



**COWLEY COLLEGE
& Area Vocational Technical School**

COURSE PROCEDURE FOR

**MULTI-AXIS MILLING
MTT3556 3 Credit Hours**

Student Level:

This course is open to students on the college level in either the freshman or sophomore year and to area high school vocational students.

Catalog Description:

MTT 3556 - MULTI-AXIS MILLING (3 hrs)

This is an advanced course designed to give the student an understanding of multi-axis machining. This class deals with complex machining methods and will require knowledge from all previous machine programming courses.

Prerequisites:

MTT3547 Advanced Computer Aided Manufacturing or instructor approval.

Controlling Purpose:

This course is designed to help the student increase his/her knowledge concerning the use of Mastercam to program and machine wireframe, solids, or surface geometry.

Learner Outcomes:

Upon completion of the course, the student will be able to create programs for multi axis machines, describe the use of the toolpaths in 4 and 5 axis programming, and the parameter pages that affect multi axis toolpaths.

The learning outcomes and competencies detailed in this course outline or syllabus meet or exceed the learning outcomes and competencies specified by the Kansas Core Outcomes Groups project for this course as approved by the Kansas Board of Regents.

Units Outcomes and Criterion Based Evaluation Key for Core Content:

The following defines the minimum core content not including the final examination period. Instructors may add other content as time allows.

Evaluation Key:

- A = All major and minor goals have been achieved and the achievement level is considerably above the minimum required for doing more advanced work in the same field.
- B = All major goals have been achieved, but the student has failed to achieve some of the less important goals. However, the student has progressed to the point where the goals of work at the next level can be easily achieved.
- C = All major goals have been achieved, but many of the minor goals have not been achieved. In this grade range, the minimum level of proficiency represents a person who has achieved the major goals to the minimum amount of preparation necessary for taking more advanced work in the same field, but without any major handicap of inadequacy in his background.
- D = A few of the major goals have been achieved, but the student's achievement is so limited that he is not well prepared to work at a more advanced level in the same field.
- F = Failing, will be computed in GPA and hours attempted.
- N = No instruction or training in this area.

UNIT 1: Creating And Unwrapping Geometry
 Outcomes: Upon completion of this course, the student will be able to demonstrate the ability to unwrap geometry.

A	B	C	D	F	N	Specific Competencies
						Demonstrate the ability to:
						Create the unwrapped geometry.
						Create unwrapped numbers using Arial True Type font.

UNIT 2: Y-Axis Substitution
 Outcomes: Upon completion of this course, the student will be able to demonstrate the ability to use the Y-axis substitution.

A	B	C	D	F	N	Specific Competencies
						Demonstrate the ability to:
						Use drilling using the Y-axis substitution.
						Use engraving using the Y-axis substitution.

UNIT 3: Rotary Axis

Outcomes: Upon completion of this course, the student will be able to demonstrate the ability to use the rotary axis function.

A	B	C	D	F	N	Specific Competencies
						Demonstrate the ability to:
						Demonstrate drilling using rotary axis about the X-axis.
						Demonstrate Slot Milling using the rotary axis on X, Y, and Z axis.

UNIT 4: 4 & 5 Axis Pocket Milling

Outcomes: Upon completion of this course, the student will be able to demonstrate the ability to use Pocketing, including the rotary axis and re-machining.

A	B	C	D	F	N	Specific Competencies
						Demonstrate the ability to:
						Demonstrate Pocketing the inside using Y-axis substitution.
						Demonstrate Pocket remachining.
						Demonstrate a roughing toolpath using Rotary 4 axis toolpath with rotary cut.

UNIT 5: 5 Axis Toolpath

Outcomes: Upon completion of this course, the student will be able to demonstrate the ability to utilize all aspects of the 5 axis machining functions.

A	B	C	D	F	N	Specific Competencies
						Demonstrate the ability to:
						Demonstrate 5 axis toolpath with tool axis control normal to the surface.
						Demonstrate a curve 5 axis toolpath with tool axis control oriented to a point.
						Demonstrate a curve 5 axis toolpath with tool axis control oriented from a point.
						Demonstrate a 5 axis drill toolpath.

Projects Required:

As assigned by instructor.

Textbook:

Contact Bookstore for current textbook.

Materials/Equipment Required:

None

Attendance Policy:

Students should adhere to the attendance policy outlined by the instructor in the course syllabus.

Grading Policy:

The grading policy will be outlined by the instructor in the course syllabus.

Maximum class size:

Based on classroom occupancy

Course Timeframe:

The U.S. Department of Education, Higher Learning Commission and the Kansas Board of Regents define credit hour and have specific regulations that the college must follow when developing, teaching and assessing the educational aspects of the college. A credit hour is an amount of work represented in intended learning outcomes and verified by evidence of student achievement that is an institutionally-established equivalency that reasonably approximates not less than one hour of classroom or direct faculty instruction and a minimum of two hours of out-of-class student work for approximately fifteen weeks for one semester hour of credit or an equivalent amount of work over a different amount of time. The number of semester hours of credit allowed for each distance education or blended hybrid courses shall be assigned by the college based on the amount of time needed to achieve the same course outcomes in a purely face-to-face format.

Refer to the following policies:

[402.00 Academic Code of Conduct](#)

[263.00 Student Appeal of Course Grades](#)

[403.00 Student Code of Conduct](#)

Disability Services Program:

Cowley College, in recognition of state and federal laws, will accommodate a student with a documented disability. If a student has a disability, which may impact work in this class which requires accommodations, contact the Disability Services Coordinator.