NUMERICAL CONTROL (444)

Information provided includes course descriptions by subject only. For complete 2022-2023 programs/academic plans, please refer to Academic Programs (http://catalog.blackhawk.edu/academics/).

444-100 Manual Milling 1
Credits: 0.5-1

In this course students will explore the purpose and function of milling machines and their components. Students will practice simple mill operations such as squaring stock and basic drilling, as well as related skills such as maintenance, the use of cutting tools, and work holding. Students will also practice shop safety procedures.
Aid Code: 10 - undefined.

Complete Course Listing

444-101 Manual Milling 2
Credits: 0.5-1

In this course students will identify and use tool holding and advanced workholding concepts. Students will also explore alignment concepts as they practice using vises and fixtures, as well as aligning machine axes and using part datums to acurately locate holes and other component fixtures.
Aid Code: 10 - undefined.
Co-requisites: (444-100)

Complete Course Listing

444-102 Lathe - Manual Basic 1
Credits: 0.5-1

In this course students will identify the purpose and function of manual lathe machines and their components. Students will practice and perform simple turn operations such as simple diameters and shoulder features. Students will also practice safety and maintenance procedures as they relate to manual lathes.
Aid Code: 10 - undefined.
Co-requisites: (444-101)

Complete Course Listing

444-103 Lathe - Manual Basic 2
Credits: 0.5-1

In this course students will identify and practice tool holding and advanced workholding techniques. Students will explore and apply alignment concepts related to tools, centers, and fixtures, as well as aligning machine axes and using part datums to acurately locate radial and axial and other component features.
Aid Code: 10 - undefined.
Co-requisites: (444-102)

Complete Course Listing

444-104 Blueprint Reading 1
Credits: 0.05-1

In this course students will identify the purpose and function of different types of technical drawings, as well as proper drawing structure and drawing terminology. Students will practice producing simple sketches and visualizing two and three-dimensional parts. Students will practice visualizing drawings and blueprints using the orthographic and isometric projections in first and third angle formats.
Aid Code: 10 - undefined.
Co-requisites: (444-103)

Complete Course Listing

444-106 Metrology - Basic
Credits: 0.5-1

In this course students will explore metrology, the study of measurement. Students will identify and practice methods of inspecting parts for size and accuracy of features using an assortment of precision and semi-precision measuring instruments. Students will also practice instrument care, calibration, handling, and instrument reading.
Aid Code: 10 - undefined.
Co-requisites: (444-105)

Complete Course Listing

444-107 Metrology - Table Techniques
Credits: 0.5-1

In this course students will practice using advanced inspection instruments to carry out high precision inspection, including surface plates, blocks, pins, and dial indicators.
Aid Code: 10 - undefined.
Co-requisites: (444-106)

Complete Course Listing

444-109 Secondary Operations - Drill Press
Credits: 0.5-1

In this course students will practice advanced hand tool and manual power tool use and operation, including the use of of a drill press for production, pedestal grinder for tool maintenance, and sanders for various operations.
Aid Code: 10 - undefined.
Co-requisites: (444-108)

Complete Course Listing

444-112 Lathe - Manual Intermediate
Credits: 0.5-1

In this course students will practice and perform advanced machining operations using various materials and work holding devices. Students will practice precision boring operation, as well as precision hole and taper feature locating and machining.
Aid Code: 10 - undefined.
Co-requisites: (444-111)

Complete Course Listing

444-113 Lathe - Manual Advanced
Credits: 0.5-1

In this course students will practice and perform advanced machining, using a variety of materials and holding devices, emphasizing speed and accuracy. Student will practice using advanced lathe features and setups to machine complex multi-process (mill/turn) lathe parts.
Aid Code: 10 - undefined.
Co-requisites: (444-112)

Complete Course Listing

444-114 Milling - Manual Intermediate
Credits: 0.5-1

In this course students will practice and perform advanced machining operations using various materials and work holding devices. Students will practice precision boring operation, as well as precision hole and taper feature locating and machining.
Aid Code: 10 - undefined.
Co-requisites: (444-113)

Complete Course Listing

444-115 Milling - Manual Advanced
Credits: 0.5-1

In this course students will practice and perform advanced machining, using a variety of materials and holding devices, emphasizing speed and accuracy. Student will practice using radial axes and dividing heads for advanced machining of precision components.
Aid Code: 10 - undefined.
Co-requisites: (444-114)

Complete Course Listing

444-116 CNC Mill Fundamentals
Credits: 0.5-1

In this course students will practice basic mill operation, setup, and the fundamentals of manual programming for CNC mills.
Aid Code: 10 - undefined.
Co-requisites: (444-115 or 420-139)

Complete Course Listing

444-117 CNC Lathe Fundamentals
Credits: 0.5-1

In this course students will practice basic lathe operation, setup, and the fundamentals of manual programming for CNC lathes.
Aid Code: 10 - undefined.
Co-requisites: (444-116)

Complete Course Listing

444-118 Surface Grinding Operations
Credits: 0.5-1

In this course students will explore the use and purpose of grinding machines. Students will practice setting up and operating surface grinding machines to perform simple grinding operations to typical tolerances.
Aid Code: 10 - undefined.
Co-requisites: (444-117)

Complete Course Listing

444-120 Milling - Advanced Setups & Tooling
Credits: 0.5-1

In this course students will practice selecting and applying work holding devices when operating a mill. Students will also practice gathering data using formulas and reference material to support machining operation.
Aid Code: 10 - undefined.
Co-requisites: (444-144)

Complete Course Listing

444-121 Lathe - Advanced Setups & Tooling
Credits: 0.5-1

In this course students will practice selecting and applying work holding devices when operating a lathe. Students will also practice gathering data using formulas and reference material to support machining operation.
Aid Code: 10 - undefined.
Co-requisites: (444-120)

Complete Course Listing

444-123 Advanced Metrology Concepts
Credits: 0.5-1

In this course students will demonstrate the use of advanced measuring tools including hand tools and electronic devices. Students will practice proper setup of piece to measure and proper documentation of results.
Aid Code: 10 - undefined.
Co-requisites: (444-122)

Complete Course Listing

444-125 Intermediate CAD - Solidworks and AutoCAD
Credits: 0.5-1

In this course students will demonstrate the use of CAD software to create complex blueprints for the manufacturing sector. SolidWorks and AutoCAD will be used.
Aid Code: 10 - undefined.
Co-requisites: (444-124)

Complete Course Listing

444-140 Basic CAM - MasterCAM
Credits: 0.5-1

In this course students will demonstrate the use of CAM software for creating CNC machine programs. MasterCam will be used.
Aid Code: 10 - undefined.
Co-requisites: (444-139) or (444-116)

Complete Course Listing

444-144 GD&T Interpretations
Credits: 0.5-1

In this course students will practice the use of Geometric Dimensioning and Tolerancing as it pertains to mechanical specifications and relationships in technical drawings. Students will practice interpretation of these symbols, as well as basic inspection methodologies.
Aid Code: 10 - undefined.
Co-requisites: (444-119) or (620-173)

Complete Course Listing

444-150 Metal Science
Credits: 1-3

Students engage in basic physics and metallurgy principles, applied to the manufacturing setting. Students review accuracy and precision of measurements, introduces calculations with units and conversions within and between systems of measurements, formula rearranging, and applications in problem solving. Emphasis is placed on the application of the laws and principles of physics to practical problems found in the machine shop and industry.
Aid Code: 10 - undefined.
Pre-requisites: (804-308) and (COMPASS Reading Skills, 073 or ACT Reading, 16 or ASSET Reading Skills, 39 or AccuPlacer Reading Comp, 076 or Next Gen AccuPlacer Reading, 251 or Reading-Credit Level Met or Test Waived-College Degree or 838-104 or 838-104 or 801-195 or 801-136 or 801-196 or 801-198 or 804-133 or 806-110 or 806-112 or 806-134 or 806-139 or 806-154 or 806-177 or 806-186 or 806-194 or 806-199 or 809-103 or 809-166 or 809-172 or 809-188 or 809-195 or 809-143 or 809-196 or 809-198 or 809-199)

Complete Course Listing

444-300 Shop Computing
Credits: 1-2

The ability to use a computer has become one of the most basic skills. In this course the learner will learn to use a computer to navigate through the learning process as well as being able to use the computer to operate an assortment of software. Students learn how to operate the computer's operating system to perform many common tasks such as opening, closing, saving, and printing files. They will practice these operating system functions on files created from software used in the machine shop.
Aid Code: 32 - undefined.

Complete Course Listing

444-301 Metrology
Credits: 1-2

Metrology is the study of measurement. The production of quality parts is impossible without adequate measurement. Therefore, this is a course that should be taken before any machining course. You will learn about an assortment of precision and semi-precision measuring instruments used for the job shop or where large numbers of parts are produced. Material will cover instrument care, types, components, scales, calibration, handling, and reading the instrument. You will have an opportunity to use and gain profi ciency in most of the measuring instruments that are discussed.
Aid Code: 32 - undefined.

Complete Course Listing

444-302 Semi-Precision Machining
Credits: 1-2

This course is designed to acquaint the student with the semi-precision/ fabrication machines in the machine shop. These machines are easier to operate and provide a good starting point for the beginner. These machines should not be considered to be less important in the machine shop or to require less skill to operate. These drill presses, pedestal grinders, bench tools, and saws are extremely important tools. The associated work holding, cutting tools, processes, and measuring instruments are also taught.
Aid Code: 32 - undefined.

Complete Course Listing

444-303 Turning Fundamentals
Credits: 1-2

This module covers the introduction to the engine lathe. Emphasis is on knowing the machine parts, their function, and performing simple lathe operations. Engine lathes are one of the basic machines with the ability to produce cylindrical parts to close tolerances. Introductory subjects such as related safety, maintenance, metal cutting theory, cutting tools, and work holding for lathes will be taught. There is an emphasis on safety. All of these subjects will be introduced and built upon as the learner progresses to higher levels of proficiency.
Aid Code: 32 - undefined.

Complete Course Listing

444-304 Geometric Dimensioning and Tolerancing (GD&T) Interpretations
Credits: 0.5-1

Geometric Dimensioning and Tolerancing is a system of symbols used to portray mechanical specifications and relationships on mechanical drawings. Industries using this system include large automotive, aircraft, and agricultural manufacturers, a growing number of smaller industries and most European manufacturers. Students will explore ANSI (American National Standard Institute) Standard symbols and methods of interpretation of these symbols to meet the expectations of the mechanical design engineer that specified them on the drawing.
Aid Code: 32 - undefined.

Complete Course Listing

444-305 Milling Fundamentals
Credits: 1-2

This module covers the introduction to the milling machines. Emphasis is on knowing the machine parts, their function, and performing simple lathe operations. Introductory subjects such as related safety, maintenance, metal cutting theory, cutting tools, and work holding for the mill will be taught. There is an emphasis on safety. All of these subjects will be introduced and built upon as the learner progresses to higher levels of proficiency.
Aid Code: 32 - undefined.

Complete Course Listing

444-306 Turning Applications
Credits: 1-2

This advanced turning course involves performing more difficult machining operations, using different materials, and using different work holding devices. The material, work holding devices and setups will present the learner with challenging situations that require them to apply their past experiences along with what they have learned in theory to produce quality parts. In situations where the student is performing previously learned operations, the learner will be expected to develop their speed and accuracy. One of the requirements of an advanced course is that students apply their knowledge to problems through the trouble shooting process.
Aid Code: 32 - undefined.

Complete Course Listing

444-308 Milling Applications
Credits: 1-2

The advanced milling course involves performing more difficult machining operations, using different materials, and using different work holding devices. The materials, work holding devices and setups will present the learner with challenging situations that require them to apply their past experiences along with what they have learned in theory to produce quality parts. In situations where the student is performing previously learned operations, the learner will be expected to develop their speed and accuracy. One of the requirements of an advanced course is that students apply their knowledge to problems through the trouble shooting process.
Aid Code: 32 - undefined.

Complete Course Listing

444-311 Computer Numerical Control (CNC) Turning Operations
Credits: 1-2

CNC turning centers produce many of the cylindrical shapes machined in production machine shops today. This course is the introductory course for CNC Turning Centers and includes machine/control familiarization, machine startup procedures, program transfers, work holder preparation, tooling installation, setting tooling offsets, and establishing a part origin. In addition, students learn how to safely run the first part and make minor adjustments to create quality parts.
Aid Code: 32 - undefined.

Complete Course Listing

444-312 Computer Numerical Control (CNC) Turning - Operations and Programming 1
Credits: 1-2

This course introduces the student to the programming process for CNC Turning Centers. The student will learn to create very simple programs and to run them on the machine. Students will learn about program structure and style. Students will start using the basic "G" codes necessary for program basic turned part features such as, faces, outside diameters, and holes. They will write/edit simple programs in order to create these common part features. The goal will be to start out simple and move to programs that are efficient, effective, and clearly written.
Aid Code: 32 - undefined.

Complete Course Listing

444-313 Tooling and Workholding
Credits: 1-2

This module consists of competencies relating to work holding devices and methods. Students will learn about the basic work holding principles, work holding devices, and work holding methods. These topics will be discussed in depth so that the student will be able to select and apply the best work holding device for the situation. Advanced knowledge of work holding will promote safety, setup speed, and cutter/work rigidity. Cutting tool information is vital for an in-depth and complete understanding of the machining processes. The selection of cutting tools and cutting tool data may be one of the most complex areas of study. Students will learn to select tools based on part geometry and machining operation. The learner will acquire the cutting data from formulas along with using reference material to obtain the data. This is very important because one of the most common complaints from employers is that employees cannot set machine feeds and speeds resulting in either wasted time or damaged tooling. As the student becomes more proficient, they will gain the ability to troubleshoot machining problems that are related to cutting tools.
Aid Code: 32 - undefined.

Complete Course Listing

444-316 Computer Numerical Control (CNC) Milling-Operations and Programming 1
Credits: 1-2

This course introduces the student to the programming process for CNC Machining Centers. The student will learn to create very simple programs and to run them on the machine. Students will learn about program structure and style. Students will start using the basic "G" codes necessary for program basic milled part features such as, faces, steps, slots, holes, improved holes, and circular contours. They will write/edit simple programs in order to create these common part features. The goal will be to start out simple and move to programs that are effi cient, effective, and clearly written.
Aid Code: 32 - undefined.

Complete Course Listing

444-330 Blueprint Reading 1
Credits: 0.05-1

In this course students will identify the purpose and function of different types of technical drawings, as well as proper drawing structure and drawing terminology. Students will practice producing simple sketches and visualizing two and three-dimensional parts. Students will practice visualizing drawings and blueprints using the orthographic and isometric projections in first and third angle formats.
Aid Code: 32 - undefined.
Co-requisites: (420-134 or 420-313)

Complete Course Listing

444-331 Blueprint Reading 2
Credits: 0.05-1

In this course students will identify the purpose and function of advanced projection types, section views, coordinate systems, and other interpretations of information found on standard industrial blueprints.
Aid Code: 32 - undefined.
Co-requisites: (444-104 or 444-331)

Complete Course Listing

444-332 CNC Turning Programming 1
Credits: 0.05-1

In this course students will practice layout techniques, hand tool usage, and benchwork using hand tools. Students will also practice using bandsaws, drill presses, and other power tools.
Aid Code: 32 - undefined.
Co-requisites: (422-311 or 422-116)

Complete Course Listing

444-333 CNC G-Code Programming for Mills
Credits: 0.05-1

In this course students will use a computer to create basic G-code CNC programs. Students will practice using CNC program codes, words, and functions to create basic drilling programs for a CNC mill.
Aid Code: 32 - undefined.
Co-requisites: (420-314 or 420-135)

Complete Course Listing

444-334 CNC G-Code Programming for Lathes
Credits: 0.05-1

In this course students will practice creating G-code CNC programs for lathe (turning) processes.
Aid Code: 32 - undefined.
Co-requisites: (444-110 or 444-333)

Complete Course Listing

444-335 CNC Mill Fundamentals
Credits: 0.05-1

In this course students will practice basic mill operation, setup, and the fundamentals of manual programming for CNC mills.
Aid Code: 32 - undefined.
Co-requisites: (420-318 or 420-139)

Complete Course Listing

444-336 CNC Lathe Fundamentals
Credits: 0.05-1

In this course students will practice basic lathe operation, setup, and the fundamentals of manual programming for CNC lathes.
Aid Code: 32 - undefined.
Co-requisites: (444-116 or 444-335)

Complete Course Listing

444-337 Introduction to Gears & Gear Cutting
Credits: 0.05-1

In this course students will explore tools and techniques used in the process of gearmaking. Students will practice cutting standard spur gears.
Aid Code: 32 - undefined.
Co-requisites: (444-117 or 444-336)

Complete Course Listing

444-338 Manufacturing Support Systems
Credits: 0.05-1

In this course students will explore part production and sequencing planning in manufacturing facilities. Students will identify the impact that sudden changes, such as scrapping and reworking, can have on these processes. CNC Open Lab Hours: Tues, Wed, Thurs, Fri 8:00 AM-2:00 PM.
Aid Code: 32 - undefined.
Co-requisites: (420-321 or 420-142)

Complete Course Listing

444-339 CMM Concepts
Credits: 0.05-1

In this course students will practice the use of a coordinate measuring machine. Students will identify their types and demonstrate their care, limits, setup, and applications. CNC Open Lab Hours: Tues, Wed, Thurs, Fri 8:00 AM-2:00 PM.
Aid Code: 32 - undefined.
Co-requisites: (444-145 or 444-338)

Complete Course Listing

444-340 CNC Turning Operations 1
Credits: 0.05-1

In this course students will demonstrate machine familiarization, machine start-up procedures, program transfers, work holder preparation, tooling installation, setting tooling offsets, and establishing a part origin on a CNC Lathe. CNC Open Lab Hours: Tues, Wed, Thurs, Fri 8:00 AM-2:00 PM.
Aid Code: 32 - undefined.
Co-requisites: (606-312 or 606-175)

Complete Course Listing

444-341 CNC Turning Operations 2
Credits: 0.05-1

In this course students will demonstrate how to safely run the first part and make minor adjustments to create quality parts on a CNC Lathe. CNC Open Lab Hours: Tues, Wed, Thurs, Fri 8:00 AM-2:00 PM.
Aid Code: 32 - undefined.
Co-requisites: (444-126 or 444-340)

Complete Course Listing

444-342 CNC Turning Programming 1
Credits: 0.05-1

In this course students will demonstrate writing a simple program using correct structure and style. Students will start using the basic "G" codes necessary for program basic turned part features such as, faces, outside diameters, and holes on a CNC Lathe. CNC Open Lab Hours: Tues, Wed, Thurs, Fri 8:00 AM-2:00 PM.
Aid Code: 32 - undefined.
Co-requisites: (444-127 or 444-341)

Complete Course Listing

444-343 CNC Turning Programming 2
Credits: 0.05-1

In this course students will practice writing and editing simple programs in order to create common part features. Students will develop more advanced programs that are efficient, effective, and clearly written for the CNC Lathe. CNC Open Lab Hours: Tues, Wed, Thurs, Fri 8:00 AM-2:00 PM.
Aid Code: 32 - undefined.
Co-requisites: (444-128 or 444-342)

Complete Course Listing

444-344 CNC Milling Operations 1
Credits: 0.05-1

In this course students will demonstrate machine familiarization, machine start-up procedures, program transfers, work holder preparation, tooling installation, setting tooling offsets, and establishing a part origin on a CNC Mill. CNC Open Lab Hours: Tues, Wed, Thurs, Fri 8:00 AM-2:00 PM.
Aid Code: 32 - undefined.
Co-requisites: (444-129 or 444-343)

Complete Course Listing

444-345 CNC Milling Operations 2
Credits: 0.05-1

In this course students will demonstrate how to safely run the first part and make minor adjustments to create quality parts on a CNC Mill. CNC Open Lab Hours: Tues, Wed, Thurs, Fri 8:00 AM-2:00 PM.
Aid Code: 32 - undefined.
Co-requisites: (444-130 or 444-344)

Complete Course Listing

444-346 CNC Milling Programming 1
Credits: 0.05-1

In this course students will demonstrate writing a simple program using correct structure and style. Students will start using the basic "G" codes necessary for program basic turned part features such as, faces, outside diameters, and holes on a CNC Mill. CNC Open Lab Hours: Tues, Wed, Thurs, Fri 8:00 AM-2:00 PM.
Aid Code: 32 - undefined.

Complete Course Listing

444-347 CNC Milling Programming 2
Credits: 0.05-1

In this course students will practice writing and editing simple programs in order to create common part features. Students will develop more advanced programs that are efficient, effective, and clearly written for the CNC Mill. CNC Open Lab Hours: Tues, Wed, Thurs, Fri 8:00 AM-2:00 PM.
Aid Code: 32 - undefined.
Co-requisites: (444-132 or 444-346)

Complete Course Listing

444-348 CNC Milling Programming 3
Credits: 0.05-1

In this course students will practice writing more complex features utilizing more advanced programming methods. The learner will program and machine rectangular/circular pockets. CNC Open Lab Hours: Tues, Wed, Thurs, Fri 8:00 AM-2:00 PM.
Aid Code: 32 - undefined.
Co-requisites: (444-133 or 444-347)

Complete Course Listing

444-349 CNC Milling Programming 4
Credits: 0.05-1

In this course students will demonstrate writing more complex features utilizing more advanced programming methods. The learner will program and machine internal and external threads, and will use cutter compensation. CNC Open Lab Hours: Tues, Wed, Thurs, Fri 8:00 AM-2:00 PM.
Aid Code: 32 - undefined.
Co-requisites: (444-134 or 444-348)

Complete Course Listing

444-350 CNC Milling Problem Solving 1
Credits: 0.05-1

In this course students will practice solving basic CNC milling problems. They will use multiple work offsets, loops, subprograms, and use variables in programs to shorten and simplify programs. CNC Open Lab Hours: Tues, Wed, Thurs, Fri 8:00 AM-2:00 PM.
Aid Code: 32 - undefined.
Co-requisites: (444-135 or 444-349)

Complete Course Listing

444-351 CNC Milling Problem Solving 2
Credits: 0.05-1

In this course students will practice solving complicated CNC milling problems utilizing tools and methods from previous courses. CNC Open Lab Hours: Tues, Wed, Thurs, Fri 8:00 AM-2:00 PM.
Aid Code: 32 - undefined.
Co-requisites: (444-136 or 444-350)

Complete Course Listing

444-352 CNC Turning Problem Solving 1
Credits: 0.05-1

In this course students will demonstrate solving basic CNC Lathe problems. Students will practice using loops, subprograms, and variables in programs to shorten and simplify programs. CNC Open Lab Hours: Tues, Wed, Thurs, Fri 8:00 AM-2:00 PM.
Aid Code: 32 - undefined.
Co-requisites: (444-137 or 444-351)

Complete Course Listing

444-353 CNC Turning Problem Solving 2
Credits: 0.05-1

In this course students will practice solving complicated CNC lathe problems utilizing tools and methods from previous courses. CNC Open Lab Hours: Tues, Wed, Thurs, Fri 8:00 AM-2:00 PM.
Aid Code: 32 - undefined.
Co-requisites: (444-138 or 444-352)

Complete Course Listing

444-354 Basic CAM - MasterCAM
Credits: 0.05-1

In this course students will demonstrate the use of CAM software for creating CNC machine programs. MasterCam will be used. CNC Open Lab Hours: Tues, Wed, Thurs, Fri 8:00 AM-2:00 PM.
Aid Code: 32 - undefined.
Co-requisites: (444-139 or 444-353 or 444-116 or 444-335)

Complete Course Listing

444-355 Intermediate CAM - MasterCAM
Credits: 0.5-1

In this course students will demonstrate the use of CAM software to create more complex programs for CNC machines. MasterCam will be used. CNC Open Lab Hours: Tues, Wed, Thurs, Fri 8:00 AM-2:00 PM.
Aid Code: 32 - undefined.
Co-requisites: (444-140 or 444-354)

Complete Course Listing

444-356 CNC Internship
Credits: 0.5-1

In this course students will demonstrate the use of all the tools they have learned in the program to complete an internship at a local business, or complete the internship at the college. CNC Open Lab Hours: Tues, Wed, Thurs, Fri 8:00 AM-2:00 PM.
Aid Code: 32 - undefined.
Co-requisites: (444-141 or 444-355)

Complete Course Listing

444-357 CNC Capstone
Credits: 0.05-1

In this course students will demonstrate the use of all the tools they have learned in the program to complete an all exclusive project. CNC Open Lab Hours: Tues, Wed, Thurs, Fri 8:00 AM-2:00 PM.
Aid Code: 32 - undefined.
Co-requisites: (444-142 or 444-356)

Complete Course Listing