranges
   E. Record maintenance performed on equipment
   F. Machine maintenance
   G. Performs PMI on engine lathes
   H. Identify types and classification for fits
   I. Calculation of formulas for common mathematic problems used in lathe operations

III. Vertical milling machine operations.
   A. Adjust equipment for speeds and feeds
   B. Machine parts to proper tolerances
   C. Sets-up equipment for operations
   D. Mill parts within tolerance range
   E. Machine maintenance
   F. Perform PMI on vertical mills
   G. Record maintenance performed on equipment
   H. Identify types and classification for fits

I. Calculation of formulas for common mathematic problems used in milling operations

IV. Surface grinder operations .
   A. Identify surface grinder nomenclature
   B. Conforms to safety with surface grinders
   C. Identify types of grinder wheels
   D. Identify work holding devices
   E. Grind parts within tolerance ranges
   F. Set-up surface grinders to perform operations
   G. Grind parts using work holding devices
   H. Perform surface grinder maintenance

COURSE LEARNING OUTCOMES AND COMPETENCIES

Upon successful completion of this course, the student will:

A. Identify lathes, mills and surface grinders.
   1. Recite nomenclature of parts for lathe and mills.
   2. Identify parts of surface grinder.

B. Implement safety and working conditions.
   3. Recite safety rules for lathe
   4. Recite safety rules for mills.
   5. Recite safety rules for grinder and procedures.
   6. Recite safety rules for grinder and procedures.
   7. Conduct a job hazard (JHA) for lathes, mills and grinders.
   8. Apply precautions needed to minimize shop hazards with equipment.
   9. Adhere to safety of equipment.

C. Correct machine discrepancies.
   10. Record preventative maintenance log.
   11. Take affirm actions to correct cutting conditions.
   12. Check accuracy of equipment.
   13. Adjust equipment to maintain accuracy.
   14. Describe chatter and possible remedies.
   15. Correct common milling problems.

D. Select tooling for job planning.
   16. Maintain log for tooling used.
   17. Select proper tooling for jobs.
   18. Identify special form tools.
   19. Set-up and select tooling.
   20. Set-up tool holders and tool blocks.

21. Identify grinding wheels prescribed by ANSI standards.
22. Create job analysis for production of parts from blueprints.
23. Create job analysis for one off replication of parts.
24. Analyze blueprints to select correct tooling and layout.
25. Create blueprint for part replication.
26. Select and apply cutting fluids.

E. Select diluting cutting fluids.
27. Identify differences in cutting fluids.
28. Mix cutting fluids.
29. Correctly measure concentration of cutting fluids.
30. Apply cutting fluids.

F. Identify tool holders.
31. Identify tool blocks.
32. Set-up tool blocks.
33. Identify use for tool blocks.
34. Special tool holder set-up procedures.

G. Work holding methods and set-ups.
35. Identify part holding chucks, collets, and centers.
36. Identify 4 jaw chucks.
37. Identify face plate.
38. Identify 4-Jaw chuck.
39. Identify parts 3-Jaw chuck.
40. Identify collets chucks.
41. Identify dividing head.
42. Identify magnetic chucks.
43. Identify rotary table.

H. Set-up turning equipment for part producing.
44. Adjust equipment for speed and feeds for different materials.
45. Create job procedure list for sequence of operations.
46. Identify graduations marked on machine dials.
47. Indicate parts in a 4-jaw chuck.
48. Demonstrate knowledge of the uses of dro's.
49. Cut taper utilizing tail stock offset method. (OD)
50. Cut taper utilizing taper attachment method. (ID)
51. Perform parting operation.
52. Perform grooving operations (ID and OD).
53. Knurl parts.
54. Machine parts utilizing mandrels.

55. Grind shaft with tool post grinder.
56. Eccentric turning offset to specified size.
57. Demonstrate radii turning operation.
58. Perform production job planning sheet.
59. Machine parts between centers.
60. Cut internal and external single point 60* threads.
61. Cut internal and external 60 threads.
62. Cut internal and external single point 29* threads.
63. Cut special internal and external 60* multi lead threads.
64. Repair damaged threads.
65. Machines parts to specified size.
66. Perform machine maintenance.
67. Record maintenance performed on equipment.

I. Set-up milling equipment for part producing.
68. Adjust equipment for speed and feeds for different materials.
69. Adjust equipment to maintain accuracy.
70. Demonstrate knowledge of the uses of dro's.
71. Identify graduations marked on machine dials.
72. Set-up tool holders and collets.
73. Demonstrate knowledge of climb milling vs. conventional milling operations.
74. Demonstrate the use of parallels.
75. Machine parts to specified size.
76. Perform machine maintenance.
77. Machine parts to tolerance with indexing head procedures.
78. Machine parts to tolerance with rotary table.
79. Machine dove tail male and female.
80. Machine T-slot male and female.
81. Tap holes in parts on vertical mill.
82. Bore holes to size with adjustable boring head.
83. Identify part holding devices for milling procedures.
84. Machine key slots in shaft (woodruff, plane, and closed end)
85. Perform pocketing operations.
86. Describe slitting saw operations.
87. Record maintenance performed on equipment.

J. Set-up grinding equipment for part producing.
88. Describe max depth of cut for grinding operations.
89. Test grinding wheels for trueness and damage.
90. Mount grinding wheels and dress using appropriate methods.
91. Describe the importance of blotters.
92. Adjust automatic grinder for speeds, feeds and limits of travel.

93. Set-up surface grinder work holding devices.
94. Grind parallel surfaces.
95. Grind parts square.
96. Grind vertical surfaces.
97. Grind angles with magnetic sine plate.
98. Inspect surface finishes.
99. Perform surface grinder maintenance.
100. Perform machine maintenance.
101. Record maintenance performed on equipment.
102. Identify set-ups used in grinding operations.

K. Calculate mathematical problems used in machining operations.
103. Identify fits and calculates parts for final machining.
104. Calculate feed and speeds with chip load per tooth.
105. Calculate trigonometric functions.
106. Convert metric to American and back to mm.
107. Calculate depth of cuts.
108. Calculate sine bar formulas to determine block height and angles in DD, MM, SS.
109. Calculate compound rest angles.
110. calculate tailstock for taper turning operations.
111. calculate direct and indirect indexing solutions.
112. calculate hole locations for pattering.
113. 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.