COURSES OFFERED AT THE REGIONAL MANUFACTURING TECHNOLOGY CENTER

KELLOGG COMMUNITY COLLEGE

MACHINING

COURSE AND CERTIFICATE OPTIONS

Machinist Certificate: 16 credits
CNC Machinist Certificate: 31 credits
Computer Integrated Machining AAS Degree: 60 credits (see college catalog for program map, graduation requirements, and prerequisite information)

All costs are subject to change without notice. Please call 269-965-4137 to verify.

MACHINIST CERTIFICATE REQUIRED COURSES

KCC Course	Course Description	Credit	Contact Hours
☐ **INMT 100**	**INTRODUCTION TO MACHINING TECHNOLOGY**	**1.00**	**24**
	An introduction to the various machines, processes, and careers that make production of precision machined components possible. Machine shop safety and hazard awareness are stressed. Locating technical information in the Machinery's Handbook and other references is included.		
☐ **INMT 101**	**APPLIED TECHNICAL MATHEMATICS**	**3.00**	**72**
	Acquaints students with the mathematical terms, concepts, and formulae essential to the machining trades. Emphasis is placed on applying mathematical principles to machining related problems and developing problem solving skills.		
☐ **INMT 102**	**INTRODUCTION TO TECHNICAL DRAWINGS**	**2.00**	**48**
	An introduction to multiview technical drawings and precision part definition. Drawing views, dimensioning styles, and tolerancing methods are explored as a means of communicating part geometry and machining requirements.		
☐ **INMT 103**	**MATERIALS AND PROCESS PLANNING**	**1.00**	**24**
	An introduction to the materials and planning required to machine precision products. Topics include the properties and structures of metals and other materials, metal classification systems, hardness testing, cutting tool materials, machining principles, and process data. Part geometry, tolerances, machinery, rough stock, workholding, and tooling are considered as primary inputs into the development of machining process plans.		
☐ **INMT 104**	**PRECISION MEASUREMENT 1**	**1.00**	**24**
	An introduction to precision dimensional measurement. A variety of measuring instruments are introduced and used to measure typical part features. Comparison of measured values to design specifications is stressed.		
☐ **INMT 105**	**PRECISION MEASUREMENT 2**	**2.00**	**48**
	A continuation of dimensional measurement. Precision instruments and tools are used to analyze part features and surfaces in a lab environment. Measurement and analysis of geometric characteristics are introduced.		
☐ **INMT 120**	**LATHE 1**	**2.00**	**48**
	The first in a series of modules that introduces the manual lathe and its capabilities. Topics include safety, machine maintenance, cutting tools, and basic lathe processes on chucked parts. Adherence to design tolerances is stressed.		
☐ **INMT 130**	**MILL 1**	**2.00**	**48**
	A beginning course in the use of manual milling machines. Topics include milling machine safety, maintenance, cutting tools, workholding, and basic milling processes. Accurate measurement of milled part features and conformance to design tolerances is emphasized.		

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KCC Course	Course Description	Credit	Contact Hours
☐ **INMT 140**	**SURFACE GRINDING 1**	**2.00**	**48**
	An introduction to precision grinding with surface grinders. Topics include grinding wheel selection, grinding safety, maintenance, fixturing, and basic grinding operations. Parts with ground faces, steps, shoulders, and slots are produced.		
	TOTAL FOR MACHINIST CERTIFICATE REQUIRED COURSES	***16***	***384***

CNC MACHINIST CERTIFICATE REQUIRED COURSES

☐ **ALL REQUIRED COURSES FROM THE MACHINIST CERTIFICATE: INMT 100, INMT 101, INMT 102, INMT 103, INMT 104, INMT 105, INMT 120, INMT 130, AND INMT 140.**

KCC Course	Course Description	Credit	Contact Hours
☐ **INMT 150**	**CNC MILL SETUP AND OPERATION**	**1.00**	**24**
	A beginning course in the use of computer controlled milling machines. Foundational CNC milling concepts are explored with emphasis on safety, setup, and operation of two and three-axis mills. Conversational and G-code programming styles are introduced.		
☐ **INMT 151**	**CNC MILL PROGRAMMING 1**	**2.00**	**48**
	The first in a series of courses that develop programming skills for CNC milling machines. Programs for basic parts are created using conversational, G-code, and CAM programming styles. Safe verification of part programs and precision of milled features are stressed.		
☐ **INMT 160**	**CNC LATHE SETUP AND OPERATION**	**1.00**	**24**
	A beginning course in the use of computer controlled lathes to make precision parts. Topics include safety, tooling, maintenance, setup, and operation of toolroom and turret lathes. Conversational and G-code programming styles are introduced.		
☐ **INMT 161**	**CNC LATHE PROGRAMMING 1**	**2.00**	**48**
	The first in a series of courses that develop programming skills for CNC lathes. Programs for basic parts are created using conversational, G-code, and CAM programming styles. Safe verification of part programs and precision of turned features are stressed.		
☐ **INMT 175**	**WIRE EDM SETUP AND OPERATION**	**1.00**	**24**
	An introduction to electrical discharge machining and the use of wire EDM machines. Fundamental EDM concepts are considered with emphasis on the safe setup and operation of wire machines. Efficient production of quality parts is stressed.		
☐ **INMT 200**	**COORDINATE MEASURING MACHINE (CMM)**	**2.00**	**48**
	An introduction to the use of coordinate measuring machines to inspect parts of moderate complexity. Coordinate systems, dimensioning, tolerancing, measurement planning, setup, data collection, and data analysis are emphasized.		

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KCC Course	Course Description	Credit	Contact Hours
☐ **INMT 250 CNC MILL PROGRAMMING 2**		**2.00**	**48**
	A continuation of CNC programming for 2.5-axis milling operations. Methods of producing intermediate parts and features are explored with conversational, G-code, and CAM programming. Emphasis is placed on utilizing software features to improve programming efficiency.		
☐ **INMT 260 CNC LATHE PROGRAMMING 2**		**2.00**	**48**
	A continuation of CNC programming for 2-axis turning operations. Methods of producing intermediate parts and features are explored with conversational, G-code, and CAM programming. Emphasis is placed on utilizing software features to improve programming efficiency.		
☐ **INMT 275 WIRE EDM PROGRAMMING**		**2.00**	**48**
	Develops programming skills for CNC wire machines. CAM software and on-board programming are explored as methods of creating code for two-axis wire operations. Machining strategies, tooling, and power settings are examined in depth.		
	TOTAL FOR CNC COURSES	***15***	***360***
	TOTAL FOR CNC MACHINIST CERTIFICATE REQUIRED COURSES	***31***	***744***

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KCC Course	Course Description	Credit	Contact Hours

OTHER INMT COURSES OFFERED:

☐ **ALL REQUIRED MACHINIST CERTIFICATE COURSES**

or

☐ **ALL REQUIRED CNC MACHIINST CERTIFICATE COURSES**

☐ **INMT 110 BENCH AND TOOL GRINDERS** — **1.00** — **24**

An introduction to abrasives and abrasive processes. Bench and tool grinders are used to sharpen drills, punches, and other tooling. Topics include drill terminology, grinding safety, abrasive types, grinding equipment, and tool sharpening.

☐ **INMT 111 LAYOUT AND HAND TOOLS** — **1.00** — **24**

Provides experience with layout and hand tools. Rough stock is fashioned into finished parts through precision layout and benchwork operations, including filing, drilling, reaming, tapping, and broaching. Hand tools, threads, and fasteners are examined in detail.

☐ **INMT 112 BAND SAWS** — **1.00** — **24**

An introduction to band saws and sawing. Coursework includes horizontal and vertical band saw safety, saw blade selection, sawing speeds, blade welding, stock preparation, and creating parts with band saws and hand tools.

☐ **INMT 113 DRILL PRESS** — **2.00** — **48**

An introduction to drill presses and precision holemaking. Topics include safety for drill presses, holemaking tools, speeds and feeds, position tolerances, hole inspection, fit, and light assembly. Multiple details are produced and assembled into a functional product.

☐ **INMT 121 LATHE 2** — **2.00** — **48**

A continuation of lathe operations. Coursework emphasizes reduced tolerances and introduces boring, ID grooving, external and internal threading, and knurling. Parts are machined both chucked and between centers.

☐ **INMT 131 MILL 2** — **2.00** — **48**

A continuation of milling operations. Machining of bosses, pockets, and slots are introduced while emphasizing reduced tolerances and fit. Keyed joints are explored in detail. Specialized tooling is introduced when applicable.

☐ **INMT 170 SINKER EDM SETUP AND OPERATION** — **1.00** — **24**

An introduction to electrical discharge machining and the use of sinker EDM machines. Fundamental EDM concepts are considered with emphasis on the safe setup and operation of sinker machines. Efficient production of quality parts is stressed.

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☐ **INMT 180**	**METALLURGY FUNDAMENTALS**	**2.00**	**48**
	An introduction to the field of metallurgy. The processing, properties, and structures of metals are investigated with concentration on the heat treatment processes of steel. Lab work includes hardening various steel samples.		
☐ **INMT 220**	**LATHE 3**	**3.00**	**72**
	A continuation of turning operations that introduces methods for producing internal and external tapers, radii, and face grooves. Geometric tolerances are emphasized on challenging parts that are produced both chucked and between centers.		
☐ **INMT 230**	**MILL 3**	**2.00**	**48**
	A third course exploring the capabilities of manual milling machines. Methods of producing bored holes, dovetails, angled surfaces, and radii are introduced. Geometric dimensioning is emphasized. Specialized tooling is introduced when applicable.		
☐ **INMT 231**	**MILL 4**	**2.00**	**48**
	Explores the use of attachments to expand the capabilities of a manual milling machine. Topics include setup and use of the dividing head, rotary table, and horizontal milling attachment to mill atypical part features such as gear teeth, blind circular pockets, and radial slots.		
☐ **INMT 240**	**SURFACE GRINDING 2**	**2.00**	**48**
	A continuation of surface grinding operations. Methods of producing ground angles and radii are explored. Grind tolerances and geometric dimensioning are emphasized. Specialized tooling is introduced when applicable.		
☐ **INMT 251**	**CNC MILL PROGRAMMING 3**	**3.00**	**72**
	Explores the use of CAM software to machine complex surfaces. A variety of three-dimensional surfacing toolpaths are examined and used to produce bosses, cavities, and other complex surfaces common to electrodes, molds, and dies.		
☐ **INMT 270**	**SINKER EDM ELECTRODE DESIGN**	**2.00**	**48**
	Provides instruction in the design and processing of EDM electrodes. Topics include material selection, design, machining of electrodes, and production of parts. Emphasis is placed on the use of simple electrodes to produce complex part features.		
☐ **INMT 280**	**HEAT TREATMENT AND FINISHING OF STEELS**	**2.00**	**48**
	Explores the processing of hardened steel parts from raw stock through finish machining. Various steels are machined, heat treated, and finished by several methods, including hard milling, hard turning, and grinding.		

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☐ **INMT 290 FIXTURE PROJECT**		**4.00**	**96**
	A capstone project in fixture design and making. Students are provided an opportunity to showcase the skills and knowledge they've accumulated throughout the program by researching, designing, and building a fixture. A presentation of the design process and finished product completes the experience.		
☐ **INMT 291 DIE PROJECT**		**4.00**	**96**
	A capstone project in die design and making. Students are provided an opportunity to showcase the skills and knowledge they've accumulated throughout the program by researching, designing, and building a die. A presentation of the design process and finished product completes the experience.		
☐ **INMT 292 MOLD PROJECT**		**4.00**	**96**
	A capstone project in mold design and making. Students are provided an opportunity to showcase the skills and knowledge they've accumulated throughout the program by researching, designing, and building a mold. A presentation of the design process and finished product completes the experience.		