

NUMERICAL CONTROL (NCT)

NCT 100 Foundation Concepts for Manufacturing (CNC) (3 Credits)

30 lecture, 45 lab, 3 total contact hours

In this course, students will explore a variety of different machining technologies including computer numerical control (CNC), traditional, and hybrid machine tools for the purpose of later integration. Students will be introduced to projects on CNC machining centers and computer-aided design/computer-aided modeling (CAD/CAM) systems, additive manufacturing as well as other technologies used to manufacture parts. This course will prepare students to succeed in NCT 101 and other courses in the Mechatronics program. Students should have a basic familiarity with computers for this course. Level I Prerequisite: Academic Reading and Writing Levels of 6; Academic Math Level 2

NCT 101 Introduction to Computerized Machining (CNC) - I (2 Credits)

30 lecture, 30 lab, 2 total contact hours

This is the first course of the numerical control series. Students explore various aspects of automated machining centers used in automated manufacturing. Studies include an introduction to controllers, fundamentals of setup and operation, programming computer numerical control (CNC) controllers, computer-aided design/computer-aided manufacturing (CAD/CAM) software, and simulation software. Level I Prerequisite: Academic Reading and Writing Levels of 6; NCT 100 minimum grade "C"

NCT 110 Introduction to Computerized Machining (CNC) - II (2 Credits)

30 lecture, 30 lab, 2 total contact hours

In this course, students focus on the set-up and operation of Computer Numerical Control (CNC) mills and lathes in the laboratory. Parts will be machined to specification, through variations of set-up and interactions with the machine tool controllers. Students will be able to operate the CNC mills and lathes in the lab after successful completion of this class. This class prepares students for the manual programming and advanced programming classes. Level I Prerequisite: Academic Reading and Writing Levels of 6; NCT 101 minimum grade "C", may enroll concurrently

NCT 120 Introduction to 2D CAD CAM Programming and Applications (2 Credits)

30 lecture, 30 lab, 2 total contact hours

In this course, students will learn CAD/CAM software to design parts for the various CNC manufacturing equipment. Points, lines, circles, view control, layers colors, break and trim functions will be used to create the geometry. Students will create both 2D and 3D geometry. The part geometry will be used to generate output files for various manufacturing equipment. Fundamental G and M codes will be reviewed to address machine specific requirements. This course contains material previously taught in NCT 249. Level I Prerequisite: Academic Reading and Writing Levels of 6

NCT 121 Manual Programming and NC Tool Operation (4 Credits)

30 lecture, 60 lab, 4 total contact hours

In this course, students will interpret working drawings of sample parts, write and edit programs, setup and operate CNC machine tools, and inspect the finished products in the process of manufacturing parts. Feeds and speeds, fixed cycles, program editing, set up procedures, and program preparation are major topics presented. This is the first in a two-course study of manual programming of CNC milling and turning centers. Students with experience equivalent to NCT 101 and NCT 110 may contact the instructor for permission to waive the prerequisites. Programming time outside of the classroom is required to be successful in this course. Level I Prerequisite: Academic Reading and Writing Levels of 6; Academic Math Level 4; NCT 101 and NCT 110, minimum grade "C"

NCT 123 2D CAD CAM CNC Programming for Mills and Lathes (2 Credits)

30 lecture, 30 lab, 2 total contact hours

In this course, students will use geometry creation skills to create tool paths for drilling operations, arc hole patterns, hole patterns, slotting, facing, contouring, and pocket milling. The computer-aided manufacturing (CAM) files will be posted to the vertical computer numerical control (CNC) machine tools to create milled parts. Lathe cycles such as facing, internal and external roughing, grooving, and threading will be used with the CAM software to produce parts on the CNC horizontal lathes. Level I Prerequisite: Academic Reading and Writing Levels of 6; NCT 101 and NCT 120, minimum grade "C"

NCT 174 NCT Co-op Education I (1-3 Credits)

120 to 360 clinical/other, 1 to 3 total contact hours

Students are placed in an approved industrial work experience to gain skills and knowledge offered by the employer. Together with the instructor and employer, students set up work assignments and learning objectives to connect classroom learning with career-related work experience. This is the first of two co-op courses. Level I Prerequisite: Academic Reading and Writing Levels of 6; NCT 221; consent required

NCT 201 Geometric Dimensioning and Tolerancing (GD&T) (2 Credits)

15 lecture, 30 lab, 2 total contact hours

This course will build on basic blueprint reading skills from MEC101. This course will prepare the student to understand and apply Geometric Dimensioning and Tolerancing (GD&T) according to national standards. Level I Prerequisite: Academic Reading and Writing Levels of 6; Academic Math Level 2; MEC 101 and NCT 120, minimum grade "C"

NCT 221 Advanced Manual Programming and NC Tool Operation (4 Credits)

30 lecture, 60 lab, 4 total contact hours

In this course, students will learn complex cutter path generation, cutter compensation, repetitive programming, multi-quadrant circular interpolation, three axis interpolation, threading macros, and other advanced programming techniques are practiced. Geometry creation using computer-aided design/computer-aided manufacturing (CAD/CAM) software will be presented and used in this class. The class format is similar to that of NCT 121. Students with experience equivalent to NCT 121 may contact the instructor for permission to waive the prerequisite. This is the second of a two-course study of manual programming and computer numerical control (CNC) Machine Tool Operation. Level I Prerequisite: Academic Reading and Writing Levels of 6; Academic Math Level 4; NCT 121 and NCT 123, minimum grade "C"

NCT 244 Advanced Manufacturing Capstone (CNC) (3 Credits)

15 lecture, 60 lab, 3 total contact hours

In this course, students will use skills learned in the advanced manufacturing program to design and build complex project(s) to solve a problem. To create these projects, students will use CNC and manual machinery, as well as create machine code programs (G-Code) manually and with CAD/CAM software. Students will create detailed drawings of their project with CAD software. Process plans, detailed set up sheets including required tooling and cutting conditions will be developed to meet industry standards. Level I Prerequisite: Academic Reading and Writing Levels of 6; Academic Math Level 4; NCT 121, NCT 123, and NCT 221, minimum grade "C+" in each course; NCT 221 may enroll concurrently

NCT 274 NCT Co-op Education II (1-3 Credits)

120 to 360 clinical/other, 1 to 3 total contact hours

Students are placed in an approved industrial work experience to gain skills and knowledge offered by the employer. Together with the instructor and employer, students set up work assignments and learning objectives to connect classroom learning with career-related work experience. This is the second of two possible co-op courses. Level I Prerequisite: Academic Reading and Writing Levels of 6; NCT 174; consent required